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FINAL

REMOVAL SITE EVALUATION REPORT NORTHEAST CHURCH ROCK MINE SITE

October 1, 2007

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ACRONYMS

ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
Bi-214	bismuth-214
BIA	Bureau of Indian Affairs
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	constituents of concern
C-O-C	chain-of-custody
COPC	constituent of potential concern
CSF	cancer slope factor
CSM	conceptual site model
cpm	counts per minute
CWA	Clean Water Act
DCGL	Derived Concentration Guideline Level
DGPS	differential global positional system
DQA	Data Quality Assurance
DQO	Data Quality Objective
EDD	electronic data deliverable
EPA	Environmental Protection Agency
EPC	exposure-point concentration
FSL	field screening level
HAS	historical site assessment
HHRA	human health risk assessment
HI	hazard index or hazard indices
HQ	hazard quotient
ILCR	incremental lifetime cancer risk
IDW	investigation derived waste
LOAEL	lowest observed adverse effect level
MARSSIM	Multi-Radiation Survey and Site Investigation Manual
MDC	minimum detectable concentration
MDL	method detection limit
Mf	modifying factor
MMD	New Mexico Mining and Mineral Division
NaI	sodium iodide
NCP	National Contingency Plan
NECR	Northeast Church Rock
NEMSA	non-economic material storage area
NFA	no further action
NMEID	New Mexico Environmental Improvement Division
NMED	New Mexico Environment Division
NMMA	New Mexico Mining Act
NNEPA	Navajo Nation Environmental Protection Agency
NOAEL	no observable adverse effect level
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
ORNL	Oak Ridge National Laboratory
pCi/g	picoCurie per gram
PPE	personal protective equipment
PRG	preliminary remediation goal
QA/QC	quality assurance/quality control
Ra-226	radium-226

RAIS	Risk Assessment Information System
RfD	Reference Dose
RPM	Remedial Project Manager
RSE	removal site evaluation
SARA	Superfund Amendments and Reauthorization Act
SPLP	synthetic precipitation leaching procedure
SSL	soil screening level
SVOC	semi-volatile organic compound
TCLP	toxicity characteristic leaching procedure
UCL	upper confidence limit
UFn	uncertainty factor
UMTRCA	Uranium Mill Tailings Radiation Control Act
UNC	United Nuclear Corporation
USCS	Unified Soils Classification System
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VOC	volatile organic compound
VSP	Visual Sampling Plan

EXECUTIVE SUMMARY

A Removal Site Evaluation (RSE) was conducted at the Northeast Church Rock (NECR) Mine (the Site), and nearby areas between August 14, 2006 and December 5, 2006. The RSE consisted of investigating surface and subsurface soils and sediments at various areas within and near the Site. The Site is located approximately 16 miles northeast of Gallup, McKinley County, New Mexico. The RSE was conducted in accordance with the *Removal Site Evaluation Work Plan* (MWH, 2006a) (RSEWP).

The primary ore mineral that was mined at the Site was coffonite (U(SiO4)1-x(OH)4x), which was placed in small temporary stockpiles at NECR-1 and NECR-2 before transport to the Church Rock mill site. Ore and low-grade ore stockpiles were temporarily stored on the NECR-1 and NECR-2 pads prior to being transported off-site to the Church Rock mill. Following New Mexico's approval of a license amendment to permit placement of tailings in mine stopes for structural reinforcement in 1978, tailings material from ore processing at the mill was temporarily stored in three areas referred to as Sand Backfill Areas No. 1, No. 2 and No. 3 (see Figure 1-2) prior to placement in the mine stopes. The bulk of the tailings material from the sand backfill areas was placed in the mine stopes; the remaining tailings were removed and disposed of off-site during the 1986 NRC reclamation.

Stormwater and mine dewatering discharge were routed to three sediment ponds for treatment. Treated water was discharged to the Unnamed Arroyo pursuant to an NPDES permit. Sediment in these ponds was periodically removed and temporarily placed on the Sediment Pad prior to off-site transport to the mill site. Non-economic material (overburden and low-grade ore) was also placed in the Non Economic Material Storage Area(NEMSA). Refuse and other discarded equipment was placed in the Boneyard. Both the NEMSA and Boneyard were reclaimed in 1994 (UNC, 1994), which included placement of one foot of topsoil over the non-native materials and then seeding.

The Site was initially divided into eleven individual survey areas for the RSE, which included NECR-1, NECR-2, Ponds 1 and 2, Pond 3/3a, Sandfill 1, Sandfill 2, Sandfill 3, Sediment Pad, Boneyard, NEMSA, and the Unnamed Arroyo. Two additional areas were added during the field investigation based on preliminary radiological scans. These areas are Vent Hole 3/8 and the Trailer Park. Additionally, nine Home Sites located northeast of the Site were also investigated as part of the RSE and a soil removal action was subsequently carried out at five of these home sites (comprising three residences) based on the results of the RSE. These home sites are located between NECR and the Quivera mine and are situated on the Quivera mine lease. Potential impacts to the Home Sites may have occurred due to wind or water transport of materials stemming from historical operations at NECR, historical operations at the Quivera mine, or background conditions.

Several methods were employed in conducting this field investigation. Initially, static gamma measurements were conducted on random triangular grids. Equivalent Ra-226 concentrations were derived from the gamma survey results by developing correlations using regression analysis between the gamma survey results and co-located surface soil samples analyzed for Ra-226. Due to the presence of radiation containing materials on side-slopes or in a pile that can cause radiation shine (potentially causing an overestimation of Ra-226 soil concentrations), a lead collimator was used on the field detector to minimize interference.

Surface soil samples for laboratory analysis were collected at a minimum of 13 of the gamma measurement locations in each survey area. Subsurface samples were collected using a hollow-stem auger drill rig, test pits excavated with a backhoe, and a hand-auger.

Based on the constituents typically associated with uranium roll-front deposits, the following preliminary constituents of potential concern (COPCs) were evaluated:

- Ra-226
- Arsenic
- Molybdenum
- Selenium
- Uranium
- Vanadium

The metals not including Ra-226 were analyzed for screening purposes only and not for delineating the vertical and lateral extent of metals in soil. Progeny of Ra-226 were not analyzed during the investigation but were accounted for during the Site risk evaluation.

At the Boneyard, the full suite of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) as well as analysis of the eight Resource Conservation and Recovery Act (RCRA) metals by Toxicity Characteristics Leaching Procedure (TCLP) were also analyzed. Samples from each survey area were also collected for analysis of leachate using the Synthetic Precipitation Leaching Procedure (SPLP) procedure and analyzing the leachate for the COPCs.

A Field Screening Level for Ra-226 was developed for the RSE. The FSL for Ra-226 was based on an acceptable risk range of 10^{-4} for residential scenarios, which results in a FSL of 2.24 pCi/g (1.24 pCi/g plus the mean of the Ra-226 background concentration 1.0 pCi/g].

The results of the gamma radiation surveys indicated that surface soils within the initial boundaries of each of the on-site areas contain surface soils with Ra-226 concentrations above the 2.24 pCi/g FSL over the majority of the areas surveyed. Only small fractions of the survey points within the initial boundaries areas were below the FSL. The locations of exceedances of Ra-226 from the gamma survey were frequent and closely spaced such that delineation of any smaller, clean areas within the interior of the areas is not practical, except possibly in Sandfill 1, where about 11 contiguous survey grid points were below the FSL.

The results of the static gamma radiation survey show that the average surface soil Ra-226 concentrations, as determined by correlation with the gamma survey results (CPM), range from approximately four to twenty times the 2.24 pCi/g FSL within each survey area. The surface soil Ra-226 concentration range is wide, with high standard deviations near or above the average concentrations indicating sporadic occurrences of elevated Ra-226 surface soil.

Based on the results, an outer boundary delineating the extent of exceedances of the FSL (i.e., locations below the Ra-226 FSL) based on the static gamma radiation survey for each area was interpreted and termed the FSL boundary. The FSL boundary was drawn outside of most exceedances of the FSL.

Initially, while in the field, the locations of the FSL boundaries were estimated based on the following:

- Undisturbed ground, such as in wooded areas with native soils.
- Roads, structures, and fences.
- Topographic limitations such as precipices, and steep hillsides.
- Boundaries of adjoining survey areas.
- Knowledge of historical operations.

The FSL boundaries were definitely determined based on the results of the gamma radiation surveys and analytical results from the soil sampling. The above listed features merely helped to guide the field investigation and to confirm the boundaries based on the survey and analytical results.

Surface soil samples were collected at 20% of the 80-foot triangular grid nodes (sample locations), or at least 13 locations within each survey area, as well as the five scan locations with the highest CPM readings at each of the nine Home Sites. Additionally, judgmental samples were collected in Vent Hole 3/8 and the Trailer Park, based on any gamma hotpots observed during the gamma survey scans conducted at those two areas. The results show that although there may be some variation between Ra-226 surface soil concentrations by soil sampling versus static gamma radiation survey at some locations, the averages are comparable. Ra-226 and uranium exceed the screening levels at some locations, while all results for molybedenum, selenium and vanadium were below their respective screening levels. Ra-226, uranium and arsenic concentrations in surface soil were as follows:

- Ra-226 values ranged from 0.8 to 875 pCi/g with 70% of the 268 surface soil samples analyzed for Ra-226 [includes stepouts] exceeding the FSL of 2.24 pCi/g.

- Uranium values ranged from 0.7 to 3,970 mg/kg with 9% of the 230 samples analyzed for uranium exceeding the screening level of 200 mg/kg.

- Arsenic values ranged from non-detect to 14.9 mg/kg with 60% of the 230 samples analyzed for arsenic exceeding the screening level of 3.7 mg/kg. The data do not show any correlation between arsenic and Ra-226 or uranium concentrations, and there does not appear to be any spatial pattern in concentrations within the survey areas.

Subsurface soil samples (>0.5 feet bgs) were collected from each of the (original) eleven on-site survey areas, which includes the Unnamed Arroyo. Samples were collected in test pits, soil borings, and hand auger holes and analyzed for the preliminary COPCs. The results show that Ra-226, uranium and arsenic exceed the screening levels at some locations, while all results for molybedenum, selenium and vanadium were below their respective screening levels. Ra-226, uranium and arsenic concentrations in surface soil were as follows:

- Ra-226 values ranged from 0.6 to 438 pCi/g; 66% of the 145 subsurface soil samples analyzed for Ra-226 exceeded the FSL of 2.24 mg/kg.

- Total uranium values ranged from 0.7 to 760 mg/kg; 12% of the 145 samples analyzed for uranium exceeded the screening level of 200 mg/kg.

- Arsenic values ranged from non-detect (<0.5) to 13.9 mg/kg; 52% of the 145 samples analyzed for arsenic exceeded the screening level of 3.7 mg/kg. The relative concentrations of asrsenic do not correlate with the concentrations of Ra-226 (e.g., high arsenic concentrations were not necessarily co-located with high Ra-226 concentrations).

Exeedances of the screening levels in subsurface soils was confined to the top 5 to 14 feet at all sample locations, except at NECR-1. At NECR-1, exceedances of the field screening levels were detected in one soil boring (SB-090) in all samples collected from 5 to 25 feet bgs.

The Ra-226 levels measured during the step-out static gamma radiation survey for the NECR-1 were above the FSL at the outermost locations in three primary areas: to the east within the parking area and across Red Water Pond Road, to the north towards and around the Home Sites, and in the IX Plant area. The area around the IX Plant consists of a near-vertical cliff that represents a natural, physiographic boundary, and does not warrant additional investigation. The areas to the north and east represent potential data gaps in the FSL boundary, however results to the north are increasingly likely to represent disturbances or impacts associated with historical mining or exploration activities on the Quivera Mining Company lease, and results to the east appear to be related to the construction or historical use of the former Quivera mine haul road.

A human health risk assessment (HHRA) was conducted for the Site based on the laboratory analysis results for surface soils (<0.5 feet bgs), and subsurface soils to a depth of 10 feet bgs. The HHRA for Home Sites 4, 6, 7, 8, and 9 where EPA conducted removal actions is based on the post-removal confirmation sampling at these Home Sites. The HHRA is a quantitative and qualitative evaluation of potential impacts of Site-derived contaminants on human health, in the absence of remediation or institutional controls. Results of the HHRA, along with other factors are used to determine whether residual levels of contaminants in Site media are protective of human health and may be left in place, or consideration of remedial alternatives are warranted. The HHRA results also provide the basis for the development of alternatives and risk-based cleanup goals for the Site, as appropriate.

The HHRA described herein was conducted in accordance with methods described in Section 6.0 of the approved *Removal Site Evaluation Work Plan* (MWH, 2006). In addition, at the request of EPA and the Navajo Nation, a HHRA was conducted for a hypothetical future on-site resident. This HHRA is comprised of a site-specific conceptual site model (CSM), screening-level HHRA, and baseline HHRA. Risk characterization results expressed as cancer ILCR and non-cancer HI estimates for on-site receptors (current/future maintenance personnel, hypothetical future livestock grazers and hypothetical future on-site residents) and for off-site receptors (current/future residents and hypothetical future livestock grazers) exposed to soils and sediments at the NECR Site are described below.

For each off-site and on-site area, two scenarios were evaluated: Scenario 1 summarizes risks to receptors when only direct soil exposure pathways are considered (i.e., incidental ingestion and inhalation of fugitive dust), while Scenario 2 includes six exposure pathways included in the USEPA risk models for non-radiological and radiological constituents (i.e., incidental soil ingestion, inhalation of fugitive dust, consumption of home-grown produce, consumption of locally grown meat, consumption of locally raised eggs, and external radiation) (USEPA, 2007). However, for a future site maintenance worker, Scenario 2 does not include consumption of home-grown plants or consumption of locally raised meat and eggs. Additionally, for the on-site livestock grazer, Scenario 2 does not include consumption of locally raised eggs or homegrown plants.

Additionally, the total combined risk for each area was calculated across all exposure pathways. Because the risk calculation methodology generated results that exceeded EPA's risk range even at background levels, incremental risk was also calculated, which is the result of the background risk subtracted from the total combined risk. The incremental risk is the risk attributable to each survey area above the background risk.

Located within the main NECR Site, there are 12 areas of concern which include: NECR-1, NECR-2 Ponds 1 & 2, Pond 3/3a, Sediment Pad, Sandfill 1, Sandfill 2, Sandfill 3, NEMSA, Boneyard, Vents 3 & 8, and the Trailer Park. Each on-site location was evaluated for both current/future maintenance personnel and the hypothetical future livestock grazer and hypothetical future on-site residents. The results of the assessment indicated the following:

- For current/future maintenance personnel, under Scenario 1, no surface or subsurface soils in the on-site areas have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1.

- For current/future maintenance personnel under Scenario 2, surface soils in eight of the areas, and subsurface soils in five of the areas have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. A surface soil Ra-226 concentration of 50 pCi/g would result in an estimated incremental risk or HQ within the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ < 1.

- For the hypothetical future on-site livestock grazer, under Scenario 1, no surface or subsurface soils in the on-site areas have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1.

- For the hypothetical future on-site livestock grazer, under Scenario 2, surface soils in all on-site areas, and subsurface soils in all but one of the areas have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. A surface soil Ra-226 concentration of 2.5 pCi/g would result in an estimated incremental risk or HQ within the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ < 1.

- For the hypothetical future on-site resident under Scenario 1, surface soils in all but three of the areas have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. Risk drivers under Scenario 1 were Ra-226 and uranium. A surface soil Ra-226 concentration of 110 pCi/g would result in an estimated incremental risk or HQ within the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ < 1. A surface soil uranium concentration of 48 mg/kg would result in an estimated incremental risk or HQ within the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ < 1.

- For the hypothetical future on-site resident under Scenario 2, surface soils in all of the areas have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. A surface soil Ra-226 concentration of 1.9 pCi/g would result in an estimated incremental risk or HQ within the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ <1. A surface soil uranium concentration of 48 mg/kg would result in an estimated incremental risk or HQ within the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ < 1.

For a resident under scenario 2, in order to achieve the EPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ <1, concentrations of Ra-226 in surface soil concentrations cannot exceed 1.9 pCi/g, which is below the naturally occurring average levels of Ra-226 levels on the Colorado Plateau.

Off-site areas include the nine Home Sites evaluated for residential receptors, the Unnamed Arroyo evaluated for the hypothetical future livestock grazer, and background data collected for the purpose of comparison to combined risk and hazard estimates for each area.

The results of the risk assessment, for residents of the Home Sites indicate the following:

- Scenario 1 - none of the Home Sites have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. Home Site #5 was associated with the highest ILCR (2E-05) estimated for any of the Home Sites under Scenario 1. However, the ILCR due to background soils under Scenario 1 was estimated as 1E-05.

- Scenario 2 – none of the Home Sites on the western side of the Unnamed Arroyo (Home Sites #1 through #5 have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1.

- Scenario 2 - none of the Home Sites on the eastern side of the Unnamed Arroyo (Home Sites #6, #7, #8 and #9) have incremental ILCR or HQ estimates above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1, based on EPA's post-removal confirmation sampling results. The total ILCR for all Home Sites on the eastern side of the Unnamed Arroyo were equal to 1E-04. For comparison, the total ILCR estimate for background soil was equal to 2E-04. Both the site-related and background risk estimates presented in this baseline ILCR are likely over-estimated as described in the Uncertainty Analysis (Section 4.4).

Incremental risk estimates greater than 1E-04 are attributable to the consumption of homegrown produce, the consumption of homegrown meat, and the external exposure pathways considered in Scenario 2. Actual exposures will be lower than those assumed if vegetable gardens are not used, livestock are not grazed in the area, and/or if a concrete slab is part of the foundation at these Home Sites. In addition, it may not be appropriate to consider the latter indirect exposure pathways given that the risk-based Soil Screening Levels (SSLs) for Ra-226 for external exposure, consumption of homegrown produce, and consumption of homegrown meat based on a risk level of 10-6 are 0.01 pCi/g, 0.069 pCi/g and 0.024 pCi/g, respectively, and are below the site-specific background level of 1.0 pCi/g. It should also be noted that the exposure and risk estimates described in this HHRA are biased high due to the soil sampling design. Field screening was used to identify biased locations for the collection of soil samples. In turn, the 95% UCL on the mean concentration of these biased soil samples was used to estimate exposure doses and risk estimates. In most cases, the concentrations observed at biased sample locations are representative of only a very minor portion of the entire home site.

However, as documented in USEPA's Home Site Investigation Trip Report September 11, 2007, (E&E, 2007), EPA has carried out a soil removal action at three properties referred to in the RSEWP as Home Sites 4, 6, 7, 8, and 9. As stated in the Request for Time-Critical Removal Action at the Northeast Church Residential Site Memorandum dated April 18, 2007, the goal of EPA's removal action was to "reduc[e] the UCL 95% radium concentration in the excavation footprint to a concentration that is less than the Site screening level."

The field screening level (FSL) is 2.24 pCi/g, which is based on the sum of the Site-specific background mean (1.0 pCi/g) and a risk-based value representing the upper end of the risk range (i.e., the 1 in 10,000 excess cancer risk for radium in residential exposure scenarios) or 1.24 pCi/g. It should also be noted that the exposure and risk estimates described in this HHRA are biased high for the Home Sites due to the soil sampling design. Field screening was used to identify biased locations for the collection of soil samples. In turn, the 95% UCL on the mean concentration of these biased soil samples was used to estimate exposure doses and risk estimates. In most cases, the concentrations observed at biased sample locations are representative of only a very minor portion of the entire home site.

For the hypothetical future livestock grazer within the Unnamed Arroyo evaluated under Scenarios 1 and 2, neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1.

For the background data, only surface soil samples were collected. For Scenario 1, no soil concentrations of any COPC have a cumulative risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For Scenario 2, arsenic and Ra-226 contribute to incremental risk estimates above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 and/or HQ > 1 due to ingestion of soil, the consumption of homegrown produce and meat, and exposure to external radiation.

Different sources of uncertainty described in the report are incorporated into the risk estimate. Because the majority of these uncertainties err on the conservative side, the estimated risks presented in the HHRA for NECR most likely represent upper bound estimates; the actual risks are anticipated to be less. The protective nature of these assumptions is demonstrated by risk estimates associated with background concentrations of Ra-226 and non-radiological constituents in soil. The total ILCR for Ra-226 across all exposure pathways (i.e., Scenario 2) was estimated as 1E-04, and the total ILCR for measured concentrations of all constituents in background soil (assuming scenario 2) was estimated as 2E-04. Therefore, it is appropriate to consider both Scenario 1 and 2 in making risk management decisions.

1.0 INTRODUCTION

This Removal Site Evaluation Report describes the objectives, scope of work, and results of the Removal Site Evaluation (RSE) conducted at the Northeast Church Rock (NECR) Mine (the Site), and nearby areas between August 14, 2006 and December 5, 2006. The RSE consisted of investigating surface and subsurface soils and sediments at various areas within and near the Site. The Site is located approximately 16 miles northeast of Gallup, McKinley County, New Mexico, as shown on Figure 1-1, *Site Location*. The RSE was conducted in accordance with the *Removal Site Evaluation Work Plan* (MWH, 2006a) (RSEWP) and the modifications described herein.

This section summarizes the objectives, site history, land use and the regulatory history of the Site. References in this report to site history, past operations, and the title status are asserted by UNC to be correct, and are subject to verification by EPA and the Navajo Nation.

1.1 PROBLEM STATEMENT AND OBJECTIVES

The NECR Mine is an inactive uranium mine site. The bulk of the mining lease is located on Navajo surface trust lands that are administered by the Navajo Regional Office Bureau of Indian Affairs. UNC owns the remaining portion of the Site through a patented mining claim. The Mine is subject to the New Mexico Mining Act (NMMA), as well as other statutory and regulatory requirements detailed below. UNC had submitted a closeout plan to the New Mexico Mining and Mineral Division (MMD) on January 30, 2004, received comments from MMD on June 23, 2004, incorporated those comments and responded on July 30, 2004. On November 10, 2004 the MMD supplemented their closeout plan comments with a request for UNC to submit a Materials Characterization Work Plan. UNC submitted the plan in December 2004. On February 15, 2005, MMD conditionally-approved the plan along with some comments, which UNC responded to on March 11, 2005.

On March 22, 2005, the Navajo Nation Environmental Protection Agency (NNEPA) requested that EPA Region 9 assume primary oversight of the NECR Mine in coordination with the NNEPA, the State of New Mexico and the Bureau of Indian Affairs. On November 7, 2005, EPA Region 9 agreed to act as the lead regulatory agency for the Site. On December 16, 2005, MMD informed UNC that it would defer further permitting action at the mine pending successful completion of the EPA process.

EPA requested that UNC, the former operator of the mine, undertake an environmental evaluation of the Site for purposes of determining whether a CERCLA removal action is warranted. Based on prior radiological surveys conducted by the EPA Las Vegas Radiation Laboratory in coordination with NNEPA, EPA noted the potential that several residences located north of the Site may be impacted by hazardous substances that were transported there by wind or stormwater runoff, and requested that the removal evaluation encompass these areas. UNC representatives met with federal, state and tribal agencies on February 28, 2006, March 27-28, 2006, and May 23, 2006.

The final RSEWP was approved by the EPA on August 14, 2006. Collection of background and gamma level to soil concentration correlation samples (see Section 2.2.3) was conducted on August 17 and 18, 2006 and submitted to Energy Laboratories, Inc. (ELI) of Casper, Wyoming for chemical analysis. These data were reported in the *Results of the Background and Radium Correlation Sampling Technical Memorandum* (MWH, 2006b) and are presented here as well. The remaining field activities were conducted between November 6 and December 5, 2006.

The main objective of the investigation was to conduct an RSE that was consistent with the National Contingency Plan (NCP), Title 40, Code of Federal Regulation 300.410 – 415. The NCP lists several factors to be considered in determining the appropriateness of a removal action in 300.415 (b)(2), as discussed in the RSEWP.

In order to comply with the NCP (see the RSEWP, MWH, 2006a), the following RSE objectives were fulfilled:

- Conducted an RSE in conformance with the NCP;
- Characterized the nature and extent of releases of radionuclides in soil and sediment;
- Characterized the nature and concentrations of releases of metals in soil and sediment;
- Collected data to determine the appropriate response;
- Identified exposure pathways in accordance with the RSEWP;
- Evaluated baseline human health risks;
- Preliminarily defined survey areas and boundaries;
- Defined potential range of removal actions that are consistent with current and reasonably anticipated future land uses; and
- Evaluated soil for the reestablishment of a self sustaining ecosystem.

1.2 SITE HISTORY AND LAND USE

1.2.1 Ownership and Surrounding Land Use

Figure 1-2, *Local Land Use*, illustrates the property interests that encompass the Site and the surrounding lands that are of potential interest to the RSE. Surface ownership for Section 35 of T17N, R16W and Section 3 of T16N, R16W, which includes the majority of the NECR mine permit area, is held in trust by the Bureau of Indian Affairs for the Navajo Nation. The mineral rights are owned by Newmont USA, Ltd, successor to Santa Fe Pacific Gold Corporation. A small portion of the permit area is located on lands owned by UNC in the eastern part of Section 34, T17N, R16W. The remainder of Section 34 to the west of the NECR mine permit area is controlled by the Bureau of Land Management and is used for grazing, and potentially for mining. The NECR mine permit area encompasses approximately 125 acres.

UNC owns Section 36, T17N, R16W to the east, and Section 2, T16N, R16W to the southeast of the Site. These parcels are part of the Church Rock mill and tailings storage facility that is maintained under a Source Material License in compliance with Nuclear Regulatory Commission (NRC) requirements. Upon termination of the license, and to comply with Title II of the Uranium Mill Tailings Radiation Control Act (UMTRCA), these lands will be deeded to the Department of Energy, and will be held in perpetuity in the Legacy Monitoring Program. The Church Rock tailings storage facility is an EPA Region 6 National Priority List Site that is operated and maintained primarily through a NRC Source Materials License.

All lands to the north of the Site are part of the Navajo Indian Reservation. From the late 1960's into the early 1990's, the part of the reservation immediately adjacent to the Site was mined by Kerr-McGee Corporation (Quivera Mining Company) through a lease with the Navajo Nation (these mines were referred to as Church Rock I, IA and II). Kerr McGee's subsurface mining operations extended to near the underground workings of the Northeast Church Rock Mine. Based upon aerial photographs, by 1997 the Quivera Mine had been closed. In 1990, the Department of Interior, Bureau of Land Management (BLM) issued Quivera Mining Company a conditional approval letter of their Abandonment and Reclamation Plan for the Quivera Mine (BLM, 1990). One of the conditions imposed by the BLM was that the Quivera Mine surface be cleaned up so that gamma radiation as measured one meter above the ground surface does not exceed 50 uR/hr above background at roadways, fence lines, vent holes protore storage areas, and mine ponds and 57 uR/hr at mine spoils areas above background (see Abandonment and Reclamation Plan, Quivera, 1987). Between 1997 and 2004, it appears that between six and nine home sites had been developed on the land located south of the Quivera Mine. The area is also used for grazing. Historical aerial photographs reveal some prior disturbances surrounding the home sites that appear to be related to the mining activity at the Quivera Mine. Because natural water supplies are high in dissolved minerals content, potable and livestock water is supplied to the reservation via Navajo utilities. Two wells in the area, NR-1 and Friendship Well, are located northwest of the home sites. Both wells appear to have been unused for several years and the NR-1 well is locked by UNC.

The mine site is currently inactive and is fully fenced to prevent access by unauthorized visitors as well as livestock. However, there is a current grazing permit for the site issued by the Department of Interior Bureau of Indian Affairs (see Appendix A), and the Site was used for grazing previously prior to construction of the new property fence. The surrounding area is largely undeveloped land and is used primarily for livestock grazing. Wildlife are also present in the area. Adjacent to the northern permit boundary (north side of NECR-1) is Navajo Reservation Land. Approximately 800 feet to the north of NECR-1 are the home sites mentioned above; the land around the home sites used in connection with residential occupancy.

1.2.2 NECR Mining Practices

The majority of the NECR mine property (i.e., that part which lies on lands held in trust by the Bureau of Indian Affairs for the Navajo Nation) was operated by UNC under the terms of a mineral lease with the predecessors of what is now Newmont USA, Ltd. Active mine operations at the Site took place between 1968 and 1982 at which time the mine was placed on stand-by status. Mining was conducted by underground methods. The infrastructure included two main shafts (NECR-1 and NECR-2), several vent holes, support buildings, roads, and water treatment facilities, as shown on Figure 1-3, *Site Layout*. Reviews of historical aerial photographs and Site reconnaissance have indicated that portions of the Site are located within an arroyo.

Beginning in 1979 and ending when the mine went on standby status, pursuant to a permit from the New Mexico Environmental Improvement Division (NMEID), UNC used coarse tailings sands from the mill to provide roof support for critical mined-out portions of the NECR mine. The tailings sands were temporarily staged at the three locations shown on Figure 1-3 (see Sandfill areas), and then were pumped underground into specified areas using a sand slurry. Backfill preparation within the underground mine consisted of building bulkheads equipped with drains around the area to be backfilled. The entrained slurry water drained into the mine drainage system, where it mixed with mine water that was collected and pumped to the surface.

Dewatering operations continued into 1983. The water was treated in three constructed ponds to reduce suspended solids and radionuclide concentrations before being discharged into what is referred to as the Unnamed Arroyo. Upon passage of the Clean Water Act (CWA), discharges were released pursuant to a National Pollutant Discharge Elimination System (NPDES) permit. Treatment processes were added or changed over the years, principally to meet revisions to discharge requirements as dictated by the CWA. Even prior to the time that permitting requirements became effective ponds were used to settle suspended solids. Thus mine water was never directly discharged to the Unnamed Arroyo without some type of treatment.

The individual ponds were used as follows: Pond 1 functioned as a surge tank to allow for homogenization and sand settling. A flocculant was also added to remove suspended solids. The clarified water then flowed into Pond 2. Between Pond 2 and Pond 3a, sulfuric acid and barium chloride were added, resulting in the removal of radium through precipitation as radium sulfate in Pond 3/3a. Water from Pond 3 was fed to an ion exchange (IX) plant for the recovery of uranium and then discharged into the Unnamed Arroyo. The IX Plant was added to the Site's NRC license in 1977 and operated until dewatering operations ceased, at which point UNC closed the IX Plant, mine water treatment ponds, and tailings sand backfill areas in accordance with its NRC Source Materials License.

UNC undertook various closure activities at the NECR Mine between 1986 and 1994 pursuant to NRC requirements and the mining lease. In addition to removing the IX Plant and sludge-contaminated soils from the treatment ponds, closure actions included: removal of equipment and some buildings; backfilling and sealing the two shafts (NECR-1 and NECR-2) and associated vent holes with reinforced concrete caps; regrading, covering and revegetation of the non-economic materials storage area (NEMSA). The only remaining structural features include the main office, power poles, building foundations and other concrete platforms. The concrete pads were left standing at the request of the Pinedale Navajo Chapter house. A disposal area is located on that part of Section 34 owned by UNC (the Boneyard). The Boneyard was used to store old equipment, tires, wood pallets, and other miscellaneous materials. This material was either removed from the Site or buried at the Boneyard area. The area was covered with one foot of soil and reseeded as part of the closure activities.

1.2.3 Regulatory History

The NECR Mine has been regulated under various permits during active and post-closure operations, as listed below.

- A NPDES permit for the treatment and discharge of mine water.
- An amendment to the radioactive materials license from the State of New Mexico for the operation of the IX Plant.
- A discharge permit and radioactive materials license from the State of New Mexico for backfilling coarse tailings sand into the mine.
- A source materials license with NRC following the June 1986 return of the State's licensing authority to the NRC for the closure of the sand backfill staging areas and the IX Plant and water treatment ponds.
- A mining permit issued by the State of New Mexico in 2004 to conduct additional mine closeout activities under the NMMA.
- A storm water discharge permit with EPA in 2005.

The NPDES permit covered the discharge of treated mine water into the arroyo downstream of NECR-1. The water was monitored for flow rate, pH, suspended solids, radionuclides, and trace metals; and was reported to the State of New Mexico and EPA in quarterly reports. The permit was inactive after mine dewatering ceased in 1983, and the permit was allowed to lapse at the end of 1993, at the same time that the mineral lease expired.

On June 23, 1977, UNC's State-issued radioactive materials license (UN-UNC-ML) was amended to allow for the operation of the IX Plant, and on January 29, 1979, the license was again amended to govern radiological aspects for the backfilling of coarse tailings sands into the mine workings for structural control. (During this period, New Mexico had agreement state status and was authorized to administer the license.) The NMEID issued discharge permit DP-63 to govern water quality aspects of the tailings sand backfill. As a basis for the permit, Battelle (1982) investigated potential impacts from the sand backfill areas on groundwater quality, and concluded that degradation would not occur. The permit required groundwater monitoring to verify the conclusions reached by Battelle.

In June 1986, the State of New Mexico returned its licensing authority for uranium recovery facilities to the NRC. UNC therefore closed the IX Plant, mine water treatment ponds, and tailings sand backfill areas in accordance with its NRC Source Materials License. This included the removal of radionuclide contaminated soils and process equipment, which were disposed of at the mill site in conjunction with mill decommissioning and reclamation activities. NRC certified the completion of the NECR cleanup activities in October 1989 in their letter to UNC dated October 1989. The letter stated: "Based on the equilibrium ration and the U-nat date provided by the licensee, the staff concludes that UNC has adequately removed remaining byproduct material from the mine site. Therefore no further action is necessary." (NRC, 1989).

UNC halted on-site activities at NECR in December 1993 after its lease expired. In September 2002, the New Mexico Appellate Court held that NECR was subject to the NMMA (New Mexico Mining Com'n v. United Nuclear, 133 NM 8, 57 P.3d 862, 2002). UNC submitted a mine permit application in July 2003 and a Closeout Plan in January 2004 (MWH, 2004a) to the MMD. UNC worked with MMD to complete work plans for site characterization and mine closure through March 2005. The State of New Mexico issued a letter in June 2004 for UNC to prepare a groundwater abatement plan. At roughly the same time that UNC received conditional approval to execute the Materials Characterization Work Plan (MWH, 2004b), the NNEPA requested that EPA assume jurisdiction for mine cleanup. On November 7, 2005, EPA agreed to the NNEPA's request, and in a December 16, 2005 letter from MMD to UNC, MMD deferred further permit action for NECR to EPA on the presumption that an EPA-led cleanup would result in compliance with the NMMA and address NMMA reclamation requirements. MMD reserved its right to make a determination of NMMA compliance following EPA's release of the mine site.

On May 13, 2005, UNC submitted a complete Notice of Intent (NOI) form seeking coverage under EPA's Multi-Sector General Permit for storm water discharges. There have been no discharge events to trigger any monitoring events since the permit has been in place, nor has there been continuous flow into the arroyos adjacent to the Site. UNC has implemented and maintains the best management practices that are contained in the Stormwater Pollution Prevention Plan (MWH, 2005).

1.2.4 Previous Work

Previous work that has been conducted at the Site is documented in serveral historical documents. These documents include those listed below.

- Closeout Plan (MWH, 2004a)
- Material Characterization Work Plan (MWH, 2004b)
- Groundwater Quality in the Westwater Canyon Member at the Northeast Church Rock Mine (MWH, 2004c)
- Northeast Church Rock Mine Site Assessment (MWH, 2003)
- Tailings Sand Backfill Cleanup Verification Report (UNC, 1989a)
- Kerr-McGee (Quivera Mine) Operations and Closure Report (date unknown)

Additionally, data concerning the results of the EPA field radiological scan that was conducted in 2005 (see Section 1.1) was conveyed to the project team by personal communication (EPA, personal communication, 2006).

1.3 PHYSICAL SETTING

1.3.1 Physiography

The Site is located in the southeastern part of the Colorado Plateau Physiographic Province, which is characterized by large regions of folding with broad uplifts and intervening basins. The site is located at the juncture of several of these major structures: the San Juan Basin, the Zuni Uplift, and the Defiance Uplift.

The NECR Mine site is located in an arroyo that drains to the northeast downstream of NECR-1 into another arroyo that drains to the east into Pipeline Canyon. For the purposes of the RSE, the arroyo that drains along the north side of the mine site and then between NECR-1 and Red Water Pond Road is hereafter referred to as the Unnamed Arroyo. Elevations at the Site range from 7,100 to 7,200 feet. Pipeline canyon is a northeast-southwest trending alluvial valley that drains intermittently to the southwest, eventually emptying into the Rio Puerco. Surface water flow from the Site discharges intermittently into the Unnamed Arroyo that empties into Pipeline Canyon via the other arroyo.

1.3.2 Climate

The average temperature in Gallup, 16 miles south of the Site, ranges between an average of 29 degrees Fahrenheit in January to an average of 68 degrees Fahrenheit in July. Gallup receives an average of 0.8 inches of precipitation in January and 2 inches in August, with a total annual average precipitation of 11 inches. Daily extremes reach as high as 100 degrees Fahrenheit in summer and as low as –34 degrees Fahrenheit in winter.

Potential evaporation in New Mexico is much greater than average precipitation. The average annual net pan evaporation is approximately 54 inches. Wind speeds over the state are usually moderate, although relatively strong winds often accompany occasional frontal activity during late winter and spring months. Blowing dust and serious soil erosion is a problem during dry spells. Based on data (1992-2002) from the Gallup airport, winds predominate from the west to southwest 11 months out of the year. A predominant direction from the south is reported for the month of August (http://www.wrcc.dri.edu).

1.3.3 Geology and Groundwater Quality

The surface of the Site, beneath the soil or colluvium layers (see Section 1.3.4) consists of alluvium along the axes of the drainages and bedrock in other areas. The alluvium present generally consists of clay, silt, sand, and gravel deposited in interfingering layers. The alluvium is very thin or absent at the mine, and is unsaturated. Approximately one mile southeast of the Site, in the valley bottom along the axis of Pipeline Canyon, the alluvium attains sufficient thickness and continuity to be a mappable geologic unit. Similarly, the alluvium becomes partially saturated only along the axis of Pipeline Canyon, in large part if not entirely due to infiltration of mine water discharge from the two upstream mines. Water levels in the alluvium have been gradually lowering ever since mine water discharges ceased.

The Site is underlain by the upper Cretaceous Crevasse Canyon Formation. The cliffs that rim the Site are comprised of white, medium- to coarse-grained sandstone of the Dalton Sandstone Member of the Crevasse Canyon Formation, while much of the Site permit area is underlain by unsaturated mudstones, sandstones, and coal beds of the Crevasse Canyon Formation. Underlying the Crevasse Canyon Formation are the Gallup and Mancos Shale formations, also of Cretaceous age. Groundwater is first encountered in the Gallup Formation; during the drilling of the NECR-1 area mine shaft an approximately 30 gpm yield was reported. The Mancos is a very effective confining layer being comprised of 500-800 feet of shale.

Underlying the Cretaceous sediments, are the Jurassic Morrison Formation and Dakota Formation. The primary uranium ore body mined at the Site is present within the Westwater Canyon Sandstone Member of the Morrison Formation. The NECR-1 and NECR-2 mine shafts at the Site extended to a depth of approximately 1,500 to 1,800 feet into the Westwater Canyon Sandstone Member. The Dakota and Morrison Formations may be hydraulically connected; together they constitute a productive aquifer, and produced about 1,500 gpm during mine dewatering operations.

A discussion of the background concentrations of COPCs is included in Section 2.5.

Groundwater quality data at the Site was presented in the document *Groundwater Quality in the Westwater Canyon Member at the Northeast Church Rock Mine* (MWH, 2004c). Maximum concentrations for background mine water quality exceeded NMED standards for iron, manganese, nitrate, and radium-226 (Ra-226). A sample collected from the NECR-1 area well on May 17, 2004 exceeded New Mexico Environment Division (NMED) standards for pH, total dissolved solids and boron.

1.3.4 Soils

Native soils at the Site boundary consist of well-drained silty sands and inorganic silts and clays, characteristic of a semi-arid pinyon-juniper region. Soils in the areas surrounding the nine home sites are expected to be similar. Coarser, poorly sorted alluvial deposits containing gravel and cobbles are found along the Unnamed Arroyo. The NECR-1 pad was constructed of non-economic mine materials consisting of sandstone and clay shale fragments, while the NECR-2 pad was constructed primarily of native soils. The NEMSA and the Boneyard were seeded in 1994, after being covered with one foot of native topsoil. Currently, areas of the Site have supported a variety of native vegetation, but revegetation of some areas has had little success due to livestock grazing.

The water treatment ponds (Pond 1, Pond 2, and Pond 3/3a) were originally filled with water and sediments settled in them from storm water runoff that drained the tailings sand backfill areas, as well as water from mine operations (see Section 1.2.2). The sediments were periodically removed and placed on the Sediment Pad for temporary storage prior to being transported off-site for processing at the mill. Residual tailings were removed from the ponds and the Sediment Pad as part of the 1986 cleanup pursuant to Condition 33 of NRC Permit License No. SUA-1475 (UNC, 1989a). Currently, the ponds and the Sediment Pad consist primarily of native materials.

As stated above, the sand backfill areas originally were used to store tailings from the mill. As discussed in Section 1.0, the tailings were removed and used to backfill the mine workings. The sand backfill areas were then included in the 1986 cleanup pursuant to Condition 33 of NRC Permit License No. SUA-1475 (UNC, 1989a). As such, the sand backfill areas now consist primarily of native materials.

2.0 FIELD INVESTIGATION METHODS

2.1 INTRODUCTION

This RSE investigation was conducted in a manner consistent with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM, EPA, 2000a), as described below. MARSSIM is a comprehensive survey guidance for soils impacted by radionuclides. It is a performance-based approach for demonstrating compliance with a dose- or risk-based regulation. Consistent with MARSSIM, the RSE included processes to identify data quality needs and any limitations to conducting the survey. The survey design used in this RSE was developed and documented using the Data Quality Objectives (DQO) Process, as described in detail in Section 3.0 of the RSEWP, in accordance with MARSSIM. This represents the planning phase of MARSSIM. A quality assurance and quality control (QA/QC) plan was also include in the RSEWP, which incorporated the DQOs and integrated all technical and quality aspects for the life cycle of the project, including planning, implementation, and assessment.

The RSE was carried out in accordance with the SOPs and QAPP, and resulted in the generation of raw data (the Implementation Phase). The data collection techniques used were consistent with MARSSIM (see Chapters 6 and 7, and Appendix H of MARSSIM).

This report represents the Assessment Phase of the MARSSIM process. The data included were first verified to ensure that the SOPs specified in the QAPP were actually followed and that the measurement systems were performed in accordance with the criteria specified in the QAPP. Then the data were validated to ensure that the results of data collection activities support the objectives of the survey as documented in the QAPP, or permit a determination that these objectives should be modified. The data quality assessment (DQA) process was then applied using the validated data to determine if the quality of the data satisfied the intended use.

The Site was initially divided into eleven individual survey areas, which included NECR-1, NECR-2, Ponds 1 and 2, Pond 3/3a, Sandfill 1, Sandfill 2, Sandfill 3, Sediment Pad, Boneyard, NEMSA, and the Unnamed Arroyo. Two additional areas were added for limited investigation during the field work based on the results of preliminary radiological scans. These areas are Vent Hole 3/8 and Trailer Park. Additionally, nine home sites located northeast of the Site were also investigated as part of the RSE. These fourteen survey areas are shown on Figure 1-3, and Figure 1-4, *Locations of Home Sites*.

Several methods were employed in conducting this field investigation. Initially, static gamma measurements were conducted on random triangular grids. Surface soil samples were collected at several of the gamma measurement sites. Subsurface samples were collected using a hollow-stem auger drill rig, test pits excavated with a backhoe, and a hand-auger.

2.2 RADIOLOGICAL SURVEYS AND FIELD SCANS

The radiological characterization for the surface soil consisted of stationary (static) direct gamma radiation level measurements and radiation gamma scans for additional characterization of the survey area and boundaries. These two survey methods provided for detailed coverage of the aerial extent of Ra-226 within the top six inches of soil, which allowed for a more thorough characterization of the Site compared to relying on surface soil sampling and laboratory analysis alone. The field gamma radiation correlations, static measurements, and scans for the Ra-226 content in soil were performed using a Ratemeter/Scaler (Ludlum 2221) connected to a 2-inch by 2-inch sodium iodide (NaI) crystal scintillation detector (Eberline SPA-3), which detects all gamma radiation above a specific selected energy, including gamma radiation emitted from bismuth-214 (Bi-214), a decay product of Ra-226 in the soil. Prior to conducting the gamma radiation measurements, the operating high voltage levels of the NaI detectors were established in accordance with manufacturer instructions. The operating high voltage yielding the lowest noise, optimum efficiency and least sensitivity to voltage fluctuations in the field was established by determining the high voltage plateau of the detector.

The presence of radiation containing material on a side slope or in a pile can cause radiation shine at a location near that body of material (i.e., gamma rays are emitted in three dimensions and can impact areas laterally away from the source as well as vertically). Due to the elevated activity of materials at the Site, as discussed in Section 3.0, radiation shine could interfere with and cause an overestimation of Ra-226 soil concentrations at certain locations. A lead collimator was used to minimize this interference (it blocks lateral radiation shine), and a separate correlation calibration was performed for the collimated detector. This detector was held eighteen inches above the survey point to obtain a one-minute integrated count.

Static measurements were taken at all locations on a triangular grid, except at Vent Holes 3/8, the Trailer Park and the Home Sites. Vent Holes 3/8, the Trailer Park and the Home Sites were scanned first to locate elevated areas, and then static gamma measurements were taken at the highest readings to get more precise readings and locations for judgmental soil sample locations. The measurement results, field forms and function check forms are located in Appendix B.

2.2.1 Field Gamma Radiation Survey

The field radiation survey at the Site included the measurement of field gamma radiation levels to characterize the nature and lateral extent of Ra-226 concentration in surface soils. The field gamma radiation level measurements were performed using a 2x2 NaI scintillation detector coupled with a scaler/ratemeter as specified in the Standard Operating Procedures (SOPs) included in the RSEWP. The gamma radiation level measurement consisted of gamma radiation static (stationary) surveys and gamma radiation scan surveys for additional characterization of the survey areas and boundaries. These field gamma radiation surveys provided greater aerial extent of Ra-226 contamination for the top six inches of soil for the Site compared to relying on surface soil sampling alone.

Ra-226 is primarily an alpha emitting radionuclide with a gamma radiation emission of 186 KeV at about 4% intensity. This low energy and intensity of the Ra-226 gamma radiation emission makes direct determination of Ra-226 in the field a difficult task. However, bismuth-214 (Bi-214), a Ra-226 decay product, emits three high-energy (609 to 1764 KeV) gamma radiations at a total of approximately 80% intensity. The gamma radiation of Bi-214 can be readily and adequately measured in the field utilizing a NaI scintillation detector having high sensitivity. If soil geometry and other parameters such as moisture are consistent, the ratio of Bi-214 to Ra-226 would be consistent. This means there would be a direct relation (correlation) between Bi-214 gamma radiation levels and Ra-226 concentrations in the surface soil. The gamma radiation from other naturally occurring isotopes in soil, such as thorium-232 (Th-232) decay products and postassium-40 (K-40), may contribute to gross gamma radiation intensity. In addition, background gamma radiation from cosmic rays also contributes to gross gamma radiation intensity. However, the Th-232 decay products, K-40, and gamma radiation levels from cosmic rays are generally at a constant level. A linear regression would identify such a constant to correct for and minimize interference with the gamma radiation level and Ra-226 soil concentration correlation. Therefore, to calibrate the 2x2 NaI detector for Ra-226 measurement, a site-specific correlation between the gross gamma radiation level in counts per minute (CPM) and surface soil Ra-226 concentration (pCi/g) was performed in accordance with SOP-02 (see RSEWP) prior to the field survey.

The gamma radiation level instrumentation configuration consisted of an Eberline SPA-3, 2x2 NaI Scintillation detector connected to a Ludlum 2221 Scaler/Ratemeter. Minimum Detectable Concentration (MDC) is the activity level that the instrumentation is expected to detect 95% of the time. The RSEWP specified a gamma radiation survey instrument MDC of 50% of the Derived

Concentration Guideline Limit (DCGL). The $DCGL_W$ was specified in the RSEWP to be 1.24 pCi/g corresponding to the 10^{-4} risk criterion assuming a residential exposure scenario. Therefore, an instrumentation MDC of 0.61 pCi/g (50% of the 1.24 pCi/g) was specified for the static gamma radiation survey. Detailed descriptions of the instrumentation and the MDC calculations are included in Appendix B.

A correlation between the gamma radiation levels in CPM and surface soil Ra-226 concentrations was performed prior to the field gamma radiation survey for a site-specific calibration of the 2x2 NaI detectors. The results were provided in *Results of Background and Radium Correlation Sampling Northeast Church Rock Mine Site Technical Memorandum* (MWH, 2006b). The gamma radiation CPM equivalent to the Ra-226 field screening level (FSL) was necessary prior to conducting the actual surveys in order to identify area boundaries and identify locations above the FSL during the radiation survey. This required performing the necessary gamma radiation level measurements and soil sampling for Ra-226 to determine a correlation between gamma radiation level CPM and Ra-226 concentration in surface soils. A detailed discussion of the correlations that were developed is included in Appendix B.

The FSL (2.24 pCi/g) for Ra-226 was defined as the $DCGL_w$ (1.24 pCi/g) above the mean background Ra-226 concentration (1.0 pCi/g), as discussed in more detail in Section 2.4.

The field gamma radiation survey results and soil sampling results for the applicable correlations are provided in Table 2.2, *Gamma Radiation Levels Versus Surface Soil Ra-226 Concentrations Regression Data.* The summarized linear regression for <10,000 CPM and >10,000 CPM are shown on Figure A-5, *Gamma Radiation Levels vs Surface Soil Ra-226 Concentration Regression Data, NECR-1 Step Out Survey Points for <10K CPM Correlation with Collimated 2x2 NaI Detector,* and Figure A-6, *Gamma Radiation Level to Surface Soil Ra-226 Regression On-site Areas >10K Survey Points for >10K CPM Correlation with Collimated 2x2 NaI Detector*, respectively, included in Appendix B. All static gamma radiation survey readings were converted to surface soil Ra-226 concentration using the following equations, and are discussed in Section 3.1:

- Surface soil Ra-226 pCi/g = (0.0024 x CPM) – 11.608 (R^2 = 0.98) for collimated 2x2 NaI detectors (shown on Figure A-5 of Appendix B) with gamma radiation levels below 10,000 CPM. (2.24 pCi/g FSL equivalents to 5,770 CPM)

- Surface soil Ra-226 pCi/g = (0.0016 x CPM) – 13.909 (R^2 = 0.74) or collimated 2x2 NaI detectors (shown on Figure A-6 of Appendix B) with gamma radiation levels above 10,000 CPM. (2.24 pCi/g FSL equivalents to 10,093 CPM)

The first linear regression analysis shown above was used to estimate low levels of surface soil Ra-226 concentrations (i.e., near the FSL) in areas such as the step-outs where Ra-226 impacts were expected to be in surface soil only with gamma radiation levels generally below 10,000 CPM, yielded a regression with a low R^2 value significantly below the specified value of 0.80. This could be due to elevated variance and error associated with measurements at low levels. Therefore, two survey points collected from the step-out survey area (where Ra-226 contamination is in surface soil only) with Ra-226 concentrations above 10,000 CPM were included in the liner regression to improve the R^2 value. Although, this biased regression produced an R^2 value of 0.98, the data obtained by the field instrumentation was of estimated quality for field screening purposes.

The second linear regression analysis shown above which was used for correlation at locations with gamma radiation measurements above 10,000 CPM for the on-site areas, had an R^2 value of 0.74, lower than the 0.80 value specified in the RSEWP. A revision to the correlation was necessary to minimize interference and over estimation of surface soil Ra-226 from significantly elevated levels of subsurface Ra-226.

Despite the potential for over-estimation due to interference, the field gamma radiation survey measurements provided data of a quality sufficient for field screening. The data collected with field instruments have the potential for error and low accuracy and are considered to be estimated values, especially, in areas with different contamination distribution than the instrument calibration/correlation assumptions. This was the case for most of the on-site survey areas, where significantly elevated levels of Ra-226 are present in the subsurface. The initial correlation was developed prior to the field survey for Ra-226 in surface soils (less than six inches deep) with fairly homogeneous distribution. The initial correlation did not expect and account for the elevated gamma radiation shine from the subsurface Ra-226, and thus, the Ra-226 concentrations for surface soils determined by the gamma radiation survey using the initial correlations were higher compared to the single point soil sampling results. The correlations were revised and biased to account for the elevated gamma radiation levels in the subsurface, and to obtain more representative Ra-226 surface soil concentrations and improve the quality of the gamma radiation survey data. However, the revised correlation, which would account for subsurface Ra-226 interference, does not account for any variation in gamma radiation shine interference due to variation in subsurface Ra-226 concentrations at different on-site area locations. Therefore, the data obtained by field instrumentation with revised correlations is estimated data suitable for field screening purposes.

2.2.2 Field Direct Gamma Radiation Levels for Surface Soil Ra-226

The field gamma radiation survey for surface soil Ra-226 was performed between November 7 and December 1, 2006 in accordance with the RSEWP. The field gamma radiation survey included a static (stationary) survey and a scan survey. The static gamma radiation surveys were designed primarily to characterize the nature and extent of Ra-226 in surface soils. The gamma radiation scan survey was intended primarily to aid with investigation and characterization of the lateral extent of Ra-226 and to identify elevated areas in surface soils. The selected instrumentation for the gamma radiation survey provides gross gamma radiation levels in counts per unit time. As discussed above, the initial site-specific correlation for calibration of the instrumentation gamma radiation level in CPM to surface soil Ra-226 concentration, and the Ra-226 field screening level (2.24 pCi/g) equivalent gamma radiation level CPM were established.

2.2.2.1 Static Gamma Radiation Survey

Static gamma radiation surveys were performed at specified grid nodes within the survey areas. The grid nodes were determined using Visual Sampling Plan (VSP) on an 80-foot triangular grid cast on a random origin. Initially, a total of 543 80-foot triangular grid nodes (sample locations) were generated that extended beyond the initial survey area boundaries to assist with the boundary delineation evaluation, as presented in Section 3.0. The locations of the static gamma measurements are shown on Figure 2-1, *Static Gamma Measurement Locations*. The following on-site survey areas were included in the survey:

- NECR-1 (156 grid points)
- NECR-2 (75 grid points)
- Pond 1/2 (85 grid points)
- Pond 3/3a (73 grid points)
- Sandfill 1 (76 grid points)
- Sandfill 2 (21 grid points)
- Sandfill 3 (28 grid points)
- Sediment Pad (29 grid points)

Colored flags were used in the field to indicate static gamma measurement and soil sample locations. Each of the grid points was located using a Differentially Corrected Global Positioning System (DGPS). The DGPS consisted of either the Trimble Geo XT or the Starlink Invicta GPS receiver with real time differential correction using OMNI STAR satellite, Tripod Data System (TDS) Ranger data logger with SOLO surveying software capable of navigating to a point. The differential correction provided submeter accuracy of point locations.

When the grid point was located where the survey would be difficult or inappropriate, such as a building foundation or pad, tree or big shrub, or unsafe terrain, the point was moved to the closest appropriate location and the new point location coordinates were obtained. The grid point was marked with a pin flag with survey area description and grid point number. A one-minute static gamma radiation level measurement was performed with a collimated SPA-3 2x2 NaI detector at each grid point as specified in Section 5.1 of SOP-03 (see RSEWP). The survey information, which included the point number and gamma radiation counts, was logged in the TDS data logger. The data logger automatically logged the corresponding date, time and coordinates. Also, the survey date, survey point ID and the gamma radiation reading in CPM, with any comment, were recorded in the Static Gamma Radiation Survey Field Forms, which are included in Appendix B. The survey information from the data logger files and the field forms are summarized and presented in Section 3.0.

Following completion of the static gamma radiation survey for all of the initial 543 grid points (see Figure 2-1) in the above specified survey areas on November 10, 2006, the gamma radiation counts for the grid point at or near the survey area boundaries were reviewed against the FSL of 4600 CPM for the survey area boundary evaluation. The survey area boundary delineation included the scan survey described in Section 5.2 of SOP-03 (see RSEWP) by walking along the 80-foot spaced transects perpendicular to the initial perimeter of each survey area. These transects were to be run between the most outer 80-foot static grid node with a gamma radiation level above the FSL to the next 80-foot grid node below the FSL outside the survey area boundary. However, the review indicated that the gamma radiation levels were above the 4,600 CPM FSL at most of the survey area boundary grid points. Therefore, a step-out static gamma radiation survey was started on November 13, 2006 beyond the survey area boundary grid points to locate points below the FSL readings for boundary delineation scan surveys.

The step-out static gamma radiation surveys for boundary delineation was performed along transects until the gamma radiation level counts were below the FSL, or other limiting features were encountered, such as a cliff or the boundary of another survey area. Additionally, features such as unimpacted ground (e.g., wooded areas with native soils), roads, structures, and fences were used to help estimate the locations of the FSL boundary. The results of the gamma radiation surveys and the soils sample analyses were used to confirm or adjust the FSL boundary subsequent to the field determination using more definitive data.
Gamma radiation readings at some of the outer step-out static survey points were slightly above the FSL. Nevertheless, the static survey for area boundary delineation was ceased after discussions and agreement with the EPA's on-site representatives based on the criteria listed above in conjunction with levels at or below the FSL. The surface soil sampling results were used in conjunction with the gamma radiation levels for final boundary delineation. A total of 238 step-out static gamma radiation surveys were performed for the area boundary delineations, as listed below.

- NECR-1: 149 step-out survey points
- NECR-2: 43 step-out survey points
- Pond 1 and Pond 2: 0 step-out survey points
- Pond 3/3a: 20 step-out survey points
- Sandfill 1: 0 step-out survey points
- Sandfill 2: 0 step-out survey points
- Sandfill 3: 15 step-out survey points
- Sediment Pad: 11 step-out survey points

A static gamma radiation survey with a collimated SPA-3 2x2 NaI detector was performed at 38 points along the banks of the Unnamed Arroyo, starting at the IX Plant (See Figure 1-2) and moving downstream. This area was not included originally in the RSEWP; however, discussions with the on-site EPA-representatives led to include this survey for boundary delineation along the banks of the Unnamed Arroyo, as documented in FCR#001 (see Appendix C).

Static gamma radiation surveys with a bare (uncollimated) SPA-3, 2x2 NaI detector were also performed at the nine home sites (total of 45 survey points), and the newly identified areas: Vent Hole 3/8 (35 survey points) and the Trailer Park (40 survey points). An uncollimated detector was selected for these areas to fully utilize the detector's lateral range for investigation purposes. A scan gamma radiation survey with uncollimated detector in these areas, as discussed in the following section, was performed to identify locations for further investigation.

Overall, static gamma radiation measurements were obtained at a total of 939 points from all areas at the Site between November 7 and December 1, 2006. All of the static survey readings recorded in the Static Gamma Radiation Survey Field Forms are included in Appendix B. The static gamma radiation reading counts were converted to surface soil Ra-226 concentrations using appropriate correlation linear regression equations, as discussed in Section 2.2.3. Results of the gamma radiation static survey are presented and discussed in Section 3.0.

2.2.2.2 Gamma Radiation Scan Survey

Gamma radiation scan surveys were specified in the RSEWP to identify any hot spots (areas with elevated levels), and to delineate the lateral extent of contamination. The scan survey was conducted judgmentally around areas with elevated gamma readings from the static survey, and at site-specific locations. The gamma radiation scan surveys (walkthrough surveys) were performed as described in Section 5.2 of SOP-03 (see RSEWP) by walking at a rate of about one foot per second in serpentine shape along transects with a bare (uncollimated) 2x2 NaI detector at about 18 inches from the ground surface.

<u>NECR On-Site Survey Areas</u>

The RSEWP specified gamma radiation scan surveys at a coverage of up to 20% of the gamma radiation static surveys that exceeded the FSL to identify any hot spots. The RSEWP specified that if over 80% of the static survey within a survey area exceeded the FSL (equal to $DCGL_w$ plus background), there would be no scan survey in that area. Over 80% of the static gamma radiation survey measurements in all on-site survey areas exceeded the FSL, therefore no scan gamma radiation survey was performed in any of the original on-site survey areas.

<u>NEMSA and Boneyard</u>

The RSEWP specified that a gamma radiation scan survey be conducted at the NEMSA and Boneyard. Prior to implementing the survey, an inspection of these areas was conducted on November 11, 2006 by AVM, MWH and EPA representatives. The NEMSA appeared to contain a clean soil cover, however, the cover had been eroded at several locations and non-economic material was visible The gamma radiation exposure rates in the NEMSA ranged from about 25 μR/hr in areas with unimpacted cover to above 120 μR/hr where the soil cover was eroded and non-economic material was exposed. Elevated gamma exposure rates near 100 μR/hr were also observed at several locations in the Boneyard where subsidence and voids were present in the cover. A gamma radiation scan, which is meant to characterize surface soil, would not have provided any meaningful data as it would have been skewed by the deeper gamma radiation. Therefore, a decision was made to suspend the gamma radiation scan survey in these areas (see FCR#002 in Appendix C). Instead, characterization of these areas is based on surface and subsurface soil sampling, and visual observations made during the subsurface investigation.

Home Sites

Gamma radiation scan surveying was performed on November 15, 2006 at the nine home sites. The four corners of the half-acre square area around each home were marked with pin flags. The scan survey was performed by walking at a rate of about one foot per second in a serpentine pattern along transects spaced 10 feet apart with an uncollimated 2x2 NaI detector (#408522-33) at about 18 inches from the ground surface. The scans were used to identify areas with gamma levels above the 16,600 CPM FSL. EPA on-site representatives provided oversight and assisted with the survey.

Locations with levels above the FSL, or a total of five locations with the highest readings, were identified and marked with pin flags at each home site. A gamma radiation static survey and soil sampling was then conducted at each of these locations. The gamma radiation static survey readings were recorded in the Field Data Forms, which are included in Appendix B; the results are discussed in Section 3.0.

Based on the preliminary results from this RSE investigation, the EPA conducted a soils removal action at Home Sites 4 and 6 through 9. Soils were excavated to a depth of three to 12 inches around these five Home Sites. Following excavation, EPA conducted confirmation sampling and analysis for Ra-226. A summary report was prepared by the EPA that included hand-sketch drawings showing the lateral extent of the soils removal, the locations of the post-excavation confirmation samples, and analytical results; a copy of the report is included in Appendix D. The EPA's removal boundaries showing the lateral extent of excavation are illustrated on Figure 2-1. It should be noted that these boundaries were surveyed and are of unknown accuracy. The results of the post-confirmation sampling were used in the risk assessment (Section 4), but are otherwise only included in Appendix D; Sections 2.0 and 3.0 of this report include the results of the RSE investigation only.

Vent Hole 3/8 and Trailer Park

The EPA's on-site representative identified Vent Hole 3/8 and the Trailer Park during the field survey as additional areas requiring investigation and characterization. The addition of these two areas was documented in FCR#004 (see Appendix C). A scan survey was performed by walking at a rate of about one foot per second in serpentine pattern along transects spaced 10 feet apart with a bare (uncollimated) SPA-3 2x2 NaI detector (#408522-33) at about 18 inches from the ground surface. The scan survey was used to identify areas with elevated exposure rates, as specified in the RSEWP. Following the scan survey, a gamma radiation static survey was performed with the uncollimated detector at the areas with elevated gamma levels. The scan results (sketches and the Static Gamma Radiation Survey Field forms) are included in Appendix B. The results of the scan survey in these areas are summarized in Section 3.0

Unnamed Arroyo

The RSEWP specified that a gamma radiation survey be conducted of the surface sediments in the channel of the Unnamed Arroyo. The RSEWP indicates that the scan be conducted with a collimated 2x2 NaI detector to identify areas with exceeding the 2.24 pCi/g Ra-226 FSL, equivalent to 5,200 CPM for the collimated SPAS-3 detector #408522-33. The 5,200 CPM FSL (detector 408522-33) was derived from the regression analysis performed for the Unnamed Arroyo gamma radiation survey correlation, as presented in Figure 7 of the document *Results of the Background and Radium Correlation Sampling Technical Memorandum* (MWH, 2006b), which included the Ra-226 correlation sampling results. The regression analysis indicated that 5,200 CPM is equivalent to 2.24 pCi/g of Ra-226. Due to the presence of radiation containing materials on side-slopes or in a pile that can cause radiation shine (potentially causing an overestimation of Ra-226 soil concentrations), a lead collimator was used on the field detector to minimize interference.

The correlation survey that was conducted revealed that all fifteen locations in the arroyo sediment bed had Ra-226 concentrations significantly above the FSL. The fifteen sampling locations extended from the edge of NECR-1 to the area around the home sites (see Technical Memorandum). The converted Ra-226 concentrations ranged from 9.7 pCi/g to 26.4 pCi/g. The survey results indicated that surface sediments along the entire length of the Unnamed Arroyo included in the RSEWP for surveying were likely to be above the FSL. Therefore, in consultation with the on-site EPA representatives, a decision (see FCR#001 in Appendix C) was made to eliminate the gamma radiation scan survey in the Unnamed Arroyo, and instead perform subsurface sediment sampling for laboratory analysis. As discussed in Section 2.2.4.1, a gamma radiation static survey at 80-foot grid transect locations along the arroyo bank was performed.

2.3 SURFACE SOIL FIELD INVESTIGATION

Surface soil sampling was initially performed at the individual survey areas listed below. Surface soils for the purpose of the RSE are defined as less than or equal to 0.5 feet below ground surface (feet bgs).

- NECR-1
- NECR-2
- Sandfill 1
- Sandfill 2
- Sandfill 3
- Ponds 1 and 2
- Pond 3/3a
- Sediment Pad
- NEMSA
- Boneyard

Surface soil sampling was also conducted at the nine home sites.

Two additional areas were added during the field investigation, because preliminary radiological scans yielded sufficiently high results. These areas are Vent Hole 3/8 and the Trailer Parks (See Figures 1-2 and 1-3). Sample locations at eight of the on-site survey areas were based on predetermined grids. Sample locations at the Boneyard, NEMSA, Trailer Park, Vent Hole 3/8, and the nine home sites were collected at judgmental locations, as described in this Section. Surface soil sample locations are shown on Figure 2-2, *Surface Soil Sample Locations Mine Site*. A tabular summary of the surface soil samples collected from each survey area is included in Table 2.3, *Summary of Soil Sampling Program*, and a more detailed summary of samples collected is included in Appendix B.

From eight of the on-site survey areas, surface soil samples were collected from 20% of the static gamma measurements or a minimum of 13 samples per area, whichever was greater. VSP was originally used to locate the surface soil samples on a triangular grid cast on a random origin. In order, to have the static gamma measurements and surface soil samples on the same grid, the surface soil locations were randomly co-located with the static gamma measurements that were cast on the 80-foot triangular grid. Surface soil samples were collected manually as grab samples from 0 to 0.5 feet and analyzed for the preliminary COPCs.

Initially, a total of 132 surface soil samples were co-located with static gamma measurements in eight of the on-site survey areas. The number of original surface soil samples for each area is summarized as follows (see also Appendix B):

- NECR-1 (31 surface soil samples)
- NECR-2 (15 surface soil samples)
- Sandfill 1 (15 surface soil samples)
- Sandfill 2 (13 surface soil samples)
- Sandfill 3 (13 surface soil samples)
- Pond 1 and No. Pond 2 (19 surface soil samples)
- Pond 3/3a (15 surface soil samples)
- Sediment Pad (14 surface soil samples)

As a result of FCR#003 (see Appendix C), 30 additional soil samples were collected at the step-out static gamma locations, as well as boundary confirmation samples. The numbers of step-out and boundary confirmation surface soil samples collected in each survey area were as follows:

- NECR-1 (16 step-out surface soil samples)
- NECR-2 (4 step-out surface soil samples
- Sandfill 1 (3 boundary confirmation surface soil samples)
- Sandfill 3 (2 boundary confirmation surface soil samples)
- Pond 1/2 (4 boundary confirmation surface soil samples)

Because the Boneyard and NEMSA were reclaimed in 1994 and covered with a one-foot layer of topsoil, they were unlikely to have preliminary COPCs at the surface. Therefore, only five judgmental surface samples were collected from each of these areas to evaluate if any impacts subsequent to reclamation have occurred. The sample locations were chosen based on field observations or evidence that impacts may have occurred (e.g., buried materials, stressed vegetation, eroded ground, areas with sediments deposited from storm water run-on). If no such evidence existed, the samples were collected randomly. Surface samples from the Boneyard and NEMSA were analyzed for preliminary COPCs and agronomic parameters.

The Trailer Park and Vent Hole 3/8 areas were added as per FCR#004 (see Appendix C). Five judgemental locations were selected from the Trailer Park and and five from Vent Hole 3/8 based on the gamma radiation scan survey and static gamma measurements. Surface soil samples were co-located with static gamma measurements, collected as grab samples from 0 to 0.5 feet bgs and analyzed for preliminary COPCs.

Sample locations at the nine home sites were developed judgmentally, based on the highest readings from the gamma radiation scan survey. Five samples were collected for the analysis of preliminary COPCs from each of the nine home sites (total of 45 samples) in a judgmental manner within approximately a one-half acre buffer around each home site, as shown on Figure 2-3, *Surface Soil Sample Locations, Home Sites*. The samples were located on native ground and were collected from the top three inches of soil. If grass was covering the soil, a small patch of grass was cleared down to the soil surface, as that would likely be the zone that wind borne particles from the Site would deposit if they were to make it to that location. The sample locations were biased to the five highest gamma measurements that resulted from the gamma radiation scan survey. The surface sample locations were refilled and leveled to grade after sampling with remaining soil.

Samples collected from the Unnamed Arroyo were initially planned to be taken as surface soil samples. However, as per FCR#001 (see Appendix C), subsurface soil samples were collected instead as discussed in Section 2.2.4.2. The collection methods for these samples are described in section 2.4.3.

Surface soil samples were also collected from the on-site survey areas for analysis of agronomic properties. Five samples were collected from each set of survey areas with similar characteristics, as follows:

- Five samples from the Pond 1/2, Pond 3/3a and the Sediment Pad;
- Five samples from Sandfill 1, Sandfill 2, and Sandfill 3;
- Five samples from NECR-1 and NECR-2; and
- Five samples from the Boneyard and the NEMSA.

This equated to a total of 20 samples. The samples collected in a judgmental manner from locations representative of the areas that may require reclamation, such as the application of top soil and/or reseeding. These data will be used to determine the suitability of the soils as growth media, including availability of nutrients and any potential toxicity.

Samples were also selected for the analysis of preliminary COPCs in leachate using the EPA Method 1213, Synthetic Precipitation Leaching Procedure (SPLP). Two samples were selected in a judgmental manner from each of the on-site survey areas that were not reclaimed (i.e., not including the NEMSA or the Boneyard). The sample locations were chosen at the surface or subsurface locations in each of the survey areas based on the highest total metal results. For each surface sample collected, the percent difference between the metal concentrations and the screening levels was determined. This percent difference was summed for each metal associated with the soil sample. Then the two samples from each survey area with the highest percent difference were selected for SPLP analysis. Of the 16 samples selected for SPLP analysis, 13 of the samples were selected from surface soil sample locations, and the other three were selected from subsurface soil sample locations. These survey areas and soil samples for SPLP are summarized below.

- NECR-1 (2 surface soil samples)
- NECR-2 (2 surface soil samples)
- Sandfill 1 (2 subsurface samples
- Sandfill 2 (2 surface soil samples)
- Sandfill 3 (1 surface soil sample, and 1 subsurface soil sample)
- Pond 1/2 (2 surface soil samples)
- Pond 3/3a (2 surface soil samples)
- Sediment Pad (2 surface soil samples)

Surface soil samples were collected, packaged, and handled according to the protocols in the RSEWP. All surface soil samples were collected using dedicated field equipment. Surface soils were sampled to a depth of 0.5 feet bgs in the on-site survey area and to depth of three inches at the nine home sites. The samples were collected using dedicated stainless steel teaspoons. These samples were placed in one-gallon Ziploc bags, and labeled with date, time, and sample identification. Field duplicates were collected at five percent of the sample locations, and the EPA took field duplicates at ten percent of the sample locations. Homogeneity was achieved by sampling twice the amount in one bag, then mixing and dividing into a separate bag. Additional sample volume was required for samples requiring agronomic analysis. Surface soil samples were submitted to ELI, Casper, Wyoming for analysis of preliminary COPCs, agronomic parameters, and SPLP analyses.

2.4 SUBSURFACE SOIL FIELD INVESTIGATION

Subsurface soil samples were collected from on-site survey areas specified in the RSEWP. In addition, subsurface samples were also collected from the Unnamed Arroyo as a result of FCR#001 (see Appendix C). Subsurface soil sample locations are shown one Figure 2-4, *Subsurface Soil Sample Locations*. A summary of the subsurface soil samples collected from each survey area is included in Table 2.3, *Summary of Soil Sampling Program* (See also Appendix B summary).

For the on-site areas, a total of five locations were selected judgmentally from each survey area and were co-located with surface soil sample locations. These subsurface soil sample locations were selected based on elevated surface gamma measurements, as well as the spatial distribution within the survey area (i.e., not clustered). Grab samples were collected from non-native materials every five feet until native soil was reached. At least one grab sample of the native soil was also attempted from each location. In several locations, the presence of sandstone bedrock made collection of a native soil sample not feasible. If the depth of non-native material was less than five feet at any location, one sample of non-native material was collected at approximately the middle of the vertical extent of non-native material, and one sample of the native soil was also collected, where possible. Subsurface soil samples collected at the Boneyard and NEMSA included one sample of the pre-cap material at each subsurface location.

Subsurface samples were collected using three methods. Locations where native soil was anticipated to be at depths greater than ten feet bgs were collected using a drilling rig fitted with hollow-stem augers. Locations where native soil was anticipated to be less than 10 feet and were accessible by heavy equipment were collected using test pits dug with a backhoe. A hand auger, the third method, was used in the Unnamed Arroyo. The sample collection methods are outlined in the sections below. A total of 146 subsurface soil samples were collected. A summary of the number of subsurface samples and subsurface sample intervals follows:

- NECR-1: six locations (28 samples); sample depths ranging from 4 to 45 feet bgs
- NECR-2: five locations (6 samples); sample depths ranging form 0.5 to 5 feet bgs
- Sandfill 1: five locations (9 samples); sample depths ranging from 0.5 to 4 feet bgs
- Sandfill 2: five locations (5 samples); sample depths ranging from 0.5 to 2 feet bgs
- Sandfill 3: five locations (7 samples); sample depths ranging from 0.5 to 2 feet bgs
- Pond 1/2: five locations (14 samples); sample depths ranging from 4.5 to 20 feet bgs
- Pond 3/3a: five locations (14 samples); sample depths ranging from 9 to 25 feet bgs
- Sediment Pad: five locations (9 samples); sample depths ranging from 1 to 10 feet bgs
- NEMSA: five locations (13 samples); sample depths ranging from 4 to 8.5 feet bgs
- Boneyard: five locations (11 samples); sample depths ranging from 1 to 9.5 feet bgs
- Unnamed Arroyo: 10 locations (30 samples); sample depths ranging from 0 to 3 feet bgs

Samples were also selected for the analysis of preliminary COPCs in leachate using the SPLP method, as discussed in Section 2.3. Of the total 16 samples selected for SPLP analysis, three were selected from subsurface soil sample locations, the remaining were selected from surface soil sample locations (see Section 2.3). The three subsurface soil samples were collected from Sandfill 1 (two samples) and Sandfill 3 (one sample).

During drilling at soil boring number SB-131, which was located along the northeastern edge of NECR-1, as shown on Figure 2-4, a dark gray clayey material was encountered that had a distinct petroleum odor to it. Consequently, one sample was collected from 22.0 to 23.5 feet bgs and submitted for analysis of Total Petroleum Hydrocarbons by EPA Method 8015B and VOCs by EPA Method 8260B.

Subsurface soils were visually classified in the field in accordance with the Unified Soil Classification System (USCS), and any soil horizons observed during the sample collection were noted in the field books and field logs located in Appendix C. Subsurface soil samples were collected, packaged, and handled according to the protocols in the RSEWP. Subsurface soil samples were placed in the appropriate container, and labeled with date, time, and sample identification. Field duplicates were collected at five percent of the sample locations. Homogeneity was achieved by sampling twice the amount in one bag, then mixing and separating into a separate bag. The EPA did not collect field splits from the subsurface sample locations.

Subsurface soil samples were sent to ELI in Casper, Wyoming for analysis of COPCs and SPLP. Soil samples for SVOC analysis were sent to ELI in Billings, Montana for analysis. The soil samples were analyzed for preliminary COPCs at nine of the on-site survey areas and the Unnamed Arroyo. At the Boneyard, samples for VOCs, SVOCs, and TCLP analysis were also collected.

2.4.1 Hollow-Stem Auger

At subsurface locations where native soil was anticipated to be greater than the depths achievable by a backhoe (greater than 10 ft bgs), sampling was conducted with a drill rig fitted with hollow-stem augers. The hollow-stem auger drill rig was used to collect samples at eight subsurface sample locations, as listed below:

- NECR-1 (five locations)
- Pond 1/2 (two locations)
- Pond 3 (one location)

Water Development Corporation (WDC) was the contractor hired to conduct the drilling. For each soil boring, the soil boring was advanced to the desired interval and an 18-inch split-spoon sampler was lowered into the bottom of the soil boring and driven with blows from a 140-pound hammer falling 30 inches in general accordance with ASTM D1586. The number of blow counts for each six-inch interval was recorded on the boring logs. Sampler refusal is generally indicated if more than 50 blows are required to advance the sampler six inches. This occurred several times, but only after native soil was reached, so there was no need to relocate any of the soil borings. Samples were collected every five feet to total depths from 14 feet to 45 ft bgs.

The split-spoon samplers were decontaminated between each sample interval using Alconox® and distilled water, as per the RSEWP (nitric acid was not used). This assured there would be no cross-contamination of the split-spoon samples. The augers were also decontaminated using a pressure washer and Alconox®.

2.4.2 Test Pits

Test pits were used where native soil was anticipated to be less than ten feet bgs. A total of 43 test pits were excavated, as listed below:

- NECR-1 (one test pit)
- NECR-2 (five test pits)
- Pond 1/2 (three test pits)
- Pond 3/3a (four test pits)
- Sandfill 1 (five test pits)
- Sandfill 2 (five test pits)
- Sandfill 3 (five test pits)
- Sediment Pad (five test pits)

The test pits were excavated using a rubber-tired backhoe that was capable of reaching a maximum depth of ten feet bgs. Dedicated stainless steel spoons were used to collect the soil samples. For test pits that were less than three feet in depth, soil samples were collected by multi-increment scoops along the test pit wall or bottom at the desired interval. For test pits greater than three feet in depth, soil samples were extracted using multi-increment scoops from the bucket of the backhoe. After samples were collected, the excavated soil was used as backfill and the backhoe was used to compact the area.

2.4.3 Hand Auger

A hand-auger was used to collect subsurface soil samples from the Unnamed Arroyo. Initially, only soil samples from zero to one foot bgs from ten transects (three locations per transect) were planned for collection, but as per FCR#001 (see Appendix C), a deeper subsurface investigation was required. As per FCR#001, samples were collected from ten transects oriented perpendicular to the arroyo, from the former NPDES discharge point to its confluence with the next downstream arroyo. The transects are shown schematically on Figure 2-4. One location from the midpoint of each transect was selected and samples were collected in one foot intervals from 0 to 3 feet, for a total of three samples at each of the ten locations.

The hand auger was decontaminated in between every sample interval. The decontamination was conducted in three stages using an Alconox® wash, nitric acid, and de-ionized water. A rinsate blank was also collected at the end of each day by pouring laboratory-grade de-ionized water on the hand auger in order to ensure thorough decontamination.

2.5 DEVELOPMENT OF FIELD SCREENING LEVELS

Screening levels for Ra-226 and arsenic were developed using the background concentrations of the COPCs, as presented in the Technical Memorandum (MWH, 2006). Soil samples for background determination were collected on August 17, 2006 and submitted to ELI of Casper, Wyoming for chemical analysis. The location of the background reference area and the sampling design were selected based on MARSSIM (EPA, 2000a). The area was located to the northwest of the Boneyard, as shown on Figure 2-5, *Surface Soil Sample Locations Background Refrence Area,* and was selected based on the following:

- Similar geology to the Site (Crevasse Canyon Formation);
- Upwind of the predominant wind direction (west to southwest);
- Distance from the Site (approximately one-half mile from permit boundary); and
- No evidence of impacts due to exploration or mining.

A total of 25 surface soil samples and two duplicate samples were collected from the background reference area. The samples were collected using the methods described in the Technical Memorandum. EPA representatives were present during sampling and confirmed background sample locations. Analytical results are summarized in Table 2.4, *Summary of Analytical Results from Background Sampling*; laboratory reports are included in the Appendix B. The concentrations of all analytes were less than the applicable Preliminary Remediation Goals (PRGs), except arsenic and Ra-226. Arsenic and Ra-226 concentrations exceeded both the industrial and residential PRGs in all samples (see Table 2.4). Table 2.4 also shows the mean and standard deviation for each of the COPCs. Screening levels were based on the EPA Superfund Preliminary Remediation Goals (PRGs) for radionuclides (EPA, 2004c) and the EPA Region 9 PRGs for metals and organic constituents (EPA, 2004a).

For Ra-226 plus daughters, the residential, agricultural, and outdoor worker PRGs for soil are 0.0124 pCi/g, 0.000632 pCi/g, and 0.0258 pCi/g, respectively. These values are not achievable by standard

EPA-approved analytical methods. The standard reporting limit (RL) of commercial laboratories using EPA Method 901.1, Ra-226 by gamma spectrometry, is 0.5 pCi/g.

Based on the technical limitations of Ra-226 analysis an alternate FSL was developed for Ra-226. As stated in the RSEWP, the FSL for Ra-226 was based on an acceptable risk range of 10^{-4} for residential scenarios, which results in a FSL of 2.24 pCi/g; (1.24 pCi/g plus the mean of the Ra-226 background concentration 1.0 pCi/g]. The background concentration was determined based on the results of background sampling conducted for the background determination (MWH, 2006b). The results for Ra-226 ranged from 0.6 to 1.3, with an average of 1.0 pCi/g. . However, it is important to note that at the nearby Church Rock I, IE and II Mines, the background gamma exposure rate is 9 uR/hr (Quivera, 1987), which is approximately equivalent to 4.5 pCi/g, as discussed in the following paragraph. Additionally, the average background concentration of Ra-226 throughout the Colorado Plateau is reportedly about 2 pCi/g (EPA, 2005).
Exposure rate levels above background levels at former uranium facilities are primarily from Ra-226 in soil. A linear regression between gamma exposure rate and Ra-226 soil concentration was performed to estimate the Ra-226 soil concentration at a gamma exposure rate of 57 uR/hr. The regression was based on exposure rate measurements collected around soil sampling locations obtained during the August 2006 correlation sampling activities at the Site. Based on this informal correlation, a location with 57 uR/hr would have approximately 27 pCi/gm Ra-226 in soil. However, the exposure rates were made at a reconnaissance level, and so were of the general area around each sampling location, not right above the location, which averages the concentration for that specific location. Also, a correlation between exposure rate and soil concentration can be affected by gamma shine related to the area geometry and contamination distribution.

The Site background value of 1.0 pCi/g appears to be on the low end of the range of concentrations seen in the region. The background value at the adjacent Quivera Mines is approximately 4.5 pCi/g (see discussion above). Other examples include: the NRC approved a Ra-226 soil background value for the Bluewater Mill Site (approximately 10 miles from Grants) of 1.9 pCi/g, and both the NRC and EPA approved a Ra-226 soil background value for the Homestake Mining Company Mill Site (approximately six miles from Grants) of 5.5 pCi/g (Nat Patel, personal communication). Additionally, the average background concentration of Ra-226 throughout the Colorado Plateau is about 2 pCi/g. (EPA Detailed Comments on EIS for Moab Uranium Mill Tailings Site). One possible explanation for the lower background value observed in the background reference area, is that the soils there are near an arroyo and may be largely of alluvial origin where the finer-grained material (silts and clays) may have been washed out. Radionuclides tend to adhere or bond to the finer grained particles, and so can be washed out of the coarser material.

Since all of the background arsenic concentrations exceeded the PRGs, the mean of the background arsenic concentrations (3.7 mg/kg) was used as the screening level for arsenic. The residential non-cancer PRG for arsenic is 22 mg/kg, and the industrial non-cancer PRG is 260 mg/kg. The screening levels for vanadium, molybdenum, and selenium were based on the EPA Region 9 PRGs, as shown on Table 2.4.

2.6 SITE RECONNAISSANCE

During the course of site reconnaissaince and site walk-overs, the following new survey areas were identified based on obvious mining-related activity or structures, as listed below.

- Vent Holes 3 and 8 – surficial disturbance and mounded soil.

- Trailer Park – surficial distubance

- NECR-2 Drainage - at less than two meters bgs, partially buried drums were observed on the ground surface.

- Magazine - at less than two meters bgs, construction debris and trash was observed.

- Fuel Oil Storage Area - at less than 2 meters bgs, no known material.

All of these areas were investigated during the RSE. Both the Vent Hole 3/8 area and the Trailer Park were investigated using gamma radiation scan surveys, judgmental gamma radiation static surveys, and judgmental surface soil sampling. The NECR-2 Drainage and the Magazine area were investigated coincidentally during the step-out investigation of NECR-2. Static gamma measurements were collected in both areas and step-out surface soil samples from NECR-2 were collected in the Magazine area. The Fuel Oil Storage Area was investigated coincidentally during the step-out investigation of NECR-1.

3.0 FINDINGS AND DISCUSSION

3.1 FIELD GAMMA RADIATION SURVEY DATA

The results of the field gamma radiation surveys presented herein were performed between August 15 and December 1, 2007 at the Site. The gamma radiation surveys consisted of static and scan gamma radiation surveys, as discussed in Section 2.2. The objective of the gamma radiation surveys was to characterize the nature and lateral extent of Ra-226 concentrations in surface soils at the Site. In addition to the surface soils at the Site impacted by past mining activities, impacts may have occurred to the northeast as a result of various transport mechanisms as discussed in the RSEWP. Due to these potential transport mechanisms, the objectives included characterization of radionuclides in surface soils outside the current survey area boundaries, along the Unnamed Arroyo and at the nine Home Sites.

As discussed in Section 2.2, static gamma radiation surveys were performed at on-site survey areas and the Home Site areas. The static gamma radiation level measurements obtained in CPM were recorded in the Static Gamma Radiation Survey Field Forms, which are included in Appendix B. The static gamma radiation reading counts were converted to surface soil Ra-226 concentrations using appropriate linear regression equations from the correlation study, as discussed in Section 2.2.3. All Ra-226 concentrations discussed in this section are the equivalent Ra-226 concentrations and not laboratory Ra-226 concentrations (laboratory Ra-226 concentrations are discussed in Section 3.2). The equivalent Ra-226 surface soil concentrations as determined from the gamma radiation surveys are presented graphically on Figure 3-1, *Results of Field Gamma Radiation Survey* and discussed in the following subsections.

3.1.1 NECR-1

The NECR-1 area was thought to contain non-economic materials and/or low-grade uranium ore, but was not expected to exceed the FSL, thus it was classified in the RSEWP as a potential Class 2 Area. Initially, one-minute static gamma radiation measurement was taken at a total of 156 grid nodes within and extending beyond the initial survey area boundary. The results of these static gamma survey measurements are summarized in Table 3.1, *NECR-1 Static Gamma Radiation Survey Results*. The results show that the surface soil Ra-226 concentrations within the initial survey boundary ranged from <0.6 to 218.8 pCi/g (averaged 29.8 pCi/g). The results show that the surface soil concentrations are above the FSL of 2.24 pCi/g at 153 of 156 locations (98% of the area). Gamma radiation readings exceeded the FSL of 4,600 CPM over 80% of the static survey points, therefore, no gamma radiation scan was performed to further identify hot spots within NECR-1.

The surface soil Ra-226 concentrations at grid points near the initial survey area boundary were above the FSL, as shown on Figure 3-1. A total of 149 step-out static gamma radiation survey measurements, as shown in Table 3.1 and Figure 3-1, were performed beyond the initial survey area boundary of NECR-1 to delineate the lateral extent of surface soil contamination. The levels measured during the step-out static gamma radiation survey for the NECR-1 were above the FSL at the outermost locations in three primary areas: to the east within the parking area and across Red Water Pond Road, to north towards and around the Home Sites, and in the IX Plant area. The area around the IX Plant consists of a near-vertical cliff that represents a natural, physiographic boundary, and does not warrant additional investigation. However, the areas to the north towards the Home Sites and to the east across Red Water Pond Road represent potential data gaps in definitively determining the FSL boundary, however results to the north are increasingly likely to represent disturbances or impacts associated with historical mining or exploration activities on the Quivera Mining Company lease, and results to the east appear to be related to the construction or historical use of the former Quivera mine haul road . The static gamma radiation survey was stopped for boundary delineation based on the criteria discussed in Section 2.2.4.1, and as follows:

- At the bank of the Unnamed Arroyo to the west and northwest.
- The Home Sites and wooded area with native soils to the north;
- The property fence, road and the Trailer Park area to the east and southeast.
- The boundary of Sandfill 1, Ponds 1 and 2, and Pond 3/3a to the southeast, south and southwest.

The gamma survey measurements and soil sample analytical results were then used to confirm or adjust the FSL boundary locations.

The gamma survey results at the 149 step-out locations from NECR-1 ranged from <0.6 to 85.8 pCi/g (averaged 8.9 pCi/g). The surface soil Ra-226 levels within the entire NECR-1 area including the step-out locations averaged 19.6 pCi/g.

3.1.2 NECR-2

The NECR-2 area, similar to NECR-1, was thought to contain non-economic materials and/or low grade uranium ore, but was not expected to exceed the FSL, therefore, it was also classified as a potential Class 2 survey area in the RSEWP. Initially, one-minute static gamma radiation measurements were obtained at a total of 75 grid nodes within, and extending beyond, the initial survey area boundary. The results of these static gamma survey measurements are summarized in Table 3.2, *NECR-2 Static Gamma Radiation Survey Results*. The results show that the surface soil Ra-226 concentrations ranged from <0.6 to 215.2 pCi/g (averaged 22.6 pCi/g); 64 out of the 75 (85%) exceeded the FSL. Gamma radiation readings exceeded the FSL of 4,600 CPM at over 80% of the static survey points; therefore, no scan gamma radiation survey was performed to delineate hot spots. Also, the surface soil Ra-226 concentrations at most of the grid points close to the initial survey area boundary were above the FSL, as shown on Figure 3-1.

Static gamma radiation measurements were made at 43 step-out locations around NECR-2 to delineate the lateral extent of Ra-226 in surface. The gamma radiation levels at the step-out locations were mostly above the FSL, except along the western boundary. Therefore, the static gamma radiation survey was stopped for boundary delineation based on the criteria discussed in Section 2.2.4.1, as follows:

- To the west until the readings were below the FSL.
- To the boundary of Sandfill 3 and Magazine area to the north.
- The wooded areas with native soils to the east.
- To the mesa cliff and Sandfill 2 to the southeast and south.

The gamma survey measurements and soil sample analytical results were then used to confirm or adjust the FSL boundary locations.

The gamma survey conducted at the 43 step-out locations indicated that Ra-226 ranged from <0.6 to 19.2 pCi/g (averaged at 3.4 pCi/g). The equivalent Ra-226 concentrations in surface soil within the entire NECR-2 area, including step-out locations and Magazine area averaged 15.6 pCi/g.

3.1.3 Sandfill 1

Sandfill 1 was previously remediated by UNC to remove mill tailings material (UNC, 1989). However, this area could contain residual ore material, and was expected to contain soils with Ra-226 in excess of the FSL. The area was therefore classified as a potential Class 1 Area in the RSEWP. A one-minute static gamma radiation survey was performed at 76 grid nodes within and just outside of the initial survey area boundary. The static gamma survey results are summarized in Table 3.3, *Sandfill 1 Static Gamma Radiation Survey Results*. The results show that the equivalent surface soil Ra-226 concentrations ranged from non-detect (<0.6) to 76.0 pCi/g (averaged 9.0 pCi/g); 45 of 76 (59%) exceeded the FSL of 2.24 pCi/g. The gamma radiation readings exceeded the FSL of 4,600 CPM at 62 of 73 (over 80%) static survey points; therefore, no scan gamma radiation survey was performed to delineate additional hot spots while in the field. Equivalent surface soil Ra-226 concentrations exceeded the FSL at some grid points around the area boundary, as shown on Figure 3-1. The Sandfill 1 survey was stopped for boundary delineation, based on the criteria discussed in Section 2.2.4.1, as follows:

- Pond 1 and 2 to the west.
- NECR-1 to the north.
- A road and cliff to the east.
- Concentrations below the FSL to the south.

The gamma survey measurements and soil sample analytical results were then used to confirm or adjust the FSL boundary locations.

Additional static and scan gamma radiation surveying was not performed for boundary delineation (i.e., step-outs) due to the physical limitations around the survey area. The survey did however provide sufficient data for establishing the area boundary. It is important to note that equivalent Ra-226 levels were below the FSL at 11 grid points (#16, 17, 20–22, 26-29, 35, and 36) within the interior of the area (see Figure 3-1).

3.1.4 Sandfill 2

Sandfill 2 was also remediated previously by UNC to remove mill tailings material (UNC, 1989). However, this area could contain residual ore material, and was expected to contain soils with Ra-226 in excess of the FSL. The area was therefore classified as a potential Class 1 Area in the RSEWP. A one-minute static gamma radiation survey was performed at 21 grid nodes. The static gamma survey results are summarized in Table 3.4, *Sandfill 2 Static Gamma Radiation Survey Results*. The results show that the surface soil Ra-226 levels ranged from non-detect (<0.6) to 26.0 pCi/g (averaged 5.6 pCi/g); 12 of 21 (57%) exceeded the FSL of 2.24 pCi/g. Gamma radiation measurements exceeded the FSL of 4600 CPM at over 80% of the static survey points; therefore, no scan gamma radiation survey was performed to delineate hot spots.

Equivalent Ra-226 levels around the area boundary were near or below the FSL along the west, south and east boundary, as shown on Figure 3-1. Sandfill 2 was therefore bounded based on the criteria discussed in Section 2.2.4.1, as follows:

- By NECR-2 to the north.
- By a mesa cliff and Ra-226 levels below the FSL to the east.
- By Ra-226 levels below the FSL to the west and south.

The gamma survey measurements and soil sample analytical results were then used to confirm or adjust the FSL boundary locations. No step-out gamma survey was necessary for boundary delineation. The revised boundary is shown on Figure 3-1.

3.1.5 Sandfill 3

Sandfill 3 was also remediated previously by UNC to remove mill tailings material (UNC, 1989). However, this area could contain residual ore material, and was expected to contain soils with Ra-226 in excess of the FSL. The area was therefore classified as a potential Class 1 Area in the RSEWP. A one-minute static gamma radiation survey was performed at the 28 grid nodes. The static gamma survey results are summarized in Table 3.5, *Sandfill 3 Static Gamma Radiation Survey Results*. The surface soil concentrations within the initial area boundary ranged from non-detect (<0.6) to 133.6 pCi/g (averaged 20.9 pCi/g); 25 of 28 (89%) exceeded the FSL. Gamma radiation readings exceeded the FSL of 4,600 CPM at over 80% of the static survey points; therefore, no scan gamma radiation survey was performed to delineate hot spots. A step-out static gamma survey was performed at 15 grid points for boundary delineation. The survey area boundary was confirmed based on the criteria discussed in Section 2.2.4.1, as follows:

- Gamma readings below the FSL and wooded hills with undisturbed, native soils to the west.
- The boundary of NECR-2 to the south and east.
- The boundary of the Sediment Pad to the north.

The gamma survey measurements and soil sample analytical results were then used to confirm or adjust the FSL boundary locations. As shown in Table 3.5, equivalent Ra-226 levels at the step-out locations ranged from non-detect to 14.9 pCi/g (averaged 3.1 pCi/g).

3.1.6 Ponds 1 and 2

Ponds 1 and 2 were considered as one area during the RSE due to their proximity and similarity in mining process and operations. The ponds could contain sediments from the historical mine water treatment that have Ra-226 concentrations in excess of the FSL, and the area was therefore classified as potential Class 1. Results of the static gamma radiation survey at 85 grid points within this area are shown in Table 3.6, *Pond 1 and Pond 2 Static Gamma Radiation Survey Results* and Figure 3-1. Ra-226 concentrations ranged from non-detect (<0.6) to 498.3 pCi/g (averaged 45.8 pCi/g); 76 of 85 (89%) locations exceeded the FSL. Gamma radiation readings exceeded the FSL of 4,600 CPM at over 80% of the static survey points; therefore, no scan gamma radiation survey was performed in this area to delineate hot spots. The survey area boundary was confirmed based on the criteria discussed in Section 2.2.4.1, as follows:

- By the steep pond bank and Pond 3/3a boundary to the north.
- Steep cliffs and Sandfill 1 to the east.
- Steep cliffs and wooded areas with undisturbed native soils to the south and west.

The gamma survey measurements and soil sample analytical results were then used to confirm or adjust the FSL boundary locations. No step-out gamma survey was necessary for boundary delineation.

3.1.7 Pond 3/3a

Ponds 3 and 3a were considered as one area (Pond 3/3a) during the RSE due to their proximity and similarity of mine water treatment operations. Both ponds contained radium sulfate precipitated mine discharge water during mine operations, and may contain residual radium sulfate in the pond sediments. Due to the potential for exceedances of the FSL, the area was classified as a potential Class 1 Area in the RSEWP. Results of the static gamma radiation survey at the initial 69 grid nodes in the Pond 3/3a are summarized in Table 3.7, *Pond 3/3a Static Gamma Radiation Survey Results*. Four of the planned grid points were located under water and were therefore eliminated from the survey. The results show that the surface soil Ra-226 concentrations ranged from <0.6 to 293.6 pCi/g (averaged 25.5 pCi/g) within the initial area boundary. Ra-226 concentrations exceeded the FSL at 67 of 69 locations (97% of the area), as shown on Figure 3-1. Gamma radiation readings exceeded the FSL of 4,600 CPM at over 80% of the static survey points; therefore, no gamma survey was performed to delineate hot spots within Pond 3/3a.

Pond 3/3a was bounded based on the criteria discussed in Section 2.2.4.1, including the Sediment Pad to the west and NECR-1 to the east. A step-out static gamma radiation survey was performed at a total of 20 grid points along transects beyond the initial south boundary to the base of the Ponds 1 and Pond 2 embankments, and beyond the northern boundary to the base of the mesa cliff to adequately delineate the south and north portions of the area boundary. Results of this step-out static gamma radiation survey are included in Table 3.7; Ra-226 concentrations ranged from non-detect to 11.5 pCi/g (averaged 4.0 pCi/g). As shown on Figure 3-1, the northern boundary is bounded by concentrations below the FSL, while the southern boundary is bounded by a road as well as the Ponds 1 and 2 survey area.

3.1.8 Sediment Pad

The Sediment Pad was used to store sediments removed from the mine water radium precipitation treatment. Therefore, since it was known that the Sediment Pad could contain sediments with Ra-226 in excess of the FSL, the area was classified as a potential Class 1 Area. The one-minute static gamma radiation survey results at the initial 29 grid nodes are included in Table 3.8 *Sediment Pad Static Gamma Radiation Survey Results*. Surface soil Ra-226 concentrations within the initial area boundary ranged from 2.9 to 210.7 pCi/g (averaged 46.3 pCi/g); the FSL was exceeded at all of the initial 29 grid locations (see Figure 3-1). Gamma radiation readings exceeded the FSL of 4,600 CPM at over 80% of the static survey points; therefore no scan gamma radiation survey was performed to delineate hot spots. As shown on Figure 3-1, the Sediment Pad is bounded based on the criteria discussed in Section 2.2.4.1, as follows:

- By the Sandfill 3 to the west and southwest.
- A road and steep wooded hill to the south and southeast.
- By Pond 3/3a to the east.

The gamma survey measurements and soil sample analytical results were then used to confirm or adjust the FSL boundary locations. A step-out static gamma radiation survey for delineation of the northern boundary was performed at 11 points only beyond the northern boundary to the base of the mesa cliff. These results are included in Table 3.8 and summarized on Figure 3-1, and show that step-out surface soil Ra-226 concentration ranged from non-detect to 5.4 pCi/g (averaged 1.6 pCi/g). The northern boundary is therefore bounded by Ra-226 concentrations below the FSL.

3.1.9 Non-Economic Material Storage Area

An investigation by scan gamma radiation survey was specified in the RSEWP for characterization of the NEMSA. The NEMSA contains non-economic materials and/or low-grade ore with a clean soil cover. Ra-226 concentrations were expected to be below the FSL, thus it was classified as a potential Class 2 Area in the RSEWP. However, as a decision was made to suspend the scan survey and collect surface and subsurface soil samples for laboratory analysis instead. This decision was based on site reconnaissance that showed non-economic materials at or near the surface beneath thinner areas of the cap and elevated gamma exposure rate measurements collected at various locations within the NEMSA and the Boneyard Area by EPA and UNC representatives.

3.1.10 Vent Holes 3 and 8

Characterization of the Vent Hole 3 and 8 area was not specified in the RSEWP. This area was included in the RSE because it was identified by the on-site EPA representatives during the field survey. This area consists of areas around Vent Holes 3 and 8, as shown on Figure 3-1. As discussed in Section 2.2, a scan gamma radiation survey was performed with the bare (uncollimated) 2x2 NaI detector #805522-33 within the overall area boundary shown on Figure 3-1 to identify any hot spots above the FSL. The area boundary was determined based on inspection of the ground surface conditions, suspect ore materials, and gamma exposure rate levels around the vent holes.

The scan gamma survey, which was conducted along transects spaced approximately 10 feet apart, identified three locations (small isolated areas of about two to five feet diameter) around Vent Hole 3, and 32 locations around the Vent Hole 8. A static gamma radiation survey was then performed with the bare 2x2 NaI detector at these elevated locations. The results of the static gamma radiation survey are included in Table 3.9, *Vent Hole No. 3 and No. 8 Static Gamma Radiation Survey Results,* and shown on Figure 3-1. Ra-226 surface soil concentrations at the three locations around Vent Hole 3 identified by the scan survey ranged from 4.3 to 15.0 pCi/g. Ra-226 concentrations at the 32 locations identified by the scan survey around Vent Hole 8 ranged from non-detect to 71.6 pCi/g (averaged 19.5 pCi/g); only two locations were below the FSL within the identified hotspots. The scan gamma radiation survey indicated that Ra-226 was below the FSL at all locations outside of the identified hot spots.

Eight or so of the isolated small areas northwest of the Vent Hole 3 and 8 structure are on a mound (see field sketch in Appendix B), where unidentified earthen material was observed; the elevated concentrations could be deeper than 0.5 feet bgs on this mounded area. An apparent sump was also observed in the southwest part of the Vent Hole 3 and 8 structure (see field sketches in Appendix B), where the surface soil concentrations were slightly above the FSL.

3.1.11 Trailer Park Area

The Trailer Park area was also not specified in the RSEWP, but was included in the survey after being identified as potentially impacted area during the field activities. As discussed in Section 2.2, a scan gamma radiation survey was performed in the Trailer Park Area within the area boundary, as shown on Figure 3-1, to identify hot spots above the FSL. The area boundary was determined based on an inspection of the ground surface, visible evidence of mine-related materials, features such as structure foundation pads and fills, and the base of wooded area and hills with undisturbed native soil. The scan survey identified a total of 39 locations (small isolated areas of about 2 to 50 square feet each) within the Trailer Park. Results of the one-minute static gamma radiation survey at these locations are included in Table 3.10, *Trailer Park Area Static Gamma Radiation Survey Results* and shown on Figure 3-1. The results show that surface soil Ra-226 concentrations ranged from 2.5 to 108.7 pCi/g (averaged 16.5 pCi/g). The static survey confirmed all 39 locations within the hotspots identified by the scan survey to be above the FSL. At locations #2, #7, #9, #13, #40, and #41, visible mine-related materials was observed, which could extend deeper than 0.5 feet bgs. The scan gamma radiation survey indicated that Ra-226 was below the FSL at all locations outside of the identified hot spots.

3.1.12 Home Sites

Due to potential wind or storm water, and to a lesser extent human and animal activity, transport of ore material still present at the Site, there was a concern about potential impacts to the nine Home Sites near the downstream end of the of the Unnamed Arroyo where it intersects with the unnamed dirt road that runs east-west along the northern side of the Home Sites, as shown in Figure 2-3. . The Home Sites were classified as potential Class 3 Areas in the RSEWP, and a scan gamma radiation survey was specified to identify any locations above the FSL. As discussed in Section 2.2, a scan gamma radiation survey with a bare (uncollimated) 2x2 NaI detector was performed within a half-acre area around each of the nine Home Sites. The scan survey results showed the gamma radiation levels at or slightly above the background level, but below the FSL (16,600 CPM or 2.24 pCi/g Ra-226 in surface soil) at Home Sites 1 through 5, as shown in field forms in Appendix B. These low levels were confirmed by the results of the one-minute static gamma radiation survey, the results of which are included in Table 3.11, *Home Site Static Gamma Radiation Survey Results*.

At Home Sites 6 through 9, the scan survey results indicated gamma radiation levels from 13,000 CPM (background) to about 34,000 CPM. Results of the static gamma radiation survey, included in Table 3.11, at five elevated locations identified by the scan survey at each of the Home Sites, indicated surface soil Ra-226 concentrations above the FSL. Maximum equivalent Ra-226 concentrations were:

- 4.2 pCi/g at Home Site 6
- 11.0 pCi/g at Home Site 7
- 3.5 pCi/g at Home Site 8
- 3.2 pCi/g at Home Site 9

These results are shown on Figure 3-2, *Results of Gamma Survey and Soil Sampling at the Home Sites*. There are several potential mechanisms that could have contributed to the elevated levels detected at the Home Sites, including transport of windblown material from the NECR on-site areas and the Quivera Mine, historic disturbed areas from Quivera operations in the immediate vicinity of the Home Sites, and transport of eroded sediments from NECR-1 in storm water run off, and transport of windblown materials from the former Quivera haul road. During the NECR-1 step-out survey conducted north of NECR-1 (south of Home Sites #6 and #7), eroded sediment trails from the north slope of the NECR-1 pad were observed.

3.1.13 Unnamed Arroyo

A gamma radiation survey was specified in the RSEWP as a part of the characterization survey for the surface sediments within the Unnamed Arroyo bed. However, a scan gamma radiation survey was not performed, as discussed in Section 2.2, because the August 17, 2006 correlation gamma radiation level measurements and soil sampling data showed that gamma levels and Ra-226 concentrations are above the FSL (>80%) the entire length of the sediment bed from NECR-1 down to the Home Sites (the survey was extended to the unnamed dirt road that runs east-west on the northern side of the Home Sites, as shown on Figure 2-3). Therefore, in consultation with the on-site EPA representatives, a decision was made to eliminate the scan gamma radiation survey, and perform subsurface sediment sampling for laboratory analysis instead to evaluate the vertical extent of Ra-226.

As discussed in Section 2.2, a static gamma radiation static survey was performed at 33 transect locations along the north plus five transect locations on the south bank (downstream end) of the Unnamed Arroyo about two to three feet from the edge of the bank. The results, which are summarized in Table 3.12, *Arroyo Bank Static Gamma Radiation Survey Results,* and on Figure 3-2, indicated that surface soil Ra-226 concentrations ranged from <0.6 to 12.2 pCi/g (averaged 2.7 pCi/g). As can be seen on Figures 3-1 and 3-2, concentrations exceeded the FSL at most locations within 200 feet of NECR-1, but not farther to the northeast of NECR-1, except at two sample locations on the south side of the arroyo bank (3.2 and 12.2 pCi/g). The two farther samples are located approximately 1,100 feet northeast of NECR-1 along the south bank of the Unnamed Arroyo (see Figure 3-2).

The 33 samples collected along the north side of the Unnamed Arroyo included eleven samples collected from within the boundaries of the former IX Plant (see Figures 1-2 and 3-1). The results (see Table 3.12) indicated that equivalent surface soil Ra-226 concentrations in the area of the former IX Plant ranged from 1.3 to 9.5 pCi/g (averaged 4.3 pCi/g). Ra-226 concentrations were above the FSL at all but one of the locations within the boundaries of the former IX Plant. The FSL boundary in that area was based on the results of the static gamma survey and the presence of a near vertical cliff over 40 feet high on the north side of the IX Plant, as shown on Figures 1-2, 1-3 and 3-1.

3.1.14 Gamma Radiation Survey Results Summary

As discussed in the above subsections, the gamma radiation surveys indicated that surface soils within the initial boundaries of each of the on-site areas specified in the RSEWP, contain surface soils with Ra-226 concentrations above the 2.24 pCi/g FSL, as shown on Figure 3-1. A small fraction of the survey points within the initial boundaries areas are below the FSL. The locations of exceedances of Ra-226 (equivalent) are frequent and closely spaced such that delineation of any smaller, clean areas within the interior of the areas was not practical. About 11 survey grid points below the FSL are contiguous enough to isolate a potential, small clean area within Sandfill 1. The results of the static gamma radiation survey discussed above for all areas are further summarized in Table 3.13, *Gamma Radiation Results Summary*. The results show that the average surface soil Ra-226 concentrations, as determined by correlation with the gamma survey results (CPM), within the survey areas are significantly above the 2.24 pCi/g FSL, from approximately four to twenty times the FSL. As shown in Table 3.13, the surface soil Ra-226 concentration range is wide, with high standard deviations near or above the average concentrations indicating sporadic Ra-226 contamination in surface soil.

Based on the static survey level results (i.e., locations below the FSL), an outer boundary for each area was interpreted and is shown on Figure 3-1 as the “FSL Boundary”. This boundary was drawn outside of most exceedances of the FSL. Where the results were inconclusive, the FSL Boundary was determined based on:

- Undisturbed ground, such as in wooded areas with native soils.
- Roads, structures, and fences.
- Topographic limitations such as precipices and steep hillsides.
- Boundaries of adjoining survey areas.

The RSEWP also specified one-point surface soil sampling for laboratory analysis at 20% of the 80-foot triangular grid nodes (sample locations), or at least 13 grid nodes within an area, and five from each of the nine Home Sites as discussed in Section 3.2. The FSL Boundary was confirmed and slightly revised based on the results of the surface soil sampling, as discussed in Section 3.2. Comparisons of surface soil Ra-226 concentrations by soil sampling and by static gamma radiation surveying at 218 points are shown in Table 3.14, *Gamma Radiation Survey and Surface Soil Ra-226 Results Comparison*. The results show that although there may be some variation between Ra-226 surface soil concentrations by soil sampling versus static gamma radiation survey at some locations, the averages are comparable. The average Ra-226 surface soil sampling results at 218 locations is 31.4 pCi/g with a standard deviation of 83.2 pCi/g whereas the static gamma radiation survey results at co-locations showed an average of 28.3 pCi/g with a standard deviation of 55.8 pCi/g. The static gamma radiation survey provided surface soil Ra-226 levels at over 750 additional on-site area locations and enhanced the completeness of surface soil Ra-226 characterization compared to soil sampling for laboratory analysis would have alone.

3.2 SURFACE SOILS METALS DATA

Surface soil samples (≤0.5 feet bgs) were collected from each of the survey areas, and analyzed for the preliminary COPCs (Ra-226, As, Mo, Se, U, and V), except those collected in August 2006 for the initial gamma versus Ra-226 correlation, which were only analyzed for Ra-226. The locations of each of the surface soil sample locations are shown on Figures 2-2 and 2-3, and the analytical results are presented on Figure 3-2, and Figure 3-3, *Surface Soil Analytical Results*. The analytical results are tabulated in Table 3.15, *Summary of Surface Soil Analyical Results, Metals*. These results include the initial correlation samples, the primary surface soil samples, step-out and boundary confirmation samples, and any additional surface soil samples that were collected at subsurface sampling locations. The surface soil validated analytical data are presented in Appendix B, *Laboratory Analytical Data*.

The results show that Ra-226, arsenic, and uranium exceed the screening levels at some locations, while all results for molybedenum, selenium and vanadium were below their respective screening levels (see Table 3.15). Only the surface soil analytical results for Ra-226, total uranium and arsenic are discussed, by survey area, in the following sections. The surface soil analytical results were compared to the Ra-226 FSL and EPA Region 9 industrial PRGs for arsenic and uranium, except the Home Sites, which were compared to EPA Region 9 residential PRGs.

3.2.1 NECR-1

A total of 49 surface soil samples were collected from NECR-1 (see Table 3.15). Of these 49 samples, 31 were primary samples, 17 were step-out samples outside the original area boundary, and one sample was a correlation sample. On-site (within the NECR-1 boundary) concentrations of Ra-226 ranged from 7.0 to 93.3 pCi/g (averaged 39.3 pCi/g); all exceeded the FSL of 2.24 pCi/g. Most of the step-out samples were collected north, northeast, and southeast of NECR-1, as shown on Figure 3-3. To the north of NECR-1, concentrations of Ra-226 exceeded the FSL close to the boundary and then dropped off below the FSL within 100 to 300 feet from the boundary. To the northeast, there are Ra-226 concentrations above the FSL (e.g., locations NECR1-281, -293 and -307). The locations of these samples are shown on Figure 2-3, and the results are shown on Figure 3-3 (sheet 1) NECR1-307 is located adjacent to Red Water Pond Road, which was formerly used as the haul road for the nearby Quivera mine. The results of three samples collected between NECR-1 and Sandfill 1 ranged from 1.3 to 5.2 mg/kg. These results confirmed the gamma survey results, and it was not necessary to revise the FSL Boundary based on the gamma survey results (see Figure 3-3).

Only four out of 49 soil samples collected from NECR-1 exceeded the uranium screening level of 200 mg/kg (See Figure 3-3). Concentrations ranged between 209 and 758 mg/kg. All four of those samples were collected from on-site locations at disparate locations within the area.

On-site arsenic concentrations ranged from non-detect to 8.3 mg/kg (average 3.9 mg/kg), while step-out arsenic concentrations ranged from 2.7 to 14.9 mg/kg (average 6.0 mg/kg). These data indicate that there is no significant difference between on-site and step-out arsenic concentrations. There also does not appear to be a spatial pattern to the arsenic concentrations, or a correlation with Ra-226 concentrations.

3.2.2 NECR-2

Twenty-four surface soil samples were collected from NECR-2 (see Table 3.15). Of these 24 samples, 15 were primary samples, four were step-out samples, and five were correlation samples On-site concentrations of Ra-226 ranged from 1.2 to 160 pCi/g (averaged 27.7), and all but one of the step-out samples exceeded the FSL. The one step-out sample that exceeded the FSL was located northeast of NECR-2, within the Magazine Area. These results confirmed the gamma survey results, and it was not necessary to revise the FSL Boundary (see Figure 3-3).

Only one out of a total of 24 soil samples from NECR-2 exceeded the uranium screening level of 200 mg/kg. That one sample was collected from an on-site location (see Figure 3-3) and was reported to be 370 mg/kg.

On-site arsenic concentrations ranged from 1.3 to 6.4 mg/kg (averaged 3.5 mg/kg), while step-out arsenic concentrations ranged from 3.3 to 8.1 (averaged 5.7 mg/kg). These data indicate that there is no significant difference between on-site and step-out arsenic concentrations. Three of the highest arsenic concentrations were from the three step-out locations samples near the Magazine area. There is no apparent pattern to the spatial distribution of arsenic concentrations, no a correlation with Ra-226.

3.2.3 Sandfill 1

Eighteen surface soil samples were collected from Sandfill 1 (see Table 3.15), three of which were collected at boundary confirmation locations. On-site concentrations of Ra-226 ranged from 0.8 to 47.3 pCi/g (averaged 10.2 pCi/g); 72% exceeded the FSL. All three boundary samples were located to the east of Sandfill 1 and all three exceeded the FSL, but ranged from 3.8 and 5.4 pCi/g (averaged 4.5 pCi/g). These results were used to slightly modify the FSL Boundary (see Figure 3-3).

No results exceeded the uranium screening level of 200 mg/kg.

Arsenic concentrations at Sandfill 1 ranged from 2.0 to 6.7 (average 3.9 mg/kg); 60% exceeded the screening level. All three boundary confirmation samples exceeded the arsenic screening level.

3.2.4 Sandfill 2

Thirteen surface soil samples were collected from Sandfill 2; no step-out samples were required. Ra-226 concentrations ranged from 0.8 to 36.0 pCi/g (average 10.2 mg/kg); 77% exceeded the FSL. These results confirmed the gamma survey results, and it was not necessary to revise the FSL Boundary (see Figure 3-3).

No sample results exceeded the uranium screening level of 200 mg/kg.

Arsenic concentrations ranged from 3.2 to 9.0 mg/kg (average 5.2 mg/kg); 60% exceeded the screening level. The five highest concentrations (above 5.0 mg/kg) were located to the west of the original Sandfill 2 boundary (See Figure 3-3).

3.2.5 Sandfill 3

Sixteen surface soil samples were collected from Sandfill 3. Two were collected at boundary confirmation locations and one sample was collected at a correlation point. Ra-226 concentrations ranged from 1.0 to 123.0 pCi/g (averaged 28.7 mg/kg); all samples but the three on-site samples and the correlation sample exceeded the FSL. The boundary samples were below the FSL. These results confirmed the gamma survey results, and it was not necessary to revise the FSL Boundary (see Figure 3-3).

An additional 10 surface soil samples were collected 50 to 400 feet northwest of Sandfill 3 for the initial gamma versus Ra-226 correlation (see Table 3.15) and were analyzed for Ra-226 only. These samples were collected between the Unnamed Arroyo, the Sediment Pad, Sandfill 3 and the NEMSA, as shown on Figure 3-3. Ra-226 concentrations in these samples ranged from 1.1 to 6.6 pCi/g (average 3.1 pCi/g); 50% exceeded the FSL.

Only one out of 17 samples exceeded the uranium screening level of 200 mg/kg; this sample, at 396 mg/kg, was located in the middle of the survey area.

Arsenic concentrations ranged from 1.5 to 5.3 mg/kg (averaged 3.5 mg/kg); 35% exceeded the screening level.

3.2.6 Ponds 1 and 2

Twenty-five surface soil samples were collected from Ponds 1 and 2 (see Table 3.15). Four of the locations were boundary confirmation samples; three samples resulted from subsurface locations that were not paired with a primary surface sample; and one was a correlation sample. On-site concentrations of Ra-226 ranged from 1.0 to 655 pCi/g (averaged 105.9 pCi/g); 81% exceeded the FSL. Concentrations of Ra-226 were below the FSL at all four boundary confirmation locations. These results confirmed the gamma survey results, and it was not necessary to revise the FSL Boundary (see Figure 3-3).

Only three (on-site) out of 25 soil samples from Ponds 1 and 2 exceeded the uranium screening level of 200 mg/kg. The concentrations of these three samples ranged from 339 to 1,080 mg/kg. Two of these samples were located in the northeast corner of Pond 1, and the third in the northwest corner of Pond 1 (ore material was noted here). These samples coincided with the highest Ra-226 results.

On-site arsenic concentrations ranged from 2.5 to 8.8 mg/kg (average 4.5 mg/kg), while boundary confirmation arsenic concentrations ranged from 2.2 to 4.5 (average 3.0 mg/kg). There does not appear to be a distinct spatial pattern in arsenic concentrations, nor a clear correlation with Ra-226 concentrations.

3.2.7 Pond 3/3a

Sixteen surface soil samples were collected from Pond 3/3a (see Table 3.15); no step-out locations were required. Of the 16 samples, 13 were primary samples, two were from subsurface sample locations, and one was a correlation sample. Concentrations of Ra-226 ranged from 1.4 to 875 pCi/g (averaged 102.1 pCi/g) and all but one exceeded the FSL. These results confirmed the gamma survey results, and it was not necessary to revise the FSL Boundary (see Figure 3-3).

Three out of 16 soil samples from Pond 3/3a exceeded the uranium screening level of 200 mg/kg, corresponding to the three highest Ra-226 concentrations. These three exceedances ranged from 1,020 to 3,970 mg/kg). All three of these samples were collected within the original area boundary from the central and southwest portion of Pond 3.

Arsenic concentrations ranged from 2.7 to 8.1 mg/kg (averaged 5.3 mg/kg); all but two exceeded the screening level. There does not appear to be a spatial pattern in arsenic concentrations, nor a correlation with Ra-226 concentrations.

3.2.8 Sediment Pad

Thirteen primary surface soil samples and one additional sample paired with a subsurface location were collected from the Sediment Pad (see Table 3.15); no step-out locations were required. Concentrations of Ra-226 ranged from 1.5 to 236 pCi/g (averaged 60.5 pCi/g); all but one exceeded the FSL. These results confirmed the gamma survey results, and it was not necessary to revise the FSL Boundary (see Figure 3-3).

Three out of 14 soil samples collected from the Sediment Pad exceeded the uranium screening level of 200 mg/kg. The concentrations were reported to be 363 mg/kg, 366 mg/kg and 1,640 mg/kg. All three exceedances were located in the central portion of the area.

Arsenic concentrations ranged from non-detect to 11.6 mg/kg (average 2.9 mg/kg); only two exceeded the screening level. The two samples exceeding the screening level came from disparate locations.

3.2.9 Non-Economic Materials Storage Area

Five surface soil samples were collected from the NEMSA and were coincident with five judgmental test pit locations. Ra-226 concentrations ranged from 0.9 to 2.6 pCi/g (averaged 1.5 pCi/g) with only one sample slightly exceeding the FSL.

Uranium results were all below the screening level.

Arsenic concentrations ranged from 0.7 to 4.3 mg/kg (averaged 3.4 mg/kg) and three of the samples were just above the arsenic screening level.

3.2.10 Boneyard

Five surface soil samples were collected from the Boneyard and were coincident with five judgmental test pit locations. Ra-226 concentrations exceeded the FSL in only one sample (45.9 pCi/g), located at the southern end of the Boneyard.

Uranium concentrations were all below the screening level.

Arsenic concentrations ranged from 1.3 to 5.5 mg/kg (averaged 3.9 mg/kg). Three of the five samples were above the screening level and one sample was equal to the screening level.

3.2.11 Vent Holes 3 and 8

Five judgmental soil samples were collected from the Vent Hole 3/8 area. This area was not included in the RSEWP, but was added during the field investigation according to FCR#004 (see Appendix C). Ra-226 concentrations ranged from 1.4 to 137 pCi/g (averaged 31.5 pCi/g); all but one sample exceeded the FSL. Uranium concentrations exceeded the screening level at only one location, corresponding to the location with the highest Ra-226 concentration, located in the central portion of the Vent Hole 8 area near the Vent Hole 8 structure. Arsenic concentrations were above the screening level at only one location (5.1 mg/kg), located in the Vent Hole 8 area.

3.2.12 Trailer Park

Five judgmental soil samples were collected from the Trailer Park. This area was not included in the RSEWP, but was added during the field investigation according to FCR#004 (see Appendix C). Ra-226 concentrations ranged from 2.1 to 33.2 pCi/g (averaged 4.2 pCi/g); three of the samples exceeded the FSL. These three samples were all located at the northern end of the area (see Figure 3-3). Uranium concentrations were all less than the screening level. Arsenic concentrations ranged from non-detect (<0.5 mg/kg) to 6.1 mg/kg (averaged 4.2 mg/kg), with no apparent spatial pattern and no correlation with Ra-226..

3.2.13 Home Sites

Five surface soil samples were collected from each of the nine Home Sites in the areas where the highest readings were obtained from the gamma radiation scan survey. Overall, Ra-226 concentrations ranged from 0.9 to 29.6 pCi/g (averaged 16.6 mg/kg). All results were below the FSL for Home Sites 1, 2, 3 and 5 (see Figure 3-2). Ra-226 exceeded the FSL in 100% of the samples collected around Home Sites 6, 7, 8 and 9 and in two of the five samples from around Home Site 4. A summary of the surface soil results for these five Home Sites is as follows:

- Home Site 4 – Ra-226 ranged from 1.3 to 3.6 pCi/g and two samples exceeded the FSL.
- Home Site 6 – Ra-226 ranged from 5.6 to 14.9 pCi/g and all five samples exceeded the FSL.
- Home Site 7 – Ra-226 ranged from 3.4 to 29.6 pCi/g. Removing the highest value in the range decreased to 3.4 to 9.4 pCi/g.
- Home Site 8 – Ra-226 ranged from 2.3 to 5.6 pCi/g. All five samples exceeded the FSL; however, two samples (2.3 and 2.5 pCi/g) were just above the FSL.
- Home Site 9 – Ra-226 ranged from 2.6 to 6.7 pCi/g and all five samples exceeded the FSL.

The results of the post-excavation soils removal confirmation sampling and analysis conducted by the EPA subsequent to the RSE investigation are included in Appendix D.

Uranium concentrations ranged from 0.7 to 20.5 mg/kg (averaged 4.5 mg/kg). The residential PRG of 16 mg/kg for uranium was exceeded at two sample locations; one from around Home Site 7 (20.5 mg/kg) and the other from around Home Site 9 (19.1 mg/kg).

Arsenic concentrations ranged from 2.8 to 5.5 mg/kg (averaged 4.2 mg/kg); 60% exceeded the screening level. There does not appear to be a correlation between arsenic concentrations and Ra-226 concentrations in surface soils collected around the Home Sites.

Molybdenum results were all non-detect (<5.0 mg/kg).

Selenium concentrations ranged from non-detect to 6.3 mg/kg and were all below the screening level of 5,100 mg/kg, as well as the residential PRG of 390 mg/kg.

Vanadium concentrations ranged from 21.5 to 49.7 mg/kg and were all below the screening level of 1,000 mg/kg, as well as the residential PRG of 78 mg/kg.

3.2.14 Unnamed Arroyo

Fifteen surface soil samples were collected from the Unnamed Arroyo during the correlation sampling in August 2006, and analyzed for Ra-226. Ra-226 ranged from 9.7 to 26.4 pCi/g (averaged 16.8 pCi/g); 100% exceeded the FSL. Because of these results, additional surface soil samples were not collected as planned in the RSEWP, and instead subsurface soil samples were collected according to FCR#001 (see Appendix C). The results of the subsurface soil sampling are discussed in Section 3.3.

3.2.15 Surface Soil Analytical Results Summary

Table 3.15 includes a statistical summary of the surface soils, which shows the following:

- Ra-226 values ranged from 0.8 to 875 pCi/g (averaged 30.6 pCi/g); 70% of the 263 surface soil samples analyzed for Ra-226 [includes stepouts] exceeded the FSL of 2.24 pCi/g.
- Toal uranium values ranged from 0.7 to 3,970 mg/kg (averaged 79.7 mg/kg); 7% of the 229 samples analyzed for total uranium exceeded the screening level of 200 mg/kg (industrial

PRG). Two samples from the forty-five samples collected from around the Home Sites exceeded the residential screening level of 16 mg/kg.

- Arsenic values ranged from non-detect (<0.5 mg/kg) to 14.9 mg/kg (averaged 4.2 mg/kg); 54% of the 229 samples analyzed for arsenic exceeded the screening level of 3.7 mg/kg. There did not appear to be a pattern to the spatial distribution of arsenic. The presence, absence or range of concentrations of arsenic do not consistently correlate with higher or lower Ra-226 or uranium concentrations.

- Molybdenuym values ranged from non-detect (<5.0 mg/kg) to 214.0 mg/kg (averaged 3.8 mg/kg); all results were below the screening level of 5,100 mg/kg (industrial PRG).

- Selenium values ranged from non-detect (<0.2 mg/kg) to 159 mg/kg (averaged 9.5 mg/kg); all results were below the screening level of 5,100 mg/kg (industrial PRG), and all samples from the Home Sites were below the residential PRG.

- Vanadium values ranged from 9.0 to 502 mg/kg (averaged 40.2 mg/kg); all results were below the screening level of 1,000 mg/kg (industrial PRG), and all samples from the Home Sites were below the residential PRG.

3.3 SUBSURFACE SOILS METALS DATA

Subsurface soil samples (>0.5 feet bgs) were collected from each of the original on-site survey areas, and the Unnamed Arroyo. Samples were collected from test pits, drill holes, and hand auger borings (Unnamed Arroyo). All subsurface soil samples were analyzed for the preliminary COPCs (Ra-226, As, Mo, Se, U, and V). The locations of each of the test pits, soil borings and auger holes are shown on Figure 2-4, and the analytical results for Ra-226, uranium and arsenic are shown on Figure 3-4, *Subsurface Soil Analytical Results*. The results of these analyses are also tabulated in Table 3.16, *Summary of Subsurface Soil Analyical Results, Preliminary COPCs*. All validated subsurface data is located in Appendix B.

The subsurface data from the on-site survey areas were compared to the FSL for Ra-226 and the EPA Region 9 industrial PRGs for uranium and arsenic. The use of the FSL is not strictly valid in comparison to subsurface metals results, but was used as a rough comparison to surface soil concentrations. Subsurface soil concentrations were primarily used to evaluate the vertical extent of impacts from mining, and to determine the depths to native soils. Soils sample results to depths of 10 feet bgs were used in the HHRA, as discussed in Section 4.0. The analytical results of the subsurface soil samples show that Ra-226, uranium and arsenic exceed the screening levels at some locations, while all results for molybedenum, selenium and vanadium were below their respective screening levels (see Table 3.16).

3.3.1 NECR-1

Twenty-eight subsurface soil samples were collected from five soil borings and one test pit at NECR-1. Total depths of the soil borings ranged from 14 to 45 feet bgs, and were extended into native ground. Ra-226 concentrations ranged from 1.0 to 103.0 pCi/g (averaged 21.4 pCi/g). In all drill holes, Ra-226 exceeded the FSL in the top two samples (5 and 10 feet bgs), except SB-131 on the north edge of NECR-1 (less than the FSL at 10 feet bgs). Ra-226 concentrations exceeded the FSL at depths greater than 10 to 16.5 feet at only one location (SB-090), where it exceeded the FSL in all samples down to 25 feet bgs.

Based on a comparison of pre-mine topography with post-mine topography and observations made during drilling, the approximate depths of the NECR-1 survey area are known. Ra-226 did not exceed the FSL in any samples deeper than the maximum depths of the NECR survey area, as summarized below.

Loc ID	Estimated Depth to Native	Observed Depth to Native	Max Depth of Screening Level Exceedance
SB-016	15-20	18	15
SB-046	25-30	25	10
SB-095	10-15	12	10
SB-090	35-40	28	25
SB-131	15-20	22	5

The estimated depths to native material shown above were based on a comparison of pre-mine to post-mine topography, and the observed depths were based on observations made during the drilling. The maximum depth of the screening level exceedances was based on the depth of the last sample with Ra-226 greater then the screening level; the next sample in each case was collected 5 feet deeper. Non-native material with a distinct petroleum odor was observed at approximately 22 feet bgs in SB-131.

In boring SB-016, native material was observed at 18 feet bgs and the Ra-226 data supported this observation. The first five sampling intervals (starting at 5 feet bgs) reported Ra-226 concentrations of 21.1, 64.6, and 63.1 feet bgs, respectively; Ra-226 decreased to 1.4 pCi/g at 20 feet.

This sharp decrease in Ra-226 concentrations was observed in all five the soil borings. In some instances the decrease coincided with the observed depth in native material such as in SB-016, SB-090 and SB-095. In borings SB-046 and SB-131, it appears that the decrease in Ra-226 concentrations was due to encountering either native soils or reworked native materials. In the impacted fill materials, Ra-226 concentrations ranged between 4.2 and 103 pCi/g, while in native or re-worked native materials, Ra-226 concentrations ranged between 1.0 and 1.9 pCi/g.

The one test pit advanced at NECR-1 was located at the eastern end of the area, outside the main entrance gate, where the NECR survey area is only about five feet thick. The test pit (TP-138) was excavated to 4 feet bgs (native bedrock encountered) and sampled from 3.5 to 4 feet bgs. The FSL for Ra-226 was exceeded (24.2 pCi/g) in this one sample.
Uranium concentrations exceeded the screening level in only five samples from two soil borings (SB-046 and SB-090). In SB-090, uranium concentration exceedances ranged from 218 to 331 mg/kg. The shallowest uranium exceedance was reported at 25 feet bgs and corresponded with a Ra-226 concentration of 48.9 pCi/g. The three subsequent (deeper) uranium exceedances were 313, 331, and 240 mg/kg at 30, 35, and 40 feet bgs, respectively, corresponding to Ra-226 concentrations between 1.2 and 1.7 pCi/g. At 45 feet bgs, the uranium concentration decreased to 165 mg/kg and the Ra-226 concentration at this depth was 1.3 pCi/g. The only exceedance of uranium in SB-046 (337 mg/kg) was reported at a depth of 15 feet bgs and the Ra-226 concentration in this sample was 1.3 mg/kg.

The concentrations of uranium and Ra-226 in the next sample (20 feet bgs) were 3.4 mg/kg and 1.0 pCi/g, respectively.

Arsenic concentrations ranged from non-detect (<0.5 mg/kg) to 7.9 mg/kg (averaged 6.9 mg/kg). In all five soil borings, arsenic exceeded the screening level. Many of the exceedances were within the native material, coincident with Ra-226 concentrations less than the FSL, but not in all cases (see Table 3.16).

These results indicate that impacted materials generally extend to 10 to 15 feet bgs, except for the area around SB-090, where it extends to approximately 25 feet bgs. Soil boring SB-090 is located near the northwestern edge of NECR, and near an erosional gulley on the sideslope of the NECR-1 where the depth of NECR-1 is greatest.

3.3.2 NECR-2

Six subsurface soil samples were collected from five test pits at NECR-2. Ra-226 concentrations ranged from 1.2 to 12.6 mg/kg (averaged 5.9 pCi/g); all but one sample exceeded the FSL. The maximum depth of the test pits was from 1.0 to 5.0 feet bgs. Most areas of NECR-2 contain less than five feet of non-native or re-worked native materials. The eastern portion of the area appeared to have been cut, as the soils observed appeared to be primarily native. In the northwestern corner, around TP-052, the area appeared to have been filled in, possibly with the soil removed from the eastern portion of the area. Based on a comparison of pre-mine to post-mine topography, the northwestern corner of the area appears to be 15 to 20 feet deep, consisting primarily of native material.

At test pit location TP-015 in the southwestern corner of NECR-2, sandstone bedrock was observed at one foot bgs and excavating could not proceed any deeper. A sample was collected from 0.5 to 1.0 feet bgs and the Ra-226 concentration was 2.5 pCi/g, just above the FSL. Similarly, sandstone bedrock was observed at 1.5 feet bgs in TP-020 and excavating could not proceed any deeper. The Ra-226 concentration in the sample collected from 1.0 to 1.5 feet bgs was 1.2 pCi/g.

Native soils were logged in TP-035 (middle of area) from the ground surface to bedrock at 1.5 feet. The concentration of Ra-226 in the sample collected from 1.0 to 1.5 feet bgs was 10.4 pCi/g. This was also the case at TP-039 (eastern edge of area) where native soils were observed to bedrock at 1.5 bgs, and the sample collected from 1.0 to 1.5 ft bgs had a Ra-226 concentration of 5.5 pCi/g. Test pit TP-052 , located in the northwestern corner of NECR-2 contained non-native and reworked native materials to at least 4.0 feet bgs. The soil sampled collected from 1.5 to 2.0 bgs contained Ra-226 at 12.6 pCi/g, the highest in NECR-2. In what appeared to be native soils, the concentration of Ra-226 decreased to 2.9 pCi/g, just above the FSL.

Uranium and arsenic concentrations were all below the screening levels in the subsurface samples collected from NECR-2.

3.3.3 Sandfill 1

Nine subsurface soil samples were collected from five test pits in Sandfill 1. Ra-226 concentrations ranged from 0.6 to 113.0 pCi/g (averaged 39.4); all but one sample exceeded the FSL. Maximum sample depths ranged from 1.0 to 4.0 feet bgs. During test pitting, non-native material was observed to be as much as approximately 3.5 feet deep.

Native soils were observed starting at the surface of TP-043 to competent bedrock at 1.5 feet bgs. The one sample collected from this test pit from 1.0 to 1.5 feet bgs confirmed the presence of native soil. The concentration of Ra-226 in the sample was 0.6 pCi/g.

Non-native materials were observed to 3.5 feet bgs in TP-030. A shallow sample collected from 1.0 to 1.5 feet bgs reported a Ra-226 concentration of 113 pCi/g. A sample collected from observed native materials from 3.5 to 4.0 feet bgs showed a decrease in Ra-226 concentration to 4.8 pCi/g. Competent sandstone bedrock was encountered at 4.0 feet bgs.

Samples collected from test pits TP-049, TP-063, and TP-068, were similar to TP-030. Non-native materials were observed at depths ranging from 1.5 to 3.5 ft bgs. In all three test pits, sandstone bedrock was encountered at the bottom of the test pit. The samples collected above the bedrock reported a decrease in Ra-226 and usually uranium concentrations when compared to the samples collected in the non-native materials. The concentration of Ra-226 in the non-native materials from these three test pits ranged from 57.4 to 75.8 pCi/g, whereas, the Ra-226 concentration above the bedrock ranged from 6.4 to 8.8 pCi/g.

Uranium concentrations were all below the screening level in the subsurface samples collected from Sandfill 1.

Arsenic concentrations ranged from 1.1 to 13.9 mg/kg (average 5.3 mg/kg); four of the samples that exceeded the arsenic background screening level were at locations coincident with Ra-226 FSL exceedances. However, the arsenic exceedances were all reported in the deeper sample collected above the sandstone bedrock. The shallow samples collected in the non-native materials did not report any exceedance of arsenic above background.

3.3.4 Sandfill 2

Five subsurface soil samples were collected from five test pits in Sandfill 2, which shares its northern boundary with NECR-2. Ra-226 concentrations ranged from 1.1 to 3.8 pCi/g (averaged 2.2 pCi/g); only two of the samples were slightly above the FSL (see Figure 3-4). Both of the samples with FSL exceedances were located in the southern portion of Sandfill 2 and the Ra-226 concentrations were 2.4 and 3.8 pCi/g in TP-008 and TP-012, respectively. Native materials were observed starting from the ground surface until bedrock was encountered at depths ranging from 1.0 to 3.0 feet bgs. Samples were collected approximately at the midpoint between the ground surface and sandstone bedrock.

Uranium concentrations were all below the screening level in the subsurface samples collected from Sandfill 2.

Arsenic concentrations ranged from 3.1 to 5.3 mg/kg (averaged 3.9 mg/kg). Except for one sample, the arsenic concentrations ranged from 3.1 to 3.8 mg/kg very close to the mean background concentration of 3.7 mg/kg.

3.3.5 Sandfill 3

Seven subsurface soil samples were collected from five test pits in Sandfill 3. Ra-226 concentrations ranged from 1.2 to 84.1 pCi/g (averaged 27.8 pCi/g); all but one sample exceeded the FSL. Maximum sample depths ranged from 1.0 to 2.0 feet bgs. During test pitting, non-native material was observed to approximately 1.5 feet deep. At test pit locations TP-006, TP-009, and TP-025, native soil was logged starting at the surface to sandstone bedrock at a depth of 1.0 foot. The concentrations of Ra-226 in the soil samples from 0.5 to 1.0 feet bgs above the bedrock ranged from 5.1 to 27.8 pCi/g.

Non-native fill materials were observed in TP-005 and TP-014 to a depth of approximately 1.0 to 1.5 feet bgs. The concentration of Ra-226 in TP-005 decreased from 40.8 to 28.1 pCi/g between the fill and native intervals. Sandstone bedrock was encountered at 2.0 feet bgs. The concentrations of Ra-226 in TP-014 were reported as 1.2 pCi/g and 84.1 pCi/g for the 0.5 to 1.0 feet bgs and the 1.0 to 1.5 feet bgs sample intervals, respectively. Since the log for this test pit reports the fill/native soil interface as 1.0 feet bgs, there is a possibility that the sample labels were inadvertently switched for this location.

Uranium concentrations ranged from 21.1 to 488 mg/kg (averaged 162.6 mg/kg). The two samples that exceeded the uranium screening level (227 and 488 mg/kg) were the two samples collected from TP-014.

Arsenic concentrations ranged from 0.8 to 6.9 mg/kg (averaged 3.9 mg/kg); all but two of the samples exceeded the screening level.

3.3.6 Ponds 1 and 2

Fourteen subsurface soil samples were collected from two soil borings and three test pits in Ponds 1 and 2. The soil borings extended to 15 and 20 feet bgs. The maximum sample depths collected from the test pits were between 5.0 and 9.5 feet bgs. Ra-226 concentrations ranged from 0.7 to 438 pCi/g (averaged 71.2 pCi/g). No exceedances of the FSL occurred in samples from SB-071, which was located in the Pond 1 berm along the road on the north side of the ponds (see Figures 2-3 and 3-4). The FSL was exceeded in the 5 and 10 foot samples only from SB-082, which was sampled to 20 feet bgs. Native material was observed at a depth of 15 feet bgs at SB-082. The concentration of Ra-226 decreased from 12.2 to 1.1 pCi/g between the 10 - and 15 -foot bgs samples in this boring.

The highest Ra-226 concentrations detected in Ponds 1 and 2 were 417 and 438 pCi/g. These two samples were collected in Pond 1 at 1.5 and 5.0 feet bgs from test pits TP-035 and TP-058, respectively. These two test pits are located on the western side of Pond 1 with TP-035 near the lowest point in the pond. The Ra-226 concentration decreased to 1.3 pCi/g in the 8.5 to 9.0-foot bgs sample interval in TP-058; however, bedrock sandstone was not reached in this test pit. A decreasing trend in Ra-226 concentrations was also observed in TP-035 with Ra-226 concentrations reported in the 2.0 to 2.5 feet bgs and 9.0 to 9.5 feet bgs sample intervals as 41.5 and 19.6 pCi/g, respectively. It did not appear that native soil was reached in TP-035 and the depth of impacted pond sediments appears to be greater than 10 feet bgs.

The only subsurface samples collected from Pond 2 were from TP-030 near the center of the pond. The lowest location in the pond was not accessible due to soft, muddy ground conditions. The Ra-226 concentration in non-native pond materials was reported as 41.3 pCi/g in the 2.0 - to 3.0-foot bgs sample interval. Native materials were observed starting at 4.0 feet bgs to the depth of the test pit at 7.0 feet bgs. The sample collected from 4.0 to 5.0 feet bgs in the logged native materials reported a decreased Ra-226 concentration of 6.2 pCi/g.

The maximum depths of non-native material within Pond 1 and Pond 2 are 5 and 15 feet, respectively, based on a comparison of pre-mine to post-mine topography. This assumes no excavation into native ground was conducted during pond construction. Pond 1, based on test pit observations, contains over three meters of construction debris and pond sediments.

Uranium concentrations ranged from 1.3 to 760 mg/kg (averaged 116.7 mg/kg). The screening level was exceeded in three samples (206 to 760 mg/kg), collected from test pits TP-035 and TP-058, where the two highest Ra-226 concentrations were detected.

Arsenic concentrations ranged from 1.4 to 6.8 mg/kg (averaged 4.9 mg/kg); all but two samples exceeded the screening level, including locations where Ra-226 was below the FSL.

3.3.7 Pond 3/3a

Fourteen subsurface soil samples were collected from one soil boring and four test pits in Pond 3/3a. The soil boring was sampled every five feet to 25 feet bgs. The maximum sample depths collected from the test pits were from 9.0 to 9.5 feet bgs. Ra-226 concentrations ranged from 0.7 to 15.7 pCi/g (averaged 3.4 pCi/g). There were no exceedances of the FSL from SB-061, which was located on the berm road between NECR-1 and Pond 3 on the east side of Pond 3 (see Figures 2-3 and 3-4). Ra-226 exceeded the FSL in only three of the test pit samples.

The concentration of Ra-226 in TP-007, located between Ponds 3 and 3a, was 4.5 pCi/g in the 5.0 to 5.5-foot bgs sample. The Ra-226 concentration at 9.0 to 9.5 feet bgs was 0.7 pCi/g and this sample appeared to be in native or re-worked native material. No exceedance of the FSL was reported in TP-014 and TP-037 at depths greater than 5.0 feet bgs. However, it was difficult to tell if the materials were pond sediments or native materials at these locations. No samples between 0.5 and 5.0 feet bgs were collected in these two locations; therefore, Ra-226 concentrations greater than the FSL could exist between the surface and 5.0 feet bgs. This observation is supported by the Ra-226 results from TP-029 located between TP-014 and TP-037. In TP-029, Ra-226 concentrations exceeded the FSL in the 3.0 to 3.5 foot bgs and 6.0 to 6.5 foot bgs sample intervals. The Ra-226 concentrations were reported to be 14.3 and 15.7 pCi/g, respectively. However, the Ra-226 concentration (2.1 pCi/g) decreased to below the FSL in the 9.0 to 9.5 foot bgs interval in the bottom of TP-029.

The maximum depth of non-native material within Pond 3/3a is 10 feet, based on a comparison of pre-mine to post-mine topography; this assumes no excavation into native ground was conducted during pond construction.

Uranium concentrations were all well below the screening level in the subsurface samples collected from Pond 3/3a.

Arsenic concentrations ranged from 2.9 to 6.7 mg/kg (average 4.7 mg/kg); all but three samples exceeded the screening level, at locations with Ra-226 both above and below the FSL.

3.3.8 Sediment Pad

Nine subsurface soil samples were collected from five test pits at the Sediment Pad. Ra-226 concentrations ranged from 2.8 to 165 pCi/g (averaged 70.0 pCi/g); all of the samples exceeded the FSL. Maximum sample depths ranged from 1.0 to 10.5 feet bgs.

Non-native fill materials were observed to a depth of 3.0 feet in TP-006, located on the west side of the Sediment Pad. The Ra-226 concentration reported from the fill sample (1.5 to 2.0 feet bgs) was 92.9 pCi/g. The sample collected from the observed native soil (3.0 to 3.5 feet bgs) showed a decrease in Ra-226 concentration to 2.8 pCi/g, just slightly above the FSL. This same trend was observed at TP-012 and TP-014. However, the depths of fill materials at these locations were between 1.0 and 1.5 feet bgs and the native soil Ra-226 concentrations were 2.9 and 9.8 pCi/g at TP-012 and TP-014, respectively.

The location investigated on the east side of the Sediment Pad, TP-021, appeared to be located over a historic pond. Both fill samples from this test pit exceeded the FSL (99.7 and 86.3 pCi/g) and the depth of fill materials exceeded the depth of the excavator (10.5 bgs).

Only one sample was collected from TP-026 where bedrock was encountered at 3.0 feet bgs. The test pit logs reported that the sample was collected in what appeared to native soils; however, the concentration of Ra-226 was 86.6 pCi/g, greater than the FSL.

The maximum depth of non-native material within the Sediment Pad is 10 feet, based on a comparison of pre-mine to post-mine topography. This assumes no excavation into native ground was conducted during pad construction.

Uranium concentrations ranged from 68.6 to 357 mg/kg (averaged 161 mg/kg). Three of the samples exceeded the screening level, at locations coincident with higher Ra-226 concentrations.

Arsenic concentrations ranged from non-detect to 5.5 mg/kg (averaged 2.7 mg/kg); four of the samples exceeded the screening level, generally at locations coincident with the lowest Ra-226 concentrations.

3.3.9 Non-Economic Materials Storage Area

Thirteen subsurface soil samples were collected from five test pits at the NEMSA. Ra-226 concentrations ranged from 0.8 to 140 pCi/g (averaged 45.4 pCi/g). Maximum sample depths ranged from 4.5 to 9.0 feet bgs. As specified in the RSEWP, one sample of the pre-cap material was to be collected at each test pit. In the case of TP-002, the pre-cap surface was located at 0.25 feet bgs. Therefore, this sample collected in non-economic material from 0.25 to 0.75 bgs is considered a subsurface sample. Based on test pit observations, the depths to native material ranged from around 2 feet along its southern boundary with the Boneyard, to greater than 10 feet at its northern end (based on visual observations). A comparison of pre-mine to post-mine topography suggested the maximum depth at the northern end is approximately 12 feet. Concentrations of Ra-226 in the non-economic materials ranged from 8.4 pCi/g to 140 pCi/g. The four Ra-226 concentrations below the FSL were all located in native materials and ranged between 0.8 and 1.3 pCi/g.

Uranium concentrations ranged from 1.4 to 390 mg/kg (averaged 124.9 mg/kg). Two of the exceedances (227 and 311 mg/kg) were coincident with native soil samples collected from TP-001 and TP-002. The uranium concentrations in the other two native sample from TP-003 and TP-005 were 49.3 and 1.4 mg/kg, respectively. Native soil was not reached in TP-004 as the depth to native soil exceeded the depth of the excavator. The third exceedance of uranium (390 mg/kg) was collected in non-economic material from TP-004.

Arsenic concentrations ranged from non-detect to 4.9 mg/kg (averaged 2.2 mg/kg); three of the samples exceeded the screening level, and two of these samples were collected in native soil.

3.3.10 Boneyard

Eleven subsurface soil samples were collected from five test pits in the Boneyard. Ra-226 concentrations ranged from 1.1 to 50.7 pCi/g (averaged 11 pCi/g). However, only three samples exceeded the FSL; all three of which were collected from test pit TP-004, which was located near northern boundary with the NEMSA. This test pit contained trash, scrap metals and gray fill materials. The Ra-226 concentrations in the three other test pits ranged from 1.1 to 1.9 pCi/g. This indicates that some mine materials were placed near TP-004 in addition to the scrap metal and other debris, but mine materials do not appear to be prevalent throughout the Boneyard

As specified in the RSEWP, one sample of the pre-cap material was to be collected at each test pit in the Boneyard. However, unlike NEMSA, there was not a visual distinction between the cap soil material and the re-worked native soil material mixed with debris. Therefore, no pre-cap samples were collected from the Boneyard; samples were collected approximately every five feet to native soil plus one sample of native soil.

Maximum sample depths ranged from 1.5 to 10.0 feet bgs. Based on test pit observations, the depths to native material ranged from at the surface at its southern end, to approximately 9 to 10 feet along the western lobe near TP-004 and TP-005. A comparison of pre-mine to post-mine topography suggested that depths were zero along its entire eastern lobe, 5 to 7 feet along its western lobe, and 8 feet or so in its northwestern corner.

No debris was noted in TP-001. Both TP-002 and TP-003 observed partially buried cables but no other debris. Both TP-004 and TP-005 contained large amounts of buried debris including scrap metal and plastic debris.

Uranium concentrations ranged from 0.8 to 240 mg/kg (average 46.2 mg/kg). Only two of the samples exceeded the FSL, both were from TP-004 and were coincident with two of the higher Ra-226 concentrations.

Arsenic concentrations ranged from 0.8 to 5.2 mg/kg (averaged 3.8 mg/kg). Seven of the samples exceeded the FSL; the four that did not were collected from test pit TP-004 in the northwestern corner.

3.3.11 Unnamed Arroyo

Ten hand auger holes were advanced each to 3 feet bgs from the edge of NECR-1 to near the confluence with the next arroyo (see Figure 3-4). Three composite subsurface soil samples were collected from each auger hole at 0-1 foot bgs, 1-2 feet bgs, and 2-3 feet bgs, for a total of 30 subsurface soil samples from the Unnamed Arroyo. Ra-226 concentrations ranged from 8.4 to 35.7 pCi/g (average 16.4 pCi/g); all 30 samples exceeded the FSL. The vertical distribution of concentrations does not suggest a downward decreasing trend from 0 to 3 feet bgs; in four of the holes, the highest concentrations were detected in the deepest samples. There also does not appear to be a spatial trend with the highest Ra-226 concentration located at SB-005 in between NECR-1 and the next arroyo.

Uranium concentrations were all below the screening level of 200 pCi/g.

Arsenic concentrations ranged from 1.2 to 8.2 mg/kg (averaged 3.4 mg/kg); the screening level was exceeded in only nine of the samples, seven from the deepest samples from each hole, and two from 1 to 2 feet bgs.

3.3.12 Subsurface Soil Analytical Results Summary

Table 3.16 includes a statistical summary of the analytical results, which shows the following, site wide:

- Ra-226 values ranged from 0.6 to 438 pCi/g (averaged 30.9 pCi/g); 66% of the 146 subsurface soil samples analyzed for Ra-226 exceeded the FSL of 2.24 mg/kg.
- Total uranium values ranged from 0.7 to 760 mg/kg (averaged 86.4 mg/kg); 12% of the 146 samples analyzed for uranium exceeded the screening level of 200 mg/kg.
- Arsenic values ranged from non-detect (<0.5) to 13.9 mg/kg (averaged 4.0 mg/kg); 52% of the 146 samples analyzed for arsenic exceeded the screening level of 3.7 mg/kg.
- Vanadium values ranged from 10.4 to 173 mg/kg (averaged 40.1 mg/kg); all results were below the screening level of 1,000 mg/kg.
- Selenium values ranged from non-detect (<0.2 mg/kg) to 227 mg/kg (averaged 16.0 mg/kg); all results were below the screening level of 5,100 mg/kg.
- Molybdenuym values were all non-detect (<5.0 mg/kg).

3.4 SOIL LEACHATE ANALYSES

3.4.1 Soils Synthetic Precipitation Leachate Procedure

A total of 16 surface and subsurface samples were collected for analysis by the SPLP method, as described in Section 2.3. Two samples were collected from each of the following areas.

- NECR-1
- NECR-2
- Ponds 1 and 2
- Pond 3/3a
- Sandfill 1, 2 and 3
- Sediment Pad

The leachate was analyzed for the preliminary COPCs (Ra-226, uranium, arsenic, selenium, and vanadium), the results of which are presented in Table 3.17, *Summary of Synthetic Precipitation Leaching Procedure Analytical Results*. Laboratory analytical reports are included in Appendix B. The results of the SPLP analyses indicated the following:

- Ra-226 ranged from non-detect to 27.1 pCi/L (averaged 5.6 pCi/L).

- Uranium concentrations ranged from 0.00096 to 4.4 mg/L.

- Arsenic concentrations ranged from 0.0013 to 0.0084 mg/L.

- Molybdenum results were all non-detect (<0.1 mg/L).

- Selenium concentrations ranged from non-detect (<0.0029 mg/L) to 0.94 mg/L.

Available analytical data for Site mine water are presented in the groundwater technical memorandum titled *Groundwater Quality in the Westwater Canyon Member at the Northeast Church Rock Mine* (MWH, 2004c). These data represent the ambient groundwater quality in the Westwater Canyon Member at the Site. These data indicated the following:

- Concentrations of Ra-226 ranged from 0.6 to 490 pCi/L (averaged 97.6 pCi/L), compared to the New Mexico Human Health Standard of 30 pCi/L (Ra-226 and Ra-228 combined).

- Concentrations of uranium ranged from 0.725 to 3.71 mg/kg (averaged 2.08 mg/kg), compared to the New Mexico Human Health Standard of 5.0 mg/kg.

- Concentrations of arsenic ranged from 0.0100 to 0.0118 mg/kg (averaged 0.0102 mg/kg), compared to the New Mexico Human Health Standard of 0.1 mg/kg.

- Concentrations of molybdenum ranged from 0.001 to 0.04 mg/kg (averaged 0.012 mg/kg), compared to the New Mexico Human Health Standard of 1.0 mg/kg.

- Concentrations of selenium ranged from 0.0.004 to 0.05 mg/kg (averaged 0.031 mg/kg), compared to the New Mexico Human Health Standard of 0.05 mg/kg.

The laboratory results from the SPLP leachate analyses suggested that if the materials within the areas listed in Table 3.17 were subjected to sufficient infiltration by rainwater or snowmelt, they could generate a leachate that contains Ra-226, uranium, selenium and/or arsenic. While the SPLP leachate results were primarily below the New Mexico Human Health Standards for groundwater (NMAC 20.6.2.3103) or the Federal Maximum Contaminant Levels (MCLs), there were exceedances of one or the other of these standards for Ra-226, uranium and selenium, as shown in Table 3.17. Ra-226 exceeded the MCL of 5 pCi/L in five samples from Ponds 1/2, Pond 3 and Sandfill 1, but did not exceed the New Mexico standard of 30 pCi/L. Both selenium and uranium exceeded the MCL and New Mexico standard of 0.03 mg/L in two samples from Ponds 1/2 and one sample from Pond 3/3a. However, the concentrations of these constituents are all within the range of concentrations detected in the Westwater Canyon Member, with the exception of selenium. Selenium concentrations in the SPLP leachate exceeded the maximum concentrations detected in the Westwater Canyon Member in samples collected from Ponds 1 and 2 and Pond 3/3a. Additionally, it should be noted that as a practical matter, rainfall does not impact groundwater in the Westwater Canyon Member as a result of a combination of arid climate, depth to groundwater and the number and thickness of intervening confining layers.

3.4.2 Soils Toxicity Characteristic Leaching Procedure

Eleven subsurface soil samples were collected from the Boneyard and analyzed using the TCLP method, which is designed to determine the mobility of potential inorganic analytes, specifically the RCRA priority pollutant metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). The results of these analyses are presented in Table 3.18, *Summary of Toxicity Characteristic Leaching Procedure Analytical Results*. Laboratory analytical reports are included in Appendix B. All results were non-detect, indicating that there are no materials in the Boneyard capable of generating a poor quality leachate of metals.

3.5 SOILS ORGANICS DATA

3.5.1 Boneyard

Eleven surface soil samples were collected between one and ten feet bgs from test pits in the Boneyard. The samples were analyzed for VOCs by EPA Method 8260B and for SVOCs by EPA Method 8270C. Laboratory analytical reports are included in Appendix B. The results of these analyses were non-detect for all VOC and SVOC parameters.

3.5.2 NECR-1

One subsurface soil sample was also collected from the north edge of NECR-1 for analysis of organic compounds. During drilling at soil boring SB-131 in NECR-1, which was located along the northeastern edge of NECR-1 (see Figure 3-4), a dark gray clayey material was encountered that had a distinct petroleum odor to it. Consequently, one soil sample was collected between 22.5 and 24 feet bgs and submitted for analysis of Total Petroleum Hydrocarbons (TPH) by EPA Method 8015B and VOCs by EPA Method 8260B. Laboratory analytical reports are include in Appendix B. All VOC parameters were non-detect, except for the parameters sec-Butylbenzene (0.24 mg/kg) and 1,2,3-trichlorobenzene (0.53 mg/kg). The results for these two compounds were both significantly below their respective EPA Region 9 PRGs. The results of the TPH analysis revealed the following:

- Diesel range organics at 1,400 mg/kg
- TPH C_8-C_{40} at 1,900 mg/kg
- Oil range organics at 460 mg/kg

These results suggest that the material sampled contained primarily diesel or fuel oil range organic compounds.

3.6 SOILS AGRONOMIC DATA

Fifteen surface soil samples and five subsurface soil samples (test pits) were collected from analysis of agronomic parameters, and other constituents that could have an impact on plant growth. The samples were analyzed for: pH, calcium, magnesium, potassium, sodium, Sodium Absorption Ratio (SAR), chlorine, arsenic, molybdenum, radium-226, selenium, uranium, and vanadium. The results of analyses for agronomic parameters are presented in Table 3.19, *Summary of Surface Soil Analytical Results, Agronomic Parameters*. The results of metals analyses in surface soils are shown in Table 3.15. The purpose of the analyses was to identify the potential risks to plant establishment based on the levels of constituents present. Results from the laboratory analysis were used to evaluate the impact of constituent levels on direct revegetation success at the Site and to determine if additional soil cover may be necessary in some areas to provide a suitable medium for root growth and plant establishment. Although toxicity thresholds of plants for each constituent will vary by individual species and life form (e.g. grasses, forbs, shrubs, trees), general toxicity guidelines and potential impacts on plant establishment at the Site are outlined below.

The level of arsenic that plants tolerate varies by plant species and life form. Although some species of grass are extremely tolerant of high levels of arsenic and maintain normal growth at very high levels, most plants will begin to exhibit symptoms of toxicity (reduction in plant biomass, decreased root growth, deceased germination) when arsenic levels in the soils reach 50 to 100 mg/kg. Studies evaluating the effect of arsenic toxicity on ryegrass, reported lowest observable effective concentration (LOEC) for arsenic in soils at 50 mg/kg, with substantial reductions in plant growth occurring at 250 mg/kg (Jiang and Singh, 1994). Concentrations of arsenic in surface soils ranged from non-detect (<0.5 mg/kg) to 13.9 mg/kg, well below the toxicity threshold of 50 mg/kg. Based on toxicity thresholds in the literature, arsenic concentrations in the soil would not negatively impact plant establishment at the Site.

Molybdenum is a microelement that is least soluble in an acid environment and more readily available in alkaline soils. When elevated levels of molybdenum occur in soils plant toxicity can occur. The level of molybdenum that plants tolerate varies by plant species and life form. Ducsay and Kovacik (2001) reported sensitive agronomic species displayed signs of molybdenum toxicity at 90 mg/kg, where native grasses and shrubs tend to have higher tolerances to molybdenum in soils, exhibiting toxic effects of molybdenum at much higher concentrations, around 150 mg/kg. As a general guide, molybdenum levels in soils are considered safe to native plants at levels below 150 mg/kg. Results from the laboratory analysis report molybdenum surface and sub-surface concentrations at all locations below laboratory detectable levels, with one exception, NECR-1. NECR-1 had four surface soil samples with detectable levels of molybdenum, with only one sample exceeding the molybdenum toxicity threshold of 150 mg/kg. Based on toxicity thresholds in the literature, the extent of molybdenum in NECR-1 would have negligible impact on vegetation establishment.

Radium-226 is the most abundant and stable radionuclide in the biosphere, with increased mobility and solubility in soils under extremely acidic conditions (Kabata-Pendias, 2000). Although results from the laboratory analysis report concentrations of Ra-226 at the Site ranged from non-detect (<0.6 mg/kg) to 438 mg/kg, the impact of these levels on vegetation establishment cannot be determined. No information was uncovered in the literature that would provide an adequate way to measure the phytotoxicity of Ra-226; therefore the impact of Ra-226 on plant establishment cannot be evaluated. However, due to the slightly basic pH of the soils at the Site and low mobility of Ra-226 in solution, it is probable that the amount of Ra-226 in solution available for plant uptake would be limited, lowering the potential for plant toxicity to occur.

Selenium is a naturally occurring element found in rocks, soil and water. Selenium enters the soil profile through the weathering of Selenium-rich rocks, moving through the soil until adsorbed on clay particles, iron hydroxides or organic particles. Selenite and selenates are produced in the soil by microorganisms from the less soluble forms of selenium. When selenium occurs in alkaline soils and becomes oxidized as selenate, the selenium becomes water-soluble. This form is highly toxic and easily leached from the soil, thus facilitating uptake of selenium by certain plants. Although some studies have shown sensitive species of ryegrass exhibiting selenium toxicity in sandy soils with selenate concentrations as low as 2 mg/kg (Smith, 1984), symptoms of selenium toxicity for most plants occur when selenium levels in the soils range from 10 to 20 mg/kg. Results from the laboratory analysis at the site report selenium levels in NECR-1, Sediment Pad, NEMSA, Boneyard, Sandfill 1, Sandfill 3, and Ponds 1 and 2 exceeding the toxicity threshold of 10 to 20 mg/kg for plants. Based on information in the literature, direct revegetation at the site will be impaired in locations exhibiting elevated selenium concentrations in the soils, suggesting additional topsoil may be needed for successful plant establishment.

Uranium is a naturally occurring element found in low levels within all rock, soil, and water, existing in +4 and +6 oxidation states in most geologic environments (Kabata-Pendias, 2000). Through the process of weathering, uranium forms mainly organic complexes in the soil that are easily soluble and mobile, with the distribution of uranium highly controlled by the oxidation state and Eh-pH of the system. Although few studies have been done to evaluate the toxicity of uranium on plants, one study conducted in 1995 found no adverse effect of uranium on native plant species at uranium levels of 5,000 mg/kg in soil. All areas of the Site were well below the no observable effective concentration (NOEC) of 5,000 mg/kg, indicating uranium concentrations in the soil would not negatively impact plant establishment at the Site.

Vanadium is a natural element in the earth, forming compounds with other elements such as oxygen, sodium, sulfur, or chloride. Although small amounts of vanadium have been found to stimulate plant growth, present in large amounts vanadium is toxic to plants, with pentavalent vanadium being the most toxic form (Irwin, 1997). Vanadium toxicity to plants varies with soil type due to the differences in phytoavailablity associated with soil colloids and organic matter. For example, studies have shown vanadium toxicity occurring in sandy soils at 80 mg/kg, where vanadium concentrations of 100 mg/kg in loamy soils had no effect on plant growth (Kabata-Pendias, 2000). As a general guide, vanadium levels in soils are considered safe to plants at levels below 100 mg/kg. Although results from this RSE indicated a few samples with vanadium concentrations greater than 100 mg/kg, nearly all of the samples collected at the Site had vanadium concentrations below the phytotoxicity level of 100 mg/kg. Impacts to plant growth from vanadium concentrations in the soil will be limited to NECR-2 where elevated levels of selenium are already present, suggesting additional topsoil may be needed in this location to provide an adequate medium for plant growth.

Soluble salts, Sodium Absorption Ratio (SAR) and pH are important soil properties and can impact the success of plant growth and establishment. When high amounts of soluble salts (calcium, magnesium, potassium) are present, severe plant growth problems can occur. In addition, soils high in sodium or elevated SAR can present physical restrictions in the soil for plant growth. When high levels of sodium are present, exchange sites on the soil particles become saturated with sodium, creating dense layers, restricting root development and plant growth.

Soil pH controls the solubility of ions and impacts plant growth under extreme alkaline or acidic conditions. Under acidic conditions, many soil minerals dissolve, increasing the concentration of metal ions in solution to toxic levels, inhibiting plant growth. Under alkaline conditions, the solubility of minerals can decrease to the point that nutrient deficiencies can occur, reducing plant biomass.

Results from this RSE indicated consistently neutral or slightly basic pH at the Site, with low soluble salts and SAR, with one exception. Samples taken from the Sediment Pad had extremely high levels of salts and an elevated SAR at the surface (EC = 11.70 and SAR of 20.90). Although pH for the Sediment Pad is neutral and would not impact plant establishment at the Site, elevated salts and sodium levels will limit direct revegetation success on the Sediment Pad, indicating additional soil cover will be needed for plant establishment.

Overall, constituent concentrations at the site are relatively low and the quality of the soil high, suggesting some areas within the Site would be able to support plant communities without additional soil cover. However, elevated selenium, vanadium or salts occurring in NECR-1, Sediment Pad, NEMSA, Boneyard, Sandfill 1, Sandfill 3, and Ponds 1 and 2 suggest that direct revegetation at these locations would be challenging in some areas and that additional soil cover would be advised to provide an adequate growth medium for vegetation establishment. The amount and total area of soil cover needed should be determined by the levels of constituents present at each location.

4.0 HUMAN HEALTH RISK ASSESSMENT

This section documents the methods used in, and results of, a human health risk assessment (HHRA) conducted for the Site. The HHRA is a quantitative and qualitative evaluation of potential impacts of Site-derived contaminants on human health, in the absence of remediation or institutional controls. Results of the HHRA are used to determine whether residual levels of contaminants in Site media are protective of human health and may be left in place, or consideration of remedial alternatives are warranted. As such, results of this HHRA will be used to evaluate the need for potential remediation at the Site, and will provide the basis for the development of alternative, risk-based cleanup goals for the Site, as appropriate.

The HHRA described herein was conducted in accordance with methods described in Section 6.0 of the approved *Removal Site Evaluation Work Plan* (MWH, 2006). This HHRA is comprised of a site-specific conceptual site model (CSM), screening-level HHRA, and baseline HHRA, as described in the following subsections.

4.1 CONCEPTUAL SITE MODEL

The CSM is a descriptive and graphical presentation of the physical, chemical, and biological relationships between sources of contaminants and potentially exposed populations. As such, the CSM describes and integrates information on the following (EPA, 1989):

- Contaminant sources, contaminated media and COPCs;
- Contaminant fate and transport pathways;
- Potentially exposed populations under current and future scenarios; and
- Potentially complete exposure pathways between contaminated media and receptors.

Each of these components of the CSM for the Site are described below.

4.1.1 Contaminated Media and COPCs

Sources of contamination and potentially impacted media associated with the Site, and downgradient off-site areas, are described in this subsection.

As described in Section 3.1.1 of the *Removal Site Evaluation Work Plan* (MWH, 2006), the primary ore mineral that was mined at the Site was coffonite (U(SiO4)1-x(OH)4x), which was placed in small temporary stockpiles at NECR-1 and NECR-2 before transport to the Church Rock mill site. A level pad was created at NECR-1, and fill material consisting of non-economic material was placed to a depth of approximately 20 to 30 feet in the northwestern corner of NECR-1. The pad for NECR-2 was made of native material and did not require material from processing of the ore at the Church Rock mill. Ore and low-grade ore stockpiles were temporarily stored on the NECR-1 and NECR-2 pads prior to off-site transport to, and processing at, the Church Rock mill. Following New Mexico's approval of a license amendment to permit placement of tailings in mine stopes for structural reinforcement in 1978, tailings material from ore processing at the mill was stored in three areas referred to as Sand Backfill Areas No. 1, No. 2 and No. 3 (see Figure 1-2). The bulk of the tailings material from the sand backfill areas was placed in the mine stopes; the remaining tailings were removed and disposed of off-site during the 1986 NRC reclamation. In addition, rainfall runoff from the sand backfill areas and water from the mine dewatering operations (see Section 1.2.2) was routed to three sediment ponds. Sediment in these ponds was periodically removed and temporarily placed on the Sediment Pad prior to off-site transport to the mill. The water in these ponds was treated and then discharged down the Unnamed Arroyo pursuant to an NPDES permit.

Residual tailings material in the three sand backfill areas and in the sediments in the ponds and Sediment Pad were removed and taken off-site in 1986, pursuant to NRC License No. SUA-1475, Condition 33 (UNC, 1989b), as discussed in Section 1.2.2. The tailings material was identified based on the ratio of natural uranium to Ra-226, which was less than 0.75 for tailings. Low-grade ore and non-economic material had a ratio of greater than 0.75 and native ground had low concentrations of all radionuclides. The bulk of the tailings material from the sand backfill areas was placed in the mine stopes pursuant to State approval. The sandfill areas were further cleaned up using NRC approved reclamation criteria for NECR based on foreseeable future uses of the site as grazing land and wildlife habitat. Because the NRC reclamation focused on tailings removal, the RSE focused on the potential that material with elevated levels of radionuclides may still be present in areas of NECR as suggested by the verification results shown in the *Tailings Sand Backfill Cleanup Verification Report* (UNC, 1989a).
Non-economic material was also placed in the NEMSA. Refuse and other discarded equipment was placed in the Boneyard. Both of these sites were reclaimed in 1994 (UNC, 1994), which included placement of one foot of topsoil over the non-native materials and then seeding.
Groundwater from the mine workings was pumped to the surface and treated in three ponds to reduce suspended solids and radionuclide concentrations and then sent through the IX unit (see Section 1.2.2). The spent water was then discharged to the northeast along the Unnamed Arroyo, in accordance with a NPDES permit, which restricted the discharge of COPCs into the Unnamed Arroyo.

Due to the potential for transport of site soils or sediment by wind or rainwater, and to a lesser extent by human and animal activity, potential impacts to nine Home Sites near the mouth of the Unnamed Arroyo were investigated. Potential sources of any such impacts include historical site operations, operations at the Kerr McGee mine, or background conditions. [The Bureau of Land Management, in their conditional approval letter (BLM, 1990) of Quivera's Abandonment and Reclamation Plan, instructed Quivera Mining Company to reclaim the surface of roadways, fence lines, vent holes protore storage areas, and mine ponds so that gamma radiation levels would be reduced to 50 uR/hr above background and reclaim the surface of the mine spoils area so that gamma radiation levels would be reduced to below 57 uR/hr above background (BLM, 1990). Values of 50 uR/hr and 57 uR/hr are approximately equivalent to 23.7 pCi/g and 27 pCi/g, respectively, as discussed in Section 2.5.

4.1.2 Contaminant Fate and Transport Pathways

As described in Section 3.0, the chemicals detected at the Site during the 2006 field investigation include several metals (i.e., arsenic, molybdenum, selenium, uranium, vanadium and zinc), and one radionuclide (i.e., Ra-226). These metals and radionuclide are naturally occurring elements in the Earth's crust. Radium is naturally-occurring and is almost ubiquitous in soil, water, geologic materials, plants and foods at low concentrations (ATSDR, 1990). Radium is only moderately soluble in water and can enter surface water or groundwater by desorption from rock surfaces, dissolution of geologic materials, and by ejection from minerals during radioactive decay (USGS, 1998). However, radium solubility is controlled by adsorption to, or co-precipitation within, sulfate minerals (e.g., barite and gypsum). In experiments on radium bioavailability in contaminated soils and sediment, leaching of radium from waste pit materials was observed to be low (DeLaune et al., 1994). The adsorptive behavior of radium is similar to that of other divalent cations including barium, calcium and strontium, and solubility in water generally increases with increasing pH (ATSDR, 1990). Consequently, radium is not a very mobile constituent in the environment (ATSDR, 1990). For radionuclides including radium, radioactive decay is the only degradation process that results in conversion of a radioisotope to more or less harmful daughter products. The radioactive half-life of Ra-226 is 1,602 years, and the decay products include radon-222 and alpha/gamma emissions (ATSDR, 1990).

For the stable metals, weathering of metal-containing ore and/or anthropogenic metals, dissolution of weathered metal ions and particulates in storm water, and transport of dissolved ions or particulates in storm water runoff to surface water (including the Unnamed Arroyo) represent a potential fate and transport pathway. This potential migration pathway is also applicable to radionuclides. Dissolution of radionuclides or metals in storm water, and infiltration/percolation is a method for transporting surficial contaminants to subsurface soil and groundwater. As described above, however, radium is resistant to significant transport via this pathway except under conditions of elevated pH. Entrainment of dust that contains radionuclides or metals adsorbed to the surface, or contained within soil particles may be a method for off-site transport. Dust generation and wind transport and human and animal activity may possibly have resulted in the unexpected transport of COPCs to off-site areas.

Finally, uptake of radionuclides or metals into plants, and subsequent transfer to human and wildlife receptors through the food chain is another potential fate and transport mechanism. Uptake of radium by plants is dependent upon soil and plant type (ATSDR, 1990). Soil-to-plant transfer coefficients are reported to range from 1.1 x 10^{-3} to 6.5 (Watson et. al., 1984, as cited in ATSDR, 1990). A partition coefficient for Ra-226 in forage and hay was estimated as 0.1. Because radionuclides including radium may be absorbed by plants, there is the potential for human exposure through consumption of meat, eggs or milk derived from animals that graze on forage grown in soils containing these substances. Mean ratios of radium-226 in milk and beef to that in the animals' diet has been estimated to be 3.8 x 10^{-3} and 6.8 x 10^{-3}, respectively (Watson et. al., 1984, as cited in ATSDR, 1990). Once ingested, radium tends to partition into bone due to its similarity to calcium, and may bioaccumulate in humans and animals (USGS, 1998).

4.1.3 Land Uses and Potentially Exposed Populations

The Site is the former location of an underground uranium mine. The Site is currently inactive, and human receptors at the Site are limited to facility oversight, security personnel, and UNC representatives. The Site is fully fenced preventing access by unauthorized visitors, livestock or wildlife, as has happened historically. The Site was used for agricultural grazing under a grazing permit issued by the BIA until December 2006 when GE/UTC installed a fence. The planned future land use of the Site is grazing within the mine permit area. With cooperation of the NNEPA, access to the Site will be secured and limited for a period of at least twelve years after site reclamation is complete, as required by the New Mexico Mining Act (NMMA) so that revegetation programs have sufficient time to restore a self-sustaining ecosystem. Past uses of the NECR mine permit area included grazing and a reasonably anticipated future use for reclaimed surface areas at mines such as NECR would typically be limited to grazing or wildlife habitat (as is the case with the nearby Quivera Mine). At the request of EPA and the Navajo Nation, the risk assessment has been revised to include calculations for unrestricted use for the site survey areas. All lands to the north of the Site, with the exception of Quivera Mine, are part of the Navajo Indian Reservation and, with the exception of Quivera Mine, which is fenced and is not used for residential purposes, land use is unrestricted. These lands include home sites (with the exception of the reclaimed Quivera mine spoils and ponds area), and are also used for livestock grazing and hunting. The former United Nuclear Corporation mill is located southeast of the Site, and the former Kerr-McGee Quivera Mine Permit Area is located immediately northeast of the Site.

4.1.4 Potentially Complete Exposure Pathways

Based on future land uses for the Site, human receptors may be exposed to COPCs through ambient air, soil, surface water, sediment, and biota (i.e., plants and animals). Exposures to COPCs in ambient air may occur through inhalation of dust entrained in air, as well as deposition onto plant surfaces and subsequent consumption of plant parts by humans. Potentially complete soil exposure pathways include external radiation, incidental ingestion of soil particles, dermal contact with soil particles, root uptake and translocation of COPCs to above-ground plant parts and subsequent consumption; and uptake by livestock (e.g., cattle, sheep and poultry) and wildlife that are subsequently harvested and consumed by humans. Sediment exposure pathways for human receptors are similar to soil pathways, because the Unnamed Arroyo is dry for the majority of the year. Potentially complete surface water exposure pathways include incidental ingestion and dermal contact of surface water by off-site residents, and potential uptake of COPCs in surface water by plants or animals that are subsequently harvested and consumed by humans.

Currently, there are no potable or non-potable uses of groundwater beneath the Site. In addition, there are no plans to install wells on-site during the foreseeable future, or to use groundwater beneath the Site for potable or other uses. It is possible that off-site groundwater may be used for potable or agricultural uses (e.g., irrigation of plants or watering livestock). Groundwater associated with the Westwater Canyon sandstone member of the Morrison Formation is present at a depth of 1,500 to 1,800 feet bgs, and is separated from alluvial, non-potable groundwater by an aquitard, as discussed in Section 1.3.3. Therefore, potential domestic and agricultural groundwater exposure pathways are considered incomplete.

Diagrams of the CSMs for each scenario graphically depict the relationship between potential sources of contamination, exposure media, and human receptors for the Site are presented in Figure 4-1, *Human Health Conceptual Site Model (Scenario 1)*, and Figure 4-2, *Human Health Conceptual Site Model (Scenario 2)*. It should be noted that unrestricted (i.e., residential) land use only applies to areas north of the Mine permit, excluding the Quivera Mine site (refer to Section 4.1.3). Hypothetical future on-site residents are included in the CSMs for on-site (i.e., Mine permit) areas for evaluation of the potential need for future deed restrictions.

4.2 SCREENING-LEVEL HHRA

A screening-level HHRA was conducted to evaluate whether detected concentrations of chemicals of potential concern (COPCs) identified for each investigation area may pose a current or potential future risk or hazard to public health based on protective, screening-level assumptions. Results of the screening level HHRA were used to identify those investigation areas and media that are appropriate for no further action (NFA), and those investigation areas and media for which further evaluation is warranted.

Methods used in the screening-level HHRA are described in Section 4.2.1, and results of the screening HHRA are presented in Section 4.2.2.

4.2.1 Screening HHRA Methods

The general approach to the screening-level HHRA was to compare detected concentrations of radionuclides and metals/organics to EPA PRGs for Radiologicals (EPA, 2004c) and EPA Region 9 PRGs (EPA, 2004a), respectively. Screening-level, cumulative cancer risk estimates and non-cancer hazard indices (HIs) were calculated under both residential and industrial scenarios, in order to evaluate the need for potential future institutional controls at the Site.

Screening risk assessment methods and procedures for radionuclides and metals, respectively, are documented in *Soil Screening Guidance for Radionuclides: Technical Background Document* (EPA, 2000b) and *EPA Region 9 PRGs – 2004 Update* (EPA, 2004a), respectively. The general framework for conducting HHRAs under CERCLA is provided in *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part A. Baseline Risk Assessment* (EPA, 1989).

Human Health COPC screening for soil and sediment was based on comparison of maximum detected concentrations in surface and subsurface soil to residential and industrial USEPA Region 9

Preliminary Remediation Goals (PRGs). A complete data summary for each site is presented in Section 3.2 for soil analytes and Section 3.3 for sediment analytes. Based on this comparison (Tables 3.15 and 3.16), the following COPCs were identified for soil: one radionuclide (Ra-226); five metals (i.e., arsenic, molybdenum, selenium, uranium, and zinc). Ra-226, arsenic and uranium were the immediate chemicals of concern due to their exceedance of PRG values, however the screening-level cumulative carcinogenic risk and non-carcinogenic hazard index (HI) for all detected chemicals was calculated in accordance with USEPA guidance as described below.

According to USEPA Region 9 (2004), when more than one chemical is present, it is appropriate to calculate the screening-level, cumulative carcinogenic risk and non-carcinogenic HI for all detected chemicals in soil. The underlying basis for this calculation is that a chemical may be present at a maximum concentration that is lower than its respective PRG, but still contribute to a cumulative carcinogenic risk or non-carcinogenic HI.

Briefly, chemical-specific cancer risk estimates, the "probability of an individual developing cancer as a result of a lifetime of exposure to a particular level of a potential carcinogen" (EPA, 1989), were calculated for each COPC, in each medium, at each investigation area. Next, chemical-specific cancer risk estimates were summed across exposure pathways to estimate medium-specific cumulative cancer risk estimates. Total cumulative cancer risk estimates were calculated by adding medium-specific cancer risk estimates. A similar procedure was used to estimate total non-cancer HIs. Total HIs, which represent the cumulative hazard from "multiple substances and/or multiple exposure pathways" (EPA, 1989), were calculated by summing medium-specific HIs.

Results of the screening-level HHRA were used to evaluate whether detected concentrations of COPCs in a given investigation area represent no significant risk to human receptors and the area is appropriate for NFA in regard to human health, or the Site requires further risk evaluation.

4.2.2 Screening HHRA Results

Results of the screening-level HHRA for the Site are presented in Tables 4-1 through 4-4. For all on-site investigation areas, screening-level cumulative carcinogenic risk and/or non-carcinogenic HI estimates for residential receptors exposed to surface soil exceeded the USEPA screening-level cancer risk criterion of 1 x 10-6 or HI equal to 1 (Table 4-1). For residential receptors exposed to subsurface soils at on-site investigations areas, screening-level cumulative carcinogenic risk and/or non-carcinogenic HI estimates also exceeded the USEPA screening-level cancer risk criterion of 1 x 10-6 or HI equal to 1 (Table 4-2). Exceedances of screening-level risk and/or HI criteria were generally attributable to arsenic and Ra-226.

For all on-site investigation areas, screening-level cumulative carcinogenic risk and/or non-carcinogenic HI estimates for industrial receptors exposed to surface soil exceeded the USEPA screening-level cancer risk criterion of 1 x 10-6 or HI equal to 1 (Table 4-3). For industrial receptors exposed to subsurface soils at on-site investigations areas, screening-level cumulative carcinogenic risk and/or non-carcinogenic HI estimates also exceeded the USEPA screening-level cancer risk criterion of 1 x 10-6 or HI equal to 1 (Table 4-4). Again, exceedances of screening-level risk and/or HI criteria were generally attributable to arsenic and Ra-226.

Because concentrations of arsenic and Ra-226 in sediments or surface soils along the Unnamed Arroyo and at the Home Sites were above residential PRGs, and the Home Sites require evaluation of residential exposures anyway, these locations were automatically carried through to the baseline HHRA without performing a screening-level HHRA analysis (see Section 4.3).

It should be noted that the screening-level carcinogenic risk and non-carcinogenic HI estimates described above were based on conservative assumptions regarding land use (e.g., residential land use for all portions of the Site), default exposure assumptions, and do not take into account the contribution to risk of background concentrations of metals and Ra-226. As such, screening-level risk estimates tend to be over-estimated. Based on the above results, however, all investigation areas at the Site were further evaluated in a baseline HHRA, using more appropriate considerations regarding land uses and exposures, as described in Section 4.3.

4.3 BASELINE HHRA

This section describes methods and results of a baseline HHRA conducted for the Site. A detailed discussion of the methods used in the baseline HHRA is presented in Section 4.3.1, and results of the baseline HHRA are presented in Section 4.3.2.

4.3.1 Baseline HHRA Methods

Risks to public health and the environment were evaluated in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remedial Response process, as amended by the Superfund Amendments and Reauthorization Act (SARA), and in consideration of State of New Mexico risk assessment guidance (NMED, 2005). The HHRA evaluates potential public health risks associated with contaminants present at the Site, as well as potential historic releases of contaminants from the Site to the surrounding environment. Potential public health risks associated with current levels of radionuclides and metals present in Site media were evaluated assuming external radiation exposure, direct exposure to contaminated media, and indirect exposures through the food chain, as applicable, as described below.

A site-specific, baseline evaluation of risk was conducted for all COPCs, media and investigation areas identified during the screening-level risk evaluation (refer to Section 4.2). The baseline HHRA includes refinements to the screening-level risk evaluation approach including, but not limited to, use of dose modeling based on site-specific exposure scenarios and pathways, and statistically-derived media concentrations. The baseline risk evaluation includes the calculation of "total" risk and hazard estimates based on site-related contamination and background levels of radionuclides and metals, as well as risk and hazard estimates excluding background. Risk and hazard estimates in excess of background are termed "incremental" risks or hazards. Results of the baseline risk evaluation will be used to identify constituents of concern (COCs) for applicable Site media. Radionuclides or metals that contributed to an incremental risk or hazard in excess of EPA's risk management range of 1×10^{-6} to 1×10^{-4} and HI of 1 will be identified as Site COCs, in accordance with EPA (1991a). The final step of the risk assessment process involved the calculation of site-specific and media-specific cleanup goals for any COCs identified for the Site.

Specific guidance considered during preparation of the baseline HHRA for the Site includes, but was not limited to, the following documents and reference materials:

- *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. Baseline Risk Assessment* (EPA, 1989).
- *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors* (EPA, 1991a).
- *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decision* (EPA, 1991b).
- *Exposure Factors Handbook, Volume I: General Factors* (EPA, 1997a).
- *Exposure Factors Handbook, Volume III: Activity Factors* (EPA, 1997b).

- *Soil Screening Guidance for Radionuclides: User's Guide* (EPA, 2000b).

- *Soil Screening Guidance for Radionuclides: Technical Background Document (*EPA, 2000c).

- *EPA Region 9 PRGs – 2004 Update* (EPA, 2004a).

- *Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)* (EPA, 2004b).

- *New Mexico Environmental Department Technical Background Document for Development of Soil Screening Levels – Final Report. Revision 3* (NMED, 2005).

4.3.1.1 Exposure Assessment

The exposure assessment begins with development of a site-specific CSM. The human health CSM for the Site was described in Section 4.1.

Upon request of the EPA and Navajo Nation, the following potential current and future human receptors were considered for the Site:

- Current and future on-site maintenance personnel;
- Hypothetical future livestock grazer;
- Hypothetical future on-site residential receptors; and
- Current and future off-site residential receptors.

Relevant exposure pathways for the above receptors are visually presented in Figures 4-1 and 4-2. Potentially complete and incomplete exposure pathways for human receptors are described in more detail below.

Soil Exposure Pathways

Contaminants may be released to surface and subsurface soil through the unexpected release of COPCs via fugitive dust, via permitted discharge of treated mine waters to the Unnamed Arroyo, and potential metals disposal in the Boneyard. Potential human exposure pathways to COPCs in surface or subsurface soils include the following:

- Incidental ingestion of soil particulates by current/future on-site maintenance personnel, hypothetical future livestock grazers, hypothetical future on-site residential receptors, and current/future off-site residential receptors.

- Ingestion of homegrown produce by hypothetical future on-site residential receptors and current/future off-site residential receptors.

- Ingestion of locally-raised meat by hypothetical future on-site residential receptors, current/future off-site residential receptors, and on-site livestock grazer receptors.

- Ingestion of locally-raised eggs by hypothetical future on-site residential receptors and current/future off-site residential receptors.

- Inhalation of soil particulates (e.g., dust) by current/future on-site maintenance personnel, hypothetical future livestock grazers, hypothetical future on-site residential receptors, and current/future off-site residential receptors.

- External exposure of radiation from soil particulates by current/future on-site maintenance personnel, hypothetical future livestock grazers, hypothetical future on-site residential receptors, and current/future off-site residential receptors.

Incidental ingestion of soil particles in the form of dust, dermal contact with dust, and inhalation of dust are potentially complete exposure pathways for current/future on-site maintenance personnel, hypothetical future on-site residential receptors, current/future off-site residential receptors, and hypothetical future on-site livestock grazers (Figure 4-1**)**. Additionally, ingestion of produce grown in potentially contaminated soil, ingestion of meat from livestock (e.g., cattle or sheep) grazing in potentially contaminated areas, ingestion of eggs from poultry raised in potentially contaminated areas, and external exposure to radiation from soil are potentially complete exposure pathways for hypothetical future on-site residential receptors and current/future off-site residents (Figure 4-2). Ingestion of potentially contaminated soil, ingestion of meat from livestock (e.g., cattle or sheep) grazing in potentially contaminated areas, and external exposure to radiation from soil are potentially complete pathways for the on-site livestock grazer (Figure 4-2).

Sediment Exposure Pathways

Contaminants may be released to sediment from water treatment ponds (Pond No. 1, Pond No. 2, and Pond No. 3/3a) which were originally filled with water and sediments settled in them from storm water runoff that drained the tailings sand backfill areas, as well as water from mine operations (see Section 1.2.2). The sediments were placed on the Sediment Pad for temporary storage prior to being transported off-site for processing at the mill, and so contaminants may be released from unexpected fugitive dust from the Sediment Pad, as well as fugitive dust from sediment present in the Unnamed Arroyo. Potential human exposure pathways include:

- Incidental ingestion of sediment particulates by current/future on-site maintenance personnel, hypothetical future on-site industrial workers, hypothetical future on-site residential receptors, current/future off-site residential receptors, or hypothetical future livestock grazers, and.

- Ingestion of homegrown produce by hypothetical future on-site residential receptors or current/future off-site residential receptors.

- Inhalation of sediment particulates (e.g., dust) by current/future on-site maintenance personnel, hypothetical future on-site industrial workers, hypothetical future on-site residential receptors, current/future off-site residential receptors, or hypothetical future livestock grazers

- External exposure of radiation from sediment particulates by current/future on-site maintenance personnel, hypothetical future on-site industrial workers, hypothetical future on-site residential receptors, current/future off-site residential receptors, or hypothetical future livestock grazers.

Incidental ingestion of sediment particles in the form of dust, dermal contact with dust, and inhalation of dust are potentially complete exposure pathways for current/future maintenance personnel, hypothetical future on-site residential receptors, current/future off-site residential receptors, and hypothetical future on-site livestock grazers (Figure 4-1). Additionally, external exposure, ingestion of homegrown produce, ingestion of locally-raised meat, and ingestion of locally-raised eggs are potentially complete exposure pathways for hypothetical future on-site residential receptors and current/future off-site residents (Figure 4-2). Ingestion of potentially contaminated sediment, ingestion of meat from livestock (e.g., cattle or sheep) grazing in potentially contaminated areas, and external exposure to radiation from sediment are potentially complete pathways for the on-site livestock grazer (Figure 4-2).

4.3.1.2 Exposure Quantification

Potential exposures and risks associated with the complete exposure pathways identified above were quantified in the baseline HHRA conducted for the Site. Methods used in the derivation of media exposure point concentrations (EPCs), and procedures for quantifying exposure doses for current and future human receptors, are described in the following subsections.

Deriving Exposure-Point Concentrations

For purposes of quantifying exposure doses in the baseline HHRA, exposure-point concentrations (EPCs) were derived as the 95 percent upper confidence limit (95% UCL) on the arithmetic mean concentration. The 95% UCL of the mean concentration was calculated consistent with methods described in EPA (2002b). First, sampling results for individual COPCs detected within a given medium were evaluated to identify whether the data population is representative of an underlying normal or lognormal distribution. The Shapiro-Wilks W test for normality and the coefficient of variation statistic (Gilbert, 1987) were used, as necessary, to test the underlying data distribution (see Appendix D). For data sets that are best represented by a normal distribution, the 95% UCL is typically calculated based on the Student t-statistic (USEPA, 2002b).
It should be noted that the EPCs derived herein reflect the nature of the sampling design. For on-site source areas, EPCs are derived from soil sampling results collected on a random grid. For the Home Sites, EPCs developed prior to EPA conducting removal actions at Home Sites 4, 6, 7, 8, and 9 are based on biased soil sample locations selected using field screening measurements. Field screening was used to identify biased locations for the collection of soil samples. In turn, the 95% UCL on the mean concentration of these biased soil samples was used to estimate EPCs. In most cases, the concentrations observed at biased sample locations are representative of only a very minor portion of the entire Home Site. Therefore, the 95% UCL on the mean for biased soil sample results represents a significant over-estimate of actual exposures for home site residents. Following removal of contaminated surficial soils at Home Sites 4, 6, 7, 8, and 9, EPA conducted post-removal confirmation sampling at these Home Sites. EPCs for Ra-226 based on post-removal confirmation sampling results for the Home Sites are presented in Appendix D. For comparison, EPCs and risk estimates based on the original, pre-removal action COPC concentrations are presented in Appendix E.

The equation for calculating the UCL for a normal distribution (USEPA, 2002b) is:

$$UCL = x(bar) + t\ (s/\sqrt{n})$$

Where:

UCL	=	Upper confidence limit
x(bar)	=	Mean of the untransformed data
s	=	Standard deviation of the untransformed data
t	=	Student t-statistic (from table published in Gilbert, 1987)
n	=	Number of samples

For data sets that are best represented by a lognormal distribution, 95% UCL concentrations may be calculated using the Land method (i.e., H-statistic), Chebyshev inequality method, or Student t-statistic based on the natural log-transformed data (USEPA, 2002b).

Alternative methods of deriving 95% UCL concentrations are available for other distribution types (e.g., the gamma distribution), or when the shape of the underlying distribution of concentrations is unknown. Nonparametric, or distribution-free, methods require no assumptions about the shape of the data distribution, and are applicable to a variety of situations. Examples of nonparametric methods include the jackknife procedure, bootstrap re-sampling procedures, and the Chebyshev inequality method (USEPA, 2002b). Automated approaches to calculating the 95% UCL concentration have been developed, including USEPA's ProUCL software.

USEPA's ProUCL software, along with other statistical methods cited in USEPA (2002b), were used to estimate potential 95% UCL on the mean EPCs for soil and sediment data sets at the Site. For the HHRA described herein, the EPC recommended by ProUCL was used to quantify potential human health risks. EPCs and summary statistics for each site, medium, and COPC are summarized in Appendix D.

EPCs were identified based on the following:

- <u>Potential exposure</u>. Soil and sediment EPCs were selected from samples collected from between zero and 10 feet bgs (inclusive). Data from soil samples collected from below 10 feet bgs were excluded, as it is assumed that potential on-site maintenance activities would not extend below this depth. Specific sample depths that were used to determine surface EPC versus subsurface EPCs were 0 to 0.5 ft bgs and >0.5 to 10 ft bgs, respectively.

- <u>Qualified data</u>. Only validated, qualified data were reviewed in the EPC selection process. All data with "B" (analytes detected in an associated field or laboratory blank) or "R" (result unusable because quality control criteria were not met) qualifiers were eliminated.

- <u>Naturally occurring metals</u>. Concentrations of all COPCs detected in soil or sediments were included in the risk assessment, regardless of whether or not they represent background conditions (i.e., are naturally occurring). Attribution of risk to background or source-related contamination was evaluated during the risk characterization phase, as described below.

Calculating Exposure Doses

This section describes HHRA methods for quantifying exposure doses for human receptors. As described in Section 4.3.1.1, complete and potentially significant exposure pathways between human receptors and site-related COPCs are limited to direct soil and sediment contact pathways (i.e., incidental ingestion, and inhalation of particulates), and indirect exposure pathways (i.e., ingestion of homegrown produce, ingestion of locally-raised meat, ingestion of locally-raised eggs, and external exposure to radiation). Potential exposures and risks related to other pathways and media were qualitatively evaluated in the HHRA. The dose equations used in the quantification of direct exposure pathways for soil and sediment are consistent with USEPA guidance for conducting exposure assessments (USEPA, 1989a).

Equations for quantifying direct exposure pathways (i.e., incidental ingestion, and inhalation of COPCs in dust derived from sediment) are presented below.

Incidental Ingestion:

$$\text{Ingestion Intake for Soil/Dust (mg/Kg-day)} = \frac{CS \times IR \times CF \times EF \times ED}{BW \times AT}$$

Where:

CS = Concentration in soil (mg/Kg)
IR = Ingestion rate (milligrams [mg] soil/day)
CF = Conversion factor (10^{-6} kilogram [Kg]/mg)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (Kg)
AT = Averaging time (period over which exposure is averaged – days)

Inhalation:

$$\text{Inhalation Intake for Soil/Sediment (mg/Kg-day)} = \frac{CS \times (1/PEF) \times InhR \times EF \times ED}{BW \times AT}$$

Where:

CS = Concentration in soil/sediment (mg/Kg)
PEF = Particulate emission factor (cubic meters [m^3]/Kg)
InhR = Inhalation rate (m^3/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (Kg)
AT = Averaging time (period over which exposure is averaged – days)

As described further in Section 4.3.1.4, dose modeling and baseline cancer risk and non-cancer hazard estimates were calculated for direct and indirect exposure pathways using EPA's PRG Calculator for Radiologicals (EPA, 2006a) for Ra-226, EPA's PRG Calculator for Non-radiologicals for metals (EPA, 2006b), and the Oak Ridge National Laboratory (ORNL) Risk Assessment Information System (RAIS) PRG Calculator (ORNL, 2007) for ingestion of meat. The algorithms for evaluation of the ingestion of homegrown produce and external radiation exposure are described in EPA (2006a, 2006b).

Specific assumptions to be used in quantifying exposures for human receptors are provided in Tables 4-5 through 4-7 of this HHRA Report.

4.3.1.3 Toxicity Assessment

This section describes the toxicity assessment methodology used in the evaluation of public health risks described herein. Human health toxicity assessment methods were developed in accordance with USEPA (1989a) guidance.

Toxicity assessment involves a critical review and interpretation of toxicology data from epidemiological, clinical, animal, and in vitro studies. A review of toxicology data ideally determines both the nature of health effects associated with a particular chemical and the probability that a given dose of a chemical could result in an adverse health effect. Following are the primary sources of toxicity values that were used in the baseline HHRA for the Site:

- IRIS Database (USEPA, 2007a).
- HEAST (USEPA, 1995a).

- National Center for Environmental Assessment (USEPA, 2007b).
- Agency for Toxic Substances and Disease Registry Toxicology Profiles (various dates)

Toxicology information important for quantitative risk assessment of long-term health effects is generally divided into the following two categories:

- Potential for carcinogenic health effects
- Potential for chronic non-carcinogenic, adverse health effects

Table 4-8 presents the list of toxicity values used in the HHRA presented herein.

Carcinogenic Effects of COPCs

The cancer slope factor (CSF) is the toxicity value used to quantitatively express the carcinogenic potential of cancer-causing constituents. The slope factor is expressed in units of milligrams per kilogram per day (mg/Kg-day)-1 and represents the cancer risk per unit daily intake of a carcinogenic chemical (refer to Table 4-8). The CSF represents the upper 95 percent confidence interval of the slope of the dose response curve. The 95 percent upper confidence interval value assures a safety factor to protect the most sensitive receptors.

In cases where available carcinogenic toxicity values are presented as inhalation unit risks (expressed as the inverse of micrograms per cubic meter [$\mu g/m^3]^{-1}$), the following conversion method will be used:

$$\text{Inhalation Slope Factor (mg/Kg-day)}^{-1} = \frac{\text{Air Unit Risk } (\mu g/m3)\ \text{-1 X 70 Kg X 103 } \mu g/mg}{\text{20 m3/day}}$$

The following default assumptions (USEPA, 1991a) are incorporated as parameters for this equation:

- Body weight of 70 Kg
- Inhalation rate of 20 m^3/day

When an absorption fraction of less than 1.0 is applied in deriving the unit risk, an additional conversion factor is necessary so that the slope factor is based on an administered dose. The standardized duration assumption for slope factors is continuous lifetime exposure.

Non-Carcinogenic Effects of COPCs

The reference dose (RfD) is the toxicity value used to quantitatively express the potential for a chemical to produce chronic non-carcinogenic effects. The RfD is expressed in units of mg/Kg-day and represents a daily intake of contaminant per kilogram of body weight that is not sufficient to cause the threshold effect of concern for the contaminant (refer to Table 4-8). Exposure doses that are above the RfD, the threshold dose for non-carcinogens, could potentially cause adverse health effects. Confidence in the RfD is subjective, based on USEPA review groups and quality of the supporting database. Chemical-specific RfDs do not account for the potential effects of chemical mixtures.

RfDs are generally based on no observable adverse effect levels (NOAELs) derived from animal studies. When NOAEL values are unavailable, a lowest observable adverse effect level (LOAEL) is generally used. An uncertainty factor (UF) is typically incorporated into the RfD to reduce the numerical value, resulting in a more conservative toxicity value.

In addition to UFs, modifying factors (MFs) are often used in calculating RfDs. A MF ranging from 0 to 10 can be included to reflect a qualitative professional assessment of additional uncertainties in critical studies and available databases.

The equation for calculating an RfD is:

$$RfD = \frac{NOAEL \text{ or } LOAEL}{UF1 \times UF2 \ldots \times MF}$$

Where:

RfD	=	Reference dose (mg/Kg-day)
NOAEL	=	No observed adverse effect level (mg/Kg-day)
LOAEL	=	Lowest observed adverse effect level (mg/Kg-day)
UFn	=	Uncertainty factor
MF	=	Modifying factor

4.3.1.4 Risk Characterization

Baseline human health risk characterizations for the Site integrate the results of exposure and toxicity assessments described in Sections 4.3.1.2 and 4.3.1.3 to derive a quantitative and qualitative evaluation of potential risks to current and potential future human receptors. Methods used in the characterization of baseline human health risks are described below.

Calculated exposure doses for each identified COPC were used to estimate chemical-specific and cumulative cancer risks; and non-cancer hazard quotients (HQ) and HIs.

Risk of developing cancer from exposure to a carcinogenic chemical is estimated by multiplying the CSF by the exposure dose (USEPA, 1989a):

$$ILCR \text{ (unitless)} = CSF \times Dose$$

Where:

ILCR	=	Incremental lifetime cancer risk (unitless)
CSF	=	Cancer slope factor (mg/Kg-day)-1
Dose	=	Exposure dose (mg/Kg-day)

Cancer risks from multiple COPCs are assumed to be additive and are summed to estimate a cumulative ILCR for all carcinogenic site contaminants.

The HQ describes the potential for site COPCs to produce non-carcinogenic effects. HQ is defined as the ratio of the exposure dose to the RfD (USEPA, 1989a):

$$HQ \text{ (unitless)} = \frac{Dose}{RfD}$$

Where:

Dose = Exposure dose (mg/Kg-day)
RfD = Reference dose (mg/Kg-day)

An HQ greater than 1.0 indicates that the estimated exposure dose for that COPC may not be protective of non-carcinogenic health effects. An HQ of less than 1.0 suggests that non-carcinogenic health effects should not occur. Individual HQs for site COPCs are summed to produce a cumulative hazard estimate, termed the HI. In cases where the cumulative HI exceeds 1.0, the HI may be re-evaluated based on target organ effects (USEPA, 1989a).

According to the USEPA (USEPA, 1991b), sites with a cumulative cancer risk estimate between 1.0 x 10-6 and 1.0 x 10-4, and a non-cancer HI of less than 1.0, may be appropriate for NFA. Alternatively, sites with a cumulative cancer risk estimate or non-cancer HI in excess of these criteria are appropriate for further evaluation or consideration of remedial alternatives. Any future decisions regarding the need for remedial action will consider in an evaluation of Site-specific issues related to future land uses, the technical feasibility of remediation, and related considerations.

For identified radiological COPCs, the baseline HHRA involved refinement of EPA's screening-level PRGs for Radiologicals (EPA, 2004b). EPA PRGs for Radiologicals (EPA, 2004b) are available for both residential and industrial exposure scenarios. As described in Section 4.1.3, reasonably anticipated future land use of the Site is grazing within the mine permit area, following a period of undisturbed land use to allow for revegetation after restoration activities are completed. Therefore, refinements to EPA PRGs for Radiologicals (EPA, 2004b), such as Ra-226 and daughters, was made to consider this site-specific scenario and applicable exposure assumptions. Refined PRGs for radionuclides were developed using EPA's PRG Calculator (EPA, 2006b) and the RAIS PRG Calculator (ORNL, 2007), with site-specific input variables. In addition, hypothetical future on-site residential land use is evaluated in the baseline HHRA to determine the potential need for future deed restrictions.

For identified non-radiological COPCs, the baseline HHRA involved a refined evaluation of risk consistent with methods published in EPA's *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part A. Baseline Risk Assessment* (EPA, 1989). Cumulative carcinogenic risk and non-carcinogenic HI estimates were calculated across non-radiological metals and exposure media, and compared to EPA's risk management range of 1 x 10^{-6} to 1 x 10^{-4} for carcinogenic risk and non-carcinogenic HI of 1 (EPA, 1991b). Again, total and incremental cancer risk and non-cancer HI estimates were calculated and reported concurrently.

Radionuclides, metals, and organic constituents in excess of EPA's risk management range (EPA, 1991b) were identified as COCs for potential evaluation of remedial alternatives.

4.3.2 Baseline HHRA Results

Risk characterization results expressed as cancer ILCR and non-cancer HI estimates for on-site receptors (current/future maintenance personnel, hypothetical future livestock grazers, and hypothetical future on-site residents) and for off-site receptors (current/future residents and hypothetical future livestock grazers) exposed to soils and sediments at the NECR Site are described in this section and summarized in Tables 4-9 through 4-24.

For each off-site and on-site area, two scenarios were evaluated: Scenario 1 summarizes risks to receptors when only direct soil exposure pathways are considered (i.e., incidental ingestion and inhalation of fugitive dust), while Scenario 2 potentially includes six exposure pathways (i.e., incidental soil ingestion, inhalation of fugitive dust, consumption of homegrown produce, consumption of locally-raised meat, consumption of locally-raised eggs, and external radiation), as applicable to individual receptors. Individual exposure pathways described above for Scenario 2 are only applied to appropriate individual receptors. For example, maintenance personnel were not evaluated for consumption of homegrown produce, or locally-raised meat and eggs. Livestock grazers were not evaluated for consumption of homegrown produce or eggs, but were evaluated for consumption of locally-raised meat, as indicated in Tables 4-10 and 4-14, respectively. On-site residents were evaluated for all six exposure pathways, including consumption of homegrown produce, locally-raised meat, and locally-raised eggs. Scenario 2 presents the more conservative exposure scenario for each receptor.

Additionally, the total combined risk for each area was calculated across all exposure pathways, for each area and for background. In order to distinguish the contribution of background in accordance with EPA's Policy Statement on the Role of Background in the CERCLA Decision Process (OSWER 9265.6-07P, EPA 2002) the results are discussed in terms of incremental risk, which is the result of the background risk subtracted from the total combined risk. Because background soils exceeded EPA's risk range the risk characterization focuses on the incremental risk or the risk attributable to each survey area above the background risk.

4.3.2.1 On-Site Areas

Located within the main NECR Site, there are 12 areas of concern which include: NECR-1, NECR-2 Ponds 1 & 2, Pond 3/3a, Sediment Pad, Sandfill 1, Sandfill 2, Sandfill 3, NEMSA, Boneyard, Vents 3 & 8, and the Trailer Park (See Figures 1-3 and 2-1). Each on-site location was evaluated for current/future maintenance personnel, the hypothetical future on-site resident, and the hypothetical future livestock grazer.

NECR-1

For current/future maintenance personnel within NECR-1 evaluated under Scenario 1 (Tables 4-9 and 4-11), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of NECR-1 for maintenance personnel under Scenario 2 (Tables 4-10 and 4-12), only subsurface soil has an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 at an EPC of 46 pCi/g in subsurface soil, and the external exposure pathway.

For the hypothetical future livestock grazer within NECR-1 evaluated under Scenario 1 (Tables 4-13 and 4-15), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of NECR-1 for the livestock grazer under Scenario 2 (Tables 4-14 and 4-16), both surface and subsurface soil have an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 39 pCi/g, in subsurface soil with a Ra-226 EPC of 46 pCi/g, and both the meat consumption and external exposure pathways.

For the hypothetical future on-site resident within NECR-1 evaluated under Scenario 1 (Table 4-17), none of the COPCs has an incremental risk above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04. Uranium has an incremental HQ > 1, which is attributable to soil ingestion. For evaluation of NECR-1 for hypothetical future on-site residents both for the national average and for Native Americans under Scenario 2 (Tables 4-18 and 4-19), surface soil has an incremental risk greater than 1E-06 to 1E-04 and an HQ > 1. Incremental risk estimates greater than 1E-04 are attributable to the consumption of homegrown produce and/or meat, and the external exposure pathways. The only exposure pathway with an HQ > 1 is soil ingestion. Actual exposures may be lower than those estimated if vegetable gardens are not used, if livestock do not graze in the area, or if these levels are reduced through future reclamation activities at the site. Also, it should be noted that it may not be appropriate to consider the latter indirect exposure pathways given that the risk-based Soil Screening Levels (SSLs) calculated for Ra-226 for external exposure, consumption of homegrown produce, and consumption of homegrown meat based on a risk level of 10^{-6} are 0.01 pCi/g, 0.069 pCi/g, and 0.024 pCi/g, respectively, and are all well below the site-specific background level of 1.0 pCi/g.

NECR-2

For current/future maintenance personnel within NECR-2 evaluated under Scenario 1 (Tables 4-9 and 4-11), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ

> 1. For evaluation of NECR-2 for maintenance personnel under Scenario 2 (Tables 4-10 and 4-12), neither surface soil or subsurface soil concentrations of any COPC have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1.

For the hypothetical future livestock grazer within NECR-2 evaluated under Scenario 1 (Tables 4-13 and 4-15), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of NECR-2 for the future livestock grazer under Scenario 2 (Tables 4-14 and 4-16), both surface and subsurface soil has an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 39 pCi/g, in subsurface soil with a Ra-226 EPC of 10 pCi/g, and the meat consumption pathway.

For the hypothetical future on-site resident within NECR-2 evaluated under Scenario 1 (Table 4-17), none of the COPCs has an incremental risk above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04. Uranium has an incremental HQ > 1, which is attributable to soil ingestion. For evaluation of NECR-2 for hypothetical future on-site residents both for the national average and for Native Americans under Scenario 2 (Tables 4-18 and 4-19), surface soil has an incremental risk greater than 1E-06 to 1E-04 and an HQ > 1. Incremental risk estimates greater than 1E-04 are attributable to the consumption of homegrown produce and/or meat, and the external exposure pathways. The only exposure pathway with an HQ > 1 is soil ingestion. As discussed above for NECR-1, actual exposures may be lower than those estimated and it may not be appropriate to consider the latter indirect exposure pathways.

Ponds 1 & 2

For current/future maintenance personnel at Ponds 1 & 2 evaluated under Scenario 1 (Tables 4-9 and 4-11), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of Ponds 1 & 2 for maintenance personnel under Scenario 2 (Tables 4-10 and 4-12), both surface and subsurface soil have an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 179 pCi/g and in subsurface soil with a Ra-226 EPC of 352 pCi/g.

For the hypothetical future livestock grazer at Ponds 1 & 2 evaluated under Scenario 1 (Tables 4-13 and 4-15), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of Ponds 1 & 2 for the future livestock grazer under Scenario 2 (Tables 4-14 and 4-16), both surface and subsurface soil have an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 179 pCi/g, in subsurface soil with a Ra-226 EPC of 352 pCi/g, and both the meat consumption and external exposure pathways.

For the hypothetical future on-site resident at Ponds 1 & 2 evaluated under Scenario 1 (Table 4-17), surface soil concentrations of Ra-226 have an incremental risk above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04, and uranium has an incremental HQ > 1. These risks are attributable to soil ingestion. For evaluation of Ponds 1 & 2 for hypothetical future on-site residents both for the national average and for Native Americans under Scenario 2 (Tables 4-18 and 4-19), surface soil has an incremental risk greater than 1E-06 to 1E-04 and an HQ > 1. Incremental risk estimates greater than 1E-04 are attributable to soil ingestion, the consumption of homegrown produce, the consumption of locally raised meat and/or locally raised eggs, and the external exposure pathways. The only exposure pathway with an HQ > 1 is soil ingestion. As discussed above for NECR-1, actual exposures may be lower than those estimated and it may not be appropriate to consider the latter indirect exposure pathways.

Pond 3/3a

For current/future maintenance personnel at Pond 3/3a evaluated under Scenario 1 (Tables 4-9 and 4-11), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of Pond 3/3a for maintenance personnel under Scenario 2 (Tables 4-10 and 4-12), both surface and subsurface soil have an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 253 pCi/g and in subsurface soil with a Ra-226 EPC of 11 pCi/g.

For the hypothetical future livestock grazer at Pond 3/3a evaluated under Scenario 1 (Tables 4-13 and 4-15), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of Ponds 3/3a for the future livestock grazer under Scenario 2 (Tables 4-14 and 4-16), both surface and subsurface soil has an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 253 pCi/g and both the meat consumption and external exposure pathways. This is also attributable to the presence of Ra-226 in subsurface soil at an EPC of 11 pCi/g and the meat consumption pathway.

For the hypothetical future on-site resident at Pond 3/3a evaluated under Scenario 1 (Table 4-17), surface soil concentrations of Ra-226 have an incremental risk above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04, and uranium has an incremental HQ > 1. These risks are attributable to soil ingestion. For evaluation of Pond 3/3a for hypothetical future on-site residents both for the national average and for Native Americans under Scenario 2 (Tables 4-18 and 4-19), surface soil has an incremental risk greater than 1E-06 to 1E-04 and an HQ > 1. Incremental risk estimates greater than 1E-04 are attributable to soil ingestion, the consumption of homegrown produce, the consumption of locally raised meat and/or locally raised eggs, and the external exposure pathways. The only exposure pathway with an HQ > 1 is soil ingestion. As discussed above for NECR-1, actual exposures may be lower than those estimated and it may not be appropriate to consider the latter indirect exposure pathways.

Sediment Pad

For current/future maintenance personnel within the Sediment Pad area evaluated under Scenario 1 (Tables 4-9 and 4-11), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the Sediment Pad for maintenance personnel under Scenario 2 (Tables 4-10 and 4-12), both surface and subsurface soil have an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 109 pCi/g and in subsurface soil with a Ra-226 EPC of 104 pCi/g.

For the hypothetical future livestock grazer within the Sediment Pad area evaluated under Scenario 1 (Tables 4-13 and 4-15), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the Sediment Pad for the future livestock grazer under Scenario 2 (Tables 4-14 and 4-16), both surface and subsurface soil have an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 109 pCi/g, and in subsurface soil with a Ra-226 EPC of 104 pCi/g, and both the meat consumption and external exposure pathways.

For the hypothetical future on-site resident within the Sediment Pad area evaluated under Scenario 1 (Table 4-17), none of the COPCs has an incremental risk above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04. Uranium has an incremental HQ > 1, which is attributable to soil ingestion. For evaluation of Sediment Pad area for hypothetical future on-site residents both for the national average and for Native Americans under Scenario 2 (Tables 4-18 and 4-19), surface soil has an incremental risk greater than 1E-06 to 1E-04 and an HQ > 1. Incremental risk estimates greater than 1E-04 are attributable to the consumption of homegrown produce and/or meat, and the external exposure pathways. The only exposure pathway with an HQ > 1 is soil ingestion. As discussed above for NECR-1, actual exposures may be lower than those estimated and it may not be appropriate to consider the latter indirect exposure pathways.

Sandfill 1

For current/future maintenance personnel at the Sandfill 1 area evaluated under Scenario 1 (Tables 4-9 and 4-11), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the Sandfill 1 for maintenance personnel under Scenario 2 (Tables 4-10 and 4-12), only surface soil has an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 106 pCi/g.

For the hypothetical future livestock grazer at the Sandfill 1 area evaluated under Scenario 1 (Tables 4-13 and 4-15), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the Sandfill 1 for the future livestock grazer under Scenario 2 (Tables 4-14 and 4-16), both surface soil and subsurface soil have an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 15 pCi/g, the presence of Ra-226 in subsurface soil at an EPC of 106 pCi/g, and both the meat consumption and external exposure pathways.

For the hypothetical future on-site resident at the Sandfill 1 area evaluated under Scenario 1 (Table 4-17), none of the COPCs has an incremental risk above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or an HQ > 1. For evaluation of the Sandfill 1 area for hypothetical future on-site residents both for the national average and for Native Americans under Scenario 2 (Tables 4-18 and 4-19), surface soil has an incremental risk greater than 1E-06 to 1E-04. Incremental risk estimates greater than 1E-04 are attributable to the consumption of homegrown produce and/or meat, and the external exposure pathways. As discussed above for NECR-1, actual exposures may be lower than those estimated and it may not be appropriate to consider the latter indirect exposure pathways.

Sandfill 2

For current/future maintenance personnel at the Sandfill 2 area evaluated under Scenario 1 (Tables 4-9 and 4-11), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the Sandfill 2 for maintenance personnel under Scenario 2 (Tables 4-10 and 4-12), neither surface soil nor subsurface soil concentrations of any COPC have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1.

For the hypothetical future livestock grazer at the Sandfill 2 area evaluated under Scenario 1 (Tables 4-13 and 4-15), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the Sandfill 2 for the future livestock grazer under Scenario 2 (Tables 4-14 and 4-16), only surface soil had an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 19 pCi/g and the meat consumption pathway.

For the hypothetical future on-site resident at the Sandfill 2 area evaluated under Scenario 1 (Table 4-17), none of the COPCs has an incremental risk above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or an HQ > 1. For evaluation of the Sandfill 2 area for hypothetical future on-site residents both for the national average and for Native Americans under Scenario 2 (Tables 4-18 and 4-19), surface soil has an incremental risk greater than 1E-06 to 1E-04. Incremental risk estimates greater than 1E-04 are attributable to the consumption of homegrown produce and/or meat, and the external exposure pathways. As discussed above for NECR-1, actual exposures may be lower than those estimated and it may not be appropriate to consider the latter indirect exposure pathways.

Sandfill 3

For current/future maintenance personnel at the Sandfill 3 area evaluated under Scenario 1 (Tables 4-9 and 4-11), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of Sandfill 3 for maintenance personnel under Scenario 2 (Tables 4-10 and 4-12), neither surface nor subsurface soil have an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. Surface soil has a total cancer risk of 2E-4. This is attributable to the presence of Ra-226 in surface soil at an EPC of 69 pCi/g.

For the hypothetical future livestock grazer at the Sandfill 3 area evaluated under Scenario 1 (Tables 4-13 and 4-15), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of Sandfill 3 for the future livestock grazer under Scenario 2 (Tables 4-14 and 4-16), both surface and subsurface soil have an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 69 pCi/g, in subsurface soil with a Ra-226 EPC of 49 pCi/g, and both the meat consumption and external exposure pathways.

For the hypothetical future on-site resident at the Sandfill 3 area evaluated under Scenario 1 (Table 4-17), none of the COPCs has an incremental risk above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04. Uranium has an incremental HQ > 1, which is attributable to soil ingestion. For evaluation of the Sandfill 3 area for hypothetical future on-site residents both for the national average and for Native Americans under Scenario 2 (Tables 4-18 and 4-19), surface soil has an incremental risk greater than 1E-06 to 1E-04 and an HQ > 1. Incremental risk estimates greater than 1E-04 are attributable to the consumption of homegrown produce and/or meat, and the external exposure pathways. The only exposure pathway with an HQ > 1 is soil ingestion. As discussed above for NECR-1, actual exposures may be lower than those estimated and it may not be appropriate to consider the latter indirect exposure pathways

NEMSA

For current/future maintenance personnel within the NEMSA area evaluated under Scenario 1 (Tables 4-9 and 4-11), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the NEMSA area for maintenance personnel under Scenario 2 (Tables 4-10 and 4-12), only subsurface soil has an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in subsurface soil at an EPC of 69 pCi/g.

For the hypothetical future livestock grazer within the NEMSA area evaluated under Scenario 1 (Tables 4-13 and 4-15), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the NEMSA area for the future livestock grazer under Scenario 2 (Tables 4-14 and 4-16), both surface and subsurface soil have an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 42 pCi/g, in subsurface soil with a Ra-226 EPC of 69 pCi/g, and both the meat consumption and external exposure pathways.

For the hypothetical future on-site resident within the NEMSA area evaluated under Scenario 1 (Table 4-17), none of the COPCs has an incremental risk above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04. Uranium has an incremental HQ > 1, which is attributable to soil ingestion. For evaluation of the NEMSA area for hypothetical future on-site residents both for the national average and for Native Americans under Scenario 2 (Tables 4-18 and 4-19), surface soil has an incremental risk greater than 1E-06 to 1E-04 and an HQ > 1. Incremental risk estimates greater than 1E-04 are attributable to the consumption of homegrown produce and/or meat, and the external exposure pathways. The only exposure pathway with an HQ > 1 is soil ingestion. As discussed above for NECR-1, actual exposures may be lower than those estimated and it may not be appropriate to consider the latter indirect exposure pathways.

Boneyard

For current/future maintenance personnel within the Boneyard area evaluated under Scenario 1 (Tables 4-9 and 4-11), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the Boneyard area for maintenance personnel under Scenario 2 (Tables 4-10 and 4-12), neither surface or subsurface soil have an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 36 pCi/g.

For the hypothetical future livestock grazer within the Boneyard area evaluated under Scenario 1 (Tables 4-13 and 4-15), neither surface soil nor subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the Boneyard area for the future livestock grazer under Scenario 2 (Tables 4-14 and 4-16), both surface and subsurface soil have an incremental risk greater than 1E-06 to 1E-04 or an HQ >1. This is attributable to the presence of Ra-226 in surface soil at an EPC of 46 pCi/g, in subsurface soil with a Ra-226 EPC of 36 pCi/g, and both the meat consumption and external exposure pathways.

For the hypothetical future on-site resident within the Boneyard area evaluated under Scenario 1 (Table 4-17), none of the COPCs has an incremental risk above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or an HQ > 1. For evaluation of the Boneyard area for hypothetical future on-site residents both for the national average and for Native Americans under Scenario 2 (Tables 4-18 and 4-19), surface soil has an incremental risk greater than 1E-06 to 1E-04. Incremental risk estimates greater than 1E-04 are attributable to the consumption of homegrown produce and/or meat, and the external exposure pathways. As discussed above for NECR-1, actual exposures may be lower than those estimated and it may not be appropriate to consider the latter indirect exposure pathways.

Vents 3 & 8

The Vents 3 & 8 area was added on during the RSE and therefore only surface soil samples were taken from this area.

For current/future maintenance personnel within the Vents 3 & 8 area evaluated under Scenario 1 (Table 4-9), no surface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the Vents 3 & 8 area for maintenance personnel under Scenario 2 (Tables 4-10), surface soil has an incremental risk greater than 1E-06 to 1E-04. This is attributable to the presence of Ra-226 in surface soil at an EPC of 92 pCi/g.

For the hypothetical future livestock grazer within the Vents 3 & 8 evaluated under Scenario 1 (Tables 4-13 and 4-15), no surface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the Vents 3 & 8 for the future livestock grazer under Scenario 2 (Tables 4-14), surface soil has an incremental risk greater than 1E-06 to 1E-04. This is attributable to the presence of Ra-226 via the external exposure pathway at an EPC of 92 pCi/g, and both the meat consumption and external exposure pathways.

For the hypothetical future on-site resident within the Vents 3 & 8 area evaluated under Scenario 1 (Table 4-17), none of the COPCs has an incremental risk above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04. Uranium has an incremental HQ > 1, which is attributable to soil ingestion. For evaluation of the Vents 3 & 8 area for hypothetical future on-site residents both for the national average and for Native Americans under Scenario 2 (Tables 4-18 and 4-19), surface soil has an incremental risk greater than 1E-06 to 1E-04 and an HQ > 1. Incremental risk estimates greater than 1E-04 are attributable to the consumption of homegrown produce and/or meat, and the external exposure pathways. Exposure pathways with an HQ > 1 include soil ingestion. As discussed above for NECR-1, actual exposures may be lower than those estimated and it may not be appropriate to consider the latter indirect exposure pathways.

Trailer Park

The Trailer Park area was added on during the RSE and therefore only surface soil samples were taken from this area.

For current/future maintenance personnel within the Trailer Park area evaluated under Scenario 1 (Table 4-9), no surface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the Trailer Park area for maintenance personnel under Scenario 2 (Table 4-10), no surface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1.

For the hypothetical future livestock grazer within the Trailer Park area evaluated under Scenario 1 (Table 4-13), no surface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For evaluation of the Trailer Park area for the future livestock grazer under Scenario 2 (Table 4-14), surface soil has an incremental risk greater than 1E-06 to 1E-04. This is attributable to the presence of Ra-226 in surface soil at an EPC of 32 pCi/g, and both the meat consumption and external exposure pathways.

For the hypothetical future on-site resident within the Trailer Park area evaluated under Scenario 1 (Table 4-17), none of the COPCs has an incremental risk above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04. Uranium has an incremental HQ > 1, which is attributable to soil ingestion. For evaluation of the Trailer Park area for hypothetical future on-site residents both for the national average and for Native Americans under Scenario 2 (Tables 4-18 and 4-19), surface soil has an incremental risk greater than 1E-06 to 1E-04 and an HQ > 1. Incremental risk estimates greater than 1E-04 are attributable to the consumption of homegrown produce and/or meat, and the external exposure pathways. Exposure pathways with an HQ > 1 include soil ingestion. As discussed above for NECR-1, actual exposures may be lower than those estimated and it may not be appropriate to consider the latter indirect exposure pathways.

4.3.2.2 Off-Site Areas

Off-site areas include the nine Home Sites evaluated for residential receptors (Figure 2-3), the Unnamed Arroyo (Figure 2-4) evaluated for the hypothetical future livestock grazer, and background data collected for the purpose of comparison to combined risk and hazard estimates for each area (Figure 2-5). The Home Sites were divided into a western and eastern group based on potential levels of impact and the geography of the two areas. The two areas are separated by the unnamed arroyo. The five eastern home sites are closer to the Site. Two of the four western home sites are located near the Unnamed Arroyo; the other two western home sites are located near the former Kerr McGee haul road. As a result of EPA's removal action within Home Sites #4, #6, #7, #8, and #9, the incremental risks and hazards associated with pre-soil removal results (Appendix E) are no longer representative of current conditions for those Home Sites. Following the removal action, EPA collected post-removal confirmation sampling results for Ra-226, but not for other analytes. Consequently, post-removal data for Ra-226 were used to evaluate current incremental risks and hazards associated with these Home Sites.

Western Home Sites (#1 through #5)

For residents of the western Home Sites evaluated under Scenario 1 (Table 4-20), none of the Home Sites have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For residents of the western Home Sites evaluated under Scenario 2, none of the Home Sites have an incremental risk or HQ above the USEPA risk management range of 1E-06 to 1E-04 or HQ > 1 (Tables 4-21 and 4-22).

Eastern Home Sites (#6 through #9)

For residents of the eastern Home Sites evaluated under Scenario 1 (Table 4-23), none of the incremental risk or HQ for any of the Home Sites exceeds the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For residents of the eastern Home Sites evaluated under Scenario 2 (Table 4-24 and 4-25), none of the Home Sites have incremental ILCR or HQ estimates above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1, based on EPA's post-removal confirmation sampling results. The total ILCR for all Home Sites on the eastern side of the Unnamed Arroyo were equal to 1E-04. For comparison, the total ILCR estimate for background soil was equal to 2E-04. Both the site-related and background risk estimates presented in this baseline ILCR are likely over-estimated as described in the Uncertainty Analysis included in Section 4.4.

Unnamed Arroyo

For the hypothetical future livestock grazer within the Unnamed Arroyo evaluated under Scenario 1 (Table 4-26), neither surface soil or subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. This is also true for the evaluation of the livestock grazer within the Unnamed Arroyo under Scenario 2 (Table 4-27).

Background Data

For the background data, only surface soil samples were collected. For Scenario 1, no soil concentrations of any COPC have a cumulative risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For Scenario 2, the total cumulative risk is 2E-04, and is above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04. This excess risk estimate for background soil is attributable to arsenic and Ra-226 by the soil ingestion, consumption of homegrown produce, consumption of locally-raised meat, and external radiation pathways.

4.4 UNCERTAINTY ANALYSIS

Following is a brief summary of potential uncertainties associated with the HHRA conducted for NECR. The following uncertainties have been identified based on limitations in the available information, methods, or assumptions described in this HHRA.

4.4.1 Contaminant Source Characterization

Environmental investigations conducted at the Site were based on site histories, known or suspected releases, and observed physical characteristics (e.g., the presence of waste materials or topographic anomalies) for non-radiological constituents. In addition, areas of the Site not known to be contaminated were investigated using a field gamma radiation survey for surface soil Ra-226. The field gamma radiation survey for surface soil Ra-226 was performed between November 7 and December 1, 2006 in accordance with the RSEWP. The field gamma radiation survey included a static (stationary) survey and a scan survey. The static gamma radiation surveys were designed primarily to characterize the nature and extent of Ra-226 in surface soils. The gamma radiation scan survey was intended primarily to aid with investigation and characterization of the lateral extent of Ra-226 and to identify elevated areas in surface soils. Areas of the site with significant detections of gamma radiation were targeted for additional, biased sampling. Based on the investigation methods employed, it is unlikely that locations within the 0.5-acre Home Site survey areas that were not specifically sampled contain significant levels of Site-related contaminants.

4.4.2 Site COPC Identification

The process used in the selection of site COPCs may introduce a degree of uncertainty in the HHRA. However, protective methods and assumptions were used to select site COPCs, in accordance with EPA (1989; 1991a). Protective assumptions used in the COPC screening procedure included comparison of maximum detected chemical concentrations of Ra-226 to EPA Soil Screening Levels (EPA, 2000b), and non-radiological analytes to residential and industrial PRGs (USEPA, 2004a). It should be noted, however, that these screening levels are based on conservative assumptions regarding land use (e.g., residential land use for all portions of the Site), default exposure assumptions, and do not take into account the contribution to risk of background concentrations of metals and Ra-226. As such, screening-level risk estimates tend to be over-estimated. Based on results of the screening HHRA, all investigation areas at the Site were further evaluated in a baseline HHRA

4.4.3 Exposure Assessment

Exposure assessment describes the processes used to identify potentially important receptors, exposure media, exposure pathways, and methods used to quantify exposure of human receptors to site contaminants. Potential uncertainties in the exposure assessment include, but are not limited to, the receptors, exposure pathways, exposure assumptions, and EPCs that are quantitatively and/or qualitatively evaluated in the HHRA. Receptors that were quantitatively evaluated in the HHRA for the NECR Site include residents for on-site, as well as off-site areas. As described in Sections 4.1.3 and 4.1.4, however, land use restrictions are in place for the Mine permit area by virtue of the NMMA, the current deed which allows the mineral rights owner to use as much of the surface as is necessary and convenient in connection with mining activities on the property, and the mine permit that allows mining and grazing activities. Unrestricted (i.e., residential) land use only applies to areas north of the Mine permit, excluding the Quivera Mine site, which is fenced and not used for residential purposes. Hypothetical future on-site residents were included in the baseline HHRA for evaluation of the potential need for future deed restrictions.

Exposure assumptions included the consumption of homegrown produce, and meat and eggs obtained from livestock raised in both on-site and off-site areas of the Mine permit. Exposure of human receptors to COPCs through the food chain is typically associated with substantial uncertainty due to the methods and assumptions used in modeling food chain exposures. Consequently, food uptake factors and exposure assumptions tend to err on the protective side. For example, the consumption rate of locally raised meat was based on the 95th percentile meat consumption rate for Native Americans equal to 5.09 grams per kilogram per day (g/kg-d), or 124.95 kilograms per year (kg/yr), published in EPA's *Exposure Factors Handbook* (USEPA, 1997b). The mean consumption rate for Native Americans, as cited in EPA (1997b), is less than half this amount, or 1.87 g/kg-d (51.45 kg/yr). In addition, information provided to GE/UTC by EPA indicates that the diet of local Navajo members includes a significant portion of mutton from sheep. The mean per capita intake rate for mutton in the U.S. is 0.0125 g-kg-d (0.31 kg/yr), while that for beef is 1.16 g/kg-d (28.4 kg/yr). While ranchers tend to have higher intake rates of locally-grown meat than average U.S. citizens, these comparisons suggest that the assumption regarding meat intake rate used in this baseline HHRA is protective. As a result, the carcinogenic risk estimate for ingestion of meat based on background levels of Ra-226 measured in soils at the Site was equal to 4E-05.

Finally, medium-specific EPCs used to quantify exposures for human receptors may result in uncertainty in exposure dose estimates. To address this potential uncertainty, maximum or 95 % UCL concentrations were used to estimate exposure doses for human receptors exposed to Site-related media, consistent with EPA (1989, 1992) guidelines. Based on the above considerations, the exposure doses presented in the HHRA for NECR are believed to represent protective, upper bound estimates of exposure.

4.4.4 Toxicity Assessment

The toxicity values (CSFs and RfDs) that were used in estimating carcinogenic risks and noncarcinogenic hazards also represent a potential source of uncertainty. The toxicity values used in the HHRA for NECR were derived from EPA sources, as described in Section 4.3.1.3. Toxicity values that are developed by the EPA generally represent upper bound estimates of toxicity, and incorporate uncertainty factors for extrapolation from animal data to humans, differences in individual sensitivity within populations, and the overall confidence in the data set. Because the toxicity values established by EPA are based on NOAEL concentrations and incorporate uncertainty factors, they are generally considered to be protective. The use of conservative toxicity values in the risk estimate tends to overestimate actual risks.

Route-to-route extrapolations were used when toxicity values were not available for a given route of exposure. The most frequent route-to-route extrapolations were performed to derive dermal CSFs or RfDs from oral values, because dermal CSFs and RfDs are not typically available. However, route-to-route extrapolations were also performed when inhalation CSFs or RfDs were not available, and the toxicological information supports such extrapolation. Route-to-route extrapolations were performed as described in USEPA (2002c). Route-to-route extrapolation results in potential uncertainty in the toxicological and risk evaluations for chemicals where this practice was employed, because some chemicals may be more or less toxic, or exhibit a different mechanism of toxicity, by the dermal versus oral route of exposure.

4.4.5 Risk Characterization

The different sources of uncertainty described above are incorporated into the risk estimate. Because the majority of these uncertainties err on the conservative side, the estimated risks presented in the HHRA for NECR most likely represent upper bound estimates; the actual risks are anticipated to be less. The protective nature of these assumptions is demonstrated by risk estimates associated with background concentrations of Ra-226 and non-radiological constituents in soil. The total ILCR for measured concentrations of all constituents in background soil (assuming scenario 2) was estimated as 2E-04. In other words, the uncertainty assumptions built into the risk calculation methodology are such that the HHRA results indicate that local residents are exposed to risks above EPA's target risk range based solely on background (pre-existing) conditions.

5.0 SUMMARY AND CONCLUSIONS

This Report describes the results of the RSE conducted at the Site and adjacent properties between August 14, 2006 and December 5, 2006. The RSE consisted of investigating surface and subsurface soils and sediments at various areas within and near the Site, in accordance with the RSEWP.

The Site was initially divided into eleven individual survey areas, which included NECR-1, NECR-2, Ponds 1 and 2, Pond 3/3a, Sandfill 1, Sandfill 2, Sandfill 3, Sediment Pad, Boneyard, NEMSA, and the Unnamed Arroyo. Two additional areas were added during the field investigation based on preliminary radiological scans; these areas were investigated in a judgmental manner only. These areas are Vent Hole 3/8 and the Trailer Park. Additionally, nine Home Sites located northeast of the Site were also investigated as part of the RSE and a soil removal action was subsequently carried out at five of the Home Sites (consisting of three properties) based on the results of the RSE. These home sites are located between NECR and the Quivera mine and are situated on the Quivera mine lease. Potential impacts to the Home Sites may have occurred due to wind or water transport of materials stemming from historical operations at NECR, historical operations at the Quivera mine, or background conditions.

Field investigation methods included scan and static gamma surveying, surface soil sampling, and subsurface soil sampling. The gamma radiation surveys indicated that surface soils within the initial boundaries of each of the on-site areas contain surface soils with Ra-226 concentrations above the 2.24 pCi/g FSL. The FSL for Ra-226 was derived from the residential PRG and mean background concentration of Ra-226, as described in Section 2.5. Small fractions of the survey points within the initial boundaries areas are below the FSL. The locations of exceedances of Ra-226 (equivalent) are frequent and closely spaced such that delineation of any smaller, clean areas within the interior of the areas is not practical, except possibly in Sandfill 1, where about 11 contiguous survey grid points are below the FSL.

The results of the static gamma radiation survey show that the average surface soil Ra-226 concentrations, as determined by correlation with the gamma survey results (CPM), range from approximately four to twenty times the 2.24 pCi/g FSL within each survey area. The surface soil Ra-226 concentration range is wide, with high standard deviations near or above the average concentrations indicating sporadic occurrence of elevated Ra-226 in surface soil.

Based on the static survey level results (i.e., locations below the Ra-226 FSL), an outer boundary for each area was interpreted and is shown on Figures 3-1 and 3-3 as the "FSL Boundary". This boundary was drawn outside of most Ra-226 exceedances of the FSL. The FSL Boundary was confirmed and slightly revised based on the results of the surface soil sampling. In many cases, the edge of impacted ground was established in the field, based on the following:

- Undisturbed ground, such as in wooded areas with native soils.
- Roads, structures, and fences.
- Topographic limitations such as precipices, and steep hillsides.
- Boundaries of adjoining survey areas.

The RSEWP also specified one-point surface soil sampling at 20% of the 80-foot triangular grid nodes (sample locations), or at least 13 grid nodes within an area, as well as from the five scan locations with the highest CPM readings at each of the nine Home Sites. The results show that although there may be some variation between Ra-226 surface soil concentrations by soil sampling versus static gamma radiation survey at some locations, the averages are comparable.

Surface soil samples (≤0.5 feet bgs) were collected from each of the fourteen survey areas, and analyzed for the preliminary COPCs (Ra-226, As, Mo, Se, U, and V). The results show that Ra-226 and uranium exceed the field screening levels at some locations, while all results for molybedenum, selenium and vanadium were below their respective field screening levels. Screening levels for As, Mo, Se, U, and V were based on the mean background concentrations, or in the case of arsenic, the published EPA Region 9 PRG, as described in Section 2.5. Ra-226, uranium and arsenic concentrations in surface soil were as follows:

- Ra-226 values ranged from 0.8 to 875 pCi/g with 70% of the 268 surface soil samples analyzed for Ra-226 [includes stepouts] exceeding the FSL of 2.24 pCi/g.

- Uranium values ranged from 0.7 to 3,970 mg/kg with 9% of the 230 samples analyzed for uranium exceeding the field screening level of 200 mg/kg.

- Arsenic values ranged from non-detect to 14.9 mg/kg with 60% of the 230 samples analyzed for arsenic exceeding the field screening level of 3.7 mg/kg. The data do not show any correlation between arsenic and Ra-226 or uranium concentrations, and there does not appear to be any spatial pattern in concentrations within the survey areas.

Subsurface soil samples (>0.5 feet bgs) were collected from each of the (original) eleven on-site survey areas, which includes the Unnamed Arroyo. Samples were collected in test pits, soil borings, and hand auger holes and analyzed for the preliminary COPCs. The results show that Ra-226, uranium and arsenic exceed the field screening levels at some locations, while all results for molybedenum, selenium and vanadium were below their respective field screening levels. Ra-226, uranium and arsenic concentrations in surface soil were as follows:

- Ra-226 values ranged from 0.6 to 438 pCi/g; 66% of the 145 subsurface soil samples analyzed for Ra-226 exceeded the FSL of 2.24 mg/kg.

- Total uranium values ranged from 0.7 to 760 mg/kg; 12% of the 145 samples analyzed for uranium exceeded the field screening level of 200 mg/kg.

Arsenic values ranged from non-detect (<0.5) to 13.9 mg/kg; 52% of the 145 samples analyzed for arsenic exceeded the field screening level of 3.7 mg/kg. The arsenic concentrations do not correlate with Ra-226 concentrations (e.g., locations of high aresenic concentrations are not necessarily co-located with high uranium concentrations) and there does not appear to be any spatial pattern in concentrations within the survey areas. Exeedances of the field screening levels is subsurface soils was confined to the top 5 to 14 feet at all sample locations, except at NECR-1. At NECR-1, exceedances of the field screening levels were detected in one soil boring (SB-090) in all samples collected from 5 to 25 feet bgs.

An evaluation of the the ratio of U-nat to Ra-226 concentrations in soils at the Home Sites was conducted. The average ratio of soils from around the Home Sites sampled for the RSE was 1.14. This is compared to an average ratio for background soils of 1.11, indicating that the Home Site soils are similar in nature to the background soils.

The HHRA that was conducted for the Site was based on the laboratory analysis results for surface soils (<0.5 feet bgs), and subsurface soils to a depth of 10 feet bgs. The HHRA is a quantitative and qualitative evaluation of potential impacts of Site-derived contaminants on human health, in the absence of remediation or institutional controls. Results of the HHRA are used to determine whether residual levels of contaminants in Site media are protective of human health and may be left in place, or consideration of remedial alternatives are warranted. The HHRA results also provide the basis for the development of alternatives and risk-based cleanup goals for the Site, as appropriate.

The HHRA described herein was conducted in accordance with methods described in Section 6.0 of the approved *Removal Site Evaluation Work Plan* (MWH, 2006). This HHRA is comprised of a site-specific conceptual site model (CSM), screening-level HHRA, and baseline HHRA. Risk characterization results expressed as cancer ILCR and non-cancer HI estimates for on-site receptors (current/future maintenance personnel, hypothetical future livestock grazers, and hypothetical future on-site residents) and for off-site receptors (current/future residents and hypothetical future livestock grazers) exposed to soils and sediments at the NECR Site are described below.

For each off-site and on-site area, two scenarios were evaluated: Scenario 1 summarizes risks to receptors when only direct soil exposure pathways are considered (i.e., incidental ingestion and inhalation of fugitive dust), while Scenario 2 includes five exposure pathways (i.e., incidental ingestion, inhalation of fugitive dust, consumption of homegrown produce, consumption of homegrown meat/eggs, and external radiation) (USEPA, 2007).

Additionally, the total combined risk for each area was calculated across all exposure pathways. Because the results of the risk calculations indicate that even naturally occurring (background) conditions exceed EPA's target risk range, incremental risk, which is the result of the background risk subtracted from the total combined risk, was also calculated for each survey area, as well as the Home Sites.

Located within the main NECR Site, there are 12 areas of concern which include: NECR-1, NECR-2 Ponds 1 & 2, Pond 3/3a, Sediment Pad, Sandfill 1, Sandfill 2, Sandfill 3, NEMSA, Boneyard, Vents 3 & 8, and the Trailer Park. Each on-site location was evaluated for current/future maintenance personnel, the hypothetical future livestock grazer, and hypothetical future on-site residents. The results of the assessment indicated the following:

- For current/future maintenance personnel under Scenario 1, no surface or subsurface soils in the on-site areas have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1.

- For current/future maintenance personnel under Scenario 2, surface soils in eight of the areas, and subsurface soils in five of the areas have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. A surface soil Ra-226 concentration of 50 pCi/g would result in an estimated incremental risk or HQ within the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ < 1.

- For the hypothetical future livestock grazer, under Scenario 1, no surface or subsurface soils in the on-site areas have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1.

- For the hypothetical future livestock grazer, under Scenario 2, surface soils in all but one of the areas, and subsurface soils in all but three of the areas have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. A surface soil Ra-226 concentration of 2.5 pCi/g would result in an estimated incremental risk or HQ within the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ < 1.

- For the hypothetical future on-site resident under Scenario 1, surface soils in all but three of the areas have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. Risk drivers under Scenario 1 were Ra-226 and uranium. A surface soil Ra-226 concentration of 110 pCi/g would result in an estimated incremental risk or HQ within the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ < 1. A surface soil uranium concentration of 48 mg/kg would result in an estimated incremental risk or HQ within the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ < 1.

- For the hypothetical future on-site resident under Scenario 2, surface soils in all of the areas have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. A surface soil Ra-226 concentration of 1.9 pCi/g would result in an estimated incremental risk or HQ within the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ < 1. A surface soil uranium concentration of 48 mg/kg would result in an estimated incremental risk or HQ within the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ < 1.

For a resident under scenario 2, in order to achieve the EPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ <1, concentrations of Ra-226 in surface soil concentrations cannot exceed 1.9 pCi/g, which is below the naturally occurring average levels of Ra-226 levels on the Colorado Plateau.

Off-site areas include the nine Home Sites evaluated for residential receptors, the Unnamed Arroyo evaluated for the hypothetical future livestock grazer, and background data collected for the purpose of comparison to combined risk and hazard estimates for each area.

The results of the risk assessment for residents of the Home Sites indicate the following:

- Scenario 1 - none of the Home Sites have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. Home Site #5 was associated with the highest ILCR (2E-05) estimated for any of the home sites. However, the ILCR due to background soils under scenario 1 was estimated as 1E-05.

- Scenario 2 – none of the Home Sites on the western side of the Unnamed Arroyo (Home Sites #1 through #5) have an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1.

- Scenario 2 - none of the Home Sites on the eastern side of the Unnamed Arroyo (Home Sites #6, #7, #8 and #9) have incremental ILCR or HQ estimates above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1, based on EPA's post-removal confirmation sampling results. The total ILCR for all Home Sites on the eastern side of the Unnamed Arroyo were equal to 1E-04. For comparison, the total ILCR estimate for background soil was equal to 2E-04. Both the site-related and background risk estimates presented in this baseline ILCR are likely over-estimated as described in the Uncertainty Analysis (Section 4.4).

Incremental risk estimates greater than 1E-04 are attributable to the consumption of homegrown produce, the consumption of homegrown meat, and the external exposure pathways considered in Scenario 2. Actual exposures will be lower than those assumed if vegetable gardens are not used, if livestock do not graze in the area, and/or if a concrete slab is part of the foundation at these Home Sites. In addition, it may not be appropriate to consider the latter indirect exposure pathways given that the risk-based Soil Screening Levels (SSLs) for Ra-226 for external exposure, consumption of homegrown produce, and consumption of homegrown meat based on a risk level of 10-6 are 0.01 pCi/g, 0.069 pCi/g and 0.024 pCi/g, respectively, and are below the site-specific background level of 1.0 pCi/g. It should also be noted that the exposure and risk estimates described in this HHRA are biased high due to the soil sampling design. Field screening was used to identify biased locations for the collection of soil samples. In turn, the 95% UCL on the mean concentration of these biased soil samples was used to estimate exposure doses and risk estimates. In most cases, the concentrations observed at biased sample locations are representative of only a very minor portion of the entire home site.

For the hypothetical future livestock grazer within the Unnamed Arroyo evaluated under Scenario 1 and 2, neither surface soil or subsurface soil concentrations of any COPC has an incremental risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1.

For the background data, only surface soil samples were collected. For Scenario 1, no soil concentrations of any COPC have a cumulative risk or HQ above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 or HQ > 1. For Scenario 2, arsenic and Ra-226 contribute to incremental risks above the USEPA risk management range of cancer risk equal to 1E-06 to 1E-04 and/or HQ > 1 due to soil ingestion, the consumption of homegrown produce and meat and exposure to external radiation.

Different sources of uncertainty described in the report are incorporated into the risk estimate. Because the majority of these uncertainties err on the conservative side, the estimated risks presented in the HHRA for NECR most likely represent upper bound estimates; the actual risks are anticipated to be less. The protective nature of these assumptions is demonstrated by risk estimates associated with background concentrations of Ra-226 and non-radiological constituents in soil. The total ILCR for measured concentrations of all constituents in background soil (assuming scenario 2) was estimated as 2E-04. Therefore, it is appropriate to consider both Scenario 1 and 2 in making risk management decisions.

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TABLES

Table 2.1
Gamma Radiation Levels vs. Ra-226 Soil Concentrations, Mine Site

Survey Date[1]	Gamma Rad Survey Point & Sample Identification	Gamma Rad Level (cpm) DECTECTOR: SPA-3, SR# 408522-33				Gamma Rad Level (cpm) DETECTOR: SPA-3, SR# 408522-30[1]				Soil Sample[2] Ra-226 (pCi/g)		Comments
		Lead Collimated		Bare (Uncollimated)		Lead Collimated		Bare (Uncollimated)				
		cpm	Average	cpm	Average	cpm	Average	cpm	Average	Conc.	Error	
		3,808		13,992		4,128		-				16-17 uR/hr, soil sample @1428
08/17/06	NECR-COR-A-01	3,856	3,840	13,892	13,819	4,096	4,109	-	-	1.9	0.3	
		3,857		13,573		4,102		-				
		6,794		22,199		7,109		-				23-26 uR/hr, soil sample @1440
08/17/06	NECR-COR-A-02	6,728	6,767	22,519	22,399	7,192	7,148	-	-	5.4	0.8	
		6,779		22,478		7,144		-				
		6,315		21,525		6,705		-				25 uR/hr, soil sample @1450
08/17/06	NECR-COR-A-03	6,352	6,335	21,524	21,604	6,664	6,702	-	-	4.5	0.7	
		6,337		21,764		6,738		-				
		4,809		17,195		5,177		-				20 uR/hr, soil sample @1500
08/17/06	NECR-COR-A-04	4,823	4,835	16,869	17,018	5,034	5,110	-	-	1.8	0.4	
		4,873		16,990		5,118		-				
		5,256		18,268		5,503		-				22 uR/hr, soil sample @1514
08/17/06	NECR-COR-A-05	5,122	5,145	18,357	18,421	5,434	5,449	-	-	3.7	0.8	
		5,057		18,639		5,409		-				
		4,111		15,318		4,274		-				20 uR/hr, soil sample @1527
08/17/06	NECR-COR-A-06	4,074	4,036	15,219	15,322	4,298	4,289	-	-	1.1	0.3	
		3,922		15,430		4,296		-				
		4,339		16,497		4,755		-				29-20 uR/hr, soil sample @1540
08/17/06	NECR-COR-A-07	4,502	4,410	16,555	16,630	4,687	4,681	-	-	1.5	0.4	
		4,390		16,839		4,602		-				
		5,798		23,880		6,279		24,386				28 uR/hr, soil sample @1604
08/17/06	NECR-COR-A-08	5,861	5,879	23,686	23,842	6,231	6,237	24,319	24,318	3.5	0.7	
		5,977		23,959		6,202		24,249				
		7,045		29,267		7,422		-				32 uR/hr, soil sample @1615
08/17/06	NECR-COR-A-09	7,188	7,064	29,505	29,168	7,508	7,466	-	-	6.6	0.9	
		6,960		28,733		7,468		-				
		21,588		64,550		22,970		65,453		31.6	3.6	75 uR/hr, soil sample @1635, Dup sample designated as NECR-COR-A-50 @1640
08/17/06	NECR-COR-A-10	21,377	21,529	65,569	64,820	22,448	22,740	65,176	65,468			
		21,623		64,340		22,801		65,774		32.3	3.7	
		4,750		20,267		5,104		-				22 uR/hr, soil sample @0848
08/18/06	NECR-COR-A-11	4,881	4,789	20,165	20,143	5,067	5,068	-	-	1.9	0.6	
		4,737		19,996		5,033		-				
		6,061		25,597		6,402		-				32 uR/hr, soil sample @0914
08/18/06	NECR-COR-A-12	6,205	6,086	25,634	25,491	6,432	6,439	-	-	6.8	0.9	
		5,993		25,241		6,483		-				
		6,662		27,457		7,168		-				32 uR/hr, soil sample @0922
08/18/06	NECR-COR-A-13	6,547	6,693	27,273	27,466	7,206	7,208	-	-	8.9	1.1	
		6,871		27,667		7,251		-				
		8,258		29,400		8,802		-				28 uR/hr, soil sample @0930
08/18/06	NECR-COR-A-14	8,314	8,309	29,178	29,203	8,754	8,779	-	-	10.3	1.3	
		8,354		29,031		8,780		-				
		7,086		30,194		7,616		29,230		9.2	1.1	32 uR/hr, soil sample @0945, Dup sample designated as NECR-COR-A-55 @0950
08/18/06	NECR-COR-A-15	7,361	7,265	29,917	29,949	7,681	7,649	29,721	29,677			
		7,349		29,735		7,649		30,080		8.8	0.5	
		6,441		24,754		6,838		-				40 uR/hr, soil sample @1014
08/18/06	NECR-COR-A-16	6,580	6,436	24,852	24,480	6,744	6,797	-	-	6.2	0.4	
		6,287		23,833		6,808		-				
		71,402		208,986		77,091		-				220 uR/hr, soil sample @1037
08/18/06	NECR-COR-A-17	71,884	72,060	205,275	209,441	76,034	76,378	-	-	185.0	8.7	
		72,894		214,062		76,010		-				
		29,639		92,060		31,655						110 uR/hr, soil sample @1103
08/18/06	NECR-COR-A-18	28,306	28,894	91,682	91,855	31,448	31,201			40.4	1.9	
		28,737		91,822		30,500						
		3,676		11,798		3,941		12,310				Near NECRBKG20 @ backg area, 15 uR/hr, soil sample @1200
08/18/06	NECR-COR-A-19	3,902	3,732	12,139	12,029	3,894	3,942	12,145	12,242	1.0	0.1	
		3,618		12,150		3,992		12,271				

Notes:
1. Gamma radiation level measurements with Detector #408522-30 for locations NECR-COR-A-01, 02, 03, 04, 05, 06, 07, 09, 11,12,13,14,16, and 18 were performed on November 7, 2006.
2. Soil samples were collected at co-locations with the gamma measurements and submitted to a laboratory for analysis of Ra-226.

Table 2.2 Gamma Radiation Level to Surface Soil Ra-226 Regression Data NECR-1 Step Out Survey and On Site Area >10K CPM Survey Points				
Date	**Area**	**Point No.**	**Gamma Rad Level CPM**	**Soil Sample Ra-226 pCi/gm**
NECR-1 Step Out Survey Points for <10,000 CPM Correlation				
01-Dec-06	NECR-1, SO South	316	4865	1.3
13-Nov-06	NECR-1, SO North	265	4908	1.6
13-Nov-06	NECR-1, SO North	240	5073	1.5
13-Nov-06	NECR-1, SO North	238	5080	1.6
16-Nov-06	NECR-1, SO East	307	5331	3.8
13-Nov-06	NECR-1, SO North	184	5380	1.2
13-Nov-06	NECR-1, SO North	262	5383	1.4
14-Nov-06	NECR-1, SO East	289	5400	1.8
01-Dec-06	NECR-1, SO South	323	5789	2.6
13-Nov-06	NECR-1, SO North	207	5977	3.1
16-Nov-06	NECR-1, SO East	293	6158	7.0
13-Nov-06	NECR-1, SO North	230	6557	6.9
14-Nov-06	NECR-1, SO East	266	7610	1.7
01-Dec-06	NECR-1, SO South	326	7908	5.2
13-Nov-06	NECR-1, SO North	173	9954	4.6
13-Nov-06	NECR-1, SO North	164	19872	35.7
14-Nov-06	NECR-1, SO East	281	37406	80.5
ON Site Areas w 10K CPM Survey Points for >10,000 CPM Correlation				
09-Nov-06	Pond 1&2	76	10,358	2.2
09-Nov-06	Sandfill 3	2	10,387	15.3
07-Nov-06	NECR-1	101	10437	12.7
10-Nov-06	Sandfill 2	7	10,505	16.1
10-Nov-06	Sandfill 2	12	10,586	6.2
10-Nov-06	Sandfill 1	43	10,879	6.7
17-Nov-06	Pond 1&2	42	11,185	1.0
08-Nov-06	Pond 3	27	11,737	4.7
09-Nov-06	Pond 3	57	12,207	2.8
07-Nov-06	Pond 3	15	12,447	18.8
10-Nov-06	NECR-2	69	12,599	8.9
10-Nov-06	Sandfill 1	50	12,689	15.7
10-Nov-06	Sandfill 1	30	12,777	14.3
08-Nov-06	NECR-1	49	12820	29.3
09-Nov-06	Sediment Pad	11	12,946	3.8
10-Nov-06	Pond 1&2	56	14,024	11.2
07-Nov-06	NECR-1	93	14402	35.7
09-Nov-06	NECR-2	71	14,523	40.0
09-Nov-06	Sandfill 3	8	14,637	1.4
10-Nov-06	Sandfill 2	11	15,448	6.2
09-Nov-06	Sandfill 3	10	15,681	33.4
09-Nov-06	Sandfill 3	6	15,867	17.4
09-Nov-06	Sandfill 3	9	16,019	31.9
08-Nov-06	NECR-1	28	16041	18.5
09-Nov-06	Sandfill 3	24	16,201	27.4
07-Nov-06	NECR-1	103	16490	20.9
09-Nov-06	Pond 3	63	16,625	3.8
09-Nov-06	Pond 1&2	50	16,747	13.7
08-Nov-06	NECR-1	67	16829	38.3
09-Nov-06	Sediment Pad	18	16,887	1.5
10-Nov-06	Pond 1&2	19	17,022	4.7
08-Nov-06	NECR-1	70	17802	26.1
10-Nov-06	NECR-2	18	17,871	3.6
08-Nov-06	NECR-1	18	18184	21.7
09-Nov-06	Sediment Pad	7	19,678	106.0

Table 2.2 Gamma Radiation Level to Surface Soil Ra-226 Regression Data NECR-1 Step Out Survey and On Site Area >10K CPM Survey Points				
Date	**Area**	**Point No.**	**Gamma Rad Level CPM**	**Soil Sample Ra-226 pCi/gm**
07-Nov-06	NECR-1	129	19698	7.0
13-Nov-06	NECR-1, SO North	164	19872	35.7
09-Nov-06	NECR-2	39	19,939	35.4
10-Nov-06	Sandfill 2	17	20,647	36.4
09-Nov-06	NECR-2	15	20,677	97.2
09-Nov-06	NECR-2	27	21,010	35.3
07-Nov-06	Pond 3	1	21,120	18.8
09-Nov-06	Sandfill 3	26	21,274	19.6
09-Nov-06	Sediment Pad	25	21,621	36.7
09-Nov-06	NECR-2	52	22,046	23.0
09-Nov-06	Sediment Pad	5	22,191	17.7
09-Nov-06	Sediment Pad	20	22,537	12.8
08-Nov-06	Pond 3	46	23,486	19.5
09-Nov-06	NECR-2	20	24,011	38.1
08-Nov-06	NECR-1	47	24256	31.3
08-Nov-06	NECR-1	23	24299	18.3
09-Nov-06	Sandfill 3	25	24,640	26.9
09-Nov-06	Pond 3	65	24,776	39.6
10-Nov-06	Sandfill 2	19	24,945	21.6
08-Nov-06	NECR-1	68	26252	12.8
09-Nov-06	Pond 1&2	24	28,230	26.9
07-Nov-06	NECR-1	137	29493	52.6
08-Nov-06	NECR-1	20	31670	46.2
09-Nov-06	Sediment Pad	8	31,701	25.8
10-Nov-06	Sandfill 1	63	32,153	20.8
07-Nov-06	NECR-1	133	33370	54.7
07-Nov-06	NECR-1	135	34742	63.2
09-Nov-06	Sediment Pad	26	36,363	27.1
09-Nov-06	NECR-2	17	36,878	55.2
14-Nov-06	NECR-1, SO East	281	37406	80.5
07-Nov-06	NECR-1	138	37798	48.6
09-Nov-06	Pond 3	59	38,463	26.9
08-Nov-06	NECR-1	65	40047	28.4
09-Nov-06	Pond 1&2	71	40,879	49.9
09-Nov-06	Pond 3	61	40,887	17.3
08-Nov-06	NECR-1	126	41946	50.9
10-Nov-06	Pond 1&2	14	44,649	96.9
07-Nov-06	NECR-1	131	45205	41.5
10-Nov-06	Sandfill 1	68	45,274	47.3
09-Nov-06	Sediment Pad	15	46,708	33.4
10-Nov-06	Pond 1&2	23	48,888	62.4
10-Nov-06	Sandfill 1	49	49,290	16.8
08-Nov-06	NECR-1	46	50688	58.8
08-Nov-06	NECR-1	44	53006	47.9
08-Nov-06	NECR-1	26	55532	68.4
09-Nov-06	Sediment Pad	6	58,230	38.8
07-Nov-06	NECR-1	90	60717	84.8
09-Nov-06	Sandfill 3	5	62,004	66.9
08-Nov-06	NECR-1	127	62399	93.3
09-Nov-06	Pond 1&2	47	62,918	73.1
08-Nov-06	Pond 3	38	73,114	20.9
08-Nov-06	NECR-1	16	80015	80.8
09-Nov-06	NECR-2	35	84,399	160.8
07-Nov-06	Pond 3	7	84,406	259.0

Table 2.2 Gamma Radiation Level to Surface Soil Ra-226 Regression Data NECR-1 Step Out Survey and On Site Area >10K CPM Survey Points				
Date	**Area**	**Point No.**	**Gamma Rad Level CPM**	**Soil Sample Ra-226 pCi/gm**
07-Nov-06	NECR-1	95	88148	75.7
09-Nov-06	Sandfill 3	14	92,167	123
09-Nov-06	Pond 1&2	82	92,284	177.0
09-Nov-06	Pond 1&2	60	92,295	26.5
09-Nov-06	Sediment Pad	14	110,907	236.0
09-Nov-06	Pond 1&2	77	112,122	48.7
09-Nov-06	Pond 1&2	69	112,771	161.0
09-Nov-06	Sediment Pad	12	119,627	118.0
09-Nov-06	Sediment Pad	21	140,404	85.6
09-Nov-06	Pond 1&2	35	141,363	78.5
08-Nov-06	Pond 3	29	149,128	312.0
09-Nov-06	Pond 1&2	58	320,161	655.0

Table 2.3
Summary of Soil Sampling Program

	Surface Soil Samples[1]		Soil Borings & Test Pits[1,2]
	Inside Original Boundary	**Step-out Samples**	**>0.5 ft bgs**
NECR-1	31	16	28
NECR-2	15	4	6
Ponds 1 and 2	19	4	14
Pond 3/3a	15	0	14
Sediment Pad	14	0	9
Sandfill 1	15	3	9
Sandfill 2	13	0	5
Sandfill 3	13	2	7
NEMSA	5	0	13
Boneyard	5	0	11
Trailer Park	0	5	0
Vents 3 & 8	0	5	0
Home Sites	45	0	0
Unnamed Arroyo[3]	0	0	30

Notes:
1. The above sample quantities include both gridded (random) samples, as well as judgmental samples.
2. All test pits and soil borings were within the original survey area boundaries as shown on Figures 2-3 and 2-4.
3. Soil samples were collected from the Unnamed Arroyo from 0-1, 1-2, and 2-3 feet bgs.
4. Vents 3 & 8 and the Trailer Park areas were added during the field investigations as per FCR #004.

Table 2.4
Summary of Analytical Results From Background Sampling

Location ID	Ra-226[1]	As[2]	Mo	Se	U	V
Reporting Limit	0.1	0.5	5.0	0.2	0.2	5.0
Industrial PRG	--	1.6	5100.0	5100.0	200.0	1000.0
Outdoor Worker	0.0258	--	--	--	--	--
Residential PRG	0.0124	0.39	390.0	390.0	16.0	78.0
Screening Level	2.24	1.6	5100.0	5100.0	200.0	1000.0
NECRBKG-01	0.8	4.4	nd	0.2	0.8	24.7
NECRBKG-02	1.3	9.2	nd	0.7	1.4	29.8
NECRBKG-03	1.1	10.0	nd	0.7	1.8	32.3
NECRBKG-04	1.3	5.1	nd	0.7	1.3	40.7
NECRBKG-05	1.1	4.5	nd	0.5	1.0	30.7
NECRBKG-06	1.0	6.1	nd	0.6	1.1	31.9
NECRBKG-07	1.1	4.2	nd	0.5	1.3	33.5
NECRBKG-08	1.2	3.1	nd	0.4	1.4	32.5
NECRBKG-09	1.2	2.8	nd	0.5	1.4	31.6
NECRBKG-10	0.9	2.5	nd	0.5	1.1	27.3
NECRBKG-11	1.0	2.9	nd	0.4	0.9	30.6
NECRBKG-12	1.2	3.1	nd	0.3	1.0	23.7
NECRBKG-13	1.0	2.8	nd	0.4	1.1	31.2
NECRBKG-14	1.0	2.4	nd	0.2	1.1	20.1
NECRBKG-15	1.2	2.7	nd	0.5	1.2	28.7
NECRBKG-16	0.7	2.7	nd	0.4	1.2	23.0
NECRBKG-17	1.1	3.0	nd	nd	1.2	29.0
NECRBKG-18	0.6	2.4	nd	nd	1.1	21.2
NECRBKG-19	1.1	2.7	nd	0.2	0.9	18.4
NECRBKG-20	1.0	2.7	nd	nd	0.9	20.0
NECRBKG-21	1.0	2.9	nd	0.3	1.0	22.5
NECRBKG-22	0.8	3.4	nd	0.2	0.9	18.0
NECRBKG-23	0.9	2.9	nd	nd	0.9	22.6
NECRBKG-24	1.0	2.0	nd	nd	0.9	18.8
NECRBKG-25	1.3	2.5	nd	nd	1.2	24.9
Average	**1.0**	**3.7**	**nd**	**0.4**	**1.1**	**26.7**
Standard Deviation	**0.2**	**2.0**	**nd**	**0.2**	**0.2**	**5.8**

Notes:
Shaded cells indicate results greater than the screening levels.
nd = not detected above the reporting limit. One-half the reporting limit was used for statistical parameters.
-- = not applicable
All results in mg/kg, except Ra-226, which is in pCi/g.
1. Radium 226 precision (+/-) 0.1.
2. The residential non-cancer PRG for arsenic is 22 mg/kg, and the industrial non-cancer PRG is 260 mg/kg.

Table 3.1 NECR-1 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Radiation Level (Collimated 2x2 #408522-33)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
Primary Sample Locations					
08-Nov-06	1	725,375.4	3,948,805.1	11507	4.5
08-Nov-06	2	725,402.1	3,948,805.2	8481	8.7
08-Nov-06	3	725,421.6	3,948,808.3	17937	14.8
08-Nov-06	4	725,364.9	3,948,826.2	12376	5.9
08-Nov-06	5	725,389.2	3,948,829.0	8766	9.4
08-Nov-06	6	725,413.3	3,948,828.0	7241	5.8
08-Nov-06	7	725,440.5	3,948,825.5	7381	6.1
08-Nov-06	8	725,461.8	3,948,826.4	7187	5.6
08-Nov-06	9	725,350.6	3,948,848.6	22595	22.2
08-Nov-06	10	725,374.6	3,948,849.0	49353	65.1
08-Nov-06	11	725,399.3	3,948,848.5	8225	8.1
08-Nov-06	12	725,423.4	3,948,848.8	9282	10.7
08-Nov-06	13	725,447.9	3,948,847.4	10469	2.8
08-Nov-06	14	725,472.7	3,948,849.9	6339	3.6
08-Nov-06	15	725,338.5	3,948,869.9	65159	90.3
08-Nov-06	16	725,366.1	3,948,869.8	80015	114.1
08-Nov-06	17	725,390.8	3,948,869.3	72378	101.9
08-Nov-06	18	725,413.4	3,948,868.3	18184	15.2
08-Nov-06	19	725,438.3	3,948,868.9	15502	10.9
08-Nov-06	20	725,461.5	3,948,870.5	31670	36.8
08-Nov-06	21	725,486.9	3,948,869.7	13018	6.9
08-Nov-06	22	725,508.7	3,948,869.0	6581	4.2
08-Nov-06	23	725,325.9	3,948,890.8	24299	25.0
08-Nov-06	24	725,350.3	3,948,890.8	39603	49.5
08-Nov-06	25	725,374.6	3,948,890.9	58768	80.1
08-Nov-06	26	725,398.9	3,948,891.2	55532	74.9
08-Nov-06	27	725,423.4	3,948,891.6	20946	19.6
08-Nov-06	28	725,445.8	3,948,890.3	16041	11.8
08-Nov-06	29	725,471.9	3,948,888.5	16286	12.1
08-Nov-06	30	725,497.0	3,948,889.1	8914	9.8
08-Nov-06	31	725,522.9	3,948,888.7	16751	12.9
08-Nov-06	32	725,547.8	3,948,890.8	17145	13.5
08-Nov-06	33	725,340.1	3,948,910.0	47725	62.5
08-Nov-06	34	725,363.7	3,948,911.0	49355	65.1
08-Nov-06	35	725,388.4	3,948,910.6	45420	58.8
08-Nov-06	36	725,412.2	3,948,910.8	38089	47.0
08-Nov-06	37	725,436.8	3,948,911.4	19606	17.5
08-Nov-06	38	725,460.0	3,948,911.9	21243	20.1
08-Nov-06	39	725,487.0	3,948,913.1	11917	5.2
08-Nov-06	40	725,511.4	3,948,913.4	9768	11.8
08-Nov-06	41	725,535.9	3,948,913.8	17532	14.1
08-Nov-06	42	725,562.4	3,948,913.8	8022	7.6
08-Nov-06	43	725,354.1	3,948,934.0	39276	48.9
08-Nov-06	44	725,375.8	3,948,932.1	53006	70.9
08-Nov-06	45	725,399.8	3,948,933.7	51944	69.2
08-Nov-06	46	725,424.0	3,948,933.0	50688	67.2
08-Nov-06	47	725,447.8	3,948,933.4	24256	24.9
08-Nov-06	48	725,472.5	3,948,934.1	13183	7.2
08-Nov-06	49	725,496.6	3,948,932.5	12820	6.6
08-Nov-06	50	725,522.9	3,948,940.3	4572	<0.6
08-Nov-06	51	725,545.4	3,948,932.8	8537	8.9
08-Nov-06	52	725,569.7	3,948,930.5	6751	4.6
08-Nov-06	53	725,341.2	3,948,954.2	16935	13.2
08-Nov-06	54	725,362.2	3,948,953.8	53886	72.3

Table 3.1 NECR-1 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Radiation Level (Collimated 2x2 #408522-33)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
08-Nov-06	55	725,388.4	3,948,953.5	37553	46.2
08-Nov-06	56	725,414.6	3,948,954.6	15136	10.3
08-Nov-06	57	725,438.6	3,948,954.3	35129	42.3
08-Nov-06	58	725,461.6	3,948,953.9	48968	64.4
08-Nov-06	59	725,487.0	3,948,953.8	24949	26.0
08-Nov-06	60	725,512.0	3,948,955.0	11705	4.8
08-Nov-06	61	725,535.5	3,948,953.4	4396	<0.6
08-Nov-06	62	725,559.1	3,948,953.5	10902	3.5
08-Nov-06	63	725,583.7	3,948,954.1	6388	3.7
08-Nov-06	64	725,376.4	3,948,974.6	43422	55.6
08-Nov-06	65	725,399.1	3,948,976.3	40047	50.2
08-Nov-06	66	725,424.6	3,948,976.0	41761	52.9
08-Nov-06	67	725,450.5	3,948,979.2	16829	13.0
08-Nov-06	68	725,472.6	3,948,976.3	26252	28.1
08-Nov-06	69	725,495.8	3,948,976.6	26006	27.7
08-Nov-06	70	725,521.7	3,948,975.0	17802	14.6
08-Nov-06	71	725,545.5	3,948,976.6	8163	8.0
08-Nov-06	72	725,570.8	3,948,974.3	35498	42.9
08-Nov-06	73	725,599.2	3,948,971.7	5637	1.9
08-Nov-06	74	725,387.1	3,948,996.4	44786	57.7
07-Nov-06	75	725,412.9	3,948,997.5	38489	47.7
07-Nov-06	76	725,437.5	3,948,996.5	51493	68.5
07-Nov-06	77	725,461.3	3,948,996.3	13265	7.3
07-Nov-06	78	725,484.7	3,948,993.3	14469	9.2
07-Nov-06	79	725,510.2	3,948,997.3	23748	24.1
07-Nov-06	80	725,535.8	3,948,997.4	43850	56.3
07-Nov-06	81	725,560.3	3,948,995.3	56281	76.1
07-Nov-06	82	725,581.3	3,948,997.2	8975	9.9
07-Nov-06	83	725,606.4	3,948,995.4	145474	218.8
07-Nov-06	84	725,682.1	3,948,994.2	10375	2.7
07-Nov-06	85	725,704.9	3,948,997.4	12551	6.2
07-Nov-06	86	725,730.7	3,948,996.8	19431	17.2
07-Nov-06	87	725,753.2	3,948,996.5	6101	3.0
07-Nov-06	88	725,778.3	3,948,994.9	10556	3.0
08-Nov-06	89	725,398.5	3,949,016.9	21626	20.7
07-Nov-06	90	725,434.4	3,949,015.1	60717	83.2
07-Nov-06	91	725,449.4	3,949,018.3	21054	19.8
07-Nov-06	92	725,472.3	3,949,016.5	6827	4.8
07-Nov-06	93	725,508.2	3,949,016.5	14402	9.1
07-Nov-06	94	725,523.4	3,949,019.0	26588	28.6
07-Nov-06	95	725,546.1	3,949,017.9	88148	127.1
07-Nov-06	96	725,570.5	3,949,018.4	27587	30.2
07-Nov-06	97	725,594.4	3,949,018.3	10754	3.3
07-Nov-06	98	725,621.1	3,949,017.6	19799	17.8
07-Nov-06	99	725,643.5	3,949,017.8	7204	5.7
07-Nov-06	100	725,668.0	3,949,017.3	8633	9.1
07-Nov-06	101	725,692.5	3,949,017.0	10437	2.8
07-Nov-06	102	725,715.9	3,949,020.7	8777	9.5
07-Nov-06	103	725,741.2	3,949,019.7	16490	12.5
07-Nov-06	104	725,764.9	3,949,018.3	18823	16.2
07-Nov-06	105	725,791.1	3,949,019.0	5852	2.4
07-Nov-06	106	725,813.7	3,949,017.3	7051	5.3
08-Nov-06	107	725,412.0	3,949,039.4	22186	21.6
08-Nov-06	108	725,434.8	3,949,040.3	79701	113.6
07-Nov-06	109	725,462.1	3,949,037.8	18421	15.6

Table 3.1 NECR-1 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Radiation Level (Collimated 2x2 #408522-33)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
07-Nov-06	110	725,487.8	3,949,038.8	8220	8.1
07-Nov-06	111	725,512.5	3,949,037.3	7679	6.8
07-Nov-06	112	725,536.6	3,949,036.3	69475	97.3
07-Nov-06	113	725,560.0	3,949,037.9	79793	113.8
07-Nov-06	114	725,584.8	3,949,038.9	19244	16.9
07-Nov-06	115	725,607.4	3,949,040.6	23626	23.9
07-Nov-06	116	725,632.9	3,949,038.7	22297	21.8
07-Nov-06	117	725,657.1	3,949,039.1	7309	5.9
07-Nov-06	118	725,681.5	3,949,038.1	19873	17.9
07-Nov-06	119	725,706.3	3,949,038.4	7647	6.7
07-Nov-06	120	725,730.3	3,949,039.5	11851	5.1
07-Nov-06	121	725,753.6	3,949,040.6	24860	25.9
07-Nov-06	122	725,777.4	3,949,040.3	23760	24.1
07-Nov-06	123	725,802.8	3,949,039.6	11268	4.1
07-Nov-06	124	725,827.7	3,949,039.0	7852	7.2
08-Nov-06	125	725,425.1	3,949,061.7	9426	11.0
08-Nov-06	126	725,446.6	3,949,060.4	41946	53.2
08-Nov-06	127	725,476.2	3,949,063.5	62399	85.9
07-Nov-06	128	725,497.1	3,949,057.1	24809	25.8
07-Nov-06	129	725,521.1	3,949,056.4	19698	17.6
07-Nov-06	130	725,545.4	3,949,057.8	53449	71.6
07-Nov-06	131	725,570.2	3,949,056.6	45205	58.4
07-Nov-06	132	725,594.4	3,949,057.4	34165	40.8
07-Nov-06	133	725,618.7	3,949,057.5	33370	39.5
07-Nov-06	134	725,644.1	3,949,059.2	26907	29.1
07-Nov-06	135	725,668.4	3,949,058.9	34742	41.7
07-Nov-06	136	725,691.3	3,949,059.3	21509	20.5
07-Nov-06	137	725,716.1	3,949,061.2	29493	33.3
07-Nov-06	138	725,743.8	3,949,059.2	37798	46.6
07-Nov-06	139	725,765.1	3,949,058.8	48202	63.2
07-Nov-06	140	725,790.5	3,949,060.7	9890	12.1
07-Nov-06	141	725,815.4	3,949,059.0	7820	7.2
08-Nov-06	142	725,485.7	3,949,080.3	10596	3.0
08-Nov-06	143	725,509.5	3,949,080.1	31568	36.6
08-Nov-06	144	725,533.5	3,949,082.4	49257	64.9
08-Nov-06	145	725,559.1	3,949,080.9	38198	47.2
08-Nov-06	146	725,583.4	3,949,080.7	20300	18.6
08-Nov-06	147	725,609.2	3,949,080.9	35327	42.6
08-Nov-06	148	725,631.9	3,949,079.9	18496	15.7
08-Nov-06	149	725,657.3	3,949,079.8	71156	99.9
08-Nov-06	150	725,680.1	3,949,079.1	14110	8.7
08-Nov-06	151	725,704.4	3,949,079.6	11364	4.3
08-Nov-06	152	725,728.2	3,949,080.5	7752	7.0
08-Nov-06	153	725,752.3	3,949,081.2	6566	4.2
08-Nov-06	154	725,780.5	3,949,081.9	7733	7.0
07-Nov-06	155	725,802.2	3,949,080.9	12924	6.8
07-Nov-06	156	725,827.2	3,949,080.0	13907	8.3
North Step-out Sample Locations					
13-Nov-06	157	725,473.1	3,949,100.7	10339	2.6
13-Nov-06	158	725,498.2	3,949,101.3	7204	5.7
13-Nov-06	159	725,523.9	3,949,102.0	25545	27.0
13-Nov-06	160	725,547.6	3,949,102.6	37812	46.6
13-Nov-06	161	725,571.8	3,949,101.8	30446	34.8
13-Nov-06	162	725,596.5	3,949,101.9	10548	3.0
13-Nov-06	163	725,620.4	3,949,102.1	16230	12.1

Table 3.1 NECR-1 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Radiation Level (Collimated 2x2 #408522-33)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
13-Nov-06	164	725,646.0	3,949,102.3	19872	17.9
13-Nov-06	165	725,668.3	3,949,101.4	10040	2.2
13-Nov-06	166	725,692.9	3,949,100.6	8919	9.8
13-Nov-06	167	725,717.1	3,949,100.0	6956	5.1
13-Nov-06	168	725,741.0	3,949,100.0	8529	8.9
13-Nov-06	169	725,765.5	3,949,100.7	8896	9.7
13-Nov-06	170	725,791.1	3,949,102.0	7520	6.4
13-Nov-06	171	725,816.0	3,949,100.5	8180	8.0
13-Nov-06	172	725,485.6	3,949,122.5	7060	5.3
13-Nov-06	173	725,509.1	3,949,123.2	9954	12.3
13-Nov-06	174	725,535.0	3,949,123.2	9405	11.0
13-Nov-06	175	725,557.8	3,949,123.0	61150	83.9
13-Nov-06	176	725,582.9	3,949,122.9	23864	24.3
13-Nov-06	177	725,607.3	3,949,122.9	10183	2.4
13-Nov-06	178	725,631.0	3,949,123.4	12550	6.2
13-Nov-06	179	725,654.5	3,949,124.1	11081	3.8
13-Nov-06	180	725,679.6	3,949,123.6	8416	8.6
13-Nov-06	181	725,703.8	3,949,121.7	7019	5.2
13-Nov-06	182	725,728.4	3,949,125.0	6038	2.9
13-Nov-06	183	725,753.5	3,949,121.2	8326	8.4
13-Nov-06	184	725,776.8	3,949,123.0	5380	1.3
13-Nov-06	185	725,802.9	3,949,124.1	5775	2.3
13-Nov-06	186	725,827.4	3,949,123.8	7340	6.0
13-Nov-06	201	725,536.0	3,949,165.8	14153	8.7
13-Nov-06	202	725,559.2	3,949,166.1	7961	7.5
13-Nov-06	203	725,583.8	3,949,166.0	13606	7.9
13-Nov-06	204	725,609.1	3,949,165.2	8432	8.6
13-Nov-06	205	725,632.4	3,949,165.2	36494	44.5
13-Nov-06	206	725,658.2	3,949,165.1	6654	4.4
13-Nov-06	207	725,680.8	3,949,163.4	5977	2.7
13-Nov-06	208	725,706.1	3,949,164.1	6103	3.0
13-Nov-06	209	725,730.6	3,949,164.2	5940	2.6
13-Nov-06	210	725,755.0	3,949,165.1	5482	1.5
13-Nov-06	211	725,780.1	3,949,164.7	5684	2.0
13-Nov-06	212	725,804.0	3,949,165.3	5786	2.3
13-Nov-06	213	725,827.4	3,949,162.0	7087	5.4
13-Nov-06	230	725,582.3	3,949,207.6	6557	4.1
13-Nov-06	231	725,607.1	3,949,207.9	20281	18.5
13-Nov-06	232	725,631.4	3,949,207.6	23723	24.0
13-Nov-06	233	725,655.1	3,949,207.8	7928	7.4
13-Nov-06	234	725,679.2	3,949,207.4	7750	7.0
13-Nov-06	235	725,703.6	3,949,207.5	5595	1.8
13-Nov-06	236	725,727.3	3,949,207.4	6067	3.0
13-Nov-06	237	725,751.0	3,949,206.9	5863	2.5
13-Nov-06	238	725,776.9	3,949,205.9	5080	<0.6
13-Nov-06	239	725,801.3	3,949,207.0	5115	0.7
13-Nov-06	240	725,828.1	3,949,207.5	5073	<0.6
13-Nov-06	256	725,608.0	3,949,250.5	9588	11.4
13-Nov-06	257	725,633.5	3,949,248.7	5474	1.5
13-Nov-06	258	725,657.0	3,949,247.9	14804	9.8
13-Nov-06	259	725,681.5	3,949,248.1	5944	2.7
13-Nov-06	260	725,704.0	3,949,247.3	6414	3.8
13-Nov-06	261	725,730.8	3,949,248.0	5966	2.7
13-Nov-06	262	725,754.1	3,949,246.6	5383	1.3
13-Nov-06	263	725,779.5	3,949,247.9	5352	1.2

Table 3.1 NECR-1 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Radiation Level (Collimated 2x2 #408522-33)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
13-Nov-06	264	725,804.4	3,949,248.9	5220	0.9
13-Nov-06	265	725,827.8	3,949,248.0	4908	<0.6
East Step-out Sample Locations					
14-Nov-06	266	725,802.0	3,948,996.3	7610	6.7
14-Nov-06	267	725,826.5	3,948,996.1	9057	10.1
14-Nov-06	268	725,851.0	3,948,995.9	21443	20.4
14-Nov-06	269	725,912.1	3,949,017.2	7047	5.3
14-Nov-06	270	725,863.1	3,949,017.6	10077	2.2
14-Nov-06	271	725,875.4	3,949,039.0	8904	9.8
14-Nov-06	272	725,923.2	3,949,038.0	5967	2.7
14-Nov-06	273	725,863.1	3,949,059.7	6368	3.7
14-Nov-06	274	725,911.9	3,949,059.6	16528	12.5
14-Nov-06	275	725,927.0	3,949,058.9	6410	3.8
14-Nov-06	276	725,956.4	3,949,058.6	5614	1.9
14-Nov-06	277	725,874.7	3,949,080.4	9384	10.9
14-Nov-06	278	725,922.6	3,949,080.9	10609	3.1
14-Nov-06	279	725,972.5	3,949,081.4	7905	7.4
14-Nov-06	280	725,862.9	3,949,101.5	18294	15.4
14-Nov-06	281	725,911.4	3,949,102.1	37406	45.9
14-Nov-06	282	725,947.4	3,949,102.0	8298	8.3
14-Nov-06	283	725,875.1	3,949,122.9	8327	8.4
14-Nov-06	284	725,923.2	3,949,123.0	8666	9.2
14-Nov-06	285	725,972.5	3,949,122.6	6452	3.9
14-Nov-06	286	725,851.2	3,949,144.3	6445	3.9
14-Nov-06	287	725,898.9	3,949,144.5	7617	6.7
14-Nov-06	288	725,948.0	3,949,144.4	27874	30.7
14-Nov-06	289	725,875.4	3,949,165.3	5400	1.4
14-Nov-06	290	725,923.2	3,949,165.2	6467	3.9
14-Nov-06	291	725,972.1	3,949,163.9	14088	8.6
14-Nov-06	292	725,851.1	3,949,186.4	5050	<0.6
16-Nov-06	293	725,899.1	3,949,186.6	6158	3.2
16-Nov-06	294	725,948.3	3,949,186.3	6353	3.6
16-Nov-06	295	726,007.1	3,949,122.4	7101	5.4
16-Nov-06	296	725,971.7	3,949,142.6	20349	18.6
16-Nov-06	297	726,011.6	3,949,142.6	8397	8.5
16-Nov-06	298	726,013.7	3,949,164.8	8367	8.5
16-Nov-06	299	726,016.2	3,949,185.7	24537	25.4
16-Nov-06	300	725,971.9	3,949,186.0	6387	3.7
16-Nov-06	301	726,014.2	3,949,207.4	12180	5.6
16-Nov-06	302	725,983.4	3,949,206.6	6428	3.8
16-Nov-06	303	725,989.7	3,949,228.9	5243	1.0
16-Nov-06	304	726,011.0	3,949,228.2	8326	8.4
16-Nov-06	305	726,007.7	3,949,249.6	7381	6.1
16-Nov-06	306	726,002.1	3,949,271.6	5827	2.4
16-Nov-06	307	725,989.4	3,949,248.1	5331	1.2
16-Nov-06	308	725,978.2	3,949,058.9	6076	3.0
16-Nov-06	309	725,967.1	3,949,039.1	5799	2.3
16-Nov-06	310	725,955.4	3,949,016.1	6602	4.2
16-Nov-06	311	725,861.8	3,948,995.9	20578	19.0

Table 3.1 NECR-1 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Radiation Level (Collimated 2x2 #408522-33)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
South Step-out Sample Locations					
28-Nov-06	312	725,486.9	3,948,828.7	8602	9.0
28-Nov-06	313	725,514.2	3,948,827.8	8483	8.8
28-Nov-06	314	725,470.0	3,948,803.2	8858	9.7
01-Dec-06	315	725,448.8	3,948,807.1	9276	10.7
01-Dec-06	316	725,538.4	3,948,827.4	4865	<0.6
01-Dec-06	317	725,498.3	3,948,848.3	9901	12.2
01-Dec-06	318	725,524.0	3,948,848.5	62291	85.8
01-Dec-06	319	725,546.9	3,948,848.5	20850	19.5
01-Dec-06	320	725,570.3	3,948,850.5	6899	4.9
01-Dec-06	321	725,558.6	3,948,869.9	18342	15.4
01-Dec-06	322	725,582.7	3,948,870.6	7021	5.2
01-Dec-06	323	725,608.8	3,948,869.6	5789	2.3
01-Dec-06	324	725,572.0	3,948,890.2	14578	9.4
01-Dec-06	325	725,596.6	3,948,891.1	22182	21.6
01-Dec-06	326	725,619.2	3,948,891.3	7908	7.4
01-Dec-06	327	725,643.6	3,948,891.5	5887	2.5
01-Dec-06	328	725,680.6	3,948,912.2	5775	2.3
01-Dec-06	329	725,652.6	3,948,912.5	7666	6.8
01-Dec-06	330	725,630.0	3,948,913.5	14672	9.6
01-Dec-06	331	725,606.5	3,948,911.8	8792	9.5
01-Dec-06	332	725,582.9	3,948,911.9	11642	4.7
01-Dec-06	333	725,594.6	3,948,932.3	8579	9.0
01-Dec-06	334	725,619.3	3,948,932.6	11592	4.6
01-Dec-06	335	725,644.4	3,948,932.1	9754	11.8
01-Dec-06	336	725,682.9	3,948,954.7	6852	4.8
01-Dec-06	338	725,607.1	3,948,954.1	5242	1.0
01-Dec-06	339	725,632.7	3,948,954.4	9561	11.3
01-Dec-06	340	725,656.1	3,948,953.4	6942	5.1
01-Dec-06	341	725,620.3	3,948,975.2	5808	2.3
01-Dec-06	342	725,643.4	3,948,974.4	5971	2.7
01-Dec-06	343	725,669.4	3,948,974.3	5474	1.5
01-Dec-06	344	725,657.0	3,948,995.6	6583	4.2
01-Dec-06	345	725,631.4	3,948,995.0	6521	4.0
01-Dec-06	346	725,716.8	3,948,975.3	6820	4.8
01-Dec-06	347	725,692.7	3,948,975.5	8779	9.5
01-Dec-06	348	725,669.6	3,948,932.4	6451	3.9
01-Dec-06	349	725,690.9	3,948,933.7	5970	2.7
14-Nov-06	350	725,994.6	3,949,082.7	5860	2.5
16-Nov-06	351	726,000.4	3,949,101.1	6835	4.8
				Average	**19.6**
				Standard Deviation	**26.8**

Notes:
1. Point #337 was not surveyed
2. Points #187 to 200, #214 to 229, #241 to 255 in east-west transects were not surveyed as these transects were skipped to start 80 x 160 grids.

Table 3.2 NECR-2 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Collimated 2x2 #408522-33)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
Primary Sample Locations					
10-Nov-06	1	724,984.3	3,948,224.1	4,709	<0.6
09-Nov-06	2	725,010.5	3,948,224.2	6,418	3.8
09-Nov-06	3	725,035.4	3,948,223.8	8,719	9.3
09-Nov-06	4	725,000.4	3,948,247.9	6,256	3.4
09-Nov-06	5	725,023.7	3,948,247.6	25,943	27.6
09-Nov-06	6	725,046.0	3,948,245.0	5,926	2.6
09-Nov-06	7	724,841.0	3,948,266.1	4,736	0.6
09-Nov-06	8	724,867.3	3,948,267.8	7,080	5.4
10-Nov-06	9	724,987.3	3,948,268.2	5,367	1.3
09-Nov-06	10	725,010.6	3,948,265.3	99,457	145.2
09-Nov-06	11	725,037.2	3,948,268.0	58,213	79.2
09-Nov-06	12	725,062.2	3,948,267.7	6,484	4.0
09-Nov-06	13	724,826.8	3,948,288.9	3,831	<0.6
09-Nov-06	14	724,852.5	3,948,290.0	5,753	2.2
09-Nov-06	15	724,881.1	3,948,288.4	20,677	19.2
09-Nov-06	16	724,900.5	3,948,289.2	8,266	8.2
09-Nov-06	17	724,929.8	3,948,287.6	36,878	45.1
10-Nov-06	18	724,968.7	3,948,294.7	17,871	14.7
09-Nov-06	19	725,000.1	3,948,290.3	34,105	40.7
09-Nov-06	20	725,023.0	3,948,286.7	24,011	24.5
09-Nov-06	21	725,048.2	3,948,288.0	6,764	4.6
09-Nov-06	22	724,839.4	3,948,307.0	5,391	1.3
09-Nov-06	23	724,864.4	3,948,309.3	9,472	11.1
09-Nov-06	24	724,888.8	3,948,310.1	13,046	7.0
09-Nov-06	25	724,913.1	3,948,308.1	32,328	37.8
09-Nov-06	26	724,937.7	3,948,310.6	41,158	51.9
09-Nov-06	27	724,962.9	3,948,310.2	21,010	19.7
09-Nov-06	28	724,988.1	3,948,308.2	18,668	16.0
09-Nov-06	29	725,012.3	3,948,310.5	21,008	19.7
09-Nov-06	30	725,037.3	3,948,310.3	24,444	25.2
09-Nov-06	31	725,058.9	3,948,308.9	12,034	5.3
09-Nov-06	32	724,827.2	3,948,331.8	5,068	<0.6
09-Nov-06	33	724,850.2	3,948,330.6	4,837	<0.6
09-Nov-06	34	724,877.0	3,948,330.9	16,710	12.8
09-Nov-06	35	724,901.4	3,948,330.5	84,399	121.1
09-Nov-06	36	724,927.3	3,948,331.0	22,723	22.4
09-Nov-06	37	724,949.3	3,948,330.8	8,943	9.9
09-Nov-06	38	724,976.0	3,948,329.5	19,234	16.9
09-Nov-06	39	725,000.3	3,948,330.0	19,939	18.0
09-Nov-06	40	725,017.5	3,948,327.6	37,549	46.2
09-Nov-06	41	724,814.0	3,948,352.6	4,652	<0.6
09-Nov-06	42	724,847.8	3,948,348.8	9,070	10.2
09-Nov-06	43	724,864.7	3,948,353.4	143,215	215.2
09-Nov-06	44	724,890.7	3,948,352.1	23,195	23.2
09-Nov-06	45	724,913.1	3,948,351.5	35,142	42.3
09-Nov-06	46	724,937.2	3,948,353.5	11,566	4.6
09-Nov-06	47	724,963.4	3,948,351.0	17,041	13.4
09-Nov-06	48	724,985.7	3,948,352.3	15,967	11.6
09-Nov-06	49	725,006.7	3,948,352.6	51,947	69.2

Table 3.2 NECR-2 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Collimated 2x2 #408522-33)	
09-Nov-06	50	724,829.4	3,948,372.2	6,122	3.1
09-Nov-06	51	724,853.3	3,948,373.6	18,901	16.3
09-Nov-06	52	724,877.7	3,948,371.8	22,046	21.4
09-Nov-06	53	724,900.6	3,948,372.5	10,395	2.7
09-Nov-06	54	724,924.7	3,948,373.9	8,739	9.4
09-Nov-06	55	724,948.8	3,948,374.0	11,111	3.9
09-Nov-06	56	724,973.3	3,948,371.3	7,314	5.9
09-Nov-06	57	724,996.5	3,948,369.0	60,240	82.5
09-Nov-06	58	724,813.7	3,948,392.4	4,086	<0.6
09-Nov-06	59	724,837.8	3,948,395.1	7,950	7.5
09-Nov-06	60	724,864.4	3,948,395.1	20,112	18.3
09-Nov-06	61	724,890.8	3,948,394.7	46,882	61.1
10-Nov-06	62	724,912.9	3,948,394.3	13,887	8.3
09-Nov-06	63	724,939.7	3,948,394.1	10,520	2.9
09-Nov-06	64	724,961.6	3,948,394.5	7,019	5.2
09-Nov-06	65	724,985.6	3,948,393.0	55,096	74.2
09-Nov-06	66	724,830.0	3,948,414.7	4,622	<0.6
09-Nov-06	67	724,854.7	3,948,414.1	11,626	4.7
09-Nov-06	68	724,875.5	3,948,415.5	15,477	10.9
10-Nov-06	69	724,899.8	3,948,416.1	12,599	6.2
10-Nov-06	70	724,925.8	3,948,416.1	11,172	4.0
09-Nov-06	71	724,950.0	3,948,416.1	14,523	9.3
09-Nov-06	72	724,975.7	3,948,414.7	33,150	39.1
09-Nov-06	73	724,911.7	3,948,436.1	9,176	10.4
09-Nov-06	74	724,936.2	3,948,436.9	9,150	10.4
09-Nov-06	75	724,962.5	3,948,434.4	6,003	2.8
Step-out Sample Locations					
14-Nov-06	76	724929.9	3948457.5	7,113	5.5
14-Nov-06	77	724951.0	3948456.8	6,352	3.6
14-Nov-06	78	724975.1	3948456.9	5,122	0.7
14-Nov-06	79	724999.0	3948456.8	5,544	1.7
14-Nov-06	80	725024.2	3948456.8	5,454	1.5
14-Nov-06	81	725049.0	3948456.3	5,634	1.9
14-Nov-06	82	725037.2	3948436.2	6,048	2.9
14-Nov-06	83	725010.9	3948435.9	5,587	1.8
14-Nov-06	84	724985.9	3948435.3	6,869	4.9
14-Nov-06	85	724999.4	3948413.9	5,349	1.2
14-Nov-06	86	725024.0	3948414.0	5,989	2.8
14-Nov-06	87	725049.2	3948413.3	6,205	3.3
14-Nov-06	88	725037.7	3948394.3	7,012	5.2
14-Nov-06	89	725013.0	3948394.2	6,343	3.6
14-Nov-06	90	725018.5	3948372.4	6,232	3.3
14-Nov-06	91	725046.2	3948377.5	6,197	3.3
14-Nov-06	92	725038.4	3948350.8	15,635	11.1
14-Nov-06	93	724938.9	3948481.9	7,061	5.3
14-Nov-06	94	724961.9	3948481.3	5,585	1.8
14-Nov-06	95	724986.6	3948481.7	5,776	2.3
14-Nov-06	96	725012.3	3948481.0	5,429	1.4
14-Nov-06	97	725040.0	3948479.3	5,178	0.8
16-Nov-06	98	725062.8	3948481.2	4,862	<0.6
16-Nov-06	99	725087.7	3948480.9	5,054	<0.6
16-Nov-06	100	725073.4	3948456.9	4,742	<0.6

Table 3.2 NECR-2 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Collimated 2x2 #408522-33)	
16-Nov-06	101	725098.7	3948457.6	4,824	<0.6
16-Nov-06	102	725085.9	3948438.0	4,976	<0.6
16-Nov-06	103	725108.5	3948437.6	4,999	<0.6
16-Nov-06	104	725075.7	3948506.4	5,174	0.8
16-Nov-06	105	725049.3	3948502.8	5,504	1.6
16-Nov-06	106	725023.4	3948503.1	6,941	5.1
16-Nov-06	107	725025.7	3948523.2	5,877	2.5
16-Nov-06	108	725049.6	3948522.7	5,775	2.3
16-Nov-06	109	725072.7	3948522.6	4,945	<0.6
16-Nov-06	110	725071.2	3948544.6	5,300	1.1
16-Nov-06	111	725040.9	3948544.4	6,935	5.0
16-Nov-06	112	725054.5	3948565.7	11,055	3.8
16-Nov-06	113	724889.6	3948435.6	7,521	6.4
16-Nov-06	114	724878.3	3948457.5	20,672	19.2
16-Nov-06	115	724901.1	3948455.8	7,858	7.3
28-Nov-06	116	724,982.7	3,948,500.9	7,268	5.8
28-Nov-06	117	725,002.3	3,948,524.0	7,488	6.4
28-Nov-06	118	725,022.6	3,948,545.6	7,459	6.3
				Average	**15.6**
				Standard Deviation	**29.7**

Table 3.3 Sandfill 1 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Collimated 2x2 #408522-33)	
Date	**Point No.**	**Easting**	**Northing**	**CPM**	**Equivalent Surface Soil Ra-**
10-Nov-06	1	725,498.2	3,948,562.4	5,886	2.5
10-Nov-06	2	725,521.3	3,948,561.5	3,616	<0.6
10-Nov-06	3	725,546.5	3,948,563.2	3,717	<0.6
10-Nov-06	4	725,485.7	3,948,583.1	4,085	<0.6
10-Nov-06	5	725,509.9	3,948,582.5	8,811	9.5
10-Nov-06	6	725,534.6	3,948,583.4	5,787	2.3
10-Nov-06	7	725,558.7	3,948,583.0	9,517	11.2
10-Nov-06	8	725,582.7	3,948,583.1	3,769	<0.6
10-Nov-06	9	725,497.6	3,948,603.8	4,954	<0.6
10-Nov-06	10	725,522.1	3,948,604.1	8,391	8.5
10-Nov-06	11	725,546.5	3,948,604.3	7,128	5.5
10-Nov-06	12	725,570.8	3,948,604.2	7,203	5.7
10-Nov-06	13	725,595.2	3,948,604.3	4,898	<0.6
10-Nov-06	14	725,486.0	3,948,624.6	6,176	3.2
10-Nov-06	15	725,510.2	3,948,625.0	28,900	32.3
10-Nov-06	16	725,534.0	3,948,624.4	5,152	0.8
10-Nov-06	17	725,559.2	3,948,625.5	4,933	<0.6
10-Nov-06	18	725,583.3	3,948,625.6	11,335	4.2
10-Nov-06	19	725,606.5	3,948,624.0	5,401	1.4
10-Nov-06	20	725,497.6	3,948,646.5	4,978	<0.6
10-Nov-06	21	725,518.6	3,948,646.0	4,459	<0.6
10-Nov-06	22	725,546.6	3,948,646.8	5,168	0.8
10-Nov-06	23	725,570.7	3,948,646.5	10,646	3.1
10-Nov-06	24	725,595.1	3,948,646.9	12,287	5.8
10-Nov-06	25	725,606.9	3,948,648.1	6,823	4.8
10-Nov-06	26	725,486.1	3,948,666.8	5,086	0.6
10-Nov-06	27	725,509.6	3,948,667.6	4,975	<0.6
10-Nov-06	28	725,534.3	3,948,667.3	4,103	<0.6
10-Nov-06	29	725,559.2	3,948,667.2	5,714	2.1
10-Nov-06	30	725,582.5	3,948,667.6	12,777	6.5
10-Nov-06	31	725,606.4	3,948,665.9	8,919	9.8
10-Nov-06	32	725,630.2	3,948,667.2	5,666	2.0
10-Nov-06	33	725,472.9	3,948,688.6	10,214	2.4
10-Nov-06	34	725,498.3	3,948,688.4	7,376	6.1
10-Nov-06	35	725,521.9	3,948,689.1	4,299	<0.6
10-Nov-06	36	725,546.6	3,948,688.2	3,833	<0.6
10-Nov-06	37	725,571.7	3,948,688.2	6,511	4.0
10-Nov-06	38	725,599.6	3,948,690.1	9,557	11.3
10-Nov-06	39	725,620.3	3,948,689.3	7,114	5.5
10-Nov-06	40	725,461.5	3,948,709.8	3,649	<0.6
10-Nov-06	41	725,486.9	3,948,709.8	4,649	<0.6
10-Nov-06	42	725,508.1	3,948,710.9	15,910	11.5
10-Nov-06	43	725,533.8	3,948,710.1	10,879	3.5
10-Nov-06	44	725,559.4	3,948,709.6	6,711	4.5
10-Nov-06	45	725,584.0	3,948,709.8	6,032	2.9

Table 3.3 Sandfill 1 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Collimated 2x2 #408522-33)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-
10-Nov-06	46	725,607.5	3,948,709.8	8,185	8.0
10-Nov-06	47	725,473.6	3,948,730.9	4,665	<0.6
10-Nov-06	48	725,498.2	3,948,731.4	9,809	11.9
10-Nov-06	49	725,522.5	3,948,730.4	49,290	65.0
10-Nov-06	50	725,545.4	3,948,731.5	12,689	6.4
10-Nov-06	51	725,571.7	3,948,731.3	6,237	3.4
10-Nov-06	52	725,592.6	3,948,728.3	4,406	<0.6
10-Nov-06	53	725,618.7	3,948,730.9	5,277	1.1
10-Nov-06	54	725,485.4	3,948,751.6	41,325	52.2
10-Nov-06	55	725,510.6	3,948,752.6	30,799	35.4
10-Nov-06	56	725,535.7	3,948,751.3	56,195	76.0
10-Nov-06	57	725,559.0	3,948,752.4	15,436	10.8
10-Nov-06	58	725,585.0	3,948,750.2	8,058	7.7
10-Nov-06	59	725,608.1	3,948,749.6	5,197	0.9
10-Nov-06	60	725,497.8	3,948,772.4	5,223	0.9
10-Nov-06	61	725,522.6	3,948,773.9	7,147	5.5
10-Nov-06	62	725,546.2	3,948,772.4	48,250	63.3
10-Nov-06	63	725,571.1	3,948,772.4	32,153	37.5
10-Nov-06	64	725,594.9	3,948,773.4	8,593	9.0
10-Nov-06	65	725,621.3	3,948,771.9	6,188	3.2
10-Nov-06	66	725,534.5	3,948,793.6	4,673	<0.6
10-Nov-06	67	725,559.1	3,948,794.0	7,028	5.3
10-Nov-06	68	725,583.4	3,948,794.0	45,274	58.5
10-Nov-06	69	725,606.9	3,948,794.1	23,833	24.2
10-Nov-06	70	725,546.5	3,948,815.6	6,174	3.2
10-Nov-06	71	725,571.2	3,948,815.8	10,523	2.9
10-Nov-06	72	725,595.1	3,948,815.1	6,120	3.1
10-Nov-06	73	725,622.2	3,948,816.0	5,139	0.7
10-Nov-06	74	725,559.4	3,948,836.1	5,637	1.9
10-Nov-06	75	725,584.0	3,948,836.6	4,337	<0.6
10-Nov-06	76	725,607.3	3,948,835.9	4,219	<0.6
				Average	**9.0**
				Standard Deviation	**16.3**

Table 3.4 Sandfill 2 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Collimated 2x2 #408522-33)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
10-Nov-06	1	724,864.4	3,948,158.3	4,813	<0.6
10-Nov-06	2	724,888.8	3,948,156.7	4,634	<0.6
10-Nov-06	3	724,852.5	3,948,177.9	4,124	<0.6
10-Nov-06	4	724,872.8	3,948,178.3	5,211	0.9
10-Nov-06	5	724,900.0	3,948,178.9	7,707	6.9
10-Nov-06	6	724,839.3	3,948,200.3	4,288	<0.6
10-Nov-06	7	724,868.7	3,948,200.9	10,505	2.9
10-Nov-06	8	724,888.6	3,948,199.8	7,597	6.6
10-Nov-06	9	724,920.6	3,948,200.1	4,926	<0.6
10-Nov-06	10	724,851.6	3,948,221.1	5,385	1.3
10-Nov-06	11	724,876.7	3,948,221.0	15,448	10.8
10-Nov-06	12	724,900.6	3,948,220.3	10,586	3.0
10-Nov-06	13	724,924.8	3,948,220.2	5,263	1.0
10-Nov-06	14	724,838.8	3,948,240.5	4,094	<0.6
10-Nov-06	15	724,865.1	3,948,243.6	6,792	4.7
10-Nov-06	16	724,888.8	3,948,241.5	8,197	8.1
10-Nov-06	17	724,912.4	3,948,241.1	20,647	19.1
10-Nov-06	18	724,931.9	3,948,246.1	6,062	2.9
10-Nov-06	19	724,900.2	3,948,262.9	24,945	26.0
10-Nov-06	20	724,924.3	3,948,262.7	18,397	15.5
10-Nov-06	21	724,943.1	3,948,264.8	6,884	4.9
				Average	**5.6**
				Standard Deviation	**7.0**

Table 3.5 Sandfill 3 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Collimated 2x2 #408522-30)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
Primary Sample Locations					
09-Nov-06	1	724,869.9	3,948,478.8	6,466	3.9
09-Nov-06	2	724,895.0	3,948,478.2	10,387	2.7
09-Nov-06	3	724,919.3	3,948,478.6	16,040	11.8
09-Nov-06	4	724,858.3	3,948,500.6	5,280	1.1
09-Nov-06	5	724,881.8	3,948,498.5	62,004	85.3
09-Nov-06	6	724,906.7	3,948,500.5	15,867	11.5
09-Nov-06	7	724,930.5	3,948,499.8	10,445	2.8
09-Nov-06	8	724,870.2	3,948,520.9	14,637	9.5
09-Nov-06	9	724,894.9	3,948,520.6	16,019	11.7
09-Nov-06	10	724,918.3	3,948,521.1	15,681	11.2
09-Nov-06	11	724,943.7	3,948,520.3	8,166	8.0
09-Nov-06	12	724,858.0	3,948,542.0	5,935	2.6
09-Nov-06	13	724,882.5	3,948,542.5	24,495	25.3
09-Nov-06	14	724,906.8	3,948,541.5	92,167	133.6
09-Nov-06	15	724,931.2	3,948,542.0	43,425	55.6
09-Nov-06	16	724,955.4	3,948,542.3	9,885	12.1
09-Nov-06	17	724,870.5	3,948,562.1	5,074	<0.6
09-Nov-06	18	724,894.5	3,948,562.8	14,648	9.5
09-Nov-06	19	724,919.0	3,948,562.5	10,120	2.3
09-Nov-06	20	724,943.5	3,948,563.0	48,099	63.0
09-Nov-06	21	724,967.7	3,948,562.4	25,727	27.3
09-Nov-06	22	724,881.8	3,948,583.2	5,414	1.4
09-Nov-06	23	724,906.7	3,948,583.4	22,347	21.8
09-Nov-06	24	724,931.2	3,948,584.8	16,201	12.0
09-Nov-06	25	724,955.0	3,948,584.4	24,640	25.5
09-Nov-06	26	724,979.0	3,948,584.3	21,274	20.1
09-Nov-06	27	724,894.6	3,948,605.2	8,780	9.5
09-Nov-06	28	724,918.8	3,948,605.5	10,797	3.4
Step-out Sample Locations					
16-Nov-06	29	724872.9	3948604.5	5,469	1.5
16-Nov-06	30	724846.9	3948605.9	7,612	6.7
16-Nov-06	31	724822.7	3948603.7	5,934	2.6
16-Nov-06	32	724798.7	3948602.3	5,478	1.5
16-Nov-06	33	724787.8	3948581.2	7,298	5.9
16-Nov-06	34	724811.1	3948581.5	5,184	0.8
16-Nov-06	35	724838.0	3948580.2	4,485	<0.6
16-Nov-06	36	724861.0	3948581.4	5,008	<0.6
17-Nov-06	37	724762.9	3948580.4	4,997	<0.6
17-Nov-06	38	724774.2	3948602.4	4,352	<0.6
28-Nov-06	39	724,995.0	3,948,560.5	17,982	14.9
28-Nov-06	40	725,018.6	3,948,561.1	6,682	4.4
28-Nov-06	41	724,989.4	3,948,538.0	5,724	2.1
28-Nov-06	42	724,962.1	3,948,518.1	4,948	<0.6
28-Nov-06	43	724,947.7	3,948,497.9	5,812	2.3
				Average	**14.7**
				Standard Deviation	**25.5**

Table 3.6 Ponds 1 and 2 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Collimated 2x2 #408522-30)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
10-Nov-06	1	725,209.1	3,948,548.1	4,330	<0.6
10-Nov-06	2	725,230.5	3,948,549.0	4,260	<0.6
10-Nov-06	3	725,195.0	3,948,568.8	5,472	1.5
10-Nov-06	4	725,218.1	3,948,570.2	5,610	1.9
10-Nov-06	5	725,242.5	3,948,569.2	5,373	1.3
10-Nov-06	6	725,365.2	3,948,569.0	37,608	46.3
10-Nov-06	7	725,389.6	3,948,569.1	7,641	6.7
10-Nov-06	8	725,414.0	3,948,569.8	6,187	3.2
10-Nov-06	9	725,184.3	3,948,591.1	5,461	1.5
10-Nov-06	10	725,205.8	3,948,590.9	6,377	3.7
10-Nov-06	11	725,231.2	3,948,590.1	6,902	5.0
10-Nov-06	12	725,255.4	3,948,590.1	5,565	1.7
10-Nov-06	13	725,352.9	3,948,589.8	12,151	5.5
10-Nov-06	14	725,377.1	3,948,590.6	44,649	57.5
09-Nov-06	15	725,402.0	3,948,590.7	8,918	9.8
09-Nov-06	16	725,426.1	3,948,590.2	11,908	5.1
10-Nov-06	17	725,187.9	3,948,626.0	6,452	3.9
10-Nov-06	18	725,194.7	3,948,612.3	7,521	6.4
10-Nov-06	19	725,221.0	3,948,612.4	17,022	13.3
10-Nov-06	20	725,242.9	3,948,611.2	8,732	9.3
10-Nov-06	21	725,267.0	3,948,611.3	6,387	3.7
10-Nov-06	22	725,340.5	3,948,611.3	33,905	40.3
10-Nov-06	23	725,364.4	3,948,611.5	48,888	64.3
09-Nov-06	24	725,390.0	3,948,611.8	28,230	31.3
10-Nov-06	25	725,414.0	3,948,611.6	26,902	29.1
09-Nov-06	26	725,439.7	3,948,610.6	72,749	102.5
10-Nov-06	27	725,159.0	3,948,632.4	32,643	38.3
10-Nov-06	28	725,182.3	3,948,633.7	8,411	8.6
10-Nov-06	29	725,207.5	3,948,632.7	167,837	254.6
10-Nov-06	30	725,231.4	3,948,632.9	39,539	49.4
10-Nov-06	31	725,255.2	3,948,632.6	7,134	5.5
10-Nov-06	32	725,280.0	3,948,632.9	5,670	2.0
10-Nov-06	33	725,328.6	3,948,633.4	7,591	6.6
10-Nov-06	34	725,353.3	3,948,632.2	36,539	44.6
09-Nov-06	35	725,377.6	3,948,631.5	141,363	212.3
09-Nov-06	36	725,401.9	3,948,632.0	19,222	16.8
09-Nov-06	37	725,426.1	3,948,633.2	8,143	7.9
10-Nov-06	38	725,451.6	3,948,631.5	6,744	4.6
10-Nov-06	39	725,145.6	3,948,653.7	5,322	1.2
10-Nov-06	40	725,171.4	3,948,653.3	6,334	3.6
10-Nov-06	41	725,193.4	3,948,654.6	7,325	6.0
17-Nov-06	42	725,221.2	3,948,653.8	11,185	4.0
10-Nov-06	43	725,243.0	3,948,654.4	111,328	164.2
10-Nov-06	44	725,266.9	3,948,653.1	11,041	3.8
10-Nov-06	45	725,291.5	3,948,653.2	6,633	4.3
10-Nov-06	46	725,316.0	3,948,654.3	94,508	137.3
09-Nov-06	47	725,343.9	3,948,654.4	62,918	86.8
09-Nov-06	48	725,365.4	3,948,653.3	75,125	106.3

Table 3.6 Ponds 1 and 2 Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Collimated 2x2 #408522-30)	
Date	**Point No.**	**Easting**	**Northing**	**CPM**	**Equivalent Surface Soil Ra-226 (pCi/gm)[1]**
09-Nov-06	49	725,390.0	3,948,653.9	25,210	26.4
09-Nov-06	50	725,413.9	3,948,653.8	16,747	12.9
10-Nov-06	51	725,438.9	3,948,654.2	7,555	6.5
10-Nov-06	52	725,180.0	3,948,675.6	6,858	4.9
10-Nov-06	53	725,207.9	3,948,670.3	7,715	6.9
10-Nov-06	54	725,231.0	3,948,675.4	10,271	2.5
10-Nov-06	55	725,255.3	3,948,675.0	9,984	12.4
10-Nov-06	56	725,279.9	3,948,673.7	14,024	8.5
10-Nov-06	57	725,303.7	3,948,675.8	22,989	22.9
09-Nov-06	58	725,328.9	3,948,674.4	320,161	498.3
09-Nov-06	59	725,353.7	3,948,673.8	264,301	409.0
09-Nov-06	60	725,377.2	3,948,674.7	92,295	133.8
09-Nov-06	61	725,402.0	3,948,675.5	68,437	95.6
10-Nov-06	62	725,423.7	3,948,670.6	13,864	8.3
10-Nov-06	63	725,448.0	3,948,674.4	5,911	2.6
10-Nov-06	64	725,242.6	3,948,696.9	7,871	7.3
10-Nov-06	65	725,267.6	3,948,699.5	8,502	8.8
10-Nov-06	66	725,292.5	3,948,695.1	71,850	101.1
10-Nov-06	67	725,317.2	3,948,696.0	19,517	17.3
10-Nov-06	68	725,340.7	3,948,695.2	79,437	113.2
09-Nov-06	69	725,365.4	3,948,696.5	112,771	166.5
09-Nov-06	70	725,389.7	3,948,695.7	48,368	63.5
09-Nov-06	71	725,413.9	3,948,695.7	40,879	51.5
09-Nov-06	72	725,438.3	3,948,696.4	6,489	4.0
10-Nov-06	73	725,279.9	3,948,718.2	8,153	8.0
10-Nov-06	74	725,303.5	3,948,717.6	7,598	6.6
10-Nov-06	75	725,328.3	3,948,717.5	10,358	2.7
09-Nov-06	76	725,353.1	3,948,717.3	10,358	2.7
09-Nov-06	77	725,378.0	3,948,717.6	112,122	165.5
09-Nov-06	78	725,402.2	3,948,717.0	48,662	64.0
09-Nov-06	79	725,426.3	3,948,717.8	14,503	9.3
10-Nov-06	80	725,340.1	3,948,738.2	15,174	10.4
09-Nov-06	81	725,365.7	3,948,737.7	35,002	42.1
09-Nov-06	82	725,389.9	3,948,738.2	92,284	133.7
09-Nov-06	83	725,413.4	3,948,738.4	8,859	9.7
10-Nov-06	84	725,377.6	3,948,758.9	12,841	6.6
09-Nov-06	85	725,401.8	3,948,759.5	24,915	26.0
				Average	**45.8**
				Standard Deviation	**83.2**

Table 3.7 Pond 3/3a Static Gamma Radiation Survey Results						
			Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Collimated 2x2 #408522-33)	
Date	Area	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
Primary Sample Locations						
07-Nov-06	Pond 3	1	725,105.8	3,948,684.2	21,120	19.9
07-Nov-06	Pond 3	2	725,129.1	3,948,684.3	8,225	8.1
07-Nov-06	Pond 3	3	725,153.2	3,948,684.2	14,774	9.7
07-Nov-06	Pond 3	4	725,178.1	3,948,684.3	8,031	7.7
07-Nov-06	Pond 3	5	725,092.4	3,948,704.0	10,598	3.0
07-Nov-06	Pond 3	6	725,117.2	3,948,704.8	13,688	8.0
07-Nov-06	Pond 3	7	725,141.3	3,948,704.2	84,406	121.1
07-Nov-06	Pond 3	8	725,164.9	3,948,703.7	9,176	10.4
07-Nov-06	Pond 3	9	725,189.6	3,948,705.2	8,939	9.8
07-Nov-06	Pond 3	10	725,214.1	3,948,705.2	10,533	2.9
07-Nov-06	Pond 3	11	725,103.8	3,948,725.1	8,277	8.3
07-Nov-06	Pond 3	12	725,128.3	3,948,725.8	12,978	6.9
07-Nov-06	Pond 3	13	725,152.5	3,948,725.5	51,324	68.2
07-Nov-06	Pond 3	14	725,176.1	3,948,725.0	191,805	293.0
07-Nov-06	Pond 3	15	725,202.5	3,948,726.5	12,447	6.0
07-Nov-06	Pond 3	16	725,226.7	3,948,725.0	10,185	2.4
07-Nov-06	Pond 3	17	725,250.5	3,948,724.2	6,493	4.0
07-Nov-06	Pond 3	18	725,117.4	3,948,746.8	9,632	11.5
07-Nov-06	Pond 3	19	725,142.1	3,948,746.6	15,329	10.6
07-Nov-06	Pond 3	20	725,166.0	3,948,746.0	20,579	19.0
07-Nov-06	Pond 3	21	725,189.9	3,948,747.2	20,599	19.0
07-Nov-06	Pond 3	22	725,213.8	3,948,747.3	16,408	12.3
07-Nov-06	Pond 3	23	725,237.4	3,948,745.9	10,490	2.9
07-Nov-06	Pond 3	24	725,262.4	3,948,745.9	12,075	5.4
08-Nov-06	Pond 3	25	725,128.8	3,948,767.2	6,343	3.6
08-Nov-06	Pond 3	26	725,152.8	3,948,767.6	8,923	9.8
08-Nov-06	Pond 3	27	725,177.1	3,948,768.1	11,737	4.9
08-Nov-06	Pond 3	28	725,201.6	3,948,767.2	37,176	45.6
08-Nov-06	Pond 3	29	725,226.7	3,948,768.4	149,128	224.7
08-Nov-06	Pond 3	30	725,251.4	3,948,767.6	17,619	14.3
07-Nov-06	Pond 3	31	725,274.6	3,948,767.5	17,609	14.3
07-Nov-06	Pond 3	32	725,299.3	3,948,769.7	9,632	11.5
08-Nov-06	Pond 3	33	725,141.4	3,948,788.8	6,491	4.0
08-Nov-06	Pond 3	34	725,165.1	3,948,789.1	10,990	3.7
08-Nov-06	Pond 3	35	725,188.5	3,948,789.5	12,609	6.3
08-Nov-06	Pond 3	36	725,213.5	3,948,788.0	12,938	6.8
08-Nov-06	Pond 3	37	725,238.3	3,948,788.4	14,837	9.8
08-Nov-06	Pond 3	38	725,262.1	3,948,789.1	73,114	103.1
08-Nov-06	Pond 3	39	725,286.5	3,948,790.8	26,927	29.2
08-Nov-06	Pond 3	40	725,312.2	3,948,788.2	14,619	9.5
08-Nov-06	Pond 3	41	725,176.6	3,948,809.1	5,902	2.6
08-Nov-06	Pond 3	42	725,200.8	3,948,809.4	8,802	9.5
08-Nov-06	Pond 3	43	725,224.7	3,948,809.8	11,628	4.7
08-Nov-06	Pond 3	44	(1)	(1)	N/S	N/S
08-Nov-06	Pond 3	45	(1)	(1)	N/S	N/S
08-Nov-06	Pond 3	46	725,299.5	3,948,811.3	23,486	23.7
08-Nov-06	Pond 3	47	725,322.0	3,948,812.0	47,734	62.5
08-Nov-06	Pond 3	48	725,346.3	3,948,811.1	19,020	16.5
08-Nov-06	Pond 3	49	725,188.1	3,948,830.9	6,120	3.1
08-Nov-06	Pond 3	50	725,214.5	3,948,830.5	70,038	98.2
08-Nov-06	Pond 3	51	725,237.4	3,948,831.1	25,334	26.6
08-Nov-06	Pond 3	52	(1)	(1)	N/S	N/S

Table 3.7 Pond 3/3a Static Gamma Radiation Survey Results						
			Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Collimated 2x2 #408522-33)	
Date	Area	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
08-Nov-06	Pond 3	53	(1)	(1)	N/S	N/S
08-Nov-06	Pond 3	54	725,310.9	3,948,831.8	9,367	10.9
08-Nov-06	Pond 3	55	725,336.6	3,948,832.0	40,556	51.0
09-Nov-06	Pond 3	56	725,202.5	3,948,852.0	6,072	3.0
09-Nov-06	Pond 3	57	725,225.2	3,948,852.2	12,207	5.6
09-Nov-06	Pond 3	58	725,250.0	3,948,852.9	17,038	13.4
09-Nov-06	Pond 3	59	725,277.3	3,948,853.9	38,463	47.6
09-Nov-06	Pond 3	60	725,299.0	3,948,852.9	9,044	10.1
09-Nov-06	Pond 3	61	725,323.6	3,948,850.4	40,887	51.5
09-Nov-06	Pond 3	62	725,214.6	3,948,873.6	5,080	<0.6
09-Nov-06	Pond 3	63	725,237.6	3,948,874.2	16,625	12.7
09-Nov-06	Pond 3	64	725,262.5	3,948,874.2	13,079	7.0
09-Nov-06	Pond 3	65	725,287.7	3,948,872.7	24,776	25.7
09-Nov-06	Pond 3	66	725,310.0	3,948,874.0	19,312	17.0
09-Nov-06	Pond 3	67	725,225.4	3,948,896.3	5,170	0.8
09-Nov-06	Pond 3	68	725,250.7	3,948,896.4	13,478	7.7
09-Nov-06	Pond 3	69	725,274.6	3,948,894.5	29,797	33.8
09-Nov-06	Pond 3	70	725,299.3	3,948,894.4	21,270	20.1
09-Nov-06	Pond 3	71	725,239.4	3,948,916.1	8,454	8.7
09-Nov-06	Pond 3	72	725,264.7	3,948,917.5	6,594	4.2
09-Nov-06	Pond 3	73	725,287.2	3,948,917.4	7,572	6.6
Step-out Sample Locations						
16-Nov-06	Pond 3 Step Ou	74	725336.7	3948790.3	15,883	11.5
16-Nov-06	Pond 3 Step Ou	75	725323.1	3948769.1	6,707	4.5
16-Nov-06	Pond 3 Step Ou	76	725343.1	3948768.4	8,057	7.7
16-Nov-06	Pond 3 Step Ou	77	725289.1	3948746.0	6,163	3.2
16-Nov-06	Pond 3 Step Ou	78	725316.2	3948748.1	10,638	3.1
16-Nov-06	Pond 3 Step Ou	79	725340.4	3948747.5	6,146	3.1
16-Nov-06	Pond 3 Step Ou	80	725299.1	3948725.5	10,045	2.2
16-Nov-06	Pond 3 Step Ou	81	725274.0	3948725.8	7,323	6.0
16-Nov-06	Pond 3 Step Ou	82	725237.9	3948703.4	6,400	3.8
17-Nov-06	Pond 3 Step Ou	83	725060.5	3948705.7	9,045	10.1
17-Nov-06	Pond 3 Step Ou	84	725047.6	3948703.9	7,028	5.3
17-Nov-06	Pond 3 Step Ou	85	725071.7	3948725.4	6,728	4.5
17-Nov-06	Pond 3 Step Ou	86	725093.0	3948747.1	6,858	4.9
17-Nov-06	Pond 3 Step Ou	87	725121.1	3948767.4	5,853	2.4
17-Nov-06	Pond 3 Step Ou	88	725153.5	3948810.4	5,035	<0.6
17-Nov-06	Pond 3 Step Ou	89	725155.4	3948831.4	5,338	1.2
17-Nov-06	Pond 3 Step Ou	90	725175.5	3948854.4	4,837	<0.6
17-Nov-06	Pond 3 Step Ou	91	725190.8	3948872.5	5,238	1.0
17-Nov-06	Pond 3 Step Ou	92	725212.0	3948895.4	5,872	2.5
17-Nov-06	Pond 3 Step Ou	93	725233.9	3948913.7	5,458	1.5
					Average	**20.6**
					Standard Deviation	**42.8**

Notes:

1. Locations for point #44, 45, 52 and 53 were under water.

Table 3.8 Sediment Pad Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Collimated 2x2 #408522-30)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-
Primary Sample Locations					
09-Nov-06	1	724,991.4	3,948,589.1	13,604	7.9
09-Nov-06	2	725,015.2	3,948,588.6	10,535	2.9
09-Nov-06	3	725,039.7	3,948,588.5	8,757	9.4
09-Nov-06	4	724,929.4	3,948,609.0	7,279	5.9
09-Nov-06	5	724,953.8	3,948,609.5	22,191	21.6
09-Nov-06	6	724,979.1	3,948,609.6	58,230	79.3
09-Nov-06	7	725,003.2	3,948,610.2	19,678	17.6
09-Nov-06	8	725,027.9	3,948,609.1	31,701	36.8
09-Nov-06	9	725,052.1	3,948,608.8	8,503	8.8
09-Nov-06	10	724,917.8	3,948,631.1	7,037	5.3
09-Nov-06	11	724,942.9	3,948,630.2	12,946	6.8
09-Nov-06	12	724,965.7	3,948,630.8	119,627	177.5
09-Nov-06	13	724,991.5	3,948,630.6	23,842	24.2
09-Nov-06	14	725,014.9	3,948,630.3	110,907	163.5
09-Nov-06	15	725,039.7	3,948,630.8	46,708	60.8
09-Nov-06	16	725,064.1	3,948,630.5	32,486	38.1
09-Nov-06	17	725,088.4	3,948,630.8	10,882	3.5
09-Nov-06	18	724,978.6	3,948,650.9	16,887	13.1
09-Nov-06	19	725,003.1	3,948,650.6	28,154	31.1
09-Nov-06	20	725,026.4	3,948,651.8	22,537	22.2
09-Nov-06	21	725,052.1	3,948,651.8	140,404	210.7
09-Nov-06	22	725,076.0	3,948,652.3	87,831	126.6
09-Nov-06	23	725,101.1	3,948,652.0	28,304	31.4
09-Nov-06	24	725,015.1	3,948,672.6	40,518	50.9
09-Nov-06	25	725,040.4	3,948,672.6	21,621	20.7
09-Nov-06	26	725,063.8	3,948,673.1	36,363	44.3
09-Nov-06	27	725,088.1	3,948,673.3	18,861	16.3
09-Nov-06	28	725,052.6	3,948,694.1	33,476	39.7
09-Nov-06	29	725,076.4	3,948,693.5	49,847	65.8
Step-out Sample Locations					
17-Nov-06	30	724894.5	3948629.9	4,844	<0.6
17-Nov-06	31	724870.2	3948631.1	5,015	<0.6
17-Nov-06	32	724846.8	3948631.9	4,499	<0.6
17-Nov-06	33	724857.1	3948651.4	5,341	1.2
17-Nov-06	34	724882.4	3948650.3	4,192	<0.6
17-Nov-06	35	724906.6	3948645.2	5,397	1.3
17-Nov-06	36	724929.2	3948636.4	6,099	3.0
17-Nov-06	37	724966.1	3948667.7	4,997	<0.6
17-Nov-06	38	724987.5	3948672.0	5,458	1.5
17-Nov-06	39	725027.1	3948694.1	7,091	5.4
17-Nov-06	40	725005.4	3948693.2	5,576	1.8
				Average	**34.0**
				Standard Deviation	**50.8**

Table 3.9
Vent Holes 3 & 8 Static Gamma Radiation Survey Results

Date	Point No.	Point Location Coordinates C351983 UTM (meters)		Gamma Rad Level (Uncollimated 2x2 #408522-33)	
		Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
Vent Hole No. 3					
28-Nov-06	33	724,931.0	3,948,769.3	28,730	8.3
28-Nov-06	34	724,956.5	3,948,777.7	42,160	15.0
28-Nov-06	35	724,961.4	3,948,738.4	20,810	4.3
				Average	9.2
				Standard Deviation	5.4
Vent Hole No. 8					
28-Nov-06	1	724,723.2	3,948,840.9	11,591	<0.6
28-Nov-06	2	724,739.6	3,948,846.7	17,428	2.6
28-Nov-06	3	724,736.2	3,948,860.3	43,246	15.6
28-Nov-06	4	724,761.0	3,948,879.4	63,134	25.5
28-Nov-06	5	724,770.0	3,948,896.0	43,002	15.4
28-Nov-06	6	724,780.7	3,948,910.9	62,224	25.0
28-Nov-06	7	724,797.7	3,948,907.7	35,341	11.6
28-Nov-06	8	724,785.6	3,948,923.4	44,967	16.4
28-Nov-06	9	724,800.9	3,948,926.1	96,977	42.4
28-Nov-06	10	724,810.7	3,948,920.5	50,093	19.0
28-Nov-06	11	724,811.9	3,948,899.7	70,053	29.0
28-Nov-06	12	724,820.1	3,948,896.1	33,682	10.8
28-Nov-06	13	724,828.0	3,948,911.6	48,082	18.0
28-Nov-06	14	724,787.7	3,948,875.3	30,871	9.4
28-Nov-06	15	724,767.3	3,948,844.5	109,314	48.6
28-Nov-06	16	724,778.5	3,948,818.3	36,571	12.2
28-Nov-06	17	724,787.0	3,948,854.1	123,717	55.8
28-Nov-06	18	724,791.5	3,948,867.1	53,573	20.7
28-Nov-06	19	724,805.7	3,948,857.8	155,342	71.6
28-Nov-06	20	724,814.4	3,948,850.7	119,493	53.7
28-Nov-06	21	724,820.2	3,948,846.0	22,271	5.1
28-Nov-06	22	724,799.5	3,948,845.7	31,906	9.9
28-Nov-06	23	724,791.9	3,948,826.0	43,824	15.8
28-Nov-06	24	724,823.2	3,948,807.1	43,650	15.8
28-Nov-06	25	724,831.1	3,948,826.4	51,748	19.8
28-Nov-06	26	724,833.7	3,948,836.1	38,302	13.1
28-Nov-06	27	724,841.0	3,948,935.1	27,621	7.7
28-Nov-06	28	724,813.4	3,948,967.6	14,631	1.2
28-Nov-06	29	724,781.1	3,948,962.2	32,155	10.0
28-Nov-06	30	724,791.7	3,948,963.5	43,502	15.7
28-Nov-06	31	724,867.3	3,948,874.9	18,200	3.0
28-Nov-06	32	724,832.1	3,948,789.5	21,351	4.6
				Average	**19.5**
				Standard Deviation	**17.2**

Table 3.10 Trailer Park Static Gamma Radiation Survey Results					
		Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Uncollimated 2x2 #408522-33)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226
20-Nov-06	2	725793.0	3948953.7	51,040	19.5
20-Nov-06	3	725808.5	3948940.8	33,200	10.5
20-Nov-06	4	725796.5	3948937.8	40,166	14.0
20-Nov-06	5	725821.2	3948911.4	20,640	4.3
20-Nov-06	6	725795.1	3948909.6	23,165	5.5
20-Nov-06	7	725775.6	3948933.3	51,140	19.5
20-Nov-06	8	725747.6	3948948.8	40,170	14.0
20-Nov-06	9	725713.9	3948944.6	229,480	108.7
20-Nov-06	10	725712.8	3948927.2	26,810	7.3
20-Nov-06	11	725748.2	3948886.4	23,110	5.5
20-Nov-06	12	725754.8	3948913.6	27,060	7.5
20-Nov-06	13	725798.3	3948880.6	124,460	56.2
20-Nov-06	14	725804.9	3948886.7	35,940	11.9
20-Nov-06	15	725802.4	3948869.3	39,710	13.8
20-Nov-06	16	725785.9	3948863.4	43,430	15.6
20-Nov-06	17	725785.3	3948882.4	34,850	11.4
20-Nov-06	18	725770.5	3948890.8	21,020	4.4
20-Nov-06	20	725766.2	3948857.2	27,105	7.5
20-Nov-06	21	725753.9	3948865.8	21,460	4.7
20-Nov-06	22	725733.2	3948804.9	48,200	18.0
20-Nov-06	23	725770.4	3948801.1	18,100	3.0
20-Nov-06	24	725742.4	3948775.5	62,250	25.1
20-Nov-06	25	725731.4	3948761.4	46,388	17.1
20-Nov-06	26	725721.7	3948744.3	18,015	2.9
20-Nov-06	27	725703.2	3948704.7	17,070	2.5
20-Nov-06	28	725671.9	3948736.6	22,980	5.4
20-Nov-06	29	725675.2	3948753.7	21,940	4.9
20-Nov-06	30	725684.3	3948771.8	20,130	4.0
20-Nov-06	31	725707.0	3948800.4	20,110	4.0
20-Nov-06	32	725716.8	3948822.3	32,300	10.1
20-Nov-06	33	725725.4	3948863.8	23,300	5.6
20-Nov-06	34	725718.4	3948897.1	20,380	4.1
20-Nov-06	35	725714.7	3948917.9	21,840	4.9
27-Nov-06	36	725743.5	3948929.4	41,420	14.6
27-Nov-06	37	725728.8	3948906.5	67,531	27.7
27-Nov-06	38	725730.3	3948879.6	59,576	23.7
27-Nov-06	39	725778.1	3948858.7	67,501	27.7
27-Nov-06	40	725770.7	3948814.6	49,696	18.8
27-Nov-06	41	725732.8	3948782.5	170,865	79.4
				Average	**16.5**
				Standard Deviation	**21.2**

Table 3.11 Home Sites Static Gamma Radiation Survey Results					
		Point Location Coordinates D641983 UTM (meters)		Gamma Rad Level (Uncollimated 2x2 #408522-33)	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
Home Site 1					
15-Nov-06	1	725,610.7	3,949,463.6	13,251	0.6
15-Nov-06	2	725,607.7	3,949,447.6	13,027	<0.6
15-Nov-06	3	725,598.9	3,949,455.5	13,292	0.6
15-Nov-06	4	725,590.7	3,949,460.8	13,201	<0.6
15-Nov-06	5	725,620.7	3,949,475.3	12,831	<0.6
				Average	**<0.6**
				Standard Deviation	**0.0**
Home Site 2					
15-Nov-06	1	725,574.1	3,949,423.0	13,082	<0.6
15-Nov-06	2	725,580.6	3,949,414.9	12,914	<0.6
15-Nov-06	3	725,569.4	3,949,439.7	12,981	<0.6
15-Nov-06	4	725,565.8	3,949,416.2	13,256	<0.6
15-Nov-06	5	725,595.3	3,949,411.4	12,976	<0.6
				Average	**<0.6**
				Standard Deviation	**0.0**
Home Site 3					
15-Nov-06	1	725,582.2	3,949,380.8	13,426	0.6
15-Nov-06	2	725,584.2	3,949,375.9	14,174	1.0
15-Nov-06	3	725,596.6	3,949,391.5	13,349	0.6
15-Nov-06	4	725,601.9	3,949,409.7	13,360	0.6
15-Nov-06	5	725,595.3	3,949,411.4	13,875	0.9
				Average	**0.7**
				Standard Deviation	**0.2**
Home Site 4					
15-Nov-06	1	725,683.5	3,949,434.4	14,077	1.0
15-Nov-06	2	725,697.0	3,949,438.9	15,112	1.5
15-Nov-06	3	725,703.8	3,949,445.7	15,049	1.5
15-Nov-06	4	725,704.7	3,949,455.4	16,175	2.0
15-Nov-06	5	725,712.9	3,949,447.1	15,439	1.6
				Average	**1.5**
				Standard Deviation	**0.3**
Home Site 5					
15-Nov-06	1	725,667.2	3,949,412.5	13,931	0.9
15-Nov-06	2	725,678.3	3,949,400.5	15,079	1.5
15-Nov-06	3	725,705.0	3,949,398.3	14,931	1.4
15-Nov-06	4	725,690.7	3,949,417.1	13,290	0.6
15-Nov-06	5	725,696.0	3,949,431.8	15,939	1.9
				Average	**1.2**
				Standard Deviation	**0.5**

Table 3.11 Home Sites Static Gamma Radiation Survey Results					
		Point Location Coordinates D641983 UTM (meters)		Gamma Rad Level (Uncollimated 2x2 #408522-33)	
Date	**Point No.**	**Easting**	**Northing**	**CPM**	**Equivalent Surface Soil Ra-226 (pCi/gm)[1]**
		Home Site 6			
15-Nov-06	1	725,707.6	3,949,321.1	19,807	3.8
15-Nov-06	2	725,726.1	3,949,334.5	20,100	4.0
15-Nov-06	3	725,728.0	3,949,342.6	20,605	4.2
15-Nov-06	4	725,726.8	3,949,351.1	18,754	3.3
15-Nov-06	5	725,719.5	3,949,331.3	20,483	4.2
				Average	**3.9**
				Standard Deviation	**0.4**
		Home Site 7			
15-Nov-06	1	725,728.9	3,949,283.0	17,088	2.5
15-Nov-06	2	725,689.1	3,949,281.8	24,045	6.0
15-Nov-06	3	725,682.8	3,949,273.5	34,047	11.0
15-Nov-06	4	725,720.2	3,949,297.0	18,024	2.9
15-Nov-06	5	725,685.3	3,949,321.8	20,174	4.0
				Average	**5.3**
				Standard Deviation	**3.4**
		Home Site 8			
15-Nov-06	1	725,932.7	3,949,373.5	18,235	3.0
15-Nov-06	2	725,935.0	3,949,372.4	19,201	3.5
15-Nov-06	3	725,934.5	3,949,361.5	18,271	3.1
15-Nov-06	4	725,916.3	3,949,339.2	18,232	3.0
15-Nov-06	5	725,903.3	3,949,359.1	18,032	2.9
				Average	**3.1**
				Standard Deviation	**0.2**
		Home Site 9			
15-Nov-06	1	725,926.9	3,949,319.8	17,057	2.5
15-Nov-06	2	725,945.1	3,949,318.6	18,128	3.0
15-Nov-06	3	725,951.5	3,949,315.7	18,609	3.2
15-Nov-06	4	725,945.1	3,949,312.3	18,115	3.0
15-Nov-06	5	725,920.2	3,949,312.1	16,910	2.4
				Average	**2.8**
				Standard Deviation	**0.4**

Table 3.12
Arroyo Bank Static Gamma Radiation Survey Results

Date	Point No.	Point Location Coordinates 1983 UTM (meters)		Gamma Rad Level (Uncollimated 2x2 #408522-33)	
		Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]
IX Plant Area (north of arroyo adjacent to NECR-1)					
17-Nov-06	1	725248.8	3948912.4	8,814	9.5
17-Nov-06	2	725246.2	3948934.2	6,028	2.9
17-Nov-06	3	725266.1	3948934.7	6,445	3.9
17-Nov-06	4	725281.1	3948953.7	7,017	5.2
17-Nov-06	5	725255.3	3948954.6	6,701	4.5
17-Nov-06	6	725260.1	3948974.9	7,321	6.0
17-Nov-06	7	725297.1	3948976.4	6,108	3.1
17-Nov-06	8	725280.9	3948995.6	6,682	4.4
17-Nov-06	9	725310.2	3948997.8	7,018	5.2
17-Nov-06	10	725292.7	3949016.3	5,361	1.3
17-Nov-06	11	725320.2	3949016.0	6,542	4.1
17-Nov-06	12	725344.4	3949017.7	5,594	1.8
				Average	**4.3**
				Standard Deviation	**2.2**
Arroyo Bank from NECR-1 to Home Sites[1]					
17-Nov-06	13	725399.4	3949038.0	7,909	7.4
17-Nov-06	14	725367.6	3949037.4	5,182	0.8
17-Nov-06	15	725386.5	3949060.6	5,965	2.7
17-Nov-06	16	725422.0	3949059.9	8,571	9.0
17-Nov-06	17	725445.7	3949080.4	7,206	5.7
17-Nov-06	18	725419.6	3949084.5	6,397	3.7
17-Nov-06	19	725455.8	3949103.8	6,684	4.4
17-Nov-06	20	725433.9	3949101.4	6,123	3.1
17-Nov-06	21	725447.3	3949123.8	5,419	1.4
17-Nov-06	22	725462.6	3949122.5	6,275	3.5
17-Nov-06	23	725469.0	3949146.6	5,431	1.4
17-Nov-06	24	725481.0	3949167.3	5,628	1.9
17-Nov-06	25	725501.7	3949186.9	4,820	<0.6
17-Nov-06	26	725536.7	3949208.6	5,480	1.5
17-Nov-06	27	725559.5	3949229.8	5,089	0.6
17-Nov-06	28	725575.8	3949250.9	4,861	<0.6
17-Nov-06	29	725593.1	3949272.4	4,913	<0.6
17-Nov-06	30	725606.4	3949291.4	4,826	<0.6
17-Nov-06	31	725619.6	3949312.2	4,584	<0.6
17-Nov-06	32	725656.1	3949333.1	5,043	<0.6
17-Nov-06	33	725678.7	3949352.7	4,889	<0.6
17-Nov-06	34	725700.1	3949354.0	5,705	2.1
17-Nov-06	35	725684.0	3949329.7	9,940	12.2
17-Nov-06	36	725652.8	3949312.3	6,174	3.2
17-Nov-06	37	725631.7	3949290.2	4,904	<0.6
17-Nov-06	38	725619.5	3949269.9	4,807	<0.6
				Average	**2.7**
				Standard Deviation	**3.0**

Notes:

1. Points 13 through 33 were located on the north arroyo bank, and points 45 through 38 were located on the south arroyo bank.

Table 3.13
Gamma Radiation Survey Results Summary

Survey Area	Area (acs)	Static Gamma Radiation Survey Results					Surface Soil Sampling Results				
		Number of Points	Surface Soil Ra-226 (pCi/g)			% of Samples Above the FSL	Number of Samples	Surface Soil Ra-226 (pCi/g)			% of Samples Above the FSL
			Range	Average	Std Dev			Range	Average	Std Dev	
NECR-1 Initial Area	13	156	<0.6 to 218.8	29.8	32.5	98	31	6.5 to 93.3	39.1	24.7	100
NECR-1 Step-out Area		149	<0.6 to 85.8	8.9	12.2	85	17	1.2 to 81.5	9.5	20.2	47
NECR-1 Total (Revised Area)		305	<0.6 to 218.8	19.6	26.8	92	48	1.2 to 93.3	28.6	27	81
NECR-2 Initial Area	6.4	75	<0.6 to 215.2	22.6	35.3	85	15	1.5 to160.8	36.9	43.7	86
NECR-2 Step-out Area		43	<0.6 to 19.2	3.4	3.4	56	4	1.4 to 3.1	2.1	0.8	25
NECR-2 Total (Revised Area)		118	<0.6 to 215.2	15.6	29.7	75	19	1.4 to 160.8	27.7	40.9	68
Sandfill 1 Area	5.1	76	<0.6 to 76.0	9	16.3	57	18	0.8 to 47.3	9.3	11.3	72
Sandfill 2 Area	1.6	21	<0.6 to 26.0	5.6	7	57	13	0.8 to 36.4	9.7	11.6	69
Sandfill 3 Initial Area	2.2	28	<0.6 to 133.6	20.9	29.9	89	14	1.0 to 123.0	24.8	32.6	64
Sandfill 3 Step-out Area		15	<0.6 to 14.9	3.1	3.8	40	-				
Sandfill 3 Total (Revised Area)		43	<0.6 to 133.6	14.7	25.5	72	14	1.0 to 123.0	24.8	32.6	64
Ponds 1 & 2 Initial Area	5.6	85	<0.6 to 498.3	45.8	83.2	89	23	1.0 to 655.0	65.3	138.1	70
Pond 3/3a Initial Area	6	69	<0.6 to 293.6	25.5	47.6	97	14	1.4 to 875.0	115.8	230.9	93
Pond 3/3a Step-out Area		20	<0.6 to 11.5	4	3	70	-				
Pond 3/3a Total (Revised Area)		89	<0.6 to 293.6	20.6	42.8	91	14	1.4 to 875.0	115.8	230.9	93
Sediment Pad Initial Area	2.9	29	2.9 to 210.7	46.3	55	100	13	1.5 to 236.0	57.2	65.5	100
Sediment Pad Step-out Area		11	<0.6 to 5.4	1.6	1.5	18	-				
Sediment Pad Total (Revised Area)		40	<0.6 to 210.7	34	50.8	78	13	1.5 to 236.0	57.2	65.5	100
Vent Hole 3		3	4.3 to 15.0	9.2	5.4	(1)	1	1.4	1.4	-	(1)
Vent Hole 8		32	<0.6 to 71.6	19.5	17.2	(1)	4	2.2 to 137.0	39.1	65.5	(1)
Trailer Park		41	2.5 to 108.7	16.5	21.2	(1)	5	2.1 to 23.2	16.6	15.7	(1)
IX Plant Area		12	1.3 to 9.5	4.3	2.2	83	-				
Arroyo Bank		26	<0.6 to 12.2	2.7	3	38	-				
Home Site 1	0.5	5	<0.6	<0.6	-	(1)	5	0.9 to 1.5	1.2	0.2	(1)
Home Site 2	0.5	5	<0.6	<0.6	-	(1)	5	0.9 to 0.9	0.9	0	(1)
Home Site 3	0.5	5	0.6 to 1.0	0.7	0.2	(1)	5	0.9 to 1.2	1.1	0.1	(1)
Home Site 4	0.5	5	1.0 to 2.0	1.5	0.4	(1)	5	1.3 to 3.6	2.3	1	(1)
Home Site 5	0.5	5	<0.6 to 1.9	1.2	0.5	(1)	5	0.9 to 2.1	1.3	0.5	(1)
Home Site 6	0.5	5	3.3 to 4.2	3.9	0.4	(1)	5	5.6 to 14.9	9.4	3.9	(1)
Home Site 7	0.5	5	2.5 to 11.0	5.3	3.4	(1)	5	3.4 to 26.6	10.5	9.3	(1)
Home Site 8	0.5	5	2.9 to 3.5	3.1	0.2	(1)	5	2.3 to 5.6	3.4	1.3	(1)
Home Site 9	0.5	5	2.4 to 3.2	2.8	0.4	(1)	5	2.6 to 6.7	4.3	1.7	(1)

Notes:
1. All of these locations with the highest levels or above the FSL were identified by a gamma radiation scan prior to static survey and soil sampling.

Table 3.14 Gamma Radiation Survey and Soil Sampling Surface Soil Ra-226 Results Comparision							
		Point Location Coordinates 1983 UTM (meters)		Gamma Radiation Survey Results		Soil Sample	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]	Ra-226 pCi/gm	% Difference
NECR-1							
08-Nov-06	5	725,389.2	3,948,829.0	8766	9.4	8.9	6%
08-Nov-06	16	725,366.1	3,948,869.8	80015	114.1	80.8	29%
08-Nov-06	18	725,413.4	3,948,868.3	18184	15.2	21.7	-43%
08-Nov-06	20	725,461.5	3,948,870.5	31670	36.8	46.2	-26%
08-Nov-06	23	725,325.9	3,948,890.8	24299	25.0	18.3	27%
08-Nov-06	26	725,398.9	3,948,891.2	55532	74.9	68.4	9%
08-Nov-06	28	725,445.8	3,948,890.3	16041	11.8	18.5	-57%
08-Nov-06	30	725,497.0	3,948,889.1	8914	9.8	6.5	34%
08-Nov-06	44	725,375.8	3,948,932.1	53006	70.9	47.9	32%
08-Nov-06	46	725,424.0	3,948,933.0	50688	67.2	58.8	12%
08-Nov-06	47	725,447.8	3,948,933.4	24256	24.9	31.3	-26%
08-Nov-06	49	725,496.6	3,948,932.5	12820	6.6	29.3	-344%
08-Nov-06	65	725,399.1	3,948,976.3	40047	50.2	28.4	43%
08-Nov-06	67	725,450.5	3,948,979.2	16829	13.0	38.3	-194%
08-Nov-06	68	725,472.6	3,948,976.3	26252	28.1	12.8	54%
08-Nov-06	70	725,521.7	3,948,975.0	17802	14.6	26.1	-79%
07-Nov-06	90	725,434.4	3,949,015.1	60717	83.2	84.8	-2%
07-Nov-06	92	725,472.3	3,949,016.5	6827	4.8	13.2	-176%
07-Nov-06	93	725,508.2	3,949,016.5	14402	9.1	35.7	-291%
07-Nov-06	95	725,546.1	3,949,017.9	88148	127.1	75.7	40%
07-Nov-06	101	725,692.5	3,949,017.0	10437	2.8	12.7	-355%
07-Nov-06	103	725,741.2	3,949,019.7	16490	12.5	20.9	-68%
08-Nov-06	126	725,446.6	3,949,060.4	41946	53.2	50.9	4%
08-Nov-06	127	725,476.2	3,949,063.5	62399	85.9	93.3	-9%
07-Nov-06	129	725,521.1	3,949,056.4	19698	17.6	7.0	60%
07-Nov-06	131	725,570.2	3,949,056.6	45205	58.4	41.5	29%
07-Nov-06	133	725,618.7	3,949,057.5	33370	39.5	54.7	-39%
07-Nov-06	135	725,668.4	3,949,058.9	34742	41.7	63.2	-52%
07-Nov-06	137	725,716.1	3,949,061.2	29493	33.3	52.6	-58%
07-Nov-06	138	725,743.8	3,949,059.2	37798	46.6	48.6	-4%
07-Nov-06	140	725,790.5	3,949,060.7	9890	12.1	15.8	-30%
NECR-1 Step-outs							
13-Nov-06	164	725,646.0	3,949,102.3	19872	17.9	35.7	-100%
13-Nov-06	173	725,509.1	3,949,123.2	9954	12.3	4.6	63%
13-Nov-06	184	725,776.8	3,949,123.0	5380	1.3	1.2	8%
13-Nov-06	207	725,680.8	3,949,163.4	5977	2.7	3.1	-13%
13-Nov-06	230	725,582.3	3,949,207.6	6557	4.1	6.9	-67%
13-Nov-06	238	725,776.9	3,949,205.9	5080	<0.6	1.6	-167%
13-Nov-06	240	725,828.1	3,949,207.5	5073	<0.6	1.5	-150%
13-Nov-06	262	725,754.1	3,949,246.6	5383	1.3	1.4	-7%
13-Nov-06	265	725,827.8	3,949,248.0	4908	<0.6	1.6	-167%
14-Nov-06	266	725,802.0	3,948,996.3	7610	6.7	1.7	74%
14-Nov-06	281	725,911.4	3,949,102.1	37406	45.9	80.5	-75%
14-Nov-06	289	725,875.4	3,949,165.3	5400	1.4	1.8	-33%
16-Nov-06	293	725,899.1	3,949,186.6	6158	3.2	7.0	-121%
16-Nov-06	307	725,989.4	3,949,248.1	5331	1.2	3.8	-220%
01-Dec-06	316	725,538.4	3,948,827.4	4865	<0.6	1.3	-117%
01-Dec-06	323	725,608.8	3,948,869.6	5789	2.3	2.6	-14%
01-Dec-06	326	725,619.2	3,948,891.3	7908	7.4	5.2	29%
NECR-2							
09-Nov-06	4	725,000.4	3,948,247.9	6,256	3.4	1.2	65%
09-Nov-06	15	724,881.1	3,948,288.4	20,677	19.2	97.2	-407%
09-Nov-06	17	724,929.8	3,948,287.6	36,878	45.1	55.2	-22%
10-Nov-06	18	724,968.7	3,948,294.7	17,871	14.7	3.6	75%
09-Nov-06	20	725,023.0	3,948,286.7	24,011	24.5	38.1	-55%
09-Nov-06	27	724,962.9	3,948,310.2	21,010	19.7	35.3	-79%
09-Nov-06	33	724,850.2	3,948,330.6	4,837	<0.6	2.0	-233%
09-Nov-06	35	724,901.4	3,948,330.5	84,399	121.1	160.8	-33%
09-Nov-06	37	724,949.3	3,948,330.8	8,943	9.9	4.6	53%
09-Nov-06	39	725,000.3	3,948,330.0	19,939	18.0	35.4	-97%

Table 3.14 Gamma Radiation Survey and Soil Sampling Surface Soil Ra-226 Results Comparision							
		Point Location Coordinates 1983 UTM (meters)		Gamma Radiation Survey Results		Soil Sample	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]	Ra-226 pCi/gm	% Difference
09-Nov-06	50	724,829.4	3,948,372.2	6,122	3.1	1.2	61%
09-Nov-06	52	724,877.7	3,948,371.8	22,046	21.4	23.0	-8%
09-Nov-06	56	724,973.3	3,948,371.3	7,314	5.9	11.9	-100%
10-Nov-06	69	724,899.8	3,948,416.1	12,599	6.2	8.9	-42%
09-Nov-06	71	724,950.0	3,948,416.1	14,523	9.3	40.0	-329%
NECR-2 Step-outs							
14-Nov-06	83	725010.9	3948435.9	5,587	1.8	3.1	-72%
14-Nov-06	96	725012.3	3948481.0	5,429	1.4	1.4	2%
16-Nov-06	103	725108.5	3948437.6	4,999	<0.6	1.5	-150%
16-Nov-06	109	725072.7	3948522.6	4,945	<0.6	1.6	-167%
Pond 3/3a							
07-Nov-06	1	725,105.8	3,948,684.2	21,120	19.9	18.8	5%
07-Nov-06	7	725,141.3	3,948,704.2	84,406	121.1	259.0	-114%
07-Nov-06	14	725,176.1	3,948,725.0	191,805	293.0	875.0	-199%
07-Nov-06	15	725,202.5	3,948,726.5	12,447	6.0	18.8	-213%
08-Nov-06	27	725,177.1	3,948,768.1	11,737	4.9	4.7	3%
08-Nov-06	29	725,226.7	3,948,768.4	149,128	224.7	312.0	-39%
08-Nov-06	38	725,262.1	3,948,789.1	73,114	103.1	20.9	80%
08-Nov-06	42	725,200.8	3,948,809.4	8,802	9.5	1.4	85%
08-Nov-06	46	725,299.5	3,948,811.3	23,486	23.7	19.5	18%
09-Nov-06	57	725,225.2	3,948,852.2	12,207	5.6	2.8	50%
09-Nov-06	59	725,277.3	3,948,853.9	38,463	47.6	26.9	44%
09-Nov-06	61	725,323.6	3,948,850.4	40,887	51.5	17.3	66%
09-Nov-06	63	725,237.6	3,948,874.2	16,625	12.7	3.8	70%
09-Nov-06	65	725,287.7	3,948,872.7	24,776	25.7	39.6	-54%
Sandfill No. 1							
10-Nov-06	9	725,497.6	3,948,603.8	4,954	<0.6	1.8	-200%
10-Nov-06	11	725,546.5	3,948,604.3	7,128	5.5	5.8	-5%
10-Nov-06	17	725,559.2	3,948,625.5	4,933	<0.6	2.1	-250%
10-Nov-06	21	725,518.6	3,948,646.0	4,459	<0.6	2.3	-283%
10-Nov-06	27	725,509.6	3,948,667.6	4,975	<0.6	4.4	-633%
10-Nov-06	28	725,534.3	3,948,667.3	4,103	<0.6	0.8	-33%
10-Nov-06	30	725,582.5	3,948,667.6	12,777	6.5	14.3	-119%
10-Nov-06	32	725,630.2	3,948,667.2	5,666	2.0	3.8	-91%
10-Nov-06	41	725,486.9	3,948,709.8	4,649	<0.6	1.3	-117%
10-Nov-06	43	725,533.8	3,948,710.1	10,879	3.5	6.7	-92%
10-Nov-06	44	725,559.4	3,948,709.6	6,711	4.5	11	-145%
10-Nov-06	49	725,522.5	3,948,730.4	49,290	65.0	16.8	74%
10-Nov-06	50	725,545.4	3,948,731.5	12,689	6.4	15.7	-146%
10-Nov-06	51	725,571.7	3,948,731.3	6,237	3.4	1.9	43%
10-Nov-06	53	725,618.7	3,948,730.9	5,277	1.1	5.4	-411%
10-Nov-06	63	725,571.1	3,948,772.4	32,153	37.5	20.8	45%
10-Nov-06	65	725,621.3	3,948,771.9	6,188	3.2	4.3	-33%
10-Nov-06	68	725,583.4	3,948,794.0	45,274	58.5	47.3	19%
Sandfill No. 2							
10-Nov-06	3	724,852.5	3,948,177.9	4,124	<0.6	3.3	-450%
10-Nov-06	4	724,872.8	3,948,178.3	5,211	0.9	2	-123%
10-Nov-06	6	724,839.3	3,948,200.3	4,288	<0.6	1.2	-100%
10-Nov-06	7	724,868.7	3,948,200.9	10,505	2.9	16.1	-455%
10-Nov-06	10	724,851.6	3,948,221.1	5,385	1.3	1.2	9%
10-Nov-06	11	724,876.7	3,948,221.0	15,448	10.8	6.2	43%
10-Nov-06	12	724,900.6	3,948,220.3	10,586	3.0	6.2	-105%
10-Nov-06	14	724,838.8	3,948,240.5	4,094	<0.6	0.8	-33%
10-Nov-06	15	724,865.1	3,948,243.6	6,792	4.7	4.4	6%
10-Nov-06	16	724,888.8	3,948,241.5	8,197	8.1	6.1	24%
10-Nov-06	17	724,912.4	3,948,241.1	20,647	19.1	36.4	-90%
10-Nov-06	19	724,900.2	3,948,262.9	24,945	26.0	21.6	17%
10-Nov-06	21	724,943.1	3,948,264.8	6,884	4.9	27.7	-464%
Sandfill No. 3							
09-Nov-06	2	724,895.0	3,948,478.2	10,387	2.7	15.3	-465%
09-Nov-06	4	724,858.3	3,948,500.6	5,280	1.1	1.4	-32%

Table 3.14 Gamma Radiation Survey and Soil Sampling Surface Soil Ra-226 Results Comparision							
		Point Location Coordinates 1983 UTM (meters)		Gamma Radiation Survey Results		Soil Sample	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]	Ra-226 pCi/gm	% Difference
09-Nov-06	5	724,881.8	3,948,498.5	62,004	85.3	66.9	22%
09-Nov-06	6	724,906.7	3,948,500.5	15,867	11.5	17.4	-52%
09-Nov-06	8	724,870.2	3,948,520.9	14,637	9.5	1.4	85%
09-Nov-06	9	724,894.9	3,948,520.6	16,019	11.7	31.9	-172%
09-Nov-06	10	724,918.3	3,948,521.1	15,681	11.2	33.4	-199%
09-Nov-06	12	724,858.0	3,948,542.0	5,935	2.6	1.4	47%
09-Nov-06	14	724,906.8	3,948,541.5	92,167	133.6	123	8%
09-Nov-06	17	724,870.5	3,948,562.1	5,074	<0.6	1	-67%
09-Nov-06	22	724,881.8	3,948,583.2	5,414	1.4	1.2	13%
09-Nov-06	24	724,931.2	3,948,584.8	16,201	12.0	27.4	-128%
09-Nov-06	25	724,955.0	3,948,584.4	24,640	25.5	26.9	-5%
09-Nov-06	26	724,979.0	3,948,584.3	21,274	20.1	19.6	3%
09-Nov-06	27	724,894.6	3,948,605.2	8,780	9.5	4.5	52%
Ponds 1 & 2							
10-Nov-06	9	725,184.3	3,948,591.1	5,461	1.5	1.7	-13%
10-Nov-06	11	725,231.2	3,948,590.1	6,902	5.0	1.1	78%
10-Nov-06	12	725,255.4	3,948,590.1	5,565	1.7	1.5	14%
10-Nov-06	14	725,377.1	3,948,590.6	44,649	57.5	96.9	-68%
10-Nov-06	19	725,221.0	3,948,612.4	17,022	13.3	4.7	65%
10-Nov-06	20	725,242.9	3,948,611.2	8,732	9.3	2.2	76%
10-Nov-06	23	725,364.4	3,948,611.5	48,888	64.3	62.4	3%
09-Nov-06	24	725,390.0	3,948,611.8	28,230	31.3	26.9	14%
10-Nov-06	32	725,280.0	3,948,632.9	5,670	2.0	1.6	20%
09-Nov-06	35	725,377.6	3,948,631.5	141,363	212.3	78.5	63%
10-Nov-06	41	725,193.4	3,948,654.6	7,325	6.0	3.0	50%
17-Nov-06	42	725,221.2	3,948,653.8	11,185	4.0	1.0	75%
09-Nov-06	47	725,343.9	3,948,654.4	62,918	86.8	73.1	16%
09-Nov-06	50	725,413.9	3,948,653.8	16,747	12.9	13.7	-6%
10-Nov-06	56	725,279.9	3,948,673.7	14,024	8.5	11.2	-31%
09-Nov-06	58	725,328.9	3,948,674.4	320,161	498.3	655.0	-31%
09-Nov-06	60	725,377.2	3,948,674.7	92,295	133.8	26.5	80%
10-Nov-06	63	725,448.0	3,948,674.4	5,911	2.6	1.2	53%
09-Nov-06	69	725,365.4	3,948,696.5	112,771	166.5	161.0	3%
09-Nov-06	71	725,413.9	3,948,695.7	40,879	51.5	49.9	3%
09-Nov-06	76	725,353.1	3,948,717.3	10,358	2.7	2.2	17%
09-Nov-06	77	725,378.0	3,948,717.6	112,122	165.5	48.7	71%
09-Nov-06	82	725,389.9	3,948,738.2	92,284	133.7	177.0	-32%
Sediment Pad							
09-Nov-06	5	724,953.8	3,948,609.5	22,191	21.6	17.7	18%
09-Nov-06	6	724,979.1	3,948,609.6	58,230	79.3	38.8	51%
09-Nov-06	7	725,003.2	3,948,610.2	19,678	17.6	106.0	-503%
09-Nov-06	8	725,027.9	3,948,609.1	31,701	36.8	25.8	30%
09-Nov-06	11	724,942.9	3,948,630.2	12,946	6.8	3.8	44%
09-Nov-06	12	724,965.7	3,948,630.8	119,627	177.5	118.0	34%
09-Nov-06	14	725,014.9	3,948,630.3	110,907	163.5	236.0	-44%
09-Nov-06	15	725,039.7	3,948,630.8	46,708	60.8	33.4	45%
09-Nov-06	18	724,978.6	3,948,650.9	16,887	13.1	1.5	89%
09-Nov-06	20	725,026.4	3,948,651.8	22,537	22.2	12.8	42%
09-Nov-06	21	725,052.1	3,948,651.8	140,404	210.7	85.6	59%
09-Nov-06	25	725,040.4	3,948,672.6	21,621	20.7	36.7	-77%
09-Nov-06	26	725,063.8	3,948,673.1	36,363	44.3	27.1	39%
Trailer Park							
20-Nov-06	1	725773.5	3948947.0	42,600	15.2	12.5	18%
20-Nov-06	9	725713.9	3948944.6	229,480	108.7	33.2	69%
20-Nov-06	13	725798.3	3948880.6	124,460	56.2	33.2	41%
20-Nov-06	24	725742.4	3948775.5	62,250	25.1	2.1	92%
20-Nov-06	27	725703.2	3948704.7	17,070	2.5	2.1	15%
Vent Holes 3 & 8							
28-Nov-06	2	724,739.6	3,948,846.7	17,428	2.6	3.8	-44%
28-Nov-06	6	724,780.7	3,948,910.9	62,224	25.0	13.2	47%
28-Nov-06	19	724,805.7	3,948,857.8	155,342	71.6	137.0	-91%

Table 3.14 Gamma Radiation Survey and Soil Sampling Surface Soil Ra-226 Results Comparision							
		Point Location Coordinates 1983 UTM (meters)		Gamma Radiation Survey Results		Soil Sample	
Date	Point No.	Easting	Northing	CPM	Equivalent Surface Soil Ra-226 (pCi/gm)[1]	Ra-226 pCi/gm	% Difference
28-Nov-06	31	724,867.3	3,948,874.9	18,200	3.0	2.2	27%
28-Nov-06	34	724,956.5	3,948,777.7	42,160	15.0	1.4	91%
Home Site #1							
15-Nov-06	1	725,610.7	3,949,463.6	13,251	0.6	1.2	-116%
15-Nov-06	2	725,607.7	3,949,447.6	13,027	0.4	0.9	-103%
15-Nov-06	3	725,598.9	3,949,455.5	13,292	0.6	1	-74%
15-Nov-06	4	725,590.7	3,949,460.8	13,201	<0.6	1.3	-145%
15-Nov-06	5	725,620.7	3,949,475.3	12,831	<0.6	1.5	-334%
Home Site #2							
15-Nov-06	1	725,574.1	3,949,423.0	13,082	<0.6	0.9	-91%
15-Nov-06	2	725,580.6	3,949,414.9	12,914	<0.6	0.9	-132%
15-Nov-06	3	725,569.4	3,949,439.7	12,981	<0.6	0.9	-114%
15-Nov-06	4	725,565.8	3,949,416.2	13,256	0.6	0.9	-61%
15-Nov-06	5	725,595.3	3,949,411.4	12,976	<0.6	0.9	-115%
Home Site #3							
15-Nov-06	1	725,582.2	3,949,380.8	13,426	0.6	0.9	-40%
15-Nov-06	2	725,584.2	3,949,375.9	14,174	1.0	1.1	-8%
15-Nov-06	3	725,596.6	3,949,391.5	13,349	0.6	1.1	-82%
15-Nov-06	4	725,601.9	3,949,409.7	13,360	0.6	1.2	-97%
15-Nov-06	5	725,595.3	3,949,411.4	13,875	0.9	1.1	-27%
Home Site #4							
15-Nov-06	1	725,683.5	3,949,434.4	14,077	1.0	1.3	-34%
15-Nov-06	2	725,697.0	3,949,438.9	15,112	1.5	2.1	-41%
15-Nov-06	3	725,703.8	3,949,445.7	15,049	1.5	1.6	-10%
15-Nov-06	4	725,704.7	3,949,455.4	16,175	2.0	3.6	-78%
15-Nov-06	5	725,712.9	3,949,447.1	15,439	1.6	3	-82%
Home Site #5							
15-Nov-06	1	725,667.2	3,949,412.5	13,931	0.9	1.0	-12%
15-Nov-06	2	725,678.3	3,949,400.5	15,079	1.5	1.4	5%
15-Nov-06	3	725,705.0	3,949,398.3	14,931	1.4	0.9	36%
15-Nov-06	4	725,690.7	3,949,417.1	13,290	0.6	1.3	-126%
15-Nov-06	5	725,696.0	3,949,431.8	15,939	1.9	2.1	-11%
Home Site #6							
15-Nov-06	1	725,707.6	3,949,321.1	19,807	3.8	6.1	-59%
15-Nov-06	2	725,726.1	3,949,334.5	20,100	4.0	11.4	-186%
15-Nov-06	3	725,728.0	3,949,342.6	20,605	4.2	5.6	-32%
15-Nov-06	4	725,726.8	3,949,351.1	18,754	3.3	8.9	-169%
15-Nov-06	5	725,719.5	3,949,331.3	20,483	4.2	14.9	-257%
Home Site #7							
15-Nov-06	1	725,728.9	3,949,283.0	17,088	2.5	3.4	-37%
15-Nov-06	2	725,689.1	3,949,281.8	24,045	6.0	5.5	8%
15-Nov-06	3	725,682.8	3,949,273.5	34,047	11.0	26.6	-143%
15-Nov-06	4	725,720.2	3,949,297.0	18,024	2.9	9.4	-219%
15-Nov-06	5	725,685.3	3,949,321.8	20,174	4.0	7.4	-84%
Home Site #8							
15-Nov-06	1	725,932.7	3,949,373.5	18,235	3.0	2.3	25%
15-Nov-06	2	725,935.0	3,949,372.4	19,201	3.5	2.5	29%
15-Nov-06	3	725,934.5	3,949,361.5	18,271	3.1	3.2	-4%
15-Nov-06	4	725,916.3	3,949,339.2	18,232	3.0	5.6	-84%
15-Nov-06	5	725,903.3	3,949,359.1	18,032	2.9	3.3	-12%
Home Site #9							
15-Nov-06	1	725,926.9	3,949,319.8	17,057	2.5	3.4	-38%
15-Nov-06	2	725,945.1	3,949,318.6	18,128	3.0	3.3	-10%
15-Nov-06	3	725,951.5	3,949,315.7	18,609	3.2	6.7	-107%
15-Nov-06	4	725,945.1	3,949,312.3	18,115	3.0	5.4	-81%
15-Nov-06	5	725,920.2	3,949,312.1	16,910	2.4	2.6	-9%
				Average	**28.3**	**31.4**	**-55%**
				Standard Deviation	**55.8**	**83.2**	**122.4%**

Table 3.15 Summary of Surface Soil Analytical Results, Preliminary COPCs								
Area	Sample ID	Lab ID	Analyte					
			Ra-226[1]	As[2]	Mo	Se	U	V
		Reporting Limit	0.1	0.5	5.0	0.2	0.2	5.0
		Residential PRG	0.0124	0.39	390	390	16	78
		Industrial PRG	--	1.6	5,100	5,100	200	1,000
		Outdoor Worker	0.0258	--	--	--	--	--
		Background Mean	1.0	3.7	nd	0.4	1.1	26.7
		Screening Level	2.24	3.7	5,100	5,100	200	1,000
NECR-1	NECR-COR-A-18	C06081547-020	**40.4**	na	na	na	na	na
	NECR1-SS-005	C06111057-013	**8.9**	3.7	nd	2.6	5.1	28.6
	NECR1-SB-016 [0-0.25]	C06111057-012	**80.8**	nd	nd	59.5	**758.0**	62.4
	NECR1-SS-018	C06111057-011	**21.7**	2.1	nd	5.4	17.0	27.1
	NECR1-SS-020	C06111057-010	**46.2**	1.9	nd	54.1	52.0	38.3
	NECR1-SS-023	C06111057-009	**18.3**	**4.5**	nd	11.2	71.2	42.8
	NECR1-SS-026	C06111057-008	**68.4**	nd	nd	69.4	199.0	42.5
	NECR1-SS-028	C06111057-007	**26.3**	**7.4**	63.8	6.6	79.9	35.4
	NECR1-SS-030	C06111057-006	**6.5**	**5.3**	nd	2.1	8.5	32.5
	NECR1-SS-044	C06111057-004	**47.9**	1.3	nd	27.3	57.7	48.4
	NECR1-SB-046 [0-0.5]	C06111057-003	**58.8**	nd	nd	54.2	176.0	52.5
	NECR1-SS-047	C06111057-002	**31.3**	2.3	nd	19.2	27.7	33.8
	NECR1-SS-049	C06111057-001	**29.3**	**8.3**	214.0	5.1	**664.0**	22.9
	NECR1-SS-065	C06111057-097	**28.4**	**5.7**	nd	16.0	59.1	56.9
	NECR1-SS-067	C06111057-096	**38.3**	2.9	nd	21.2	55.1	39.1
	NECR1-SS-068	C06111057-095	**12.8**	1.9	nd	5.7	**256.0**	21.6
	NECR1-SS-070	C06111057-094	**26.1**	2.5	nd	9.4	49.6	32.8
	NECR1-SS-090	C06111057-093	**84.8**	2.3	nd	29.0	122.0	47.1
	NECR1-SS-092	C06111057-092	**13.2**	3.1	nd	8.2	18.1	28.3
	NECR1-SS-093	C06111057-091	**35.7**	2.0	nd	12.8	56.9	29.6
	NECR1-SB-095 [0-0.5]	C06111057-078	**75.7**	3.0	nd	30.6	**209.0**	45.1
	NECR1-SS-101	C06111057-090	**12.7**	**4.4**	nd	4.1	27.2	30.2
	NECR1-SS-103	C06111057-089	**17.7**	**5.6**	nd	7.9	17.7	41.6
	NECR1-SS-126	C06111057-087	**50.9**	**5.9**	10.8	14.1	99.3	48.6
	NECR1-SS-127	C06111057-086	**93.3**	**6.9**	15.2	21.6	177.0	75.9
	NECR1-SS-129	C06111057-085	**7.0**	**4.4**	nd	2.4	7.7	31.9
	NECR1-SS-131	C06111057-084	**41.5**	1.6	nd	14.7	58.7	34.3
	NECR1-SS-133	C06111057-083	**54.7**	2.1	nd	12.6	52.6	35.8
	NECR1-SS-135	C06111057-082	**63.2**	**4.6**	nd	16.5	81.0	61.3
	NECR1-SS-137	C06111057-081	**52.6**	**5.4**	nd	17.6	98.5	64.2
	NECR1-SS-138	C06111057-080	**48.6**	2.2	nd	13.5	19.9	26.8
	NECR1-SS-140	C06111057-079	**15.8**	**4.8**	nd	4.2	21.2	34.7
		Average	**39.3**	**3.9**	76.0	18.7	116.2	40.4
		Standard Deviation	24.2	2.1	39.1	17.8	172.1	13.2
NECR-1 Stepouts	NECR1-SS-164	C06120235-037	**35.7**	**4.3**	nd	11.4	22.0	43.2
	NECR1-SS-173	C06120235-038	**4.6**	**4.5**	nd	1.4	5.6	32.3
	NECR1-SS-184	C06120235-039	1.2	2.7	nd	1.0	2.9	35.9
	NECR1-SS-207	C06120235-040	**3.1**	**4.9**	nd	1.4	7.6	30.5
	NECR1-SS-238	C06120235-041	1.6	**7.9**	nd	1.4J-	3.4	42.9
	NECR1-SS-240	C06120235-042	1.5	**14.9**	nd	0.5J-	3.6	50.2
	NECR1-SS-262	C06120235-044	1.4	**5.2**	nd	1.1J-	2.2	30.4
	NECR1-SS-265	C06120235-045	1.6	**4.9**	nd	0.4J-	2.4	30.6
	NECR1-SS-266	C06120235-046	1.7	**5.1**	nd	0.6J-	57.7	34.6
	NECR1-SS-281	C06120235-047	**80.5**	**4.0**	nd	53.1J-	83.4	69.7
	NECR1-SS-289	C06120235-048	1.8	**5.7**	nd	1.0J-	3.1	30.6
	NECR1-SS-293	C06120235-049	**7.0**	**9.0**	nd	3.2J-	21.4	32.9
	NECR1-SS-307	C06120235-050	**3.8**	**13.3**	nd	1.1J-	6.8	41.0

Table 3.15 Summary of Surface Soil Analytical Results, Preliminary COPCs								
Area	Sample ID	Lab ID	Analyte					
			Ra-226[1]	As[2]	Mo	Se	U	V
		Reporting Limit	0.1	0.5	5.0	0.2	0.2	5.0
		Residential PRG	0.0124	0.39	390	390	16	78
		Industrial PRG	--	1.6	5,100	5,100	200	1,000
		Outdoor Worker	0.0258	--	--	--	--	--
		Background Mean	1.0	3.7	nd	0.4	1.1	26.7
		Screening Level	2.24	3.7	5,100	5,100	200	1,000
	NECR1-SS-316	C06120235-009	1.3	2.7	nd	nd	1.2	19.3
	NECR1-SS-323	C06120235-007	**2.6**	3.7	nd	0.9	2.2	32.3
	NECR1-SS-326	C06120235-008	**5.2**	2.8	nd	1.6	4.3	28.5
		Average	**9.7**	**6.0**	nd	4.9	14.4	36.6
		Standard Deviation	20.7	3.6	nd	13.1	23.3	11.4
NECR-2	NECR-COR-A-11	C06081547-012	1.9	na	na	na	na	na
	NECR-COR-A-12	C06081547-013	**6.8**	na	na	na	na	na
	NECR-COR-A-13	C06081547-014	**8.9**	na	na	na	na	na
	NECR-COR-A-14	C06081547-015	**10.3**	na	na	na	na	na
	NECR-COR-A-15	C06081547-016	**9.2**	na	na	na	na	na
	NECR 2-SS-004	C06110906-046	1.2	**4.0**	nd	nd	1.5	28.9
	NECR 2-SS-015	C06110906-032	**97.2**	3.5	nd	11.9	107.0	46.7
	NECR 2-SS-017	C06110906-033	**55.3**	2.8	nd	13.3	48.9	39.9
	NECR 2-SS-018	C06110906-034	**3.6**	3.4	nd	1.2	2.2	29.4
	NECR 2-SS-020	C06110906-042	**38.1**	1.3	nd	15.7	66.2	26.8
	NECR 2-SS-027	C06110906-047	**35.3**	3.4	nd	6.6	12.3	34.9
	NECR 2-SS-033	C06110906-035	2.0	3.3	nd	1.2	5.2	16.0
	NECR 2-SS-035	C06110906-037	**160.0**	1.9	nd	26.7	**370.0**	67.3
	NECR 2-SS-037	C06110906-036	**4.6**	**4.8**	nd	1.2	7.1	33.0
	NECR 2-SS-039	C06110906-038	**35.4**	2.3	nd	6.5	29.5	26.7
	NECR 2-SS-050	C06110906-040	1.2J	**6.4**	nd	nd	2.0	24.7
	NECR 2-SS-052	C06110906-045	**23.0**	2.5	nd	5.6	43.5	31.0
	NECR 2-SS-056	C06110906-041	**11.9**	3.4	nd	2.6	3.9	33.0
	NECR 2-SS-069	C06110906-043	**8.9**	**4.7**	nd	2.6	9.6	34.2
	NECR 2-SS-071	C06110906-044	**40.0**	**5.0**	nd	14.5	45.7	58.9
		Average	**27.7**	3.5	2.5	7.3	50.3	35.4
		Standard Deviation	39.3	1.3	0.0	7.7	93.5	13.3
NECR-2 Stepouts	NECR2-SS-083	C06120235-017	**3.1**	3.3	nd	0.4	3.2	26.5
	NECR2-SS-096	C06120235-018	1.4	**8.1**	nd	nd	3.7	39.0
	NECR2-SS-103	C06120235-019	1.5	**4.9**	nd	0.6	2.1	35.6
	NECR2-SS-109	C06120235-020	1.6	**6.4**	nd	nd	1.7	37.2
		Average	1.9	**5.7**	2.5	0.3	2.7	34.6
		Standard Deviation	0.8	2.1	0.0	0.2	0.9	5.6
Sandfill 1	SAND1-SS-009	C06110737-028	1.8	**5.1**	nd	0.3B	1.9	20.2
	SAND1-SS-011	C06110737-024	**5.8**	3.2	nd	0.9B	2.5	22.8
	SAND1-SS-017	C06110737-022	2.1	2.0	nd	0.3B	2.8	11.8
	SAND1-SS-021	C06110737-026	**2.3**	2.6	nd	0.7B	12.6	13.4
	SAND1-SS-027	C06110737-027	**4.4**	2.8	nd	0.6B	1.0	14.1
	SAND1-SS-028	C06110737-029	0.8	3.0	nd	0.2B	0.7	15.6
	SAND1-SS-030	C06110737-023	**14.3**	**4.1**	nd	2.5	10.6	33.9
	SAND1-SS-041	C06110737-025	1.3	**5.6**	nd	0.4B	2.1	23.2
	SAND1-SS-043	C06110737-030	**6.7**	3.4	nd	1.7J	1.8	18.8
	SAND1-SS-044	C06110737-015	**11.0**	**6.7**	nd	1.6	1.7	31.9
	SAND1-SS-049	C06110737-016	**16.8**	**4.9**	nd	3.0	41.0	81.3
	SAND1-SS-050	C06110737-018	**15.7**	**5.0**	nd	8.1	4.5	26.1
	SAND1-SS-051	C06110737-019	1.9	**4.6**	nd	0.5B	1.0	32.6
	SAND1-SS-063	C06110737-020	**20.8**	3.3	nd	3.5J	6.9	28.5
	SAND1-SS-068	C06110737-021	**47.3**	2.3	nd	19.2	41.3	42.1
		Average	**10.2**	**3.9**	nd	2.9	8.8	27.8
		Standard Deviation	12.2	1.4	nd	5.0	13.6	17.2

Table 3.15
Summary of Surface Soil Analytical Results, Preliminary COPCs

Area	Sample ID	Lab ID	Analyte					
			Ra-226[1]	As[2]	Mo	Se	U	V
		Reporting Limit	0.1	0.5	5.0	0.2	0.2	5.0
		Residential PRG	0.0124	0.39	390	390	16	78
		Industrial PRG	--	1.6	5,100	5,100	200	1,000
		Outdoor Worker	0.0258	--	--	--	--	--
		Background Mean	1.0	3.7	nd	0.4	1.1	26.7
		Screening Level	2.24	3.7	5,100	5,100	200	1,000
Sandfill 1 Boundary	SAND1-SS-032	C06120235-014	**3.8**	**4.6**	nd	1.3	2.5	34.4
	SAND1-SS-053	C06120235-015	**5.4**	**7.0**	nd	1.4	2.5	32.0
	SAND1-SS-065	C06120235-016	**4.3**	**4.6**	nd	1.0	3.0	30.1
		Average	**4.5**	**5.4**	nd	1.2	2.7	32.2
		Standard Deviation	0.8	1.4	nd	0.2	0.3	2.2
Sandfill 2	SAND2-SS-003	C06110737-001	**3.3**	**8.0**	nd	0.9B	4.2	22.6
	SAND2-SS-004	C06110737-002	2.0	**7.3**	nd	0.8B	2.2	29.1
	SAND2-SS-006	C06110737-003	1.2	**7.8**	nd	0.2B	1.0	30.9
	SAND2-SS-007	C06110737-004	**16.1**	**4.0**	nd	2.8	7.0	37.6
	SAND2-SS-010	C06110737-005	1.2	**9.0**	nd	0.3B	1.2	42.6
	SAND2-SS-011	C06110737-006	**6.2**	**4.7**	nd	1.0	5.4	29.6
	SAND2-SS-012	C06110737-008	**6.2**	3.3	nd	0.9B	26.3	54.2
	SAND2-SS-014	C06110737-009	0.8	3.5	nd	nd	0.7	12.4
	SAND2-SS-015	C06110737-010	**4.4**	**5.5**	nd	0.8B	2.7	38.1
	SAND2-SS-016	C06110737-011	**6.1**	**4.5**	nd	1.3	2.5	34.3
	SAND2-SS-017	C06110737-012	**36.0**	3.2	nd	6.3	9.0	41.5
	SAND2-SS-019	C06110737-013	**21.6**	3.3	nd	3.6	27.5	49.7
	SAND2-SS-020	C06110737-014	**27.7**	**4.1**	nd	5.0	41.4	49.0
		Average	**10.2**	**5.2**	nd	1.8	10.1	36.3
		Standard Deviation	11.5	2.1	nd	2.0	13.0	11.6
Sandfill 3	NECR-COR-A-10	C06081547-010	**31.6**	na	na	na	na	na
	SAND3-SS-002	C06110906-013	**15.3**	3.4	nd	4.2	42.6	43.7
	SAND3-SS-005	C06110906-009	**66.9**	1.5	nd	32.2	86.4	54.5
	SAND3-SS-006	C06110906-012	**17.4**	**4.7**	nd	3.5	119.0	39.6
	SAND3-SS-008	C06110906-014	1.4	3.7	nd	0.5	2.9	34.1
	SAND3-SS-009	C06110906-008	**31.9**	3.7	nd	14.0	41.4	41.0
	SAND3-SS-010	C06110906-010	**33.4**	**3.8**	nd	7.2	136.0	45.0
	SAND3-SS-014	C06110906-005	**123.0**	1.7	nd	33.5	**396.0**	51.5
	SAND3-SS-017	C06110906-011	1.0	**5.3**	nd	0.7	1.4	26.0
	SAND3-SS-022	C06110906-004	1.2	2.9	nd	nd	0.9	22.7
	SAND3-SS-024	C06110906-003	**27.4**	**4.3**	nd	5.8	7.4	33.2
	SAND3-SS-025	C06110906-002	**26.9**	2.7	nd	5.5	10.9	28.6
	SAND3-SS-026	C06110906-001	**19.6**	2.5	nd	5.3	7.3	20.6
	SAND3-SS-027	C06110906-007	**4.5**	**4.7**	nd	1.4	3.2	28.7
		Average	**28.7**	3.5	nd	8.8	65.8	36.1
		Standard Deviation	32.4	1.2	nd	11.3	109.7	10.8
Sandfill 3 Boundary	SAND3-SS-004	C06120235-064	1.4	2.1	nd	1.0	3.5	34.9
	SAND3-SS-012	C06120235-065	1.4	**4.3**	nd	nd	2.3	38.8
		Average	1.4	3.2	nd	0.6	2.9	36.9
		Standard Deviation	0.0	1.6	nd	0.6	0.8	2.8
Correlation Samples	NECR-COR-A-01	C06081547-001	1.9	na	na	na	na	na
	NECR-COR-A-02	C06081547-002	**5.4**	na	na	na	na	na
(outside & NW of Sandfill 3)	NECR-COR-A-03	C06081547-003	**4.5**	na	na	na	na	na
	NECR-COR-A-04	C06081547-004	1.8	na	na	na	na	na
	NECR-COR-A-05	C06081547-005	**3.7**	na	na	na	na	na
	NECR-COR-A-06	C06081547-006	1.1	na	na	na	na	na
	NECR-COR-A-07	C06081547-007	1.5	na	na	na	na	na
	NECR-COR-A-08	C06081547-008	**3.5**	na	na	na	na	na
	NECR-COR-A-09	C06081547-009	**6.6**	na	na	na	na	na
	NECR-COR-A-19	C06081541-028	1.0	na	na	na	na	na
		Average	**3.1**	na	na	na	na	na
		Standard Deviation	1.9	na	na	na	na	na

Table 3.15
Summary of Surface Soil Analytical Results, Preliminary COPCs

Area	Sample ID	Lab ID	Analyte					
			Ra-226[1]	As[2]	Mo	Se	U	V
		Reporting Limit	0.1	0.5	5.0	0.2	0.2	5.0
		Residential PRG	0.0124	0.39	390	390	16	78
		Industrial PRG	--	1.6	5,100	5,100	200	1,000
		Outdoor Worker	0.0258	--	--	--	--	--
		Background Mean	1.0	3.7	nd	0.4	1.1	26.7
		Screening Level	2.24	3.7	5,100	5,100	200	1,000
Ponds 1 and 2	NECR-COR-A-17	C06081547-019	**185.0**	na	na	na	na	na
	POND12-SS-011	C06111057-050	1.1	**5.0**	nd	nd	1.0	35.3
	POND12-SS-014	C06111057-051	**96.9**	3.2	nd	36.3	47.5	56.2
	POND12-SS-019	C06111057-052	**4.7**	**4.9**	nd	0.9	7.8	34.9
	POND12-SS-020	C06111057-054	2.2	**5.0**	nd	0.5	2.0	35.6
	POND12-SS-023	C06111057-055	**62.4**	2.5	nd	22.8	28.6	38.5
	POND12-SS-024	C06111057-056	**26.9**	2.5	nd	7.1	16.2	28.7
	POND12-SS-035	C06111057-057	**78.5**	**8.8**	nd	30.6	85.5	83.7
	POND12-SS-041	C06111057-059	**3.0**	**4.2**	nd	1.5	4.1	26.8
	POND12-SS-042	C06111057-060	1.0	**5.6**	nd	nd	1.5	35.5
	POND12-SS-047	C06111057-061	**73.1**	3.7	nd	24.3	37.7	49.6
	POND12-SS-050	C06111057-062	**13.7**	**5.3**	nd	5.3	11.9	35.8
	POND12-SS-056	C06111057-063	**11.2**	**5.3**	nd	3.2	10.1	35.9
	POND12-SS-058	C06111057-064	**655.0**	**5.5**	nd	159.0	**1080.0**	198.0
	POND12-SS-061	C06111057-065	**26.5**	**4.4**	nd	5.2	36.6	35.8
	POND12-SS-069	C06111057-066	**161.0**	**3.8**	nd	33.0	166.0	79.6
	POND12-SB-071 [0-0.5]	C06111057-069	**49.9**	3.1	nd	11.3	73.9	34.9
	POND12-SS-076	C06111057-067	2.2	**5.2**	nd	0.2	8.0	40.8
	POND12-SS-077	C06111057-068	**487.0**	**5.1**	nd	83.7	**423.0**	123.0
	1/2-SB-82 [0-0.5]	C06111057-073	**177.0**	2.7	nd	56.3	**339.0**	75.6
		Average	**105.9**	**4.5**	nd	25.3	125.3	57.1
		Standard Deviation	172.0	1.5	nd	39.4	**259.1**	42.1
Ponds 1 and 2 Boundary	POND12-SS-009	C06120235-010	1.7	2.2	nd	1.2	1.6	24.6
	POND12-SS-012	C06120235-011	1.5	**4.5**	nd	0.8	1.7	35.2
	POND12-SS-032	C06120235-012	1.6	**4.4**	nd	0.8	2.0	33.5
	POND12-SS-063	C06120235-013	1.2	3.0	nd	0.6	1.3	40.1
		Average	1.5	3.5	nd	0.9	1.7	33.4
		Standard Deviation	0.2	1.1	nd	0.3	0.3	6.5
Pond 3/3a	NECR-COR-A-16	C06081547-018	**6.2**	na	na	na	na	na
	POND3-SS-001	C06111057-110	**18.1**	**6.1**	nd	5.2	42.0	50.4
	POND3-SS-007	C06111057-109	**259.0**	**5.5**	nd	22.3	**1020.0**	64.1
	POND3-SS-014	C06111057-122	**875.0**	**5.7**	nd	71.9	**3970.0**	118.0
	POND3-SS-015	C06111057-108	**18.8**	**3.9**	nd	8.6	11.1	32.4
	POND3-SS-027	C06111057-107	**4.7**	**4.0**	nd	0.9	19.1	26.9
	POND3-SS-029	C06111057-106	**312.0**	**5.0**	nd	24.5	**1240.0**	79.3
	POND3-TP-037 [0-0.5]	C06120336-049	**7.7**	2.7	nd	1.0	9.8	19.2
	POND3-SS-038	C06111057-105	**20.9**	**6.1**	nd	4.2	34.9	34.1
	POND3-SS-042	C06111057-103	1.4	**5.1**	nd	0.7	1.9	28.8
	POND3-SS-046	C06111057-099	**19.5**	**6.7**	nd	3.3	34.3	42.5
	POND3-SS-057	C06111057-098	**2.8**	**8.1**	nd	0.7	4.5	39.9
	POND3-SS-059	C06111057-100	**26.9**	**5.5**	nd	5.2	62.9	39.5
	3/3a-SB-61 [0-0.5]	C06111057-111	**17.3**	3.7	nd	6.8	28.4	30.3
	POND3-SS-063	C06111057-102	**3.8**	**6.4**	nd	2.9	8.8	38.9
	POND3-SS-065	C06111057-101	**39.6**	**5.7**	nd	5.2	68.4	46.8
		Average	**102.1**	**5.3**	2.5	10.9	**437.1**	46.1
		Standard Deviation	226.2	1.4	0.0	18.4	**1051.8**	25.0

Table 3.15 Summary of Surface Soil Analytical Results, Preliminary COPCs								
Area	**Sample ID**	**Lab ID**	**Analyte**					
			Ra-226[1]	**As[2]**	**Mo**	**Se**	**U**	**V**
		Reporting Limit	0.1	0.5	5.0	0.2	0.2	5.0
		Residential PRG	0.0124	0.39	390	390	16	78
		Industrial PRG	--	1.6	5,100	5,100	200	1,000
		Outdoor Worker	0.0258	--	--	--	--	--
		Background Mean	1.0	3.7	nd	0.4	1.1	26.7
		Screening Level	2.24	3.7	5,100	5,100	200	1,000
Sediment Pad	SEDPAD-SS-005	C06111057-030	**17.7**	3.1	nd	3.7	14.1	25.5
	SEDPAD-SS-006	C06111057-031	**38.8**	3.0	nd	14.2	21.7	39.5
	SEDPAD-SS-07	C06111057-032	**106.0**	1.1	nd	45.5	92.4	63.4
	SEDPAD-SS-008	C06111057-034	**25.8**	3.0	nd	7.9	19.8	35.5
	SEDPAD-SS-011	C06111057-033	**3.8**	**11.6**	nd	2.7	27.3	502.0
	SEDPAD-SS-12	C06111057-035	**118.0**	0.9	nd	37.8	**363.0**	52.9
	SEDPAD-SS-014	C06111057-036	**236.0**	2.7	nd	78.8	**366.0**	106.0
	SEDPAD-SS-015	C06111057-037	**33.4**	1.5	nd	12.9	34.7	31.5
	SEDPAD-SS-018	C06111057-038	1.5	nd	nd	nd	1.9	46.8
	SEDPAD-SS-020	C06111057-039	**12.8**	**6.0**	nd	3.8	17.7	22.2
	SEDPAD-SS-021	C06111057-040	**85.6**	1.3	nd	45.4	**1640.0**	59.1
	SEDPAD-SS-022	C06111057-041	**104.0**	1.3	nd	44.5	85.9	60.7
	SEDPAD-SS-025	C06111057-042	**36.7**	1.5	nd	7.5	21.9	29.9
	SEDPAD-SS-026	C06111057-043	**27.1**	3.0	nd	9.0	33.1	32.1
		Average	**60.5**	2.9	nd	22.4	195.7	79.1
		Standard Deviation	64.2	2.9	nd	23.7	**433.2**	123.6
NEMSA	NEMSA-TP-001 [0-0.5]	C06110906-027	1.2	3.6	nd	0.6	1.0	28.6
	NEMSA-TP-002 [0-0.25]	C06120336-030	1.7	**4.2**	nd	1.0	4.8	32.4
	NEMSA-TP-003 [0-0.5]	C06120336-034	0.9	3.2	nd	1.7	0.9	18.0
	NEMSA-TP-004 [0-0.5]	C06120336-037	1.3	**4.3**	nd	1.2	4.8	29.2
	NEMSA-TP-005 [0-0.5]	C06120336-039	**2.6**	**4.3**	nd	nd	2.2	28.9
		Average	1.5	**3.9**	nd	0.9	2.7	27.4
		Standard Deviation	0.7	0.5	nd	0.6	1.9	5.5
Boneyard	YARD-TP-001 [0-0.5]	C06110906-031	**45.9**	1.3	nd	16.7	17.4	41.3
	YARD-TP-002 [0-0.5]	C06120235-023	2.2	**5.5**	nd	0.6	2.1	32.0
	YARD-TP-003 [0-0.5]	C06120235-026	1.1	**5.1**	nd	0.8	1.5	31.6
	YARD-TP-004 [0-0.5]	C06120235-022	1.6	3.7	nd	0.4	0.8	29.0
	YARD-TP-005 [0-0.5]	C06120235-033	1.2	**4.0**	nd	nd	1.0	26.0
		Average	**10.4**	**3.9**	nd	3.7	4.6	32.0
		Standard Deviation	19.8	1.6	nd	7.3	7.2	5.7
Vents 3 & 8	VENT3-SS-034	C06120235-005	1.4	2.3	nd	0.2	1.1	9.0
	VENT8-SS-002	C06120235-001	**3.6**	**5.1**	nd	2.9	5.2	35.3
	VENT8-SS-006	C06120235-003	**13.2**	3.3	nd	5.0	19.4	30.3
	VENT8-SS-019	C06120235-006	**137.0**	3.3	nd	27.4	**358.0**	55.4
	VENT8-SS-031	C06120235-004	2.2	2.6	nd	0.9	2.1	21.6
		Average	**31.5**	3.3	nd	7.3	77.2	30.3
		Standard Deviation	59.2	1.1	nd	11.4	157.2	17.2
Trailer Park	TP-SS-001	C06120235-051	**12.5**	3.7	nd	6.6J-	12.7	43.7
	TP-SS-009	C06120235-053	**33.2**	**6.1**	nd	39.8J-	139.0	61.3
	TP-SS-013	C06120235-052	**33.2**	nd	nd	101.0J-	44.0	78.4
	TP-SS-024	C06120235-054	2.1	**5.4**	nd	1.7J-	16.7	32.8
	TP-SS-027	C06120235-056	2.1	**5.3**	nd	0.8J-	1.7	31.7
		Average	**16.6**	**4.2**	nd	30.0	42.8	49.6
		Standard Deviation	15.7	2.4	nd	42.8	56.0	20.0

Table 3.15
Summary of Surface Soil Analytical Results, Preliminary COPCs

Area	Sample ID	Lab ID	Analyte					
			Ra-226[1]	As[2]	Mo	Se	U	V
		Reporting Limit	0.1	0.5	5.0	0.2	0.2	5.0
		Residential PRG	0.0124	0.39	390	390	16	78
		Industrial PRG	--	1.6	5,100	5,100	200	1,000
		Outdoor Worker	0.0258	--	--	--	--	--
		Background Mean	1.0	3.7	nd	0.4	1.1	26.7
		Screening Level	2.24	3.7	5,100	5,100	200	1,000
Home Sites	HOME 1-SS-001	C06110906-048	1.2	2.9	nd	nd	0.8	21.5
	HOME 1-SS-002	C06110906-049	0.9	2.7	nd	0.3	1.0	28.9
	HOME 1-SS-003	C06110906-050	1.0	3.2	nd	0.2	1.0	27.8
	HOME 1-SS-004	C06110906-051	1.3	2.3	nd	nd	1.0	31.2
	HOME 1-SS-005	C06110906-052	1.5	**5.7**	nd	nd	1.4	32.3
	HOME 2-SS-001	C06110906-053	0.9	**5.9**	nd	0.7	1.0	35.9
	HOME 2-SS-002	C06110906-054	0.9	**5.1**	nd	0.3	0.7	37.5
	HOME 2-SS-003	C06110906-055	0.9	**4.1**	nd	0.6	1.0	36.1
	HOME 2-SS-004	C06110906-056	0.9	3.6	nd	1.2	0.8	33.4
	HOME 2-SS-005	C06110906-058	0.9	**4.5**	nd	0.3	1.0	35.5
	HOME 3-SS-001	C06110906-059	0.9	3.3	nd	nd	1.4	32.8
	HOME 3-SS-002	C06110906-060	1.1	3.3	nd	nd	0.9	31.2
	HOME 3-SS-003	C06110906-061	1.1	3.7	nd	0.6	0.7	28.5
	HOME 3-SS-004	C06110906-062	1.2	**4.5**	nd	0.7	1.0	37.4
	HOME 3-SS-005	C06110906-063	1.1	**6.4**	nd	nd	1.1	42.6
	HOME 4-SS-001	C06110906-064	1.3	**3.9**	nd	nd	1.1	33.5
	HOME 4-SS-002	C06110906-065	2.1	3.0	nd	0.8	1.5	26.6
	HOME 4-SS-003	C06110906-067	1.6	3.2	nd	0.7	1.5	25.8
	HOME 4-SS-004	C06110906-068	**3.6**	**6.0**	nd	1.6	3.5	28.8
	HOME 4-SS-005	C06110906-069	**3.0**	**4.3**	nd	1.1	2.7	28.2
	HOME 5-SS-001	C06110906-070	1.0	3.0	nd	0.9	0.8	30.1
	HOME 5-SS-002	C06110906-071	1.4	**5.2**	nd	1.2	1.1	31.9
	HOME 5-SS-003	C06110906-072	0.9	**4.4**	nd	1.0	0.9	30.0
	HOME 5-SS-004	C06110906-073	1.3	**7.2**	nd	0.8	1.4	31.2
	HOME 5-SS-005	C06110906-074	2.1	3.3	nd	0.7	2.4	23.8
	HOME 6-SS-001	C06110906-075	**6.1**	**4.2**	nd	1.5	9.3	33.9
	HOME 6-SS-002	C06110906-076	**11.4**	**4.4**	nd	2.0	11.1	38.4
	HOME 6-SS-003	C06110906-077	**5.6**	**4.5**	nd	2.0	5.7	34.8
	HOME 6-SS-004	C06110906-078	**8.9**	**4.5**	nd	1.7	10.2	36.8
	HOME 6-SS-005	C06110906-079	**14.9**	**4.2**	nd	2.7	12.7	37.3
	HOME 7-SS-001	C06110906-080	**3.4**	**4.9**	nd	1.2	2.3	31.0
	HOME 7-SS-002	C06110906-081	**5.5**	**4.4**	nd	1.5	6.3	34.1
	HOME 7-SS-003	C06110906-082	**29.6**	**5.2**	nd	6.3	20.5	49.7
	HOME 7-SS-004	C06110906-083	**9.4**	**5.5**	nd	2.0	11.8	43.3
	HOME 7-SS-005	C06110906-084	**7.4**	3.4	nd	1.3	9.2	28.4
	HOME 8-SS-001	C06110906-085	**2.3**	3.5	nd	0.2	2.1	30.9
	HOME 8-SS-002	C06110906-086	**2.5**	3.0	nd	0.5	2.7	33.2
	HOME 8-SS-003	C06110906-087	**3.2**	2.7	nd	0.5	5.3	34.0
	HOME 8-SS-004	C06110906-088	**5.6**	**4.1**	nd	1.2	6.4	34.0
	HOME 8-SS-005	C06110906-089	**3.3**	**5.3**	nd	nd	4.9	38.8
	HOME 9-SS-001	C06110906-090	**3.4**	**5.0**	nd	1.0	7.9	29.8
	HOME 9-SS-002	C06110906-091	**3.3**	3.6	nd	0.7	8.1	27.8
	HOME 9-SS-003	C06110906-092	**6.7**	**4.1**	nd	1.8	19.1	33.1
	HOME 9-SS-004	C06110906-093	**5.4**	2.8	nd	1.2	12.4	26.1
	HOME 9-SS-005	C06110906-094	**2.6**	**4.5**	nd	0.4	3.3	29.4
		Average	**3.9**	**4.2**	nd	1.0	4.5	32.6
		Standard Deviation	5.0	1.1	nd	1.0	5.0	5.2

Table 3.15 Summary of Surface Soil Analytical Results, Preliminary COPCs								
			Analyte					
Area	Sample ID	Lab ID	Ra-226[1]	As[2]	Mo	Se	U	V
		Reporting Limit	0.1	0.5	5.0	0.2	0.2	5.0
		Residential PRG	0.0124	0.39	390	390	16	78
		Industrial PRG	--	1.6	5,100	5,100	200	1,000
		Outdoor Worker	0.0258	--	--	--	--	--
		Background Mean	1.0	3.7	nd	0.4	1.1	26.7
		Screening Level	2.24	3.7	5,100	5,100	200	1,000
Unnamed Arroyo (correlation samples)	NECR-COR-B-01	C06081542-001	**11.9**	na	na	na	na	na
	NECR-COR-B-02	C06081542-002	**10.6**	na	na	na	na	na
	NECR-COR-B-03	C06081542-003	**9.7**	na	na	na	na	na
	NECR-COR-B-04	C06081542-004	**11.4**	na	na	na	na	na
	NECR-COR-B-05	C06081542-005	**15.8**	na	na	na	na	na
	NECR-COR-B-06	C06081542-006	**15.7**	na	na	na	na	na
	NECR-COR-B-07	C06081542-007	**14.9**	na	na	na	na	na
	NECR-COR-B-08	C06081542-008	**14.4**	na	na	na	na	na
	NECR-COR-B-09	C06081542-009	**18.9**	na	na	na	na	na
	NECR-COR-B-10	C06081542-010	**21.2**	na	na	na	na	na
	NECR-COR-B-11	C06081542-012	**19.6**	na	na	na	na	na
	NECR-COR-B-12	C06081542-013	**21.4**	na	na	na	na	na
	NECR-COR-B-13	C06081542-014	**19.2**	na	na	na	na	na
	NECR-COR-B-14	C06081542-015	**21.0**	na	na	na	na	na
	NECR-COR-B-15	C06081542-016	**26.4**	na	na	na	na	na
		Average	**16.8**	na	na	na	na	na
		Standard Deviation	4.8	na	na	na	na	na

Table 3.15
Summary of Surface Soil Analytical Results, Preliminary COPCs

Area	Sample ID	Lab ID	Analyte					
			Ra-226[1]	As[2]	Mo	Se	U	V
		Reporting Limit	0.1	0.5	5.0	0.2	0.2	5.0
		Residential PRG	0.0124	0.39	390	390	16	78
		Industrial PRG	--	1.6	5,100	5,100	200	1,000
		Outdoor Worker	0.0258	--	--	--	--	--
		Background Mean	1.0	3.7	nd	0.4	1.1	26.7
		Screening Level	2.24	3.7	5,100	5,100	200	1,000
Site-Wide Statistical Summary								
		Number of Samples	263	229	229	229	229	229
		Minimum	0.8	<0.5	<5.0	<0.2	0.7	9.0
		Average	30.6	4.2	3.8	9.5	79.7	40.2
		Maximum	875.0	14.9	214	159	3970	502
		Standard Deviation	82.0	2.0	14.6	18.9	319.1	36.0

Notes:

nd = not detected above reporting limint; na = not analyzed.

-- = not applicable

Data Qualifier Flags

J = Datum is estimated, bias unknown.

J- = Datum is estimated, potentially biased low.

J+ = Datum is estimated, potentially biased high.

B = Analyte detected in associated method blank. Sample concentration greater than five time method blank concentration.

1. Published EPA Region 9 PRGs are based on a 10^{-6} risk level. The FSL shown for Ra-226 is based on a 10^{-4} risk level.
2. The PRGs shown for arsenic are the cancer PRGs; The residential non-cancer PRG for arsenic is 22 mg/kg, and the industrial non-cancer PRG is 260 mg/kg.
3. Bolded and shaded values indicate exceedances of the field screening levels.
4. Statistical values based on one-half the reporting limits for "nd" results.
5. This table includes surface samples (<0.5 feet bgs) from the soil borings and test pits; depth are shown in square brackets.
6. Correlation samples collected in August 2006 are included in this table.

Table 3.16
Summary of Subsurface Soils Analytical Results, Preliminary COPCs

Area	Type	Sample ID	Lab ID	Depth (ft bgs)	Analyte Ra-226	As	Mo	Se	U	V
				Reporting Limit	0.1	0.5	5.0	0.2	0.2	5.0
				Residential PRG	--	0.039	390	390	16	78
				Industrial PRG	--	1.6	5,100	5,100	200	1,000
				Background Mean	1.0	3.7	nd	0.4	1.1	26.7
				Screening Level	50	3.7	5,100	5,100	200	1,000
NECR-1	Soil Boring	NECR1-SB-016 [5.0]	C06111057-014	5.0-6.5	21.1	**3.8**	nd	9.5	99.5	34.2
		NECR1-SB-016 [10.0]	C06111057-015	10.0-11.5	**64.6**	nd	nd	29.6	141.0	54.4
		NECR1-SB-016 [15.0]	C06111057-016	15.0-16.5	**63.1**	nd	nd	32.8	144.0	35.0
		NECR1-SB-016 [20.0]	C06111057-017	20.0-21.5	1.4	**5.1**	nd	0.6	21.4	38.7
		NECR1-SB-046 [5.0]	C06111057-044	5.0-6.5	31.9	nd	nd	24.6	71.1	41.7
		NECR1-SB-046 [10.0]	C06111057-045	10.0-11.5	19.3	nd	nd	5.4	72.7	31.0
		NECR1-SB-046 [15.0]	C06111057-046	15.0-16.5	1.3	**6.9**	nd	1.4	**337.0**	41.5
		NECR1-SB-046 [20.0]	C06111057-047	20.0-21.5	1.0	**5.2**	nd	nd	3.4	34.4
		NECR1-SB-046 [25.0]	C06111057-048	25.0-26.5	1.1	**5.5**	nd	0.5	0.8	39.2
		NECR1-SB-046 [30.0]	C06111057-049	30.0-31.5	1.1	**6.2**	nd	nd	1.1	37.9
		NECR1-SB-90 [5.0]	C06111057-021	5.0-6.5	6.9	**4.4**	nd	1.9	8.5	41.2
		NECR1-SB-90 [10.0]	C06111057-022	10.0-11.5	4.2	3.1	nd	0.8	43.2	44.5
		NECR1-SB-90 [15.0]	C06111057-023	15.0-16.5	**103.0**	0.8	nd	20.6	125.0	89.5
		NECR1-SB-90 [20]	C06111057-024	20.0-21.5	**90.0**	0.9	nd	45.4	144.0	63.7
		NECR1-SB-90 [25]	C06111057-025	25.0-26.5	48.9	0.6	nd	47.0	**218.0**	83.3
		NECR1-SB-90 [30.0]	C06111057-026	30.0-31.5	1.7	**6.4**	nd	0.2	**313.0**	31.7
		NECR1-SB-90 [35.5]	C06111057-027	35.0-36.5	1.3	**4.9**	nd	0.4	**331.0**	34.5
		NECR1-SB-90 [40]	C06111057-028	40.0-41.5	1.2	**4.3**	nd	1.0	**240.0**	35.1
		NECR1-SB-90 [45]	C06111057-029	45.0-46.5	1.3	**5.3**	nd	0.8	165.0	42.0
		NECR1-SB-095 [5.0]	C06111057-018	5.0-6.5	27.7	**3.8**	nd	6.7	90.4	41.9
		NECR1-SB-095 [10.0]	C06111057-019	10.0-11.5	7.9	**7.9**	nd	1.1	11.4	48.4
		NECR1-SB-095 [14.0]	C06111057-020	14.0-15.5	1.8	**5.2**	nd	0.9	2.4	39.7
		NECR1-SB-131 [5.0]	C06111057-117	5.0-6.5	**67.4**	2.8	nd	15.4	58.6	47.8
		NECR1-SB-131 [10.0]	C06111057-118	10.0-11.5	1.9	**7.3**	nd	nd	59.4	40.7
		NECR1-SB-131 [15.0]	C06111057-119	15.0-16.5	1.8	**5.1**	nd	nd	19.2	31.5
		NECR1-SB-131 [20]	C06111057-120	20.0-21.5	1.2J	**7.9**	nd	nd	1.6	39.8
		NECR1-SB-131 [24]	C06111057-121	24.0-25.5	1.3	**5.2**	nd	nd	1.5	37.3
	Test Pit	NECR1-TP-138	C06120405-010	3.5-4.0	24.2	**6.9**	nd	13.2	73.6	42.3
				Average	21.4	**4.2**	nd	9.3	99.9	43.7
				Standard Deviation	30.0	2.5	nd	14.2	104.5	14.0
NECR-2	Test Pit	NECR 2-TP-035	C06110906-015	1.0-1.5	10.4	2.9	nd	1.4	35.5	18.8
		NECR 2-TP-052	C06110906-016	1.5-2.0	12.6	3.4	nd	4.0	70.6	32.5
		NECR 2-TP-052	C06110906-017	4.0-5.0	2.9	3.2	nd	0.8	32.7	25.9
		NECR 2-TP-020	C06110906-018	1.0-1.5	1.2	3.2	nd	0.9	9.7	25.0
		NECR 2-TP-039	C06110906-019	1.0-1.5	5.5	3.6	nd	2.1	32.2	33.7
		NECR 2-TP-015	C06110906-021	0.5-1.0	2.5	3.6	nd	1.0	17.0	35.4
				Average	5.9	3.3	nd	1.7	33.0	28.6
				Standard Deviation	4.6	0.3	nd	1.2	21.1	6.4
Sandfill 1	Test Pit	SAND1-TP-030	C06120405-011	1.0-1.5	**113.0**	2.9	nd	15.8	31.7	45.7
		SAND1-TP-030	C06120405-020	3.5-4.0	4.8	**13.9**	nd	1.4	5.2	44.8
		SAND1-TP-043	C06120405-012	1.0-1.5	0.6	3.4	nd	0.4	0.8	17.4
		SAND1-TP-049	C06120405-013	1.0-1.5	**75.8**	3.4	nd	17.3	32.3	40.6
		SAND1-TP-049	C06120405-014	3.5-4.0	6.4	**4.4**	nd	2.4	3.0	23.9
		SAND1-TP-063	C06120405-016	0.5-1.0	**80.6**	1.1	nd	21.7	89.8	48.5
		SAND1-TP-063	C06120405-017	1.5-2.0	8.8	**9.2**	nd	4.6	60.5	28.3
		SAND1-TP-068	C06120405-018	0.5-1.0	**57.4**	2.5	nd	34.3	91.6	45.3
		SAND1-TP-068	C06120405-019	1.5-2.0	7.1	**6.5**	nd	0.6	27.0	10.4
				Average	39.4	**5.3**	nd	10.9	38.0	33.9
				Standard Deviation	42.6	**4.0**	nd	12.0	35.2	14.2

Table 3.16
Summary of Subsurface Soils Analytical Results, Preliminary COPCs

Area	Type	Sample ID	Lab ID	Depth (ft bgs)	Analyte Ra-226	As	Mo	Se	U	V
				Reporting Limit	0.1	0.5	5.0	0.2	0.2	5.0
				Residential PRG	--	0.039	390	390	16	78
				Industrial PRG	--	1.6	5,100	5,100	200	1,000
				Background Mean	1.0	3.7	nd	0.4	1.1	26.7
				Screening Level	50	3.7	5,100	5,100	200	1,000
Sandfill 2	Test Pit	SAND 2-TP-011	C06110906-022	0.5-1.0	1.1	**5.3**	nd	0.5	2.5	41.7
		SAND 2-TP-012	C06110906-023	1.5-2.0	3.8	3.1	nd	nd	26.5	50.9
		SAND 2-TP-017	C06110906-024	1.5-2.0	1.9	**3.8**	nd	0.7	2.8	29.9
		SAND 2-TP-019	C06110906-025	1.0-1.5	1.8	3.6	nd	nd	3.2	35.2
		SAND 2-TP-008	C06110906-026	0.5-1.0	2.4	3.6	nd	0.4	15.3	45.0
				Average	2.2	**3.9**	nd	0.4	10.1	40.5
				Standard Deviation	1.0	0.8	nd	0.3	10.7	8.2
Sandfill 3	Test Pit	SAND3-TP-005	C06120235-066	0.5-1.0	40.8	0.8	nd	39.2	131.0	63.3
		SAND3-TP-005	C06120235-067	1.5-2.0	28.1	**4.3**	nd	3.6	78.8	33.9
		SAND3-TP-006	C06120235-068	0.5-1.0	8.4	**5.0**	nd	0.8	102.0	35.0
		SAND3-TP-009	C06120235-069	0.5-1.0	5.1	**6.9**	nd	1.7	90.6	38.0
		SAND3-TP-014	C06120235-070	0.5-1.0	1.2	**4.2**	nd	1.3	**227.0**	29.4
		SAND3-TP-014	C06120235-075	1.0-1.5	**84.1**	1.5	nd	29.0	**488.0**	52.2
		SAND3-TP-025	C06120235-071	0.5-1.0	27.2	**4.6**	nd	8.9	21.1	41.3
				Average	27.8	**3.9**	nd	12.1	162.6	41.9
				Standard Deviation	28.7	2.1	nd	15.6	156.5	11.9
Ponds 1 & 2	Soil Boring	Pond12-SB-71 [5.0]	C06111057-070	5.0-6.5	0.9	**4.7**	nd	nd	1.3	30.2
		1/2-SB-71 [10.0]	C06111057-071	10.0-11.5	0.7	**5.5**	nd	nd	2.1	37.6
		1/2-SB-71 [15.0]	C06111057-072	15.0-16.5	1.0	**6.7**	nd	1.0	3.3	43.2
		1/2-SB-82 [5.0]	C06111057-074	5.0-6.5	14.4	**4.6**	nd	3.7	22.7	36.2
		1/2-SB-82 [10.0]	C06111057-075	10.0-11.5	12.2	**5.0**	nd	3.4	18.1	38.0
		1/2-SB-82 [15]	C06111057-076	15.0-16.5	1.1	**6.8**	nd	nd	5.0	42.6
		1/2-SB-82 [20]	C06111057-077	20.0-21.5	1.5	**5.1**	nd	nd	1.7	37.9
	Test Pit	POND12-TP-030	C06120235-057	2.0-3.0	41.3	**5.5**	nd	13.2J-	149.0	45.2
		POND12-TP-030	C06120235-058	4.5-5.0	6.2	**6.4**	nd	1.6J-	80.3	30.7
		POND12-TP-035	C06120235-059	1.0-1.5	**417.0**	3.2	nd	159.0J-	**286.0**	158.0
		POND12-TP-035	C06120235-060	2.0-2.5	41.5	1.4	nd	11.2J-	38.9J+	31.6J+
		POND12-TP-035	C06120235-061	9.0-9.5	19.6	**4.4**	nd	15.5	**206.0**	35.3
		POND12-TP-058	C06120235-062	4.5-5.0	**438.0**	**4.3**	nd	227.0	**760.0**	173.0
		POND12-TP-058	C06120235-063	8.5-9.0	1.3	**5.6**	nd	2.6	59.4	31.9
				Average	**71.2**	**4.9**	nd	31.3	116.7	55.1
				Standard Deviation	151.7	1.4	nd	70.0	**204.9**	47.1
Pond 3/3a	Soil Boring	3/3a-SB-61 [5.5]	C06111057-112	5.5-7.0	0.9	**4.8**	nd	nd	1.3	29.6
		3/3a-SB-61 [10.0]	C06111057-113	10.0-11.5	1.1	**4.8**	nd	nd	1.0	27.9
		3/3a-SB-61 [15.0]	C06111057-114	15.0-16.5	1.5	**4.1**	nd	nd	1.0	29.7
		3/3a-SB-61 [20.0]	C06111057-115	20.0-21.5	1.0	**4.5**	nd	nd	1.1	34.5
		3/3a-SB-61 [25.0]	C06111057-116	25.0-26.5	1.3	**4.9**	nd	nd	1.0	35.0
	Test Pit	POND3-TP-007	C06120336-042	5.0-5.5	4.5	**4.9**	nd	3.1	24.4	35.8
		POND3-TP-007	C06120336-043	9.0-9.5	0.7	2.9	nd	nd	0.7	22.6
		POND3-TP-014	C06120336-044	6.5-7.0	0.8	3.3	nd	nd	1.5	25.6
		POND3-TP-014	C06120336-045	8.5-9.0	0.8	3.2	nd	nd	1.4	22.1
		POND3-TP-029	C06120336-046	3.0-3.5	14.3	**6.2**	nd	0.8	102.0	28.5
		POND3-TP-029	C06120336-047	6.0-6.5	15.7	**6.7**	nd	2.9	116.0	31.1
		POND3-TP-029	C06120336-048	9.0-9.5	2.1	**4.5**	nd	nd	30.8	33.7
		POND3-TP-037	C06120336-050	5.0-5.5	2.2	**6.6**	nd	1.0	16.3	45.7
		POND3-TP-037	C06120336-051	8.5-9.0	0.7	**4.9**	nd	nd	23.5	31.4
				Average	3.4	**4.7**	nd	0.6	23.0	30.9
				Standard Deviation	5.0	1.2	nd	1.0	38.1	6.0

Table 3.16 Summary of Subsurface Soils Analytical Results, Preliminary COPCs										
				Depth	Analyte					
Area	Type	Sample ID	Lab ID	(ft bgs)	Ra-226	As	Mo	Se	U	V
				Reporting Limit	0.1	0.5	5.0	0.2	0.2	5.0
				Residential PRG	--	0.039	390	390	16	78
				Industrial PRG	--	1.6	5,100	5,100	200	1,000
				Background Mean	1.0	3.7	nd	0.4	1.1	26.7
				Screening Level	50	3.7	5,100	5,100	200	1,000
Sediment Pad	Test Pit	SEDPAD-TP-006	C06120405-001	1.5-2.0	**92.9**	0.6	nd	161.0	68.6	74.7
		SEDPAD-TP-006	C06120405-002	3.0-3.5	2.8	**4.2**	nd	2.4	88.7	29.0
		SEDPAD-TP-012	C06120405-003	1.0-1.5	**84.0**	0.8	nd	83.5	147.0	48.4
		SEDPAD-TP-012	C06120405-004	1.5-2.0	2.9	**4.3**	nd	2.7	158.0	30.7
		SEDPAD-TP-014	C06120405-005	0.5-1.0	**165.0**	2.7	nd	61.4	**252.0**	75.0
		SEDPAD-TP-014	C06120405-006	1.0-1.5	9.8	**3.8**	nd	3.4	18.9	31.5
		SEDPAD-TP-021	C06120405-007	5.0-5.5	**99.7**	1.9	nd	63.9	**357.0**	60.3
		SEDPAD-TP-021	C06120405-008	10.0-10.5	**86.3**	nd	nd	74.1	**270.0**	63.9
		SEDPAD-TP-026	C06120405-009	0.5-1.0	**86.6**	**5.5**	nd	40.9	89.0	65.4
				Average	**70.0**	2.7	nd	54.8	161.0	53.2
				Standard Deviation	54.6	1.9	nd	51.1	110.6	18.8
NEMSA	Test Pit	NEMSA-TP-001	C06110906-028	1.0-1.5	45.8	0.8	nd	17.5	71.0	32.5
		NEMSA-TP-001	C06110906-029	4.0-5.0	**57.3**	1.5	nd	15.6	67.0	35.1
		NEMSA-TP-001	C06110906-030	6.0-6.5	1.3J	**4.9**	nd	0.4	**311.0**	28.5
		NEMSA-TP-002	C06120336-031	0.25-0.75	**46.6**	**0.7**	nd	19.0	79.5	41.7
		NEMSA-TP-002	C06120336-032	5.5-6.0	**68.8**	nd	nd	38.9	125.0	47.3
		NEMSA-TP-002	C06120336-033	7.0-7.5	1.1	3.7	nd	nd	**227.0**	25.6
		NEMSA-TP-003	C06120336-035	1.5-2.0	38.2	0.6	nd	24.2	17.6	36.4
		NEMSA-TP-003	C06120336-036	4.0-4.5	0.8	**4.0**	nd	nd	49.3	24.9
		NEMSA-TP-004	C06120336-052	1.0-1.5	**140.0**	0.8	nd	40.1	**390.0**	43.2
		NEMSA-TP-004	C06120336-053	6.0-6.5	**112.0**	nd	nd	132.0	75.8	38.5
		NEMSA-TP-004	C06120336-038	8.5-9.0	**68.8**	1.3	nd	112.0	136.0	44.0
		NEMSA-TP-005	C06120336-040	4.0-4.5	8.4	**4.5**	nd	0.5	27.3J+	32.8
		NEMSA-TP-005	C06120336-041	8.0-8.5	0.8	3.4	nd	nd	1.4	26.5
				Average	45.4	2.1	nd	30.8	121.4	35.2
				Standard Deviation	44.7	1.8	nd	43.1	118.3	7.5
Boneyard	Test Pit	YARD-TP-001	C06120235-021	1.0-1.5	1.3	**5.2**	nd	0.2	0.8	29.9
		YARD-TP-002	C06120235-024	1.5-2.0	1.1	**5.2**	nd	nd	1.5	31.1
		YARD-TP-002	C06120235-025	9.5-10.0	1.1	**4.0**	nd	nd	0.9	27.8
		YARD-TP-003	C06120235-027	1.0-1.5	1.2	**5.1**	nd	nd	1.0	37.8
		YARD-TP-004	C06120235-028	0.5-1.0	48.4	0.8	nd	24.3	12.5	36.9
		YARD-TP-004	C06120235-029	5.5-6.0	**50.7**	1.9	nd	33.4	**228.0**	33.9
		YARD-TP-004	C06120235-030	7.0-7.5	10.1	3.3	nd	3.1	**240.0**	22.2
		YARD-TP-004	C06120235-031	9.5-10.0	1.9	3.5	nd	0.8	5.5	24.7
		YARD-TP-005	C06120235-034	2.5-3.0	1.4	**4.0**	nd	1.2	5.6	25.2
		YARD-TP-005	C06120235-035	4.5-5.0	1.7	**4.0**	nd	0.3	4.3	24.7
		YARD-TP-005	C06120235-036	8.5-9.0	1.9	**4.9**	nd	0.5	8.4	25.6
				Average	11.0	**3.8**	nd	5.8	46.2	29.1
				Standard Deviation	19.3	1.4	nd	11.6	92.9	5.3

Table 3.16
Summary of Subsurface Soils Analytical Results, Preliminary COPCs

Area	Type	Sample ID	Lab ID	Depth (ft bgs)	Analyte					
					Ra-226	As	Mo	Se	U	V
				Reporting Limit	0.1	0.5	5.0	0.2	0.2	5.0
				Residential PRG	--	0.039	390	390	16	78
				Industrial PRG	--	1.6	5,100	5,100	200	1,000
				Background Mean	1.0	3.7	nd	0.4	1.1	26.7
				Screening Level	50	3.7	5,100	5,100	200	1,000
Arroyo	Soil Boring	ARROYO-SB-001	C06120235-072	0.0-1.0	14.9	2.6	nd	4.4	29.0	27.1
		ARROYO-SB-001	C06120235-073	1.0-2.0	17.3	**5.4**	nd	3.7	27.3	29.6
		ARROYO-SB-001	C06120235-074	2.0-3.0	8.4	**7.8**	nd	2.1	14.3	32.6
		ARROYO-SB-002	C06120336-001	0.0-1.0	12.7	2.2	nd	5.9	15.6	24.0
		ARROYO-SB-002	C06120336-002	1.0-2.0	21.1	2.8	nd	8.0	21.7	28.1
		ARROYO-SB-002	C06120336-003	2.0-3.0	21.0	**6.1**	nd	11.1	108.0	34.2
		ARROYO-SB-003	C06120336-004	0.0-1.0	12.9	1.4	nd	nd	14.2	20.0
		ARROYO-SB-003	C06120336-005	1.0-2.0	13.3	3.6	nd	1.9	18.6	23.3
		ARROYO-SB-003	C06120336-006	2.0-3.0	12.4	**4.7**	nd	3.0	16.4	29.6
		ARROYO-SB-004	C06120336-007	0.0-1.0	12.5	1.2	nd	1.1	14.6	19.8
		ARROYO-SB-004	C06120336-008	1.0-2.0	14.9	2.9	nd	5.3	16.6	23.8
		ARROYO-SB-004	C06120336-009	2.0-3.0	18.5	**6.3**	nd	2.8	23.7	34.9
		ARROYO-SB-005	C06120336-010	0.0-1.0	18.1	2.2	nd	12.7	25.7	30.4
		ARROYO-SB-005	C06120336-011	1.0-2.0	30.2	**4.7**	nd	14.4	79.2	37.9
		ARROYO-SB-005	C06120336-012	2.0-3.0	10.3	**7.3**	nd	4.9	27.0	36.6
		ARROYO-SB-006	C06120336-013	0.0-1.0	11.2	1.7	nd	2.9	18.7	20.7
		ARROYO-SB-006	C06120336-014	1.0-2.0	11.8	3.3	nd	3.0	23.7	24.0
		ARROYO-SB-006	C06120336-015	2.0-3.0	11.1	**8.2**	nd	2.1	19.4	36.1
		ARROYO-SB-007	C06120336-016	0.0-1.0	14.8	1.8	nd	3.5	21.7	34.7
		ARROYO-SB-007	C06120336-017	1.0-2.0	11.1	2.6	nd	2.9	17.1	25.5
		ARROYO-SB-007	C06120336-018	2.0-3.0	35.7	**4.3**	nd	4.3	45.4	37.3
		ARROYO-SB-008	C06120336-019	0.0-1.0	17.6	1.9	nd	4.6	17.4	27.9
		ARROYO-SB-008	C06120336-020	1.0-2.0	21.5	2.1	nd	6.3	17.1	28.0
		ARROYO-SB-008	C06120336-021	2.0-3.0	24.5	2.1	nd	7.4	21.3	30.9
		ARROYO-SB-009	C06120336-024	0.0-1.0	11.7	2.2	nd	5.6	22.6	22.7
		ARROYO-SB-009	C06120336-025	1.0-2.0	15.5	1.3	nd	2.3	23.7	23.5
		ARROYO-SB-009	C06120336-026	2.0-3.0	15.5	3.5	nd	11.3	31.7	32.5
		ARROYO-SB-010	C06120336-027	0.0-1.0	18.5	2.6	nd	12.4	35.1	34.1
		ARROYO-SB-010	C06120336-028	1.0-2.0	18.6	1.9	nd	5.5	26.6	25.1
		ARROYO-SB-010	C06120336-029	2.0-3.0	12.9	1.5	nd	6.0	21.9	23.1
				Average	16.4	3.4	nd	5.4	27.2	28.6
				Standard Deviation	6.0	2.0	nd	3.7	19.7	5.5
Site-Wide Statistical Summary										
				Number of Samples	146	146	146	146	146	146
				Minimum	0.6	<0.5	<5	<0.2	0.7	10.4
				Average	30.9	**4.0**	2.5	16.0	86.4	40.1
				Maximum	**438**	**13.9**	2.5	227	**760**	173
				Standard Deviation	56.7	2.2	0.0	31.9	109.3	19.4

Notes:

nd = non-detect

Data Qualifier Flags

J = Datum is estimated, bias unknown.

J- = Datum is estimated, potentially biased low.

J+ = Datum is estimated, potentially biased high.

B = Analyte detected in associated method blank. Sample concentration greater than five time method blank concentration.

1. Published EPA Region 9 PRGs are based on a 10^{-6} risk level. The FSL shown for Ra-226 is based on a 10^{-4} risk level.
2. The PRGs shown for arsenic are the cancer PRGs; The residential non-cancer PRG for arsenic is 22 mg/kg, and the industrial non-cancer PRG is 260 mg/kg.

1. Bolded and shaded values indicate exceedances of the field screening levels.
2. Statistical values based on one-half the reporting limits for "nd" results.
3. All test pit and soil boring samples collected at less than or equal to 0.5 feet bgs are included in Table 3.15.

Table 3.17
Summary of Synthetic Precipitation Leaching Procedure Analytical Results

Area	Location ID	Lab Sample ID	Analyte				
			Ra-226	**As**	**Mo**	**Se**	**U**
		Reporting Limit	**0.2**	**0.001**	**0.1**	**0.0029**	**0.00038**
		Federal Maximum Contaminant Level	**5**	**0.01**	**n/a**	**0.05**	**0.03**
		New Mexico Human Health Standard for Groundwater	**30**	**0.1**	**1.0**	**0.05**	**0.03**
NECR-1	NECR1-SS-240	C06120235-042	nd	0.0051	nd	nd	0.0032B
	NECR1-SS-307	C06120235-050	0.6	0.0031	nd	nd	0.0042B
NECR-2	NECR2-SS-096	C06120235-018	1.4	0.0066	nd	nd	0.0035B
	NECR2-SS-109	C06120235-020	0.9J	0.0021	nd	nd	0.0021B
Ponds 1 and 2	POND12-SS-035	C06111057-057	**7.1**	0.0028	nd	0.0071	**0.22**
	POND12-SS-058	C06111057-064	**27.1**	0.0049	nd	**0.94**	**4.4**
Pond 3/3a	POND3-SS-014	C06111057-122	**20.1**	0.0084	nd	**0.1**	**0.98**
	POND3-SS-057	C06111057-098	0.8	0.0034	nd	0.0016	0.014
Sandfill 1	SAND1-TP-030	C06120405-011	**16.1**	nd	nd	0.0037	0.0024B
	SAND1-TP-063	C06120405-016	**17J**	0.0021	nd	0.0024	**0.1**
Sandfill 2	SAND2-SS-003	C06110737-001	1.4	0.0022	nd	nd	0.0012B
	SAND2-SS-010	C06110737-005	nd	0.0023	nd	nd	0.01
Sandfill 3	SAND3-TP-009	C06120235-069	nd	0.0013	nd	0.0024	**0.41**
	SAND3-SS-017	C06110906-011	1.6	0.0019	nd	nd	0.0015B
Sediment Pad	SEDPAD-SS-011	C06111057-033	nd	0.0013	nd	0.0058	0.0012B
	SEDPAD-SS-018	C06111057-038	nd	nd	nd	nd	0.00096B
		Average	**5.1**	**0.0029**	**nd**	**0.06**	**0.8**
		Maximum	**27.1**	**0.008**	**nd**	**0.9**	**4.4**

Notes:
J - Datum is estimated, bias unknown.
B - Analyte detected in associated method blank. Sample concentration greater than five time method blank concentration.
n/a = not applicable
1. Units are mg/L, except Ra-226, which is in pCi/L.
2. Statistical values based on one-half the reporting limits for "nd"
3. Bolded values indicate exceedances of the Federal MCLs (40 CFR 141) or New Mexico health standards for groundwater (NMAC 20.6.2.3103).

Table 3.18
Summary of Toxicity Characteristic Leaching Procedure Analytical Results

Loc ID	Lab Sample ID	Top Depth	Bottom Depth	Analyte[1]							
				Ag	As	Ba	Cd	Cr	Hg	Pb	Se
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Boneyard-TP-001	C06120227-001	1	1.5	nd	nd	nd	nd	nd	nd	nd	nd
Boneyard-TP-002	C06120227-002	1.5	2	nd	nd	nd	nd	nd	nd	nd	nd
	C06120227-011	9.5	10	nd	nd	nd	nd	nd	nd	nd	nd
Boneyard-TP-003	C06120227-010	1	1.5	nd	nd	nd	nd	nd	nd	nd	nd
Boneyard-TP-004	C06120227-003	0.5	1	nd	nd	nd	nd	nd	nd	nd	nd
	C06120227-004	5.5	6	nd	nd	nd	nd	nd	nd	nd	nd
	C06120227-006	9.5	10	nd	nd	nd	nd	nd	nd	nd	nd
	C06120227-007	7	7.5	nd	nd	nd	nd	nd	nd	nd	nd
Boneyard-TP-005	C06120227-005	2.5	3	nd	nd	nd	nd	nd	nd	nd	nd
	C06120227-008	4.5	5	nd	nd	nd	nd	nd	nd	nd	nd
	C06120227-009	8.5	9	nd	nd	nd	nd	nd	nd	nd	nd

Notes:
1. Soil samples analyzed for the 8 RCRA priority pollutant metals using the TCLP method.

Table 3.19
Summary of Soils Analytical Results, Agronomic Data

Area	Loc ID	Lab ID	Calcium	Chloride	Potassium	Magnesium	Sodium	Nitrate/Nitrite	pH	Phosphorous	SAR	Specific Conductivity	Sulfate	Texture
			Analyte											
		Units	**meq/L**	**mg/kg**	**mg/kg**	**meq/L**	**meq/L**	**mg/kg**	**pH**	**mg/kg**	**none**	**mmhos/cm**	**mg/kg**	**none**
		Reporting Limit	0.02	1.0	1.0	0.04	0.02	1.0	0.1	1.0	0.01	0.01	1.0	1.0
NECR-1	NECR1-SS-028	C06120336-054	8.3	6.7	17.1	1.7	0.35	2.3	8.5	19.0	0.16	0.90	28.0	nd
	NECR1-SS-044	C06111057-004	2.4	nd	1.6	0.2	0.16	nd	8.5	3.2	0.13	0.25	10.2	nd
	NECR1-SS-127	C06111057-086	14.0	nd	4.7	0.7	0.23	nd	8.4	2.4	0.08	1.13	218.0	nd
NECR-2	NECR2-SS-015	C06110906-032	4.1	3.7	9.4	1.0	0.24	nd	8.4	9.5	0.15	0.46	9.3	nd
	NECR2-SS-056	C06110906-041	2.6	nd	1.2	0.4	0.18	nd	8.7	4.7	0.15	0.25	6.4	nd
NEMSA	NEMSA-TP-001	C06110906-027	2.9	nd	1.2	0.5	0.23	nd	8.6	3.7	0.18	0.27	5.2	nd
	NEMSA-TP-003	C06120336-034	3.3	nd	1.6	0.5	0.10	2.0	8.9	6.3	0.07	0.33	29.1	nd
Ponds 1 & 2	POND12-SS-020	C06111057-054	2.3	2.3	1.4	0.6	0.18	1.9	8.6	4.2	0.15	0.24	8.3	nd
	POND12-SS-047	C06111057-061	5.4	5.1	5.6	1.2	0.69	nd	8.2	3.2	0.38	0.55	25.2	nd
Pond 3/3a	POND3-SS-046	C06111057-099	4.3	2.5	3.2	0.6	0.16	3.5	8.5	11.0	0.10	0.42	23.5	nd
	POND3-SS-057	C06111057-098	4.7	2.5	2.2	0.4	0.32	2.0	8.7	3.4	0.20	0.45	71.4	nd
Sandfill No. 1	SAND1-SS-017	C06110737-022	1.4	1.5	4.5	0.4	0.12	nd	7.6	3.5	0.13	0.18	9.4	nd
	SAND1-SS-028	C06110737-029	1.9	2.1	nd	0.4	0.68	1.0	8.1	3.2	0.64	0.26	25.4	nd
Sandfill No. 2	SAND2-SS-014	C06110737-009	2.4	nd	2.2	0.2	0.09	1.9	8.1	4.2	0.08	0.22	8.0	nd
Sandfill No. 3	SAND3-SS-017	C06110906-011	4.4	nd	3.0	0.4	0.10	nd	8.2	3.5	0.07	0.38	5.6	nd
	SAND3-SS-027	C06110906-007	4.3	1.6	5.9	1.3	0.11	nd	8.2	10.0	0.06	0.46	24.3	nd
Sediment Pad	SEDPAD-SS-021	C06111057-040	35.0	892.0	5.6	9.4	98.00	4.2	8.6	2.1	20.90	11.70	854.0	nd
Boneyard	YARD-TP-001	C06110906-031	2.2	nd	2.5	0.4	0.14	nd	8.4	3.4	0.12	0.24	5.5	nd
	YARD-TP-004	C06120235-022	2.4	1.3	nd	0.4	0.31	1.3	8.8	4.7	0.26	0.24	10.9	nd
	YARD-TP-005	C06120235-033	2.3	2.0	5.9	0.5	0.26	2.8	8.6	8.9	0.22	0.26	8.0	nd
		Average	**5.5**	**46.4**	**4.0**	**1.1**	**5.13**	**1.4**	**8.4**	**5.7**	**1.21**	**0.96**	**69.3**	**nd**
		Standard Deviation	**7.5**	**199.0**	**3.9**	**2.0**	**21.86**	**1.1**	**0.3**	**4.1**	**4.64**	**2.54**	**190.7**	**nd**

Notes:
nd = non-detect
1. Statistical values based on one-half the reporting limits for "nd" results.

Table 4.1
Tier I Screening-Level Cumulative Risk & Hazard Calculations - Residential
Surface Soil (0 to 0.5 ft bgs.)

Surface Soil Analytes	EPC [a] (mg/kg)	Cancer-based Combined PRG / EPA SSL (mg/kg) [b]	Screening Cancer Risk	Noncancer-based Combined PRG / EPA SSL (mg/kg) [c]	Screening Noncancer Hazard
NECR-1					
Arsenic	5.2	3.9E-01	**1.3E-05**	2.2E+01	0.24
Molybdenum	29	NA	NA	3.9E+02	0.07
Radium-226	39	1.1E+00	**3.5E-05**	NA	NA
Selenium	20	NA	NA	3.9E+02	0.05
Uranium	117	NA	NA	1.6E+01	**7.5**
Vanadium	42	NA	NA	7.8E+01	**0.54**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**5E-05**	**Noncancer HI:**	**8**
NECR-2					
Arsenic	4.6	3.9E-01	**1.2E-05**	2.2E+01	0.21
Molybdenum	ND	NA	NA	3.9E+02	NA
Radium-226	39	1.1E+00	**3.5E-05**	NA	NA
Selenium	11	NA	NA	3.9E+02	0.03
Uranium	85	NA	NA	1.6E+01	**5.4**
Vanadium	40	NA	NA	7.8E+01	**0.51**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**5E-05**	**Noncancer HI:**	**6**
PONDS 1 & 2					
Arsenic	4.9	3.9E-01	**1.3E-05**	2.2E+01	0.23
Molybdenum	ND	NA	NA	3.9E+02	ND
Radium-226	179	1.1E+00	**1.6E-04**	NA	NA
Selenium	43	NA	NA	3.9E+02	0.11
Uranium	223	NA	NA	1.6E+01	**14**
Vanadium	89	NA	NA	7.8E+01	**1.1**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**2E-04**	**Noncancer HI:**	**16**
PONDS 3 & 3a					
Arsenic	6	3.9E-01	**1.5E-05**	2.2E+01	0.28
Molybdenum	ND	NA	NA	3.9E+02	ND
Radium-226	253	1.1E+00	**2.3E-04**	NA	NA
Selenium	21	NA	NA	3.9E+02	0.05
Uranium	1,141	NA	NA	1.6E+01	**73**
Vanadium	58	NA	NA	7.8E+01	**0.74**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**2E-04**	**Noncancer HI:**	**74**
SED PAD					
Arsenic	4.5	3.9E-01	**1.2E-05**	2.2E+01	**0.21**
Molybdenum	ND	NA	NA	3.9E+02	ND
Radium-226	109	1.1E+00	**9.9E-05**	NA	NA
Selenium	43	NA	NA	3.9E+02	0.11
Uranium	513	NA	NA	1.6E+01	**32.79**
Vanadium	223	NA	NA	7.8E+01	**2.85**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**1E-04**	**Noncancer HI:**	**36**

Table 4.1
Tier I Screening-Level Cumulative Risk & Hazard Calculations - Residential
Surface Soil (0 to 0.5 ft bgs.)

Surface Soil Analytes	EPC [a] (mg/kg)	Cancer-based Combined PRG / EPA SSL (mg/kg) [b]	Screening Cancer Risk	Noncancer-based Combined PRG / EPA SSL (mg/kg) [c]	Screening Noncancer Hazard
SAND 1					
Arsenic	4.7	3.9E-01	**1.2E-05**	2.2E+01	**0.22**
Molybdenum	ND	NA	NA	3.9E+02	ND
Radium-226	15	1.1E+00	**1.4E-05**	NA	NA
Selenium	4.5	NA	NA	3.9E+02	0.01
Uranium	16	NA	NA	1.6E+01	**1.02**
Vanadium	35	NA	NA	7.8E+01	**0.45**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**3E-05**	**Noncancer HI:**	**2**
SAND 2					
Arsenic	6.4	3.9E-01	**1.6E-05**	2.2E+01	**0.30**
Molybdenum	ND	NA	NA	3.9E+02	ND
Radium-226	19	1.1E+00	**1.7E-05**	NA	NA
Selenium	3.4	NA	NA	3.9E+02	0.01
Uranium	20	NA	NA	1.6E+01	**1.28**
Vanadium	42	NA	NA	7.8E+01	**0.54**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**3E-05**	**Noncancer HI:**	**2**
SAND 3					
Arsenic	4	3.9E-01	**1.0E-05**	2.2E+01	0.18
Molybdenum	ND	NA	NA	3.9E+02	ND
Radium-226	69	1.1E+00	**6.3E-05**	NA	NA
Selenium	18	NA	NA	3.9E+02	0.05
Uranium	185	NA	NA	1.6E+01	**11.83**
Vanadium	55	NA	NA	7.8E+01	**0.70**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**7E-05**	**Noncancer HI:**	**13**
NEMSA					
Arsenic	4.3	3.9E-01	**1.1E-05**	2.2E+01	0.20
Molybdenum	ND	NA	NA	3.9E+02	ND
Radium-226	42	1.1E+00	**3.8E-05**	NA	NA
Selenium	12	NA	NA	3.9E+02	0.03
Uranium	75	NA	NA	1.6E+01	**4.8**
Vanadium	36	NA	NA	7.8E+01	**0.46**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**5E-05**	**Noncancer HI:**	**5**
BONEYARD					
Arsenic	5.5	3.9E-01	**1.4E-05**	2.2E+01	0.25
Molybdenum	ND	NA	NA	3.9E+02	ND
Radium-226	46	1.1E+00	**4.2E-05**	NA	NA
Selenium	11	NA	NA	3.9E+02	0.03
Uranium	12	NA	NA	1.6E+01	**0.77**
Vanadium	37	NA	NA	7.8E+01	**0.47**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**6E-05**	**Noncancer HI:**	**2**

Table 4.1
Tier I Screening-Level Cumulative Risk & Hazard Calculations - Residential
Surface Soil (0 to 0.5 ft bgs.)

Surface Soil Analytes	EPC [a] (mg/kg)	Cancer-based Combined PRG / EPA SSL (mg/kg) [b]	Screening Cancer Risk	Noncancer-based Combined PRG / EPA SSL (mg/kg) [c]	Screening Noncancer Hazard
VENTS 3 & 8					
Arsenic	4.4	3.9E-01	**1.1E-05**	2.2E+01	0.20
Molybdenum	ND	NA	NA	3.9E+02	ND
Radium-226	92	1.1E+00	**8.4E-05**	NA	NA
Selenium	27	NA	NA	3.9E+02	0.07
Uranium	224	NA	NA	1.6E+01	**14**
Vanadium	47	NA	NA	7.8E+01	**0.60**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**9E-05**	**Noncancer HI:**	**15**
TRAILER PARK					
Arsenic	6.1	3.9E-01	**1.6E-05**	2.2E+01	0.28
Molybdenum	ND	NA	NA	3.9E+02	ND
Radium-226	32	1.1E+00	**2.9E-05**	NA	NA
Selenium	71	NA	NA	3.9E+02	0.18
Uranium	96	NA	NA	1.6E+01	**6.1**
Vanadium	69	NA	NA	7.8E+01	**0.88**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**4E-05**	**Noncancer HI:**	**7**
EPA Risk Management Range:			10^{-6} - 10^{-4}		1

Notes
HI - Hazard index
HQ - Hazard quotient
mg/kg - Milligrams per kilogram.
NA - Not applicable.
PRG - Preliminary remediation goal.
USEPA - U.S. Environmental Protection Agency.
Bolding indicates a contribution to exceedence of the EPA screening-level carcinogenic risk criterion of $1x10^{6}$ or noncancer HI of 1.
[a] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration.
[b] Cancer-based combined PRGs were obtained from USEPA's PRG Intercalc Tables: Soils (USEPA Region 9, 2004b), and include cancer-based PRGs for combined ingestion, dermal and inhalation exposure pathways. The screening-level risk for Ra-226 was calculated using the PRG for 'Ra-226 and daughters', as published in EPA (2004c) and the online calculator at http://rais.ornl.gov/rad-
[c] Noncancer-based combined PRGs are equal to chronic HQ values in the 2004 USEPA Region 9 residential soil intercalc table (mg/kg).

Table 4.2
Tier I Screening-Level Cumulative Risk & Hazard Calculations - Residential
Subsurface Soil (>0.5 to 10 ft bgs.)

Surface Soil Analytes	EPC [a] (mg/kg)	Cancer-based Combined PRG / EPA SSL (mg/kg) [b]	Screening Cancer Risk	Noncancer-based Combined PRG / EPA SSL (mg/kg) [c]	Screening Noncancer Hazard
NECR-1					
Arsenic	5.2	3.9E-01	**1.3E-05**	2.2E+01	0.24
Molybdenum	ND	NA	NA	3.9E+02	NA
Radium-226	46	1.1E+00	**4.2E-05**	NA	NA
Selenium	15	NA	NA	3.9E+02	0.04
Uranium	87	NA	NA	1.6E+01	**5.6**
Vanadium	46	NA	NA	7.8E+01	**0.59**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**6E-05**	**Noncancer HI:**	**6**
NECR-2					
Arsenic	3.5	3.9E-01	9.0E-06	2.2E+01	0.16
Molybdenum	ND	NA	NA	3.9E+02	NA
Radium-226	9.7	1.1E+00	8.8E-06	NA	NA
Selenium	2.7	NA	NA	3.9E+02	0.01
Uranium	50	NA	NA	1.6E+01	**3.2**
Vanadium	34	NA	NA	7.8E+01	0.43
Screening Cumulative Risk/HI:		**Cancer Risk:**	**2E-05**	**Noncancer HI:**	**4**
PONDS 1 & 2					
Arsenic	5.3	3.9E-01	**1.4E-05**	2.2E+01	0.24
Molybdenum	ND	NA	NA	3.9E+02	NA
Radium-226	352	1.1E+00	**3.2E-04**	NA	NA
Selenium	168	NA	NA	3.9E+02	0.43
Uranium	380	NA	NA	1.6E+01	**24**
Vanadium	129	NA	NA	7.8E+01	**1.6**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**3E-04**	**Noncancer HI:**	**27**
PONDS 3 & 3a					
Arsenic	5.5	3.9E-01	**1.4E-05**	2.2E+01	0.25
Molybdenum	ND	NA	NA	3.9E+02	NA
Radium-226	11	1.1E+00	**1.0E-05**	NA	NA
Selenium	2.3	NA	NA	3.9E+02	0.01
Uranium	93	NA	NA	1.6E+01	**5.9**
Vanadium	34	NA	NA	7.8E+01	**0.43**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**2E-05**	**Noncancer HI:**	**7**
SED PAD					
Arsenic	3.8	3.9E-01	9.8E-06	2.2E+01	0.18
Molybdenum	ND	NA	NA	3.9E+02	NA
Radium-226	104	1.1E+00	**9.5E-05**	NA	NA
Selenium	86	NA	NA	3.9E+02	0.22
Uranium	230	NA	NA	1.6E+01	**15**
Vanadium	65	NA	NA	7.8E+01	**0.83**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**1E-04**	**Noncancer HI:**	**16**

Table 4.2 Tier I Screening-Level Cumulative Risk & Hazard Calculations - Residential Subsurface Soil (>0.5 to 10 ft bgs.)					
Surface Soil Analytes	**EPC [a] (mg/kg)**	**Cancer-based Combined PRG / EPA SSL (mg/kg) [b]**	**Screening Cancer Risk**	**Noncancer-based Combined PRG / EPA SSL (mg/kg) [c]**	**Screening Noncancer Hazard**
SAND 1					
Arsenic	7.8	3.9E-01	**2.0E-05**	2.2E+01	0.36
Molybdenum	ND	NA	NA	3.9E+02	NA
Radium-226	106	1.1E+00	**9.6E-05**	NA	NA
Selenium	18	NA	NA	3.9E+02	0.05
Uranium	60	NA	NA	1.6E+01	**3.8**
Vanadium	43	NA	NA	7.8E+01	**0.55**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**1E-04**	**Noncancer HI:**	**5**
SAND 2					
Arsenic	4.7	3.9E-01	**1.2E-05**	2.2E+01	0.22
Molybdenum	ND	NA	NA	3.9E+02	NA
Radium-226	3.2	1.1E+00	2.9E-06	NA	NA
Selenium	0.61	NA	NA	3.9E+02	0.0016
Uranium	20	NA	NA	1.6E+01	**1.3**
Vanadium	48	NA	NA	7.8E+01	**0.61**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**1E-05**	**Noncancer HI:**	**2**
SAND 3					
Arsenic	5.4	3.9E-01	**1.4E-05**	2.2E+01	0.25
Molybdenum	ND	NA	NA	3.9E+02	NA
Radium-226	49	1.1E+00	**4.5E-05**	NA	NA
Selenium	39	NA	NA	3.9E+02	0.10
Uranium	356	NA	NA	1.6E+01	**23**
Vanadium	51	NA	NA	7.8E+01	**0.65**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**6E-05**	**Noncancer HI:**	**24**
NEMSA					
Arsenic	3.7	3.9E-01	9.5E-06	2.2E+01	0.17
Molybdenum	ND	NA	NA	3.9E+02	NA
Radium-226	69	1.1E+00	**6.3E-05**	NA	NA
Selenium	119	NA	NA	3.9E+02	0.30
Uranium	242	NA	NA	1.6E+01	**15**
Vanadium	39	NA	NA	7.8E+01	**0.50**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**7E-05**	**Noncancer HI:**	**16**

Table 4.2
Tier I Screening-Level Cumulative Risk & Hazard Calculations - Residential
Subsurface Soil (>0.5 to 10 ft bgs.)

Surface Soil Analytes	EPC [a] (mg/kg)	Cancer-based Combined PRG / EPA SSL (mg/kg) [b]	Screening Cancer Risk	Noncancer-based Combined PRG / EPA SSL (mg/kg) [c]	Screening Noncancer Hazard
BONEYARD					
Arsenic	4.6	3.9E-01	**1.2E-05**	2.2E+01	0.21
Molybdenum	ND	NA	NA	3.9E+02	NA
Radium-226	36	1.1E+00	**3.3E-05**	NA	NA
Selenium	17	NA	NA	3.9E+02	0.043
Uranium	124	NA	NA	1.6E+01	**7.9**
Vanadium	32	NA	NA	7.8E+01	**0.41**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**4E-05**	**Noncancer HI:**	**9**
EPA Risk Management Range:			10^{-6} - 10^{-4}		1

Notes
HI - Hazard index
HQ - Hazard quotient
mg/kg - Milligrams per kilogram.
NA - Not applicable.
ND - Non-detect
PRG - Preliminary remediation goal.
USEPA - U.S. Environmental Protection Agency.
Bolding indicates a contribution to exceedence of the EPA screening-level carcinogenic risk criterion of $1x10^{6}$ or noncancer HI of 1.
[a] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration.
[b] Cancer-based combined PRGs were obtained from USEPA's PRG Intercalc Tables: Soils (USEPA Region 9, 2004b), and include cancer-based PRGs for combined ingestion, dermal and inhalation exposure pathways. The screening-level risk for Ra-226 was calculated using the PRG for 'Ra-226 and daughters', as published in EPA (2004c) and the online calculator at http://rais.ornl.gov/rad-ssg/radssl1.shtml.
[c] Noncancer-based combined PRGs are equal to chronic HQ values in the 2004 USEPA Region 9 residential soil intercalc table (mg/kg).

Table 4.3 Tier I Screening-Level Cumulative Risk & Hazard Calculations - Industrial Surface Soil (0 to 0.5 ft bgs.)					
Surface Soil Analytes	**EPC [a] (mg/kg)**	**Cancer-based Combined PRG / EPA SSL (mg/kg) [b]**	**Screening Cancer Risk**	**Noncancer-based Combined PRG / EPA SSL (mg/kg) [c]**	**Screening Noncancer Hazard**
NECR-1					
Arsenic	5.2	1.6E+00	3.3E-06	2.6E+02	0.02
Molybdenum	29	NA	NA	5.1E+03	0.01
Radium-226	39	2.2E+00	**1.8E-05**	NA	NA
Selenium	20	NA	NA	5.1E+03	0.004
Uranium	117	NA	na	2.0E+02	0.57
Vanadium	42	NA	NA	1.0E+03	0.04
Screening Cumulative Risk/HI:		**Cancer Risk:**	**2E-05**	**Noncancer HI:**	0.6
NECR-2					
Arsenic	4.6	1.6E+00	2.9E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	NA
Radium-226	39	2.2E+00	**1.8E-05**	NA	NA
Selenium	11	NA	NA	5.1E+03	0.00
Uranium	85	NA	na	2.0E+02	0.42
Vanadium	40	NA	NA	1.0E+03	0.04
Screening Cumulative Risk/HI:		**Cancer Risk:**	**2E-05**	**Noncancer HI:**	0.5
PONDS 1 & 2					
Arsenic	4.9	1.6E+00	3.1E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	179	2.2E+00	**8.1E-05**	NA	NA
Selenium	43	NA	NA	5.1E+03	0.01
Uranium	223	NA	na	2.0E+02	**1.09**
Vanadium	89	NA	NA	1.0E+03	0.09
Screening Cumulative Risk/HI:		**Cancer Risk:**	**8E-05**	**Noncancer HI:**	**1.2**
PONDS 3 & 3a					
Arsenic	6	1.6E+00	3.8E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	253	2.2E+00	**1.2E-04**	NA	NA
Selenium	21	NA	NA	5.1E+03	0.00
Uranium	1,141	NA	na	2.0E+02	**5.58**
Vanadium	58	NA	NA	1.0E+03	0.06
Screening Cumulative Risk/HI:		**Cancer Risk:**	**1E-04**	**Noncancer HI:**	**6**
SED PAD					
Arsenic	4.5	1.6E+00	2.8E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	109	2.2E+00	**5.0E-05**	NA	NA
Selenium	43	NA	NA	5.1E+03	0.01
Uranium	513	NA	na	2.0E+02	**2.51**
Vanadium	223	NA	NA	1.0E+03	**0.22**
Screening Cumulative Risk/HI:		**Cancer Risk:**	**5E-05**	**Noncancer HI:**	**3**

Table 4.3
Tier I Screening-Level Cumulative Risk & Hazard Calculations - Industrial
Surface Soil (0 to 0.5 ft bgs.)

Surface Soil Analytes	EPC [a] (mg/kg)	Cancer-based Combined PRG / EPA SSL (mg/kg) [b]	Screening Cancer Risk	Noncancer-based Combined PRG / EPA SSL (mg/kg) [c]	Screening Noncancer Hazard
SAND 1					
Arsenic	4.7	1.6E+00	3.0E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	15	2.2E+00	6.8E-06	NA	NA
Selenium	4.5	NA	NA	5.1E+03	0.00
Uranium	16	NA	na	2.0E+02	0.08
Vanadium	35	NA	NA	1.0E+03	0.03
Screening Cumulative Risk/HI:		**Cancer Risk:**	10E-06	**Noncancer HI:**	0.1
SAND 2					
Arsenic	6.4	1.6E+00	4.0E-06	2.6E+02	0.03
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	19	2.2E+00	8.6E-06	NA	NA
Selenium	3.4	NA	NA	5.1E+03	0.00
Uranium	20	NA	na	2.0E+02	0.10
Vanadium	42	NA	NA	1.0E+03	0.04
Screening Cumulative Risk/HI:		**Cancer Risk:**	**1E-05**	**Noncancer HI:**	0.2
SAND 3					
Arsenic	4	1.6E+00	2.5E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	69	2.2E+00	**3.1E-05**	NA	NA
Selenium	18	NA	NA	5.1E+03	0.00
Uranium	185	NA	na	2.0E+02	0.91
Vanadium	55	NA	NA	1.0E+03	0.05
Screening Cumulative Risk/HI:		**Cancer Risk:**	**3E-05**	**Noncancer HI:**	1
NEMSA					
Arsenic	4.3	1.6E+00	2.7E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	42	2.2E+00	**1.9E-05**	NA	NA
Selenium	12	NA	NA	5.1E+03	0.00
Uranium	75	NA	na	2.0E+02	0.37
Vanadium	36	NA	NA	1.0E+03	0.04
Screening Cumulative Risk/HI:		**Cancer Risk:**	**2E-05**	**Noncancer HI:**	0.4
BONEYARD					
Arsenic	5.5	1.6E+00	3.5E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	46	2.2E+00	**2.1E-05**	NA	NA
Selenium	11	NA	NA	5.1E+03	0.00
Uranium	12	NA	na	2.0E+02	0.06
Vanadium	37	NA	NA	1.0E+03	0.04
Screening Cumulative Risk/HI:		**Cancer Risk:**	**2E-05**	**Noncancer HI:**	0.1

Table 4.3
Tier I Screening-Level Cumulative Risk & Hazard Calculations - Industrial
Surface Soil (0 to 0.5 ft bgs.)

Surface Soil Analytes	EPC [a] (mg/kg)	Cancer-based Combined PRG / EPA SSL (mg/kg) [b]	Screening Cancer Risk	Noncancer-based Combined PRG / EPA SSL (mg/kg) [c]	Screening Noncancer Hazard
VENTS 3 & 8					
Arsenic	4.4	1.6E+00	2.8E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	92	2.2E+00	**4.2E-05**	NA	NA
Selenium	27	NA	NA	5.1E+03	0.01
Uranium	224	NA	na	2.0E+02	**1.10**
Vanadium	47	NA	NA	1.0E+03	0.05
Screening Cumulative Risk/HI:		**Cancer Risk:**	**4E-05**	**Noncancer HI:**	**1.2**
TRAILER PARK					
Arsenic	6.1	1.6E+00	3.8E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	32	2.2E+00	**1.5E-05**	NA	NA
Selenium	71	NA	NA	5.1E+03	0.01
Uranium	96	NA	na	2.0E+02	0.47
Vanadium	69	NA	NA	1.0E+03	0.07
Screening Cumulative Risk/HI:		**Cancer Risk:**	**2E-05**	**Noncancer HI:**	0.6
EPA Risk Management Range:			10^{-6} - 10^{-4}		1

Notes
HI - Hazard index
HQ - Hazard quotient
mg/kg - Milligrams per kilogram.
NA - Not applicable.
PRG - Preliminary remediation goal.
USEPA - U.S. Environmental Protection Agency.
Bolding indicates a contribution to exceedence of the EPA screening-level carcinogenic risk criterion of $1x10^{6}$ or noncancer HI of 1.
[a] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration.
[b] Cancer-based combined PRGs were obtained from USEPA's PRG Intercalc Tables: Soils (USEPA Region 9, 2004b), and include cancer-based PRGs for combined ingestion, dermal and inhalation exposure pathways. The screening-level risk for Ra-226 was calculated using the PRG for 'Ra-226 and daughters', as published in EPA (2004c) and the online calculator at http://rais.ornl.gov/rad-
[c] Noncancer-based combined PRGs are equal to chronic HQ values in the 2004 USEPA Region 9 industrial soil intercalc table (mg/kg).

Table 4.4 Tier I Screening-Level Cumulative Risk & Hazard Calculations - Industrial Subsurface Soil (>0.5 to 10 ft bgs.)					
Surface Soil Analytes	**EPC [a] (mg/kg)**	**Cancer-based Combined PRG / EPA SSL (mg/kg) [b]**	**Screening Cancer Risk**	**Noncancer-based Combined PRG / EPA SSL (mg/kg) [c]**	**Screening Noncancer Hazard**
NECR-1					
Arsenic	5.2	1.6E+00	3.3E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	NA
Radium-226	46	2.2E+00	**2.1E-05**	NA	NA
Selenium	15	NA	NA	5.1E+03	0.003
Uranium	87	NA	na	2.0E+02	0.43
Vanadium	46	NA	NA	1.0E+03	0.05
Screening Cumulative Risk/HI:		**Cancer Risk:**	**2E-05**	**Noncancer HI:**	0.5
NECR-2					
Arsenic	3.5	1.6E+00	2.2E-06	2.6E+02	0.01
Molybdenum	ND	NA	NA	5.1E+03	NA
Radium-226	9.7	2.2E+00	4.4E-06	NA	NA
Selenium	2.7	NA	NA	5.1E+03	0.00
Uranium	50	NA	na	2.0E+02	0.24
Vanadium	34	NA	NA	1.0E+03	0.03
Screening Cumulative Risk/HI:		**Cancer Risk:**	7E-06	**Noncancer HI:**	0.3
PONDS 1 & 2					
Arsenic	5.3	1.6E+00	3.3E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	352	2.2E+00	**1.6E-04**	NA	NA
Selenium	168	NA	NA	5.1E+03	0.03
Uranium	380	NA	na	2.0E+02	**1.86**
Vanadium	129	NA	NA	1.0E+03	0.13
Screening Cumulative Risk/HI:		**Cancer Risk:**	**2E-04**	**Noncancer HI:**	**2.0**
PONDS 3 & 3a					
Arsenic	5.5	1.6E+00	3.5E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	11	2.2E+00	5.0E-06	NA	NA
Selenium	2.3	NA	NA	5.1E+03	0.0005
Uranium	93	NA	na	2.0E+02	0.45
Vanadium	34	NA	NA	1.0E+03	0.03
Screening Cumulative Risk/HI:		**Cancer Risk:**	8E-06	**Noncancer HI:**	0.5

Table 4.4
Tier I Screening-Level Cumulative Risk & Hazard Calculations - Industrial
Subsurface Soil (>0.5 to 10 ft bgs.)

Surface Soil Analytes	EPC [a] (mg/kg)	Cancer-based Combined PRG / EPA SSL (mg/kg) [b]	Screening Cancer Risk	Noncancer-based Combined PRG / EPA SSL (mg/kg) [c]	Screening Noncancer Hazard
SED PAD					
Arsenic	3.8	1.6E+00	2.4E-06	2.6E+02	0.01
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	104	2.2E+00	**4.7E-05**	NA	NA
Selenium	86	NA	NA	5.1E+03	0.02
Uranium	230	NA	na	2.0E+02	**1.13**
Vanadium	65	NA	NA	1.0E+03	0.06
Screening Cumulative Risk/HI:		**Cancer Risk:**	**5E-05**	**Noncancer HI:**	**1.2**
SAND 1					
Arsenic	7.8	1.6E+00	4.9E-06	2.6E+02	0.03
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	106	2.2E+00	**4.8E-05**	NA	NA
Selenium	18	NA	NA	5.1E+03	0.00
Uranium	60	NA	na	2.0E+02	0.29
Vanadium	43	NA	NA	1.0E+03	0.04
Screening Cumulative Risk/HI:		**Cancer Risk:**	**5E-05**	**Noncancer HI:**	0.4
SAND 2					
Arsenic	4.7	1.6E+00	3.0E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	3.2	2.2E+00	1.5E-06	NA	NA
Selenium	0.61	NA	NA	5.1E+03	0.00
Uranium	20	NA	na	2.0E+02	0.10
Vanadium	48	NA	NA	1.0E+03	0.05
Screening Cumulative Risk/HI:		**Cancer Risk:**	4E-06	**Noncancer HI:**	0.2
SAND 3					
Arsenic	5.4	1.6E+00	3.4E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	49	2.2E+00	**2.2E-05**	NA	NA
Selenium	39	NA	NA	5.1E+03	0.01
Uranium	356	NA	na	2.0E+02	**1.74**
Vanadium	51	NA	NA	1.0E+03	0.05
Screening Cumulative Risk/HI:		**Cancer Risk:**	**3E-05**	**Noncancer HI:**	**1.8**

Table 4.4
Tier I Screening-Level Cumulative Risk & Hazard Calculations - Industrial
Subsurface Soil (>0.5 to 10 ft bgs.)

Surface Soil Analytes	EPC [a] (mg/kg)	Cancer-based Combined PRG / EPA SSL (mg/kg) [b]	Screening Cancer Risk	Noncancer-based Combined PRG / EPA SSL (mg/kg) [c]	Screening Noncancer Hazard
NEMSA					
Arsenic	3.7	1.6E+00	2.3E-06	2.6E+02	0.01
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	69	2.2E+00	**3.1E-05**	NA	NA
Selenium	119	NA	NA	5.1E+03	0.02
Uranium	242	NA	na	2.0E+02	**1.18**
Vanadium	39	NA	NA	1.0E+03	0.04
Screening Cumulative Risk/HI:		**Cancer Risk:**	**3E-05**	**Noncancer HI:**	**1.3**
BONEYARD					
Arsenic	4.6	1.6E+00	2.9E-06	2.6E+02	0.02
Molybdenum	ND	NA	NA	5.1E+03	ND
Radium-226	36	2.2E+00	**1.6E-05**	NA	NA
Selenium	17	NA	NA	5.1E+03	0.00
Uranium	124	NA	na	2.0E+02	0.61
Vanadium	32	NA	NA	1.0E+03	0.03
Screening Cumulative Risk/HI:		**Cancer Risk:**	**2E-05**	**Noncancer HI:**	0.7
EPA Risk Management Range:			10^{-6} - 10^{-4}		1

Notes
HI - Hazard index
HQ - Hazard quotient
mg/kg - Milligrams per kilogram.
NA - Not applicable.
PRG - Preliminary remediation goal.
USEPA - U.S. Environmental Protection Agency.
Bolding indicates a contribution to exceedence of the EPA screening-level carcinogenic risk criterion of $1x10^{6}$ or noncancer HI of 1.
[a] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration.
[b] Cancer-based combined PRGs were obtained from USEPA's PRG Intercalc Tables: Soils (USEPA Region 9, 2004b), and include cance based PRGs for combined ingestion, dermal and inhalation exposure pathways. The screening-level risk for Ra-226 was calculated using the PRG for 'Ra-226 and daughters', as published in EPA (2004c) and the online calculator at http://rais.ornl.gov/rad-ssg/radssl1.shtml.
[c] Noncancer-based combined PRGs are equal to chronic HQ values in the 2004 USEPA Region 9 industrial soil intercalc table (mg/kg).

Table 4.5
Exposure Parameters for Current/Future On-Site Maintenance Personnel

Parameter [a]		Units	Maintenance Personnel	
General				
Body Weight		kg	70	a
Averaging time				
	carcinogens	days	25,550	a
	noncarcinogens	days	9,125	a
Exposure Duration		years	25	b
Inhalation rate		m^3/day	20	c
Ingestion of soil/dust				
Soil ingestion rate		mg/day	100	b
Exposure frequency		day/yr	12	g
Dermal contact with soil/dust				
Dermal surface area		cm^2/event	3,300	d
Skin adherence factor		mg/cm^2	0.2	e
Skin absorption factor		unitless	chemical specific	
Exposure frequency		day/yr	12	g
Inhalation of particulates/dust				
Particulate Emission Factor		m^3/kg	1.30E+09	f
Exposure frequency		day/yr	12	g

Sources:
Unless otherwise noted, parameter values are from EPA (1998a, 1998b, 1997c, 1991a).
[a] Risk Assessment Guidance for Superfund (RAGS). Volume I: Human Health Evaluation Manual (Part A), Interim Final, EPA/540/1-89/002. December. (USEPA, 1989)
[b] Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. (USEPA, 1991a)
[c] Exposure Factors Handbook, Volume I: General Factors. Office of Emergency and Remedial Response. EPA/600/P-95/002 Fa. August. (USEPA, 1997a)
[d] Source: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites - Peer Review Draft (USEPA, 2002)
[e] Risk Assessment Guidance for Superfund (RAGS) Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). EPA/540/R/99/005.
[f] Region 9 PRGs – 2004 Update. U.S. Environmental Protection Agency, Region 9. October. (USEPA Region 9, 2004a)

cm^2/event - Square centimeters per event.
mg/cm^2 -Milligrams per centimeters squared.
day/yr - Days per year.
m^3/day - Cubic meters per day.
kg - Kilogram.

Table 4.6
Exposure Parameters for a Hypothetical Future Livestock Grazer

Parameter		Units	Livestock Grazer	
General				
Body weight		kg	70	a
Averaging time				
	carcinogens	days	25,550	a
	noncarcinogens	days	9,125	a
Exposure Duration		years	25	b
Inhalation rate		m^3/day	20	c
Ingestion of soil/dust				
Soil ingestion rate		mg/day	100	b
Exposure frequency		day/yr	26	g
Dermal contact with soil/dust				
Dermal surface area		cm^2/event	3,300	d
Skin adherence factor		mg/cm^2	0.2	e
Skin absorption factor		unitless	chemical specific	
Exposure frequency		day/yr	26	g
Inhalation of particulates/dust				
Particulate Emission Factor		m^3/kg	1.30E+09	f
Exposure frequency		day/yr	26	g

Sources:
Unless otherwise noted, parameter values are from EPA (1998a, 1998b, 1997c, 1991a).
[a] Risk Assessment Guidance for Superfund (RAGS). Volume I: Human Health Evaluation Manual (Part A), Interim Final, EPA/540/1-89/002. December. (USEPA, 1989)
[b] Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. (USEPA, 1991a)
[c] Exposure Factors Handbook, Volume I: General Factors. Office of Emergency and Remedial Response. EPA/600/P-95/002 Fa. August. (USEPA, 1997a)
[d] Source: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites - Peer Review Draft (USEPA, 2002)
[e] Risk Assessment Guidance for Superfund (RAGS) Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). EPA/540/R/99/005.
[f] Region 9 PRGs – 2004 Update. U.S. Environmental Protection Agency, Region 9. October. (USEPA Region 9, 2004a)

cm^2/event - Square centimeters per event.
mg/cm^2 -Milligrams per centimeters squared.
day/yr - Days per year.
m^3/day - Cubic meters per day.
kg - Kilogram.

Table 4.7
Exposure Parameters for a Hypothetical Future On-Site Resident and Current/Future Off-Site Resident

Parameter		Units	Adult Value	Child Value	
General					
Body weight		kg	70	15	a
Averaging time					
	carcinogens	days	25,550	25,550	a
	noncarcinogens	days	8,760	2,190	a
Exposure Duration		years	24	6	b
Inhalation rate		m^3/day	20	10	c
Ingestion of soil/sediment/dust					
Soil ingestion rate		mg/day	100	200	b
Exposure frequency		day/yr	350	350	b
Dermal contact with soil/sediment/dust					
Dermal surface area		cm^2/event	3,300	2,800	d
Skin adherence factor		mg/cm^2	0.2	0.2	e
Skin absorption factor		unitless	chemical specific	chemical specific	
Exposure frequency		day/yr	350	350	b
Inhalation of particulates for indoor dust					
Particulate Emission Factor		m^3/kg	1.30E+09	1.30E+09	f
Exposure frequency		day/yr	350	350	b
Ingestion of meat					
Meat ingestion rate		kg/yr	124.95	124.95	g
Ingestion of eggs					
Egg ingestion rate		kg/yr	14.9	2.3	h

Sources:
Unless otherwise noted, parameter values are from EPA (1998a, 1998b, 1997c, 1991a). If not specified, EPA PRG calculator default parameters were used.

[a] Risk Assessment Guidance for Superfund (RAGS). Volume I: Human Health Evaluation Manual (Part A), Interim Final, EPA/540/1-89/002. December. (USEPA, 1989)

[b] Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. (USEPA, 1991a)

[c] Exposure Factors Handbook, Volume I: General Factors. Office of Emergency and Remedial Response.

[d] Source: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites - Peer Review Draft (USEPA, 2002)

[e] Risk Assessment Guidance for Superfund (RAGS) Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). EPA/540/R/99/005. (USEPA, 2004)

[f] Region 9 PRGs – 2004 Update. U.S. Environmental Protection Agency, Region 9. October. (USEPA Region 9, 2004a)

[g] Total meat consumption at 95 percentile (USEPA, 1997c)

[h] Uranium-234 + Decay Chain ingestion rate used as a surrogate.

cm^2/event - Square centimeters per event.
day/yr - Days per year.
kg - Kilogram.
mg/cm^2 -Milligrams per centimeters squared.
m^3/day - Cubic meters per day.

Table 4.8
Toxicity Values for the Human Health Risk Assessment

COPC	Carcinogen Weight of Evidence		Cancer Slope Factor - CSF (mg/kg-d)⁻						Reference Dose - RfD (mg/kg-d) [a]					
			Oral		Dermal		Inhalation		Oral		Dermal		Inhalation	
Inorganics														
Arsenic	A	b	1.5E+00	I	1.5E+00	R	1.5E+01	I	3.0E-04	I	3.0E-04	R	na	I
Molybdenum	D		na		na		na		5.0E-03	I	5.0E-03	R	na	I
Selenium	D		na		na		na		5.0E-03	I	5.0E-03	R	na	I
Uranium	na		na		na		na		2.0E-04	I	2.0E-04	R	na	I
Vanadium	na		na		na		na		7.0E-03	I	7.0E-03	R	na	I
Radionuclides														
Radium-226	A	b												
Direct Contact			7.3E-10	c	na		1.2E-08	c	na		na		na	
Food Ingestion			5.2E-10	c	na		na		na		na		na	
External Exposure			na		8.5E-06	c	na		na		na		na	

Key:
CSF - Cancer slope factor
mg/kg-d - Milligram per kilogram per day
na - Not applicable
RfD - Reference dose

Source Data:
I Integrated Risk Information System (IRIS) Database (USEPA, 2007)
R Route extrapolation

[a] Calculated using the Reference Concentration (RfC) and equation RfD_{inh} (mg/kg-d) = (RfC(mg/mc^3) x 20m^3/day) / (70 kg) taken from IRIS (USEPA, 2005a).
[b] U.S. Environmental Protection Agency (USEPA) carcinogenicity classification.
[c] Based upon values used in the Soil Screening Guidance for Radionuclides: User's Guide (USEPA, 2000). Values are in risk/pCi for all except the external exposure pathway which is presented in risk/year - pCi/gram soil.

Table 4.9
Summary of Human Health Risk Estimates - On-Site
Shallow Soil - Current/Future On-site Maintenance Personnel - Scenario 1

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
NECR-1									
Arsenic	5.2	1E-07	0.0008	4E-11	NA	1E-07	0.0008	2E-08	*-0.01*
Molybdenum	29	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	0.0003
Radium-226	39	8E-07	NA	7E-10	NA	8E-07	0	8E-07	0
Selenium	20	NA	0.0002	NA	NA	0E+00	0.0002	0E+00	0.00008
Uranium	117	NA	0.009	NA	NA	0E+00	0.009	0E+00	0.007
Vanadium	42	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	*-0.004*
Cumulative ILCR/HQ:		1E-06	0.01	7E-10	NA	1E-06	0.01	8E-07	*-0.01*
NECR-2									
Arsenic	4.6	1E-07	0.0007	4E-11	NA	1E-07	0.0007	5E-09	*-0.014*
Radium-226	39	9E-07	NA	7E-10	NA	9E-07	0	8E-07	0
Selenium	11	NA	0.0001	NA	NA	0E+00	0.0001	0E+00	0.0000008
Uranium	85	NA	0.007	NA	NA	0E+00	0.007	0E+00	0.005
Vanadium	40	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	*-0.004*
Cumulative ILCR/HQ:		1E-06	0.008	7E-10	NA	1E-06	0.008	8E-07	*-0.01*
Ponds 1 & 2									
Arsenic	4.9	1E-07	0.0008	4E-11	NA	1E-07	0.0008	1E-08	*-0.01*
Radium-226	179	**4E-06**	NA	3E-09	NA	**4E-06**	0	**4E-06**	0
Selenium	43	NA	0.0004	NA	NA	0E+00	0.0004	0E+00	0.0003
Uranium	223	NA	0.02	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	89	NA	0.0006	NA	NA	0E+00	0.0006	0E+00	*-0.003*
Cumulative ILCR/HQ:		**4E-06**	0.02	3E-09	NA	**4E-06**	0.02	**4E-06**	*-0.001*

Table 4.9 Summary of Human Health Risk Estimates - On-Site Shallow Soil - Current/Future On-site Maintenance Personnel - Scenario 1									
	Soil Concentration	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
Pond 3/3a									
Arsenic	6.0	2E-07	0.0009	5E-11	NA	2E-07	0.0009	4E-08	-0.01
Radium-226	253	**6E-06**	NA	5E-09	NA	**6E-06**	0	**5E-06**	0
Selenium	21	NA	0.0002	NA	NA	0E+00	0.0002	0E+00	0.00009
Uranium	1,141	NA	0.09	NA	NA	0E+00	0.09	0E+00	0.09
Vanadium	58	NA	0.0004	NA	NA	0E+00	0.0004	0E+00	*-0.004*
Cumulative ILCR/HQ:		**6E-06**	0.09	5E-09	NA	**6E-06**	0.09	**6E-06**	0.07
Sediment Pad									
Arsenic	4.5	1E-07	0.0007	3E-11	NA	1E-07	0.0007	2E-09	*-0.01*
Radium-226	109	**2E-06**	NA	2E-09	NA	**2E-06**	0	**2E-06**	0
Selenium	43	NA	0.0004	NA	NA	0E+00	0.0004	0E+00	0.0003
Uranium	513	NA	0.04	NA	NA	0E+00	0.04	0E+00	0.04
Vanadium	223	NA	0.001	NA	NA	0E+00	0.001	0E+00	*-0.003*
Cumulative ILCR/HQ:		**2E-06**	0.04	2E-09	NA	**2E-06**	0.04	**2E-06**	0.02
Sandfill #1									
Arsenic	4.7	1E-07	0.0007	4E-11	NA	1E-07	0.0007	8E-09	*-0.01*
Radium-226	15	3E-07	NA	3E-10	NA	3E-07	0	3E-07	0
Selenium	4.5	NA	0.00004	NA	NA	0E+00	0.00004	0E+00	*-0.00006*
Uranium	16	NA	0.001	NA	NA	0E+00	0.001	0E+00	*-0.001*
Vanadium	35	NA	0.0002	NA	NA	0E+00	0.0002	0E+00	*-0.004*
Cumulative ILCR/HQ:		4E-07	0.002	3E-10	NA	4E-07	0.002	3E-07	*-0.02*

Table 4.9
Summary of Human Health Risk Estimates - On-Site
Shallow Soil - Current/Future On-site Maintenance Personnel - Scenario 1

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a] Ingestion of Soil ILCR	Ingestion of Soil HQ	Inhalation of Fugitive Dust ILCR	Inhalation of Fugitive Dust HQ	Combined Pathway Risk and Hazard Estimates Total Cancer Risk and Hazard ILCR	Total Cancer Risk and Hazard HQ	Incremental Cancer Risk and Hazard [c] ILCR	Incremental Cancer Risk and Hazard [c] HQ
Sandfill #2									
Arsenic	6.4	2E-07	0.001	5E-11	NA	2E-07	0.001	5E-08	*-0.01*
Radium-226	19	4E-07	NA	3E-10	NA	4E-07	0	4E-07	0
Selenium	3.4	NA	0.00003	NA	NA	0E+00	0.00003	0E+00	*-0.0001*
Uranium	20	NA	0.002	NA	NA	0E+00	0.002	0E+00	*-0.0004*
Vanadium	42	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	*-0.004*
Cumulative ILCR/HQ:		6E-07	0.003	4E-10	NA	6E-07	0.003	4E-07	*-0.02*
Sandfill #3									
Arsenic	4.0	1E-07	0.0006	3E-11	NA	1E-07	0.001	*-1E-08*	*-0.01*
Radium-226	69	**2E-06**	NA	1E-09	NA	**2E-06**	0	1E-06	0
Selenium	18	NA	0.0002	NA	NA	0E+00	0.0002	0E+00	0.00007
Uranium	185	NA	0.01	NA	NA	0E+00	0.01	0E+00	0.01
Vanadium	55	NA	0.0004	NA	NA	0E+00	0.0004	0E+00	*-0.004*
Cumulative ILCR/HQ:		**2E-06**	0.02	1E-09	NA	**2E-06**	0.02	1E-06	*-0.005*
NEMSA									
Arsenic	4.3	1E-07	0.0007	3E-11	NA	1E-07	0.0007	*-3E-09*	*-0.01*
Radium-226	42	9E-07	NA	8E-10	NA	9E-07	0	9E-07	0
Selenium	12	NA	0.0001	NA	NA	0E+00	0.0001	0E+00	0.00001
Uranium	75	NA	0.006	NA	NA	0E+00	0.006	0E+00	0.004
Vanadium	36	NA	0.0002	NA	NA	0E+00	0.0002	0E+00	*-0.004*
Cumulative ILCR/HQ:		1E-06	0.007	8E-10	NA	1E-06	0.007	9E-07	*-0.01*

Table 4.9
Summary of Human Health Risk Estimates - On-Site
Shallow Soil - Current/Future On-site Maintenance Personnel - Scenario 1

	Soil Concentration	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
Boneyard									
Arsenic	5.5	1E-07	0.0009	4E-11	NA	1E-07	0.0009	3E-08	-0.01
Radium-226	46	1E-06	NA	8E-10	NA	1E-06	0	1E-06	0
Selenium	11	NA	0.0001	NA	NA	0E+00	0.0001	0E+00	*-0.000004*
Uranium	12	NA	0.0009	NA	NA	0E+00	0.0009	0E+00	*-0.001*
Vanadium	37	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	*-0.004*
Cumulative ILCR/HQ:		1E-06	0.002	9E-10	NA	1E-06	0.002	1E-06	*-0.02*
Vents 3 & 8									
Arsenic	4.4	1E-07	0.0007	3E-11	NA	1E-07	0.0007	*-2E-09*	*-0.01*
Radium-226	92	**2E-06**	NA	2E-09	NA	**2E-06**	0	**2E-06**	0
Selenium	27	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	0.0002
Uranium	224	NA	0.02	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	47	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	*-0.004*
Cumulative ILCR/HQ:		**2E-06**	0.02	2E-09	NA	**2E-06**	0.02	**2E-06**	*-0.002*
Trailer Park									
Arsenic	6.1	2E-07	0.001	5E-11	NA	2E-07	0.001	4E-08	*-0.01*
Radium-226	32	7E-07	NA	6E-10	NA	7E-07	0	7E-07	0
Selenium	71	NA	0.0007	NA	NA	0E+00	0.0007	0E+00	0.0006
Uranium	96	NA	0.008	NA	NA	0E+00	0.008	0E+00	0.006
Vanadium	69	NA	0.009	NA	NA	0E+00	0.009	0E+00	0.005
Cumulative ILCR/HQ:		8E-07	0.02	6E-10	NA	8E-07	0.02	7E-07	*-0.002*

Table 4.9
Summary of Human Health Risk Estimates - On-Site
Shallow Soil - Current/Future On-site Maintenance Personnel - Scenario 1

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]: Ingestion of Soil ILCR	Ingestion of Soil HQ	Inhalation of Fugitive Dust ILCR	Inhalation of Fugitive Dust HQ	Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard ILCR	Total Cancer Risk and Hazard HQ	Incremental Cancer Risk and Hazard [c] ILCR	Incremental Cancer Risk and Hazard [c] HQ
BACKGROUND									
Arsenic	4.4	1E-07	0.01	3E-11	NA	1E-07	0.01	NA	NA
Molybdenum	ND	NA	NA	NA	NA	0E+00	0	NA	NA
Radium-226	1.1	2E-08	NA	2E-11	NA	2E-08	0	NA	NA
Selenium	0.53	NA	0.0001	NA	NA	0E+00	0.0001	NA	NA
Uranium	1.2	NA	0.002	NA	NA	0E+00	0.002	NA	NA
Vanadium	29	NA	0.004	NA	NA	0E+00	0.004	NA	NA
Cumulative ILCR/HQ:		1E-07	0.02	5E-11	NA	1E-07	0.02	NA	NA
					USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
ND - Not detected in background samples.

Table 4.10
Summary of Human Health Risk Estimates - On-Site
Shallow Soil - Current/Future On-site Maintenance Personnel - Scenario 2

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]						Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
NECR-1											
Arsenic	5.2	1E-07	0.0008	4E-11	NA	NA	NA	1E-07	0.0008	2E-08	0.0001
Molybdenum	29	NA	0.0003	NA	NA	NA	NA	0E+00	0.0003	0E+00	*-0.0004*
Radium-226	39	8E-07	NA	7E-10	NA	**8E-05**	NA	**9E-05**	0	**8E-05**	0
Selenium	20	NA	0.0002	NA	NA	NA	NA	0E+00	0.0002	0E+00	0.0002
Uranium	117	NA	0.009	NA	NA	NA	NA	0E+00	0.009	0E+00	0.009
Vanadium	42	NA	0.0003	NA	NA	NA	NA	0E+00	0.0003	0E+00	0.00009
Cumulative ILCR/HQ:		1E-06	0.01	7E-10	NA	**8E-05**	NA	**9E-05**	0.01	**8E-05**	0.01
NECR-2											
Arsenic	4.6	1E-07	0.0007	4E-11	NA	NA	NA	1E-07	0.0007	5E-09	0.00003
Radium-226	39	9E-07	NA	7E-10	NA	**9E-05**	NA	**9E-05**	0	**8E-05**	0
Selenium	11	NA	0.0001	NA	NA	NA	NA	0E+00	0.0001	0E+00	0.0001
Uranium	85	NA	0.007	NA	NA	NA	NA	0E+00	0.007	0E+00	0.007
Vanadium	40	NA	0.0003	NA	NA	NA	NA	0E+00	0.0003	0E+00	0.00008
Cumulative ILCR/HQ:		1E-06	0.008	7E-10	NA	**9E-05**	NA	**9E-05**	0.008	**8E-05**	0.007
Ponds 1 & 2											
Arsenic	4.9	1E-07	0.0008	4E-11	NA	NA	NA	1E-07	0.0008	1E-08	0.00007
Radium-226	179	**4E-06**	NA	3E-09	NA	**4E-04**	NA	**4E-04**	0	**4E-04**	0
Selenium	43	NA	0.0004	NA	NA	NA	NA	0E+00	0.0004	0E+00	0.0004
Uranium	223	NA	0.02	NA	NA	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	89	NA	0.0006	NA	NA	NA	NA	0E+00	0.0006	0E+00	0.0004
Cumulative ILCR/HQ:		**4E-06**	0.02	3E-09	NA	**4E-04**	NA	**4E-04**	0.02	**4E-04**	0.02
Pond 3/3a											
Arsenic	6.0	2E-07	0.0009	5E-11	NA	NA	NA	2E-07	0.0009	4E-08	0.0002
Radium-226	253	**6E-06**	NA	5E-09	NA	**6E-04**	NA	**6E-04**	0	**6E-04**	0
Selenium	21	NA	0.0002	NA	NA	NA	NA	0E+00	0.0002	0E+00	0.0002
Uranium	1,141	NA	0.09	NA	NA	NA	NA	0E+00	0.09	0E+00	0.09
Vanadium	58	NA	0.0004	NA	NA	NA	NA	0E+00	0.0004	0E+00	0.0002
Cumulative ILCR/HQ:		**6E-06**	0.09	5E-09	NA	**6E-04**	NA	**6E-04**	0.09	**6E-04**	0.09

Table 4.10 Summary of Human Health Risk Estimates - On-Site Shallow Soil - Current/Future On-site Maintenance Personnel - Scenario 2													
		Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]						Combined Pathway Risk and Hazard Estimates					
	Soil Concentration	Ingestion of Soil		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]			
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**		
Sediment Pad													
Arsenic	4.5	1E-07	0.0007	3E-11	NA	NA	NA	1E-07	0.0007	2E-09	0.00001		
Radium-226	109	**2E-06**	NA	2E-09	NA	**2E-04**	NA	**2E-04**	0	**2E-04**	0		
Selenium	43	NA	0.0004	NA	NA	NA	NA	0E+00	0.0004	0E+00	0.0004		
Uranium	513	NA	0.04	NA	NA	NA	NA	0E+00	0.04	0E+00	0.04		
Vanadium	223	NA	0.001	NA	NA	NA	NA	0E+00	0.001	0E+00	0.001		
Cumulative ILCR/HQ:		**2E-06**	0.04	2E-09	NA	**2E-04**	NA	**2E-04**	0.04	**2E-04**	0.04		
Sandfill #1													
Arsenic	4.7	1E-07	0.0007	4E-11	NA	NA	NA	1E-07	0.0007	8E-09	0.00005		
Radium-226	15	3E-07	NA	3E-10	NA	**3E-05**	NA	**3E-05**	0	**3E-05**	0		
Selenium	4.5	NA	0.00004	NA	NA	NA	NA	0E+00	0.00004	0E+00	0.00004		
Uranium	16	NA	0.001	NA	NA	NA	NA	0E+00	0.001	0E+00	0.001		
Vanadium	35	NA	0.0002	NA	NA	NA	NA	0E+00	0.0002	0E+00	0.00004		
Cumulative ILCR/HQ:		4E-07	0.002	3E-10	NA	**3E-05**	NA	**3E-05**	0.002	**3E-05**	0.001		
Sandfill #2													
Arsenic	6.4	2E-07	0.001	5E-11	NA	NA	NA	2E-07	0.001	5E-08	0.0003		
Radium-226	19	4E-07	NA	3E-10	NA	**4E-05**	NA	**4E-05**	0	**4E-05**	0		
Selenium	3.4	NA	0.00003	NA	NA	NA	NA	0E+00	0.00003	0E+00	0.00003		
Uranium	20	NA	0.002	NA	NA	NA	NA	0E+00	0.002	0E+00	0.001		
Vanadium	42	NA	0.0003	NA	NA	NA	NA	0E+00	0.0003	0E+00	0.0001		
Cumulative ILCR/HQ:		6E-07	0.003	4E-10	NA	**4E-05**	NA	**4E-05**	0.003	**4E-05**	0.002		
Sandfill #3													
Arsenic	4.0	1E-07	0.0006	3E-11	NA	NA	NA	1E-07	0.001	*-1E-08*	*-0.0001*		
Radium-226	69	**2E-06**	NA	1E-09	NA	**2E-04**	NA	**2E-04**	0	**1E-04**	0		
Selenium	18	NA	0.0002	NA	NA	NA	NA	0E+00	0.0002	0E+00	0.0002		
Uranium	185	NA	0.01	NA	NA	NA	NA	0E+00	0.01	0E+00	0.01		
Vanadium	55	NA	0.0004	NA	NA	NA	NA	0E+00	0.0004	0E+00	0.0002		
Cumulative ILCR/HQ:		**2E-06**	0.02	1E-09	NA	**2E-04**	NA	**2E-04**	0.02	**1E-04**	0.01		

Table 4.10
Summary of Human Health Risk Estimates - On-Site
Shallow Soil - Current/Future On-site Maintenance Personnel - Scenario 2

Location		Soil Concentration	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]						Combined Pathway Risk and Hazard Estimates			
			Ingestion of Soil		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location		EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
NEMSA												
	Arsenic	4.3	1E-07	0.0007	3E-11	NA	NA	NA	1E-07	0.0007	*-3E-09*	*-0.00002*
	Radium-226	42	9E-07	NA	8E-10	NA	**9E-05**	NA	**9E-05**	0	**9E-05**	0
	Selenium	12	NA	0.0001	NA	NA	NA	NA	0E+00	0.0001	0E+00	0.0001
	Uranium	75	NA	0.006	NA	NA	NA	NA	0E+00	0.006	0E+00	0.006
	Vanadium	36	NA	0.0002	NA	NA	NA	NA	0E+00	0.0002	0E+00	0.00005
		Cumulative ILCR/HQ:	1E-06	0.007	8E-10	NA	**9E-05**	NA	**9E-05**	0.007	**9E-05**	0.006
Boneyard												
	Arsenic	5.5	1E-07	0.0009	4E-11	NA	NA	NA	1E-07	0.0009	3E-08	0.0002
	Radium-226	46	1E-06	NA	8E-10	NA	**1E-04**	NA	**1E-04**	0	**1E-04**	0
	Selenium	11	NA	0.0001	NA	NA	NA	NA	0E+00	0.0001	0E+00	0.0001
	Uranium	12	NA	0.0009	NA	NA	NA	NA	0E+00	0.0009	0E+00	0.0008
	Vanadium	37	NA	0.0003	NA	NA	NA	NA	0E+00	0.0003	0E+00	0.00006
		Cumulative ILCR/HQ:	1E-06	0.002	9E-10	NA	**1E-04**	NA	**1E-04**	0.002	**1E-04**	0.001
Vents 3 & 8												
	Arsenic	4.4	1E-07	0.0007	3E-11	NA	NA	NA	1E-07	0.0007	*-2E-09*	*-0.00001*
	Radium-226	92	**2E-06**	NA	2E-09	NA	**2E-04**	NA	**2E-04**	0	**2E-04**	0
	Selenium	27	NA	0.0003	NA	NA	NA	NA	0E+00	0.0003	0E+00	0.0003
	Uranium	224	NA	0.02	NA	NA	NA	NA	0E+00	0.02	0E+00	0.02
	Vanadium	47	NA	0.0003	NA	NA	NA	NA	0E+00	0.0003	0E+00	0.0001
		Cumulative ILCR/HQ:	**2E-06**	0.02	2E-09	NA	**2E-04**	NA	**2E-04**	0.02	**2E-04**	0.02
Trailer Park												
	Arsenic	6.1	2E-07	0.001	5E-11	NA	NA	NA	2E-07	0.001	4E-08	0.0003
	Radium-226	32	7E-07	NA	6E-10	NA	**7E-05**	NA	**7E-05**	0	**7E-05**	0
	Selenium	71	NA	0.0007	NA	NA	NA	NA	0E+00	0.0007	0E+00	0.001
	Uranium	96	NA	0.008	NA	NA	NA	NA	0E+00	0.008	0E+00	0.01
	Vanadium	69	NA	0.0005	NA	NA	NA	NA	0E+00	0.0005	0E+00	0.0003
		Cumulative ILCR/HQ:	8E-07	0.01	6E-10	NA	**7E-05**	NA	**7E-05**	0.01	**7E-05**	0.009

Table 4.10
Summary of Human Health Risk Estimates - On-Site
Shallow Soil - Current/Future On-site Maintenance Personnel - Scenario 2

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]						Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
BACKGROUND											
Arsenic	4.4	1E-07	0.0007	3E-11	NA	NA	NA	1E-07	0.0007	NA	NA
Molybdenum	ND	NA	NA	NA	NA	NA	NA	0E+00	0	NA	NA
Radium-226	1.1	2E-08	NA	2E-11	NA	**2E-06**	NA	**2E-06**	0	NA	NA
Selenium	0.53	NA	0.000005	NA	NA	NA	NA	0E+00	0.000005	NA	NA
Uranium	1.2	NA	0.00009	NA	NA	NA	NA	0E+00	0.00009	NA	NA
Vanadium	29	NA	0.0002	NA	NA	NA	NA	0E+00	0.0002	NA	NA
Cumulative ILCR/HQ:		1E-07	0.001	5E-11	NA	**2E-06**	NA	**3E-06**	0.001	NA	NA
USEPA Risk Range:								10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
ND - Not detected in background samples.
NA - Not applicable.
USEPA - U. S. Environmental Protection Agency

Table 4.11
Summary of Human Health Risk Estimates - On-Site
Subsurface Soil - Current/Future On-site Maintenance Personnel - Scenario 1

Location		Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a] Ingestion of Soil ILCR	HQ	Inhalation of Fugitive Dust ILCR	HQ	Combined Pathway Risk and Hazard Estimates Total Cancer Risk and Hazard ILCR	HQ	Incremental Cancer Risk and Hazard [c] ILCR	HQ
NECR-1										
	Arsenic	5.2	1E-07	0.0008	4E-11	NA	1E-07	0.0008	2E-08	*-0.01*
	Radium-226	46	1E-06	NA	8E-10	NA	1E-06	0	1E-06	0
	Selenium	15	NA	0.0001	NA	NA	0E+00	0.0001	0E+00	0.00004
	Uranium	87	NA	0.007	NA	NA	0E+00	0.007	0E+00	0.005
	Vanadium	46	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	*-0.004*
		Cumulative ILCR/HQ:	1E-06	0.01	9E-10	NA	1E-06	0.01	1E-06	*-0.01*
NECR-2										
	Arsenic	3.5	9E-08	0.0006	3E-11	NA	9E-08	0.0006	*-2E-08*	*-0.014*
	Radium-226	10	2E-07	NA	2E-10	NA	2E-07	0	2E-07	0
	Selenium	3	NA	0.0000	NA	NA	0E+00	0.00003	0E+00	*-0.00008*
	Uranium	50	NA	0.004	NA	NA	0E+00	0.004	0E+00	0.002
	Vanadium	34	NA	0.0002	NA	NA	0E+00	0.0002	0E+00	*-0.004*
		Cumulative ILCR/HQ:	3E-07	0.005	2E-10	NA	3E-07	0.005	2E-07	*-0.02*
Ponds 1 & 2										
	Arsenic	5.3	1E-07	0.0008	4E-11	NA	1E-07	0.0008	2E-08	*-0.01*
	Radium-226	352	**8E-06**	NA	6E-09	NA	**8E-06**	0	**8E-06**	0
	Selenium	168	NA	0.0016	NA	NA	0E+00	0.002	0E+00	0.001
	Uranium	380	NA	0.03	NA	NA	0E+00	0.03	0E+00	0.03
	Vanadium	129	NA	0.0009	NA	NA	0E+00	0.0009	0E+00	*-0.003*
		Cumulative ILCR/HQ:	**8E-06**	0.03	6E-09	NA	**8E-06**	0.03	**8E-06**	*0.01*

Table 4.11
Summary of Human Health Risk Estimates - On-Site
Subsurface Soil - Current/Future On-site Maintenance Personnel - Scenario 1

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]: Ingestion of Soil ILCR	Ingestion of Soil HQ	Inhalation of Fugitive Dust ILCR	Inhalation of Fugitive Dust HQ	Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard ILCR	Total Cancer Risk and Hazard HQ	Incremental Cancer Risk and Hazard [c] ILCR	Incremental Cancer Risk and Hazard [c] HQ
Pond 3/3a									
Arsenic	5.5	1E-07	0.0009	4E-11	NA	1E-07	0.0009	3E-08	*-0.01*
Radium-226	11	2E-07	NA	2E-10	NA	2E-07	0	2E-07	0
Selenium	2	NA	0.0000	NA	NA	0E+00	0.00002	0E+00	*-0.00008*
Uranium	93	NA	0.01	NA	NA	0E+00	0.007	0E+00	0.01
Vanadium	34	NA	0.0002	NA	NA	0E+00	0.0002	0E+00	*-0.004*
Cumulative ILCR/HQ:		4E-07	0.01	2E-10	NA	4E-07	0.01	2E-07	*-0.01*
Sediment Pad									
Arsenic	3.8	1E-07	0.0006	3E-11	NA	1E-07	0.0006	-2E-08	*-0.01*
Radium-226	104	**2E-06**	NA	2E-09	NA	**2E-06**	0	**2E-06**	0
Selenium	86	NA	0.0008	NA	NA	0E+00	0.0008	0E+00	0.0007
Uranium	230	NA	0.02	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	65	NA	0.000	NA	NA	0E+00	0.0004	0E+00	*-0.004*
Cumulative ILCR/HQ:		**2E-06**	0.02	2E-09	NA	**2E-06**	0.02	**2E-06**	*-0.0007*
Sandfill #1									
Arsenic	7.8	2E-07	0.0012	6E-11	NA	2E-07	0.001	8E-08	*-0.01*
Radium-226	106	**2E-06**	NA	2E-09	NA	**2E-06**	0	**2E-06**	0
Selenium	18.4	NA	0.00017	NA	NA	0E+00	0.0002	0E+00	0.00007
Uranium	60	NA	0.005	NA	NA	0E+00	0.005	0E+00	0.003
Vanadium	43	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	*-0.004*
Cumulative ILCR/HQ:		**2E-06**	0.006	2E-09	NA	**3E-06**	0.006	**2E-06**	*-0.01*

Table 4.11
Summary of Human Health Risk Estimates - On-Site
Subsurface Soil - Current/Future On-site Maintenance Personnel - Scenario 1

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]: Ingestion of Soil ILCR	Ingestion of Soil HQ	Inhalation of Fugitive Dust ILCR	Inhalation of Fugitive Dust HQ	Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard ILCR	Total Cancer Risk and Hazard HQ	Incremental Cancer Risk and Hazard [c] ILCR	Incremental Cancer Risk and Hazard [c] HQ
Sandfill #2									
Arsenic	4.7	1E-07	0.001	4E-11	NA	1E-07	0.0007	6E-09	*-0.01*
Radium-226	3	7E-08	NA	6E-11	NA	7E-08	0	4E-08	0
Selenium	0.6	NA	0.00001	NA	NA	0E+00	0.000006	0E+00	*-0.0001*
Uranium	20	NA	0.002	NA	NA	0E+00	0.002	0E+00	*-0.0004*
Vanadium	48	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	*-0.004*
Cumulative ILCR/HQ:		2E-07	0.003	9E-11	NA	2E-07	0.003	5E-08	*-0.02*
Sandfill #3									
Arsenic	5.4	1E-07	0.0009	4E-11	NA	1E-07	0.0009	3E-08	*-0.01*
Radium-226	49	1E-06	NA	9E-10	NA	1E-06	0	1E-06	0
Selenium	39	NA	0.0004	NA	NA	0E+00	0.0004	0E+00	0.0003
Uranium	356	NA	0.03	NA	NA	0E+00	0.03	0E+00	0.03
Vanadium	51	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	*-0.004*
Cumulative ILCR/HQ:		1E-06	0.03	9E-10	NA	1E-06	0.03	1E-06	0.009
NEMSA									
Arsenic	3.7	9E-08	0.0006	3E-11	NA	9E-08	0.0006	*-2E-08*	*-0.01*
Radium-226	69	**2E-06**	NA	1E-09	NA	**2E-06**	0	1E-06	0
Selenium	119	NA	0.0011	NA	NA	0E+00	0.001	0E+00	0.001
Uranium	242	NA	0.019	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	39	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	*-0.004*
Cumulative ILCR/HQ:		**2E-06**	0.021	1E-09	NA	**2E-06**	0.02	1E-06	0.0004

Table 4.11
Summary of Human Health Risk Estimates - On-Site
Subsurface Soil - Current/Future On-site Maintenance Personnel - Scenario 1

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]: Ingestion of Soil ILCR	Ingestion of Soil HQ	Inhalation of Fugitive Dust ILCR	Inhalation of Fugitive Dust HQ	Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard ILCR	Total Cancer Risk and Hazard HQ	Incremental Cancer Risk and Hazard [c] ILCR	Incremental Cancer Risk and Hazard [c] HQ
Boneyard									
Arsenic	4.6	1E-07	0.0007	3E-11	NA	1E-07	0.0007	4E-09	*-0.01*
Radium-226	36	8E-07	NA	7E-10	NA	8E-07	0	8E-07	0
Selenium	17	NA	0.0002	NA	NA	0E+00	0.0002	0E+00	0.000060
Uranium	124	NA	0.0097	NA	NA	0E+00	0.01	0E+00	0.008
Vanadium	32	NA	0.0002	NA	NA	0E+00	0.0002	0E+00	*-0.004*
Cumulative ILCR/HQ:		9E-07	0.011	7E-10	NA	9E-07	0.01	8E-07	*-0.01*
BACKGROUND									
Arsenic	4.4	1E-07	0.01	3E-11	NA	1E-07	0.01	NA	NA
Molybdenum	ND	NA	NA	NA	NA	0E+00	0	NA	NA
Radium-226	1.1	2E-08	NA	2E-11	NA	2E-08	0	NA	NA
Selenium	0.53	NA	0.0001	NA	NA	0E+00	0.0001	NA	NA
Uranium	1.2	NA	0.002	NA	NA	0E+00	0.002	NA	NA
Vanadium	29	NA	0.004	NA	NA	0E+00	0.004	NA	NA
Cumulative ILCR/HQ:		1E-07	0.02	5E-11	NA	1E-07	0.02	NA	NA
USEPA Risk Range:						10-6 - 10-4	1	10-6 - 10-4	1

Table 4.11
Summary of Human Health Risk Estimates - On-Site
Subsurface Soil - Current/Future On-site Maintenance Personnel - Scenario 1

	Soil Concentration	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
ND - Not detected in background samples.

Table 4.12
Summary of Human Health Risk Estimates - On-Site
Subsurface Soil - Current/Future On-site Maintenance Personnel - Scenario 2

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]						Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
NECR-1											
Arsenic	5.2	1E-07	0.0008	4E-11	NA	NA	NA	1E-07	0.0008	2E-08	0.0001
Radium-226	46	1E-06	NA	8E-10	NA	**1E-04**	NA	**1E-04**	0	**1E-04**	0
Selenium	15	NA	0.0001	NA	NA	NA	NA	0E+00	0.0001	0E+00	0.0001
Uranium	87	NA	0.007	NA	NA	NA	NA	0E+00	0.007	0E+00	0.007
Vanadium	46	NA	0.0003	NA	NA	NA	NA	0E+00	0.0003	0E+00	0.00012
Cumulative ILCR/HQ:		1E-06	0.01	9E-10	NA	**1E-04**	NA	**1E-04**	0.008	**1E-04**	0.007
NECR-2											
Arsenic	3.5	9E-08	0.0006	3E-11	NA	NA	NA	9E-08	0.0006	-2E-08	-0.0001
Radium-226	10	2E-07	NA	2E-10	NA	**2E-05**	NA	**2E-05**	0	**2E-05**	0
Selenium	3	NA	0.00003	NA	NA	NA	NA	0E+00	0.00003	0E+00	0.00002
Uranium	50	NA	0.004	NA	NA	NA	NA	0E+00	0.004	0E+00	0.004
Vanadium	34	NA	0.0002	NA	NA	NA	NA	0E+00	0.0002	0E+00	0.00003
Cumulative ILCR/HQ:		3E-07	0.005	2E-10	NA	**2E-05**	NA	**2E-05**	0.005	**2E-05**	0.004
Ponds 1 & 2											
Arsenic	5.3	1E-07	0.0008	4E-11	NA	NA	NA	1E-07	0.0008	2E-08	0.0001
Radium-226	352	**8E-06**	NA	6E-09	NA	**8E-04**	NA	**8E-04**	0	**8E-04**	0
Selenium	168	NA	0.002	NA	NA	NA	NA	0E+00	0.002	0E+00	0.002
Uranium	380	NA	0.03	NA	NA	NA	NA	0E+00	0.03	0E+00	0.03
Vanadium	129	NA	0.0009	NA	NA	NA	NA	0E+00	0.0009	0E+00	0.0007
Cumulative ILCR/HQ:		**8E-06**	0.03	6E-09	NA	**8E-04**	NA	**8E-04**	0.03	**8E-04**	0.03

Table 4.12 Summary of Human Health Risk Estimates - On-Site Subsurface Soil - Current/Future On-site Maintenance Personnel - Scenario 2												
		Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]						Combined Pathway Risk and Hazard Estimates				
	Soil Concentration	Ingestion of Soil		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]		
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	
Pond 3/3a												
Arsenic	5.5	1E-07	0.0009	4E-11	NA	NA	NA	1E-07	0.0009	3E-08	0.0002	
Radium-226	11	2E-07	NA	2E-10	NA	**2E-05**	NA	**2E-05**	0	**2E-05**	0	
Selenium	2	NA	0.00002	NA	NA	NA	NA	0E+00	0.00002	0E+00	0.00002	
Uranium	93	NA	0.01	NA	NA	NA	NA	0E+00	0.007	0E+00	0.007	
Vanadium	34	NA	0.0002	NA	NA	NA	NA	0E+00	0.0002	0E+00	0.00004	
Cumulative ILCR/HQ:		4E-07	0.01	2E-10	NA	**2E-05**	NA	**2E-05**	0.008	**2E-05**	0.007	
Sediment Pad												
Arsenic	3.8	1E-07	0.0006	3E-11	NA	NA	NA	1E-07	0.0006	*-2E-08*	*-0.00009*	
Radium-226	104	**2E-06**	NA	2E-09	NA	**2E-04**	NA	**2E-04**	0	**2E-04**	0	
Selenium	86	NA	0.0008	NA	NA	NA	NA	0E+00	0.0008	0E+00	0.0008	
Uranium	230	NA	0.02	NA	NA	NA	NA	0E+00	0.02	0E+00	0.02	
Vanadium	65	NA	0.000	NA	NA	NA	NA	0E+00	0.0004	0E+00	0.0002	
Cumulative ILCR/HQ:		**2E-06**	0.02	2E-09	NA	**2E-04**	NA	**2E-04**	0.02	**2E-04**	0.02	
Sandfill #1												
Arsenic	7.8	2E-07	0.001	6E-11	NA	NA	NA	2E-07	0.001	8E-08	0.0005	
Radium-226	106	**2E-06**	NA	2E-09	NA	**2E-04**	NA	**2E-04**	0	**2E-04**	0	
Selenium	18.4	NA	0.0002	NA	NA	NA	NA	0E+00	0.0002	0E+00	0.0002	
Uranium	60	NA	0.005	NA	NA	NA	NA	0E+00	0.005	0E+00	0.005	
Vanadium	43	NA	0.0003	NA	NA	NA	NA	0E+00	0.0003	0E+00	0.00009	
Cumulative ILCR/HQ:		**2E-06**	0.006	2E-09	NA	**2E-04**	NA	**2E-04**	0.006	**2E-04**	0.005	
Sandfill #2												
Arsenic	4.7	1E-07	0.001	4E-11	NA	NA	NA	1E-07	0.0007	6E-09	0.00004	
Radium-226	3	7E-08	NA	6E-11	NA	**7E-06**	NA	**7E-06**	0	**5E-06**	0	
Selenium	0.6	NA	0.00001	NA	NA	NA	NA	0E+00	0.000006	0E+00	0.0000007	
Uranium	20	NA	0.002	NA	NA	NA	NA	0E+00	0.002	0E+00	0.001	
Vanadium	48	NA	0.0003	NA	NA	NA	NA	0E+00	0.0003	0E+00	0.0001	
Cumulative ILCR/HQ:		2E-07	0.003	9E-11	NA	**7E-06**	NA	**7E-06**	0.003	**5E-06**	0.002	

Table 4.12 Summary of Human Health Risk Estimates - On-Site Subsurface Soil - Current/Future On-site Maintenance Personnel - Scenario 2												
		Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]						Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
Sandfill #3											
Arsenic	5.4	1E-07	0.0009	4E-11	NA	NA	NA	1E-07	0.0009	3E-08	0.0002
Radium-226	49	1E-06	NA	9E-10	NA	**1E-04**	NA	**1E-04**	0	**1E-04**	0
Selenium	39	NA	0.0004	NA	NA	NA	NA	0E+00	0.0004	0E+00	0.0004
Uranium	356	NA	0.03	NA	NA	NA	NA	0E+00	0.03	0E+00	0.03
Vanadium	51	NA	0.0003	NA	NA	NA	NA	0E+00	0.0003	0E+00	0.0001
Cumulative ILCR/HQ:		1E-06	0.03	9E-10	NA	**1E-04**	NA	**1E-04**	0.03	**1E-04**	0.03
NEMSA											
Arsenic	3.7	9E-08	0.0006	3E-11	NA	NA	NA	9E-08	0.0006	*-2E-08*	*-0.0001*
Radium-226	69	**2E-06**	NA	1E-09	NA	**2E-04**	NA	**2E-04**	0	**2E-04**	0
Selenium	119	NA	0.001	NA	NA	NA	NA	0E+00	0.001	0E+00	0.001
Uranium	242	NA	0.02	NA	NA	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	39	NA	0.0003	NA	NA	NA	NA	0E+00	0.0003	0E+00	0.00007
Cumulative ILCR/HQ:		**2E-06**	0.02	1E-09	NA	**2E-04**	NA	**2E-04**	0.02	**2E-04**	0.02
Boneyard											
Arsenic	4.6	1E-07	0.0007	3E-11	NA	NA	NA	1E-07	0.0007	4E-09	0.00002
Radium-226	36	8E-07	NA	7E-10	NA	**8E-05**	NA	**8E-05**	0	**8E-05**	0
Selenium	17	NA	0.0002	NA	NA	NA	NA	0E+00	0.0002	0E+00	0.0002
Uranium	124	NA	0.01	NA	NA	NA	NA	0E+00	0.01	0E+00	0.01
Vanadium	32	NA	0.0002	NA	NA	NA	NA	0E+00	0.0002	0E+00	0.00002
Cumulative ILCR/HQ:		9E-07	0.01	7E-10	NA	**8E-05**	NA	**8E-05**	0.01	**8E-05**	0.01

Table 4.12
Summary of Human Health Risk Estimates - On-Site
Subsurface Soil - Current/Future On-site Maintenance Personnel - Scenario 2

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]: Ingestion of Soil ILCR	Ingestion of Soil HQ	Inhalation of Fugitive Dust ILCR	Inhalation of Fugitive Dust HQ	External Exposure ILCR	External Exposure HQ	Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard ILCR	Total Cancer Risk and Hazard HQ	Incremental Cancer Risk and Hazard [c] ILCR	Incremental Cancer Risk and Hazard [c] HQ
BACKGROUND											
Arsenic	4.4	1E-07	0.0007	3E-11	NA	NA	NA	1E-07	0.0007	NA	NA
Molybdenum	ND	NA	NA	NA	NA	NA	NA	0E+00	0	NA	NA
Radium-226	1.1	2E-08	NA	2E-11	NA	**2E-06**	NA	**2E-06**	0	NA	NA
Selenium	0.53	NA	0.000005	NA	NA	NA	NA	0E+00	0.000005	NA	NA
Uranium	1.2	NA	0.00009	NA	NA	NA	NA	0E+00	0.00009	NA	NA
Vanadium	29	NA	0.0002	NA	NA	NA	NA	0E+00	0.0002	NA	NA
Cumulative ILCR/HQ:		1E-07	0.001	5E-11	NA	**2E-06**	NA	**3E-06**	0.001	NA	NA
							USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
ND - Not detected in background samples.

NA - Not applicable.
USEPA - U. S. Environmental Protection Agency

TABLE 4.13 SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE Shallow Soil - Hypothetical Future On-site Livestock Grazer - Scenario 1									
		Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
NECR-1									
Arsenic	5.2	3E-07	0.002	9E-11	NA	3E-07	0.002	4E-08	0.0003
Molybdenum	29	NA	0.0006	NA	NA	0E+00	0.0006	0E+00	0.0006
Radium-226	39	2E-06	NA	2E-09	NA	2E-06	0	2E-06	0
Selenium	20	NA	0.0004	NA	NA	0E+00	0.0004	0E+00	0.0004
Uranium	117	NA	0.02	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	42	NA	0.0006	NA	NA	0E+00	0.0006	0E+00	0.0002
Cumulative ILCR/HQ:		2E-06	0.02	2E-09	NA	2E-06	0.02	2E-06	0.02
NECR-2									
Arsenic	4.6	3E-07	0.002	8E-11	NA	3E-07	0.002	1E-08	0.0001
Radium-226	39	2E-06	NA	2E-09	NA	2E-06	0	2E-06	0
Selenium	11	NA	0.0002	NA	NA	0E+00	0.0002	0E+00	0.0002
Uranium	85	NA	0.01	NA	NA	0E+00	0.01	0E+00	0.01
Vanadium	40	NA	0.0006	NA	NA	0E+00	0.0006	0E+00	0.0002
Cumulative ILCR/HQ:		2E-06	0.02	2E-09	NA	2E-06	0.02	2E-06	0.01
Ponds 1 & 2									
Arsenic	4.9	3E-07	0.002	8E-11	NA	3E-07	0.002	3E-08	0.0002
Radium-226	179	**9E-06**	NA	7E-09	NA	**9E-06**	0	**8E-06**	0
Selenium	43	NA	0.0009	NA	NA	0E+00	0.0009	0E+00	0.0009
Uranium	223	NA	0.04	NA	NA	0E+00	0.04	0E+00	0.04
Vanadium	89	NA	0.001	NA	NA	0E+00	0.001	0E+00	0.001
Cumulative ILCR/HQ:		**9E-06**	0.04	7E-09	NA	**9E-06**	0.04	**9E-06**	0.04
Pond 3/3a									
Arsenic	6.0	3E-07	0.002	1E-10	NA	3E-07	0.002	8E-08	0.0005
Radium-226	253	**1E-05**	NA	1E-08	NA	**1E-05**	0	**1E-05**	0
Selenium	21	NA	0.0004	NA	NA	0E+00	0.0004	0E+00	0.0004
Uranium	1,141	NA	0.2	NA	NA	0E+00	0.2	0E+00	0.2
Vanadium	58	NA	0.0008	NA	NA	0E+00	0.0008	0E+00	0.0004
Cumulative ILCR/HQ:		**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	**1E-05**	0.2

TABLE 4.13
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Shallow Soil - Hypothetical Future On-site Livestock Grazer - Scenario 1

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
Sediment Pad									
Arsenic	4.5	2E-07	0.002	7E-11	NA	2E-07	0.002	4E-09	0.00002
Radium-226	109	**5E-06**	NA	4E-09	NA	**5E-06**	0	**5E-06**	0
Selenium	43	NA	0.0009	NA	NA	0E+00	0.0009	0E+00	0.0009
Uranium	513	NA	0.09	NA	NA	0E+00	0.09	0E+00	0.09
Vanadium	223	NA	0.003	NA	NA	0E+00	0.003	0E+00	0.003
Cumulative ILCR/HQ:		**5E-06**	0.09	4E-09	NA	**5E-06**	0.09	**5E-06**	0.09
Sandfill #1									
Arsenic	4.7	3E-07	0.002	8E-11	NA	3E-07	0.002	2E-08	0.0001
Radium-226	15	7E-07	NA	6E-10	NA	7E-07	0	6E-07	0
Selenium	4.5	NA	0.00009	NA	NA	0E+00	0.00009	0E+00	0.00008
Uranium	16	NA	0.003	NA	NA	0E+00	0.003	0E+00	0.002
Vanadium	35	NA	0.0005	NA	NA	0E+00	0.0005	0E+00	0.00009
Cumulative ILCR/HQ:		1E-06	0.005	7E-10	NA	1E-06	0.005	7E-07	0.003
Sandfill #2									
Arsenic	6.4	3E-07	0.002	1E-10	NA	3E-07	0.002	1E-07	0.0007
Radium-226	19	9E-07	NA	8E-10	NA	9E-07	0	9E-07	0
Selenium	3.4	NA	0.00007	NA	NA	0E+00	0.00007	0E+00	0.00006
Uranium	20	NA	0.003	NA	NA	0E+00	0.003	0E+00	0.003
Vanadium	42	NA	0.0006	NA	NA	0E+00	0.0006	0E+00	0.0002
Cumulative ILCR/HQ:		1E-06	0.006	9E-10	NA	1E-06	0.006	1E-06	0.004
Sandfill #3									
Arsenic	4.0	2E-07	0.001	7E-11	NA	2E-07	0.001	*-2E-08*	*-0.0001*
Radium-226	69	**3E-06**	NA	3E-09	NA	**3E-06**	0	3E-06	0
Selenium	18	NA	0.0004	NA	NA	0E+00	0.0004	0E+00	0.0004
Uranium	185	NA	0.03	NA	NA	0E+00	0.03	0E+00	0.03
Vanadium	55	NA	0.0008	NA	NA	0E+00	0.0008	0E+00	0.0004
Cumulative ILCR/HQ:		**4E-06**	0.03	3E-09	NA	**4E-06**	0.03	3E-06	0.03

TABLE 4.13
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Shallow Soil - Hypothetical Future On-site Livestock Grazer - Scenario 1

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
NEMSA									
Arsenic	4.3	2E-07	0.001	7E-11	NA	2E-07	0.001	*-8E-09*	*-0.00005*
Radium-226	42	2E-06	NA	2E-09	NA	2E-06	0	2E-06	0
Selenium	12	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	0.0002
Uranium	75	NA	0.01	NA	NA	0E+00	0.01	0E+00	0.01
Vanadium	36	NA	0.0005	NA	NA	0E+00	0.0005	0E+00	0.0001
Cumulative ILCR/HQ:		2E-06	0.02	2E-09	NA	2E-06	0.02	2E-06	0.01
Boneyard									
Arsenic	5.5	3E-07	0.002	9E-11	NA	3E-07	0.002	6E-08	0.0004
Radium-226	46	2E-06	NA	2E-09	NA	2E-06	0	2E-06	0
Selenium	11	NA	0.0002	NA	NA	0E+00	0.0002	0E+00	0.0002
Uranium	12	NA	0.002	NA	NA	0E+00	0.002	0E+00	0.002
Vanadium	37	NA	0.0005	NA	NA	0E+00	0.0005	0E+00	0.0001
Cumulative ILCR/HQ:		2E-06	0.005	2E-09	NA	2E-06	0.005	2E-06	0.003
Vents 3 & 8									
Arsenic	4.4	2E-07	0.001	7E-11	NA	2E-07	0.001	*-4E-09*	*-0.00003*
Radium-226	92	**4E-06**	NA	4E-09	NA	**4E-06**	0	**4E-06**	0
Selenium	27	NA	0.0006	NA	NA	0E+00	0.0006	0E+00	0.0005
Uranium	224	NA	0.04	NA	NA	0E+00	0.04	0E+00	0.04
Vanadium	47	NA	0.0007	NA	NA	0E+00	0.0007	0E+00	0.0003
Cumulative ILCR/HQ:		**5E-06**	0.04	4E-09	NA	**5E-06**	0.04	**4E-06**	0.04

TABLE 4.13 SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE Shallow Soil - Hypothetical Future On-site Livestock Grazer - Scenario 1									
		Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
Trailer Park									
Arsenic	6.1	3E-07	0.002	1E-10	NA	3E-07	0.002	9E-08	0.001
Radium-226	32	2E-06	NA	1E-09	NA	2E-06	0	1E-06	0
Selenium	71	NA	0.001	NA	NA	0E+00	0.001	0E+00	0.001
Uranium	96	NA	0.02	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	69	NA	0.02	NA	NA	0E+00	0.02	0E+00	0.02
	Cumulative ILCR/HQ:	2E-06	0.04	1E-09	NA	2E-06	0.04	2E-06	0.04
BACKGROUND									
Arsenic	4.4	2E-07	0.002	7E-11	NA	2E-07	0.002	NA	NA
Molybdenum	ND	NA	NA	NA	NA	0E+00	0	NA	NA
Radium-226	1.1	5E-08	NA	4E-11	NA	5E-08	0	NA	NA
Selenium	0.53	NA	0.00001	NA	NA	0E+00	0.00001	NA	NA
Uranium	1.2	NA	0.0002	NA	NA	0E+00	0.0002	NA	NA
Vanadium	29	NA	0.0004	NA	NA	0E+00	0.0004	NA	NA
	Cumulative ILCR/HQ:	3E-07	0.002	1E-10	NA	3E-07	0.002	NA	NA
					USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

TABLE 4.13 SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE Shallow Soil - Hypothetical Future On-site Livestock Grazer - Scenario 1									
	Soil Concentration	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
ND - Not detected in background samples.

TABLE 4.14
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Shallow Soil - Hypothetical Future On-site Livestock Grazer - Scenario 2

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]								Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Ingestion of Meat		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
NECR-1													
Arsenic	5.2	3E-07	0.002	NA	NA	9E-11	NA	NA	NA	3E-07	0.002	4E-08	0.0003
Molybdenum	29	NA	0.0006	NA	NA	NA	NA	NA	NA	0E+00	0.0006	0E+00	*-0.0009*
Radium-226	39	**2E-06**	NA	**1E-03**	NA	2E-09	NA	**2E-04**	NA	**2E-03**	0	**1E-03**	0
Selenium	20	NA	0.0004	NA	NA	NA	NA	NA	NA	0E+00	0.0004	0E+00	0.0004
Uranium	117	NA	0.02	NA	NA	NA	NA	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	42	NA	0.0006	NA	NA	NA	NA	NA	NA	0E+00	0.0006	0E+00	0.0002
Cumulative ILCR/HQ:		**2E-06**	0.02	**1E-03**		2E-09	NA	**2E-04**	NA	**2E-03**	0.02	**1E-03**	0.02
NECR-2													
Arsenic	4.6	3E-07	0.002	NA	NA	8E-11	NA	NA	NA	3E-07	0.002	1E-08	0.00007
Radium-226	39	**2E-06**	NA	**1E-03**	NA	2E-09	NA	**2E-04**	NA	**2E-03**	0	**1E-03**	0
Selenium	11	NA	0.0002	NA	NA	NA	NA	NA	NA	0E+00	0.0002	0E+00	0.0002
Uranium	85	NA	0.01	NA	NA	NA	NA	NA	NA	0E+00	0.01	0E+00	0.01
Vanadium	40	NA	0.0006	NA	NA	NA	NA	NA	NA	0E+00	0.0006	0E+00	0.0002
Cumulative ILCR/HQ:		**2E-06**	0.02	**1E-03**		2E-09	NA	**2E-04**	NA	**2E-03**	0.02	**1E-03**	0.01
Ponds 1 & 2													
Arsenic	4.9	3E-07	0.002	NA	NA	8E-11	NA	NA	NA	3E-07	0.002	3E-08	0.0002
Radium-226	179	**9E-06**	NA	**6E-03**	NA	7E-09	NA	**9E-04**	NA	**7E-03**	0	**7E-03**	0
Selenium	43	NA	0.0009	NA	NA	NA	NA	NA	NA	0E+00	0.0009	0E+00	0.0009
Uranium	223	NA	0.04	NA	NA	NA	NA	NA	NA	0E+00	0.04	0E+00	0.04
Vanadium	89	NA	0.001	NA	NA	NA	NA	NA	NA	0E+00	0.001	0E+00	0.0009
Cumulative ILCR/HQ:		**9E-06**	0.04	**6E-03**		7E-09	NA	**9E-04**	NA	**7E-03**	0.04	**7E-03**	0.04
Pond 3/3a													
Arsenic	6.0	3E-07	0.002	NA	NA	1E-10	NA	NA	NA	3E-07	0.002	8E-08	0.0005
Radium-226	253	**1E-05**	NA	**9E-03**	NA	1E-08	NA	**1E-03**	NA	**1E-02**	0	**1E-02**	0
Selenium	21	NA	0.0004	NA	NA	NA	NA	NA	NA	0E+00	0.0004	0E+00	0.0004
Uranium	1,141	NA	0.2	NA	NA	NA	NA	NA	NA	0E+00	0.2	0E+00	0.2
Vanadium	58	NA	0.0008	NA	NA	NA	NA	NA	NA	0E+00	0.0008	0E+00	0.0004
Cumulative ILCR/HQ:		**1E-05**	0.2	**9E-03**		1E-08	NA	**1E-03**	NA	**1E-02**	0.2	**1E-02**	0.2
Sediment Pad													
Arsenic	4.5	2E-07	0.002	NA	NA	7E-11	NA	NA	NA	2E-07	0.002	4E-09	0.00002
Radium-226	109	**5E-06**	NA	**4E-03**	NA	4E-09	NA	**5E-04**	NA	**4E-03**	0	**4E-03**	0
Selenium	43	NA	0.0009	NA	NA	NA	NA	NA	NA	0E+00	0.0009	0E+00	0.0009
Uranium	513	NA	0.09	NA	NA	NA	NA	NA	NA	0E+00	0.09	0E+00	0.09
Vanadium	223	NA	0.003	NA	NA	NA	NA	NA	NA	0E+00	0.003	0E+00	0.003
Cumulative ILCR/HQ:		**5E-06**	0.09	**4E-03**		4E-09	NA	**5E-04**	NA	**4E-03**	0.09	**4E-03**	0.09

TABLE 4.14
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Shallow Soil - Hypothetical Future On-site Livestock Grazer - Scenario 2

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates[a]								Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Ingestion of Meat		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard[c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
Sandfill #1													
Arsenic	4.7	3E-07	0.002	NA	NA	8E-11	NA	NA	NA	3E-07	0.002	2E-08	0.0001
Radium-226	15	7E-07	NA	**5E-04**	NA	6E-10	NA	**7E-05**	NA	**6E-04**	0	**5E-04**	0
Selenium	4.5	NA	0.00009	NA	NA	NA	NA	NA	NA	0E+00	0.00009	0E+00	0.00008
Uranium	16	NA	0.003	NA	NA	NA	NA	NA	NA	0E+00	0.003	0E+00	0.002
Vanadium	35	NA	0.0005	NA	NA	NA	NA	NA	NA	0E+00	0.0005	0E+00	0.00009
Cumulative ILCR/HQ:		1E-06	0.005	**5E-04**		7E-10	NA	**7E-05**	NA	**6E-04**	0.005	**5E-04**	0.003
Sandfill #2													
Arsenic	6.4	3E-07	0.002	NA	NA	1E-10	NA	NA	NA	3E-07	0.002	1E-07	0.0007
Radium-226	19	9E-07	NA	**7E-04**	NA	8E-10	NA	**9E-05**	NA	**8E-04**	0	**7E-04**	0
Selenium	3.4	NA	0.00007	NA	NA	NA	NA	NA	NA	0E+00	0.00007	0E+00	0.00006
Uranium	20	NA	0.003	NA	NA	NA	NA	NA	NA	0E+00	0.003	0E+00	0.003
Vanadium	42	NA	0.0006	NA	NA	NA	NA	NA	NA	0E+00	0.0006	0E+00	0.0002
Cumulative ILCR/HQ:		1E-06	0.006	**7E-04**		9E-10	NA	**9E-05**	NA	**8E-04**	0.006	**7E-04**	0.004
Sandfill #3													
Arsenic	4.0	2E-07	0.001	NA	NA	7E-11	NA	NA	NA	2E-07	0.001	*-2E-08*	*-0.0001*
Radium-226	69	**3E-06**	NA	**2E-03**	NA	3E-09	NA	**3E-04**	NA	**3E-03**	0	**3E-03**	0
Selenium	18	NA	0.0004	NA	NA	NA	NA	NA	NA	0E+00	0.0004	0E+00	0.0004
Uranium	185	NA	0.03	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.03
Vanadium	55	NA	0.0008	NA	NA	NA	NA	NA	NA	0E+00	0.0008	0E+00	0.0004
Cumulative ILCR/HQ:		**4E-06**	0.03	**2E-03**		3E-09	NA	**3E-04**	NA	**3E-03**	0.03	**3E-03**	0.03
NEMSA													
Arsenic	4.3	2E-07	0.001	NA	NA	7E-11	NA	NA	NA	2E-07	0.001	*-8E-09*	*-0.00005*
Radium-226	42	**2E-06**	NA	**1E-03**	NA	2E-09	NA	**2E-04**	NA	**2E-03**	0	**2E-03**	0
Selenium	12	NA	0.0003	NA	NA	NA	NA	NA	NA	0E+00	0.0003	0E+00	0.0002
Uranium	75	NA	0.01	NA	NA	NA	NA	NA	NA	0E+00	0.01	0E+00	0.01
Vanadium	36	NA	0.0005	NA	NA	NA	NA	NA	NA	0E+00	0.0005	0E+00	0.0001
Cumulative ILCR/HQ:		**2E-06**	0.02	**1E-03**		2E-09	NA	**2E-04**	NA	**2E-03**	0.02	**2E-03**	0.01
Boneyard													
Arsenic	5.5	3E-07	0.002	NA	NA	9E-11	NA	NA	NA	3E-07	0.002	6E-08	0.0004
Radium-226	46	**2E-06**	NA	**2E-03**	NA	2E-09	NA	**2E-04**	NA	**2E-03**	0	**2E-03**	0
Selenium	11	NA	0.0002	NA	NA	NA	NA	NA	NA	0E+00	0.0002	0E+00	0.0002
Uranium	12	NA	0.002	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.002
Vanadium	37	NA	0.0005	NA	NA	NA	NA	NA	NA	0E+00	0.0005	0E+00	0.0001
Cumulative ILCR/HQ:		**2E-06**	0.005	**2E-03**		2E-09	NA	**2E-04**	NA	**2E-03**	0.005	**2E-03**	0.003

TABLE 4.14
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Shallow Soil - Hypothetical Future On-site Livestock Grazer - Scenario 2

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates[a]								Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Ingestion of Meat		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard[c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
Vents 3 & 8													
Arsenic	4.4	2E-07	0.001	NA	NA	7E-11	NA	NA	NA	2E-07	0.001	*-4E-09*	*-0.00003*
Radium-226	92	**4E-06**	NA	**3E-03**	NA	4E-09	NA	**4E-04**	NA	**4E-03**	0	**4E-03**	0
Selenium	27	NA	0.0006	NA	NA	NA	NA	NA	NA	0E+00	0.0006	0E+00	0.0005
Uranium	224	NA	0.04	NA	NA	NA	NA	NA	NA	0E+00	0.04	0E+00	0.04
Vanadium	47	NA	0.0007	NA	NA	NA	NA	NA	NA	0E+00	0.0007	0E+00	0.0003
Cumulative ILCR/HQ:		**5E-06**	0.04	**3E-03**		4E-09	NA	**4E-04**	NA	**4E-03**	0.04	**4E-03**	0.04
Trailer Park													
Arsenic	6.1	3E-07	0.002	NA	NA	1E-10	NA	NA	NA	3E-07	0.002	9E-08	0.0006
Radium-226	32	**2E-06**	NA	**1E-03**	NA	1E-09	NA	**2E-04**	NA	**1E-03**	0	**1E-03**	0
Selenium	71	NA	0.001	NA	NA	NA	NA	NA	NA	0E+00	0.001	0E+00	0.001
Uranium	96	NA	0.02	NA	NA	NA	NA	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	69	NA	0.001	NA	NA	NA	NA	NA	NA	0E+00	0.001	0E+00	0.0006
Cumulative ILCR/HQ:		**2E-06**	0.02	**1E-03**		1E-09	NA	**2E-04**	NA	**1E-03**	0.02	**1E-03**	0.02
BACKGROUND													
Arsenic	4.4	2E-07	0.002	NA	NA	7E-11	NA	NA	NA	2E-07	0.002	NA	NA
Molybdenum	ND	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0	NA	NA
Radium-226	1.1	5E-08	NA	**4E-05**	NA	4E-11	NA	**5E-06**	NA	**4E-05**	0	NA	NA
Selenium	0.53	NA	0.00001	NA	NA	NA	NA	NA	NA	0E+00	0.00001	NA	NA
Uranium	1.2	NA	0.0002	NA	NA	NA	NA	NA	NA	0E+00	0.0002	NA	NA
Vanadium	29	NA	0.0004	NA	NA	NA	NA	NA	NA	0E+00	0.0004	NA	NA
Cumulative ILCR/HQ:		3E-07	0.002	**4E-05**		1E-10	NA	**5E-06**	NA	**4E-05**	0.002	NA	NA
									USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
ND - Not detected in background samples.

NA - Not applicable.
USEPA - U. S. Environmental Protection Agency

TABLE 4.15
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Subsurface Soil - Hypothetical Future On-site Livestock Grazer - Scenario 1

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
		ILCR	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
NECR-1									
Arsenic	5.2	3E-07	0.002	9E-11	NA	3E-07	0.002	4E-08	0.0003
Radium-226	46	**2E-06**	NA	2E-09	NA	**2E-06**	0	2E-06	0
Selenium	15	NA	0.0003	NA	NA	0E+00	0.0003	0E+00	0.00030
Uranium	87	NA	0.01	NA	NA	0E+00	0.01	0E+00	0.01
Vanadium	46	NA	0.0007	NA	NA	0E+00	0.0007	0E+00	0.0003
Cumulative ILCR/HQ:		**2E-06**	0.02	2E-09	NA	**2E-06**	0.02	2E-06	0.02
NECR-2									
Arsenic	3.5	2E-07	0.001	6E-11	NA	2E-07	0.001	*-5E-08*	*-0.0003*
Radium-226	10	5E-07	NA	4E-10	NA	5E-07	0	4E-07	0
Selenium	3	NA	0.0001	NA	NA	0E+00	0.00006	0E+00	0.00004
Uranium	50	NA	0.009	NA	NA	0E+00	0.009	0E+00	0.008
Vanadium	34	NA	0.0005	NA	NA	0E+00	0.0005	0E+00	0.00007
Cumulative ILCR/HQ:		7E-07	0.01	4E-10	NA	7E-07	0.01	4E-07	0.01
Ponds 1 & 2									
Arsenic	5.3	3E-07	0.002	9E-11	NA	3E-07	0.002	5E-08	0.0003
Radium-226	352	**2E-05**	NA	1E-08	NA	**2E-05**	0	**2E-05**	0
Selenium	168	NA	0.003	NA	NA	0E+00	0.003	0E+00	0.003
Uranium	380	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.06
Vanadium	129	NA	0.002	NA	NA	0E+00	0.002	0E+00	0.001
Cumulative ILCR/HQ:		**2E-05**	0.07	1E-08	NA	**2E-05**	0.07	**2E-05**	0.07
Pond 3/3a									
Arsenic	5.5	3E-07	0.002	9E-11	NA	3E-07	0.002	6E-08	0.0004
Radium-226	11	5E-07	NA	5E-10	NA	5E-07	0	5E-07	0
Selenium	2	NA	0.00005	NA	NA	0E+00	0.00005	0E+00	*0.00004*
Uranium	93	NA	0.02	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	34	NA	0.0005	NA	NA	0E+00	0.0005	0E+00	0.00008
Cumulative ILCR/HQ:		8E-07	0.02	5E-10	NA	8E-07	0.02	5E-07	0.02

TABLE 4.15 SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE Subsurface Soil - Hypothetical Future On-site Livestock Grazer - Scenario 1										
	Soil Concentration	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates				
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]		
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	
Sediment Pad										
Arsenic	3.8	2E-07	0.001	6E-11	NA	2E-07	0.001	-3E-08	*-0.0002*	
Radium-226	104	**5E-06**	NA	4E-09	NA	**5E-06**	0	**5E-06**	0	
Selenium	86	NA	0.002	NA	NA	0E+00	0.002	0E+00	0.002	
Uranium	230	NA	0.04	NA	NA	0E+00	0.04	0E+00	0.04	
Vanadium	65	NA	0.001	NA	NA	0E+00	0.0009	0E+00	0.0005	
Cumulative ILCR/HQ:		**5E-06**	0.04	4E-09	NA	**5E-06**	0.04	**5E-06**	0.04	
Sandfill #1										
Arsenic	7.8	4E-07	0.003	1E-10	NA	4E-07	0.003	2E-07	0.001	
Radium-226	106	**5E-06**	NA	4E-09	NA	**5E-06**	0	**5E-06**	0	
Selenium	18.4	NA	0.0004	NA	NA	0E+00	0.0004	0E+00	0.0004	
Uranium	60	NA	0.010	NA	NA	0E+00	0.01	0E+00	0.01	
Vanadium	43	NA	0.0006	NA	NA	0E+00	0.0006	0E+00	0.0002	
Cumulative ILCR/HQ:		**5E-06**	0.01	4E-09	NA	**5E-06**	0.01	**5E-06**	0.01	
Sandfill #2										
Arsenic	4.7	3E-07	0.002	8E-11	NA	3E-07	0.002	1E-08	0.00008	
Radium-226	3	2E-07	NA	1E-10	NA	2E-07	0	1E-07	0	
Selenium	0.6	NA	0.00001	NA	NA	0E+00	0.00001	0E+00	0.000002	
Uranium	20	NA	0.003	NA	NA	0E+00	0.003	0E+00	0.003	
Vanadium	48	NA	0.0007	NA	NA	0E+00	0.0007	0E+00	0.0003	
Cumulative ILCR/HQ:		4E-07	0.006	2E-10	NA	4E-07	0.006	1E-07	0.004	
Sandfill #3										
Arsenic	5.4	3E-07	0.002	9E-11	NA	3E-07	0.002	5E-08	0.0003	
Radium-226	49	**2E-06**	NA	2E-09	NA	**2E-06**	0	**2E-06**	0	
Selenium	39	NA	0.0008	NA	NA	0E+00	0.0008	0E+00	0.0008	
Uranium	356	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.06	
Vanadium	51	NA	0.0007	NA	NA	0E+00	0.0007	0E+00	0.0003	
Cumulative ILCR/HQ:		**3E-06**	0.06	2E-09	NA	**3E-06**	0.06	**2E-06**	0.06	

TABLE 4.15
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Subsurface Soil - Hypothetical Future On-site Livestock Grazer - Scenario 1

	Soil Concentration	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
NEMSA									
Arsenic	3.7	2E-07	0.001	6E-11	NA	2E-07	0.001	*-4E-08*	*-0.0002*
Radium-226	69	**3E-06**	NA	3E-09	NA	**3E-06**	0	**3E-06**	0
Selenium	119	NA	0.002	NA	NA	0E+00	0.002	0E+00	0.002
Uranium	242	NA	0.04	NA	NA	0E+00	0.04	0E+00	0.04
Vanadium	39	NA	0.0006	NA	NA	0E+00	0.0006	0E+00	0.0001
Cumulative ILCR/HQ:		**4E-06**	0.05	3E-09	NA	**4E-06**	0.05	**3E-06**	0.04
Boneyard									
Arsenic	4.6	3E-07	0.002	8E-11	NA	3E-07	0.002	8E-09	0.00005
Radium-226	36	**2E-06**	NA	1E-09	NA	**2E-06**	0	**2E-06**	0
Selenium	17	NA	0.0004	NA	NA	0E+00	0.0004	0E+00	0.0003
Uranium	124	NA	0.02	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	32	NA	0.0005	NA	NA	0E+00	0.0005	0E+00	0.00005
Cumulative ILCR/HQ:		**2E-06**	0.02	2E-09	NA	**2E-06**	0.02	**2E-06**	0.02
BACKGROUND									
Arsenic	4.4	2E-07	0.002	7E-11	NA	2E-07	0.002	NA	NA
Molybdenum	ND	NA	NA	NA	NA	0E+00	0	NA	NA
Radium-226	1.1	5E-08	NA	4E-11	NA	5E-08	0	NA	NA
Selenium	0.53	NA	0.00001	NA	NA	0E+00	0.00001	NA	NA
Uranium	1.2	NA	0.0002	NA	NA	0E+00	0.0002	NA	NA
Vanadium	29	NA	0.0004	NA	NA	0E+00	0.0004	NA	NA
Cumulative ILCR/HQ:		3E-07	0.002	1E-10	NA	3E-07	0.002	NA	NA
USEPA Risk Range:						10-6 - 10-4	1	10-6 - 10-4	1

TABLE 4.15 SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE Subsurface Soil - Hypothetical Future On-site Livestock Grazer - Scenario 1										
		Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates				
	Soil Concentration	Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]		
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
ND - Not detected in background samples.

TABLE 4.16
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Subsurface Soil - Hypothetical Future On-site Livestock Grazer - Scenario 2

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]								Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Ingestion of Meat		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
NECR-1													
Arsenic	5.2	3E-07	0.002	NA	NA	9E-11	NA	NA	NA	3E-07	0.002	4E-08	0.0003
Radium-226	46	**2E-06**	NA	**2E-03**	NA	2E-09	NA	**2E-04**	NA	**2E-03**	0	**2E-03**	0
Selenium	15	NA	0.0003	NA	NA	NA	NA	NA	NA	0E+00	0.0003	0E+00	0.0003
Uranium	87	NA	0.01	NA	NA	NA	NA	NA	NA	0E+00	0.01	0E+00	0.01
Vanadium	46	NA	0.0007	NA	NA	NA	NA	NA	NA	0E+00	0.0007	0E+00	0.0003
Cumulative ILCR/HQ:		**2E-06**	0.02	**2E-03**		2E-09	NA	**2E-04**	NA	**2E-03**	0.02	**2E-03**	0.02
NECR-2													
Arsenic	3.5	2E-07	0.001	NA	NA	6E-11	NA	NA	NA	2E-07	0.001	*-5E-08*	*-0.0003*
Radium-226	10	5E-07	NA	**3E-04**	NA	4E-10	NA	**5E-05**	NA	**4E-04**	0	**3E-04**	0
Selenium	3	NA	0.00006	NA	NA	NA	NA	NA	NA	0E+00	0.00006	0E+00	0.00004
Uranium	50	NA	0.009	NA	NA	NA	NA	NA	NA	0E+00	0.009	0E+00	0.008
Vanadium	34	NA	0.0005	NA	NA	NA	NA	NA	NA	0E+00	0.0005	0E+00	0.00007
Cumulative ILCR/HQ:		7E-07	0.010	**3E-04**		4E-10	NA	**5E-05**	NA	**4E-04**	0.01	**3E-04**	0.008
Ponds 1 & 2													
Arsenic	5.3	3E-07	0.002	NA	NA	9E-11	NA	NA	NA	3E-07	0.002	5E-08	0.0003
Radium-226	352	**2E-05**	NA	**1E-02**	NA	1E-08	NA	**2E-03**	NA	**1E-02**	0	**1E-02**	0
Selenium	168	NA	0.003	NA	NA	NA	NA	NA	NA	0E+00	0.003	0E+00	0.003
Uranium	380	NA	0.06	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.06
Vanadium	129	NA	0.002	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.001
Cumulative ILCR/HQ:		**2E-05**	0.07	**1E-02**		1E-08	NA	**2E-03**	NA	**1E-02**	0.07	**1E-02**	0.07
Pond 3/3a													
Arsenic	5.5	3E-07	0.002	NA	NA	9E-11	NA	NA	NA	3E-07	0.002	6E-08	0.0004
Radium-226	11	5E-07	NA	**4E-04**	NA	5E-10	NA	**5E-05**	NA	**4E-04**	0	**4E-04**	0
Selenium	2	NA	0.00005	NA	NA	NA	NA	NA	NA	0E+00	0.00005	0E+00	0.00004
Uranium	93	NA	0.02	NA	NA	NA	NA	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	34	NA	0.0005	NA	NA	NA	NA	NA	NA	0E+00	0.0005	0E+00	0.00008
Cumulative ILCR/HQ:		8E-07	0.02	**4E-04**		5E-10	NA	**5E-05**	NA	**4E-04**	0.02	**4E-04**	0.02
Sediment Pad													
Arsenic	3.8	2E-07	0.001	NA	NA	6E-11	NA	NA	NA	2E-07	0.001	*-3E-08*	*-0.00020*
Radium-226	104	**5E-06**	NA	**4E-03**	NA	4E-09	NA	**5E-04**	NA	**4E-03**	0	**4E-03**	0
Selenium	86	NA	0.002	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.002
Uranium	230	NA	0.04	NA	NA	NA	NA	NA	NA	0E+00	0.04	0E+00	0.04
Vanadium	65	NA	0.0009	NA	NA	NA	NA	NA	NA	0E+00	0.0009	0E+00	0.0005
Cumulative ILCR/HQ:		**5E-06**	0.04	**4E-03**		4E-09	NA	**5E-04**	NA	**4E-03**	0.04	**4E-03**	0.04

TABLE 4.16
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Subsurface Soil - Hypothetical Future On-site Livestock Grazer - Scenario 2

	Soil Concentration	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]								Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Ingestion of Meat		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
Sandfill #1													
Arsenic	7.8	4E-07	0.003	NA	NA	1E-10	NA	NA	NA	4E-07	0.003	2E-07	0.001
Radium-226	106	**5E-06**	NA	**4E-03**	NA	4E-09	NA	**5E-04**	NA	**4E-03**	0	**4E-03**	0
Selenium	18.4	NA	0.0004	NA	NA	NA	NA	NA	NA	0E+00	0.0004	0E+00	0.0004
Uranium	60	NA	0.01	NA	NA	NA	NA	NA	NA	0E+00	0.01	0E+00	0.01
Vanadium	43	NA	0.0006	NA	NA	NA	NA	NA	NA	0E+00	0.0006	0E+00	0.0002
Cumulative ILCR/HQ:		**5E-06**	0.01	**4E-03**		4E-09	NA	**5E-04**	NA	**4E-03**	0.01	**4E-03**	0.01
Sandfill #2													
Arsenic	4.7	3E-07	0.002	NA	NA	8E-11	NA	NA	NA	3E-07	0.002	1E-08	0.00008
Radium-226	3	2E-07	NA	**1E-04**	NA	1E-10	NA	**2E-05**	NA	**1E-04**	0	**8E-05**	0
Selenium	0.6	NA	0.00001	NA	NA	NA	NA	NA	NA	0E+00	0.00001	0E+00	0.000002
Uranium	20	NA	0.003	NA	NA	NA	NA	NA	NA	0E+00	0.003	0E+00	0.003
Vanadium	48	NA	0.0007	NA	NA	NA	NA	NA	NA	0E+00	0.0007	0E+00	0.0003
Cumulative ILCR/HQ:		4E-07	0.006	**1E-04**		2E-10	NA	**2E-05**	NA	**1E-04**	0.006	**8E-05**	0.004
Sandfill #3													
Arsenic	5.4	3E-07	0.002	NA	NA	9E-11	NA	NA	NA	3E-07	0.002	5E-08	0.0003
Radium-226	49	**2E-06**	NA	**2E-03**	NA	2E-09	NA	**2E-04**	NA	**2E-03**	0	**2E-03**	0
Selenium	39	NA	0.0008	NA	NA	NA	NA	NA	NA	0E+00	0.0008	0E+00	0.0008
Uranium	356	NA	0.06	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.06
Vanadium	51	NA	0.0007	NA	NA	NA	NA	NA	NA	0E+00	0.0007	0E+00	0.0003
Cumulative ILCR/HQ:		**3E-06**	0.06	**2E-03**		2E-09	NA	**2E-04**	NA	**2E-03**	0.06	**2E-03**	0.06
NEMSA													
Arsenic	3.7	2E-07	0.001	NA	NA	6E-11	NA	NA	NA	2E-07	0.001	*-4E-08*	*-0.00023*
Radium-226	69	**3E-06**	NA	**2E-03**	NA	3E-09	NA	**3E-04**	NA	**3E-03**	0	**3E-03**	0
Selenium	119	NA	0.002	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.002
Uranium	242	NA	0.04	NA	NA	NA	NA	NA	NA	0E+00	0.04	0E+00	0.04
Vanadium	39	NA	0.0006	NA	NA	NA	NA	NA	NA	0E+00	0.0006	0E+00	0.0001
Cumulative ILCR/HQ:		**4E-06**	0.05	**2E-03**		3E-09	NA	**3E-04**	NA	**3E-03**	0.05	**3E-03**	0.04
Boneyard													
Arsenic	4.6	3E-07	0.002	NA	NA	8E-11	NA	NA	NA	3E-07	0.002	8E-09	0.00005
Radium-226	36	**2E-06**	NA	**1E-03**	NA	1E-09	NA	**2E-04**	NA	**1E-03**	0	**1E-03**	0
Selenium	17	NA	0.0004	NA	NA	NA	NA	NA	NA	0E+00	0.0004	0E+00	0.0003
Uranium	124	NA	0.02	NA	NA	NA	NA	NA	NA	0E+00	0.02	0E+00	0.02
Vanadium	32	NA	0.0005	NA	NA	NA	NA	NA	NA	0E+00	0.0005	0E+00	0.00005
Cumulative ILCR/HQ:		**2E-06**	0.02	**1E-03**		2E-09	NA	**2E-04**	NA	**1E-03**	0.02	**1E-03**	0.02

TABLE 4.16
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Subsurface Soil - Hypothetical Future On-site Livestock Grazer - Scenario 2

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]								Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Ingestion of Meat		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
BACKGROUND													
Arsenic	4.4	2E-07	0.002	NA	NA	7E-11	NA	NA	NA	2E-07	0.002	NA	NA
Molybdenum	ND	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0	NA	NA
Radium-226	1.1	5E-08	NA	**4E-05**	NA	4E-11	NA	**5E-06**	NA	**4E-05**	0	NA	NA
Selenium	0.53	NA	0.00001	NA	NA	NA	NA	NA	NA	0E+00	0.00001	NA	NA
Uranium	1.2	NA	0.0002	NA	NA	NA	NA	NA	NA	0E+00	0.0002	NA	NA
Vanadium	29	NA	0.0004	NA	NA	NA	NA	NA	NA	0E+00	0.0004	NA	NA
	Cumulative ILCR/HQ:	3E-07	0.002	**4E-05**		1E-10	NA	**5E-06**	NA	**4E-05**	0.002	NA	NA
									USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
ND - Not detected in background samples.
NA - Not applicable.
USEPA - U. S. Environmental Protection Agency

TABLE 4.17 SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE Shallow Soil - Hypothetical Future On-Site Residential Receptor - Scenario 1									
		Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
NECR-1									
Arsenic	5.2	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	**2E-06**	0.03
Molybdenum	29	NA	0.07	NA	NA	0E+00	0.07	0E+00	0.07
Radium-226	39	**4E-05**	NA	2E-08	NA	**4E-05**	0	**3E-05**	0
Selenium	20	NA	0.05	NA	NA	0E+00	0.05	0E+00	0.05
Uranium	117	NA	**2**	NA	NA	0E+00	**2**	0E+00	**2**
Vanadium	42	NA	0.08	NA	NA	0E+00	0.08	0E+00	0.02
Cumulative ILCR/HQ:		**5E-05**	**3**	4E-08	NA	**5E-05**	**3**	**4E-05**	**3**
NECR-2									
Arsenic	4.6	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	5E-07	0.009
Radium-226	39	**4E-05**	NA	2E-08	NA	**4E-05**	0	**3E-05**	0
Selenium	11	NA	0.03	NA	NA	0E+00	0.03	0E+00	0.03
Uranium	85	NA	**2**	NA	NA	0E+00	**2**	0E+00	**2**
Vanadium	40	NA	0.07	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**5E-05**	**2**	4E-08	NA	**5E-05**	**2**	**4E-05**	**2**
Ponds 1 & 2									
Arsenic	4.9	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	1E-06	0.02
Radium-226	179	**2E-04**	NA	1E-07	NA	**2E-04**	0	**2E-04**	0
Selenium	43	NA	0.1	NA	NA	0E+00	0.1	0E+00	0.1
Uranium	223	NA	**5**	NA	NA	0E+00	**5**	0E+00	**5**
Vanadium	89	NA	0.2	NA	NA	0E+00	0.2	0E+00	0.1
Cumulative ILCR/HQ:		**2E-04**	**5**	1E-07	NA	**2E-04**	**5**	**2E-04**	**5**
Pond 3/3a									
Arsenic	6.0	**1E-05**	0.3	2E-08	NA	**1E-05**	0.3	**4E-06**	0.1
Radium-226	253	**2E-04**	NA	2E-07	NA	**2E-04**	0	**2E-04**	0
Selenium	21	NA	0.05	NA	NA	0E+00	0.05	0E+00	0.05
Uranium	1,141	NA	**24**	NA	NA	0E+00	**24**	0E+00	**24**
Vanadium	58	NA	0.1	NA	NA	0E+00	0.1	0E+00	0.1
Cumulative ILCR/HQ:		**2E-04**	**25**	2E-07	NA	**2E-04**	**25**	**2E-04**	**24**
Sediment Pad									
Arsenic	4.5	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	2E-07	0.003
Radium-226	109	**1E-04**	NA	7E-08	NA	**1E-04**	0	**1E-04**	0
Selenium	43	NA	0.1	NA	NA	0E+00	0.1	0E+00	0.1
Uranium	513	NA	**11**	NA	NA	0E+00	**11**	0E+00	**11**
Vanadium	223	NA	0.4	NA	NA	0E+00	0.4	0E+00	0.4
Cumulative ILCR/HQ:		**1E-04**	**12**	8E-08	NA	**1E-04**	**12**	**1E-04**	**11**
Sandfill #1									
Arsenic	4.7	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	7E-07	0.01
Radium-226	15	**1E-05**	NA	9E-09	NA	**1E-05**	0	**1E-05**	0
Selenium	4.5	NA	0.01	NA	NA	0E+00	0.01	0E+00	0.01
Uranium	16	NA	0.3	NA	NA	0E+00	0.3	0E+00	0.3
Vanadium	35	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.01
Cumulative ILCR/HQ:		**2E-05**	1	2E-08	NA	**2E-05**	1	**1E-05**	0.3
Sandfill #2									
Arsenic	6.4	**2E-05**	0.3	2E-08	NA	**2E-05**	0.3	**5E-06**	0.1
Radium-226	19	**2E-05**	NA	1E-08	NA	**2E-05**	0	**2E-05**	0
Selenium	3.4	NA	0.009	NA	NA	0E+00	0.009	0E+00	0.007
Uranium	20	NA	0.4	NA	NA	0E+00	0.4	0E+00	0.4
Vanadium	42	NA	0.08	NA	NA	0E+00	0.08	0E+00	0.02
Cumulative ILCR/HQ:		**3E-05**	1	3E-08	NA	**3E-05**	1	**2E-05**	1
Sandfill #3									
Arsenic	4.0	**9E-06**	0.2	1E-08	NA	**9E-06**	0.2	*-1E-06*	*0.0*
Radium-226	69	**6E-05**	NA	4E-08	NA	**6E-05**	0	**6E-05**	0
Selenium	18	NA	0.05	NA	NA	0E+00	0.05	0E+00	0.05
Uranium	185	NA	**4**	NA	NA	0E+00	**4**	0E+00	**4**
Vanadium	55	NA	0.1	NA	NA	0E+00	0.1	0E+00	0.0
Cumulative ILCR/HQ:		**7E-05**	**4**	5E-08	NA	**7E-05**	**4**	**6E-05**	**4**

TABLE 4.17
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Shallow Soil - Hypothetical Future On-Site Residential Receptor - Scenario 1

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]: Ingestion of Soil ILCR	Ingestion of Soil HQ	Inhalation of Fugitive Dust ILCR	Inhalation of Fugitive Dust HQ	Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard ILCR	Total Cancer Risk and Hazard HQ	Incremental Cancer Risk and Hazard [c] ILCR	Incremental Cancer Risk and Hazard [c] HQ
NEMSA									
Arsenic	4.3	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	*-3E-07*	*0.0*
Radium-226	42	**4E-05**	NA	3E-08	NA	**4E-05**	0	**4E-05**	0
Selenium	12	NA	0.03	NA	NA	0E+00	0.03	0E+00	0.03
Uranium	75	NA	**2**	NA	NA	0E+00	**2**	0E+00	**2**
Vanadium	36	NA	0.07	NA	NA	0E+00	0.07	0E+00	0.01
Cumulative ILCR/HQ:		**5E-05**	**2**	4E-08	NA	**5E-05**	**2**	**4E-05**	**2**
Boneyard									
Arsenic	5.5	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	**2E-06**	0.0
Radium-226	46	**4E-05**	NA	3E-08	NA	**4E-05**	0	**4E-05**	0
Selenium	11	NA	0.03	NA	NA	0E+00	0.03	0E+00	0.03
Uranium	12	NA	0.3	NA	NA	0E+00	0.3	0E+00	0.2
Vanadium	37	NA	0.07	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**5E-05**	1	4E-08	NA	**5E-05**	1	**4E-05**	0
Vents 3 & 8									
Arsenic	4.4	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	*-2E-07*	*0.0*
Radium-226	92	**8E-05**	NA	6E-08	NA	**8E-05**	0	**8E-05**	0
Selenium	27	NA	0.07	NA	NA	0E+00	0.07	0E+00	0.07
Uranium	224	NA	**5**	NA	NA	0E+00	**5**	0E+00	**5**
Vanadium	47	NA	0.09	NA	NA	0E+00	0.09	0E+00	0.03
Cumulative ILCR/HQ:		**9E-05**	**5**	7E-08	NA	**9E-05**	**5**	**8E-05**	**5**
Trailer Park									
Arsenic	6.1	**1E-05**	0.3	2E-08	NA	**1E-05**	0.3	**4E-06**	0.1
Radium-226	32	**3E-05**	NA	2E-08	NA	**3E-05**	0	**3E-05**	0
Selenium	71	NA	0.2	NA	NA	0E+00	0.2	0E+00	0.2
Uranium	96	NA	**2**	NA	NA	0E+00	**2**	0E+00	**2**
Vanadium	69	NA	0.1	NA	NA	0E+00	0.1	0E+00	0.1
Cumulative ILCR/HQ:		**4E-05**	**3**	4E-08	NA	**4E-05**	**3**	**3E-05**	**2**
BACKGROUND									
Arsenic	4.4	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	NA	NA
Molybdenum	ND	NA	NA	NA	NA	0E+00	0	NA	NA
Radium-226	1.1	1E-06	NA	7E-10	NA	1E-06	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	1E-08	NA	**1E-05**	0.3	NA	NA
					USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.

TABLE 4.18
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Shallow Soil - Hypothetical Future On-Site Residential Receptor - Scenario 2 - National Average Meat Ingestion

Location	Soil Concentration EPC[b]	Ingestion of Soil		Ingestion of Produce		Ingestion of Meat		Ingestion of Eggs		Inhalation of Fugitive Dust		External Exposure		Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard		Combined Pathway Risk and Hazard Estimates: Incremental Cancer Risk and Hazard[c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
NECR-1																	
Arsenic	5.2	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	**2E-06**	0.03
Molybdenum	29	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.07
Radium-226	39	**4E-05**	NA	**6E-04**	NA	**1E-03**	NA	**3E-05**	NA	2E-08	NA	**3E-03**	NA	**5E-03**	0	**5E-03**	0
Selenium	20	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	0E+00	0.05
Uranium	117	NA	**2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	**2**	0E+00	**2**
Vanadium	42	NA	0.08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.08	0E+00	0.02
Cumulative ILCR/HQ:		**5E-05**	**3**	**6E-04**	NA	**1E-03**	NA	**3E-05**	NA	4E-08	NA	**3E-03**	NA	**5E-03**	**3**	**5E-03**	**3**
NECR-2																	
Arsenic	4.6	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	5E-07	0.009
Radium-226	39	**4E-05**	NA	**6E-04**	NA	**1E-03**	NA	**3E-05**	NA	2E-08	NA	**3E-03**	NA	**5E-03**	0	**5E-03**	0
Selenium	11	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.03
Uranium	85	NA	**2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	**2**	0E+00	**2**
Vanadium	40	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**5E-05**	**2**	**6E-04**	NA	**1E-03**	NA	**3E-05**	NA	4E-08	NA	**3E-03**	NA	**5E-03**	**2**	**5E-03**	**2**
Ponds 1 & 2																	
Arsenic	4.9	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	1E-06	0.02
Radium-226	179	**2E-04**	NA	**3E-03**	NA	**6E-03**	NA	**1E-04**	NA	1E-07	NA	**1E-02**	NA	**2E-02**	0	**2E-02**	0
Selenium	43	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.1	0E+00	0.1
Uranium	223	NA	**5**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	**5**	0E+00	**5**
Vanadium	89	NA	0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.2	0E+00	0.1
Cumulative ILCR/HQ:		**2E-04**	**5**	**3E-03**	NA	**6E-03**	NA	**1E-04**	NA	1E-07	NA	**1E-02**	NA	**2E-02**	**5**	**2E-02**	**5**
Pond 3/3a																	
Arsenic	6.0	**1E-05**	0.3	NA	NA	NA	NA	NA	NA	2E-08	NA	NA	NA	**1E-05**	0.3	**4E-06**	0.06
Radium-226	253	**2E-04**	NA	**4E-03**	NA	**9E-03**	NA	**2E-04**	NA	2E-07	NA	**2E-02**	NA	**3E-02**	0	**3E-02**	0
Selenium	21	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	0E+00	0.05
Uranium	1,141	NA	**24**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	**24**	0E+00	**24**
Vanadium	58	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.1	0E+00	0.05
Cumulative ILCR/HQ:		**2E-04**	**25**	**4E-03**	NA	**9E-03**	NA	**2E-04**	NA	2E-07	NA	**2E-02**	NA	**3E-02**	**25**	**3E-02**	**24**
Sediment Pad																	
Arsenic	4.5	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	2E-07	0.003
Radium-226	109	**1E-04**	NA	**2E-03**	NA	**4E-03**	NA	**9E-05**	NA	7E-08	NA	**8E-03**	NA	**1E-02**	0	**1E-02**	0
Selenium	43	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.1	0E+00	0.1
Uranium	513	NA	**11**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	**11**	0E+00	**11**
Vanadium	223	NA	0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.4	0E+00	0.4
Cumulative ILCR/HQ:		**1E-04**	**12**	**2E-03**	NA	**4E-03**	NA	**9E-05**	NA	8E-08	NA	**8E-03**	NA	**1E-02**	**12**	**1E-02**	**11**
Sandfill #1																	
Arsenic	4.7	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	7E-07	0.01
Radium-226	15	**1E-05**	NA	**2E-04**	NA	**5E-04**	NA	**1E-05**	NA	9E-09	NA	**1E-03**	NA	**2E-03**	0	**2E-03**	0
Selenium	4.5	NA	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.01	0E+00	0.01
Uranium	16	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.3	0E+00	0.3
Vanadium	35	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.01
Cumulative ILCR/HQ:		**2E-05**	0.6	**2E-04**	NA	**5E-04**	NA	**1E-05**	NA	2E-08	NA	**1E-03**	NA	**2E-03**	1	**2E-03**	0.3
Sandfill #2																	
Arsenic	6.4	**2E-05**	0.3	NA	NA	NA	NA	NA	NA	2E-08	NA	NA	NA	**2E-05**	0.3	**5E-06**	0.08
Radium-226	19	**2E-05**	NA	**3E-04**	NA	**7E-04**	NA	**2E-05**	NA	1E-08	NA	**1E-03**	NA	**2E-03**	0	**2E-03**	0
Selenium	3.4	NA	0.009	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.009	0E+00	0.007
Uranium	20	NA	0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.4	0E+00	0.4
Vanadium	42	NA	0.08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.08	0E+00	0.02
Cumulative ILCR/HQ:		**3E-05**	0.8	**3E-04**	NA	**7E-04**	NA	**2E-05**	NA	3E-08	NA	**1E-03**	NA	**2E-03**	0.8	**2E-03**	1

TABLE 4.18
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Shallow Soil - Hypothetical Future On-Site Residential Receptor - Scenario 2 - National Average Meat Ingestion

Location	Soil Concentration EPC[b]	Ingestion of Soil		Ingestion of Produce		Ingestion of Meat		Ingestion of Eggs		Inhalation of Fugitive Dust		External Exposure		Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard		Combined Pathway Risk and Hazard Estimates: Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
Sandfill #3																	
Arsenic	4.0	9E-06	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	9E-06	0.2	-1E-06	-0.02
Radium-226	69	6E-05	NA	1E-03	NA	2E-03	NA	6E-05	NA	4E-08	NA	5E-03	NA	9E-03	0	9E-03	0
Selenium	18	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	0E+00	0.05
Uranium	185	NA	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	4	0E+00	4
Vanadium	55	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.1	0E+00	0.05
Cumulative ILCR/HQ:		7E-05	4	1E-03	NA	2E-03	NA	6E-05	NA	5E-08	NA	5E-03	NA	9E-03	4	9E-03	4
NEMSA																	
Arsenic	4.3	1E-05	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	1E-05	0.2	-3E-07	-0.006
Radium-226	42	4E-05	NA	6E-04	NA	1E-03	NA	3E-05	NA	3E-08	NA	3E-03	NA	5E-03	0	5E-03	0
Selenium	12	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.03
Uranium	75	NA	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	2	0E+00	2
Vanadium	36	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.01
Cumulative ILCR/HQ:		5E-05	2	6E-04	NA	1E-03	NA	3E-05	NA	4E-08	NA	3E-03	NA	5E-03	2	5E-03	2
Boneyard																	
Arsenic	5.5	1E-05	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	1E-05	0.2	2E-06	0.04
Radium-226	46	4E-05	NA	7E-04	NA	2E-03	NA	4E-05	NA	3E-08	NA	4E-03	NA	6E-03	0	6E-03	0
Selenium	11	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.03
Uranium	12	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.3	0E+00	0.2
Vanadium	37	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		5E-05	0.6	7E-04	NA	2E-03	NA	4E-05	NA	4E-08	NA	4E-03	NA	6E-03	1	6E-03	0.3
Vents 3 & 8																	
Arsenic	4.4	1E-05	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	1E-05	0.2	-2E-07	-0.003
Radium-226	92	8E-05	NA	1E-03	NA	3E-03	NA	7E-05	NA	6E-08	NA	7E-03	NA	1E-02	0	1E-02	0
Selenium	27	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.07
Uranium	224	NA	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	5	0E+00	5
Vanadium	47	NA	0.09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.09	0E+00	0.03
Cumulative ILCR/HQ:		9E-05	5	1E-03	NA	3E-03	NA	7E-05	NA	7E-08	NA	7E-03	NA	1E-02	5	1E-02	5
Trailer Park																	
Arsenic	6.1	1E-05	0.3	NA	NA	NA	NA	NA	NA	2E-08	NA	NA	NA	1E-05	0.3	4E-06	0.07
Radium-226	32	3E-05	NA	5E-04	NA	1E-03	NA	3E-05	NA	2E-08	NA	2E-03	NA	4E-03	0	4E-03	0
Selenium	71	NA	0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.2	0E+00	0.2
Uranium	96	NA	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	2	0E+00	2
Vanadium	69	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.1	0E+00	0.07
Cumulative ILCR/HQ:		4E-05	3	5E-04	NA	1E-03	NA	3E-05	NA	4E-08	NA	2E-03	NA	4E-03	3	4E-03	2
BACKGROUND																	
Arsenic	4.4	1E-05	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	1E-05	0.2	NA	NA
Molybdenum	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0	NA	NA
Radium-226	1.1	1E-06	NA	2E-05	NA	4E-05	NA	9E-07	NA	7E-10	NA	8E-05	NA	1E-04	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		1E-05	0.3	2E-05	NA	4E-05	NA	9E-07	NA	1E-08	NA	8E-05	NA	2E-04	0.3	NA	NA
													USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

TABLE 4.18 SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE Shallow Soil - Hypothetical Future On-Site Residential Receptor - Scenario 2 - National Average Meat Ingestion																	
														Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Ingestion of Produce		Ingestion of Meat		Ingestion of Eggs		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Hghlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4 or HQ of 1.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.

NA - Not applicable.
USEPA - U. S. Environmental Protection Agency

TABLE 4.19
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Shallow Soil - Hypothetical Future On-Site Residential Receptor - Scenario 2 - Native American Meat Ingestion

Location	Soil Concentration EPC[b]	Ingestion of Soil		Ingestion of Produce		Ingestion of Meat		Ingestion of Eggs		Inhalation of Fugitive Dust		External Exposure		Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard		Combined Pathway Risk and Hazard Estimates: Incremental Cancer Risk and Hazard[c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
NECR-1																	
Arsenic	5.2	1E-05	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	1E-05	0.2	2E-06	0.03
Molybdenum	29	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.07
Radium-226	39	4E-05	NA	6E-04	NA	1E-03	NA	3E-05	NA	2E-08	NA	3E-03	NA	5E-03	0	5E-03	0
Selenium	20	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	0E+00	0.05
Uranium	117	NA	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	2	0E+00	2
Vanadium	42	NA	0.08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.08	0E+00	0.02
Cumulative ILCR/HQ:		5E-05	3	6E-04	NA	1E-03	NA	3E-05	NA	4E-08	NA	3E-03	NA	5E-03	3	5E-03	3
NECR-2																	
Arsenic	4.6	1E-05	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	1E-05	0.2	5E-07	0.009
Radium-226	39	4E-05	NA	6E-04	NA	1E-03	NA	3E-05	NA	2E-08	NA	3E-03	NA	5E-03	0	5E-03	0
Selenium	11	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.03
Uranium	85	NA	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	2	0E+00	2
Vanadium	40	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		5E-05	2	6E-04	NA	1E-03	NA	3E-05	NA	4E-08	NA	3E-03	NA	5E-03	2	5E-03	2
Ponds 1 & 2																	
Arsenic	4.9	1E-05	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	1E-05	0.2	1E-06	0.02
Radium-226	179	2E-04	NA	3E-03	NA	6E-03	NA	1E-04	NA	1E-07	NA	1E-02	NA	2E-02	0	2E-02	0
Selenium	43	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.1	0E+00	0.1
Uranium	223	NA	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	5	0E+00	5
Vanadium	89	NA	0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.2	0E+00	0.1
Cumulative ILCR/HQ:		2E-04	5	3E-03	NA	6E-03	NA	1E-04	NA	1E-07	NA	1E-02	NA	2E-02	5	2E-02	5
Pond 3/3a																	
Arsenic	6.0	1E-05	0.3	NA	NA	NA	NA	NA	NA	2E-08	NA	NA	NA	1E-05	0.3	4E-06	0.06
Radium-226	253	2E-04	NA	4E-03	NA	9E-03	NA	2E-04	NA	2E-07	NA	2E-02	NA	3E-02	0	3E-02	0
Selenium	21	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	0E+00	0.05
Uranium	1,141	NA	24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	24	0E+00	24
Vanadium	58	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.1	0E+00	0.05
Cumulative ILCR/HQ:		2E-04	25	4E-03	NA	9E-03	NA	2E-04	NA	2E-07	NA	2E-02	NA	3E-02	25	3E-02	24
Sediment Pad																	
Arsenic	4.5	1E-05	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	1E-05	0.2	2E-07	0.003
Radium-226	109	1E-04	NA	2E-03	NA	4E-03	NA	9E-05	NA	7E-08	NA	8E-03	NA	1E-02	0	1E-02	0
Selenium	43	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.1	0E+00	0.1
Uranium	513	NA	11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	11	0E+00	11
Vanadium	223	NA	0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.4	0E+00	0.4
Cumulative ILCR/HQ:		1E-04	12	2E-03	NA	4E-03	NA	9E-05	NA	8E-08	NA	8E-03	NA	1E-02	12	1E-02	11
Sandfill #1																	
Arsenic	4.7	1E-05	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	1E-05	0.2	7E-07	0.01
Radium-226	15	1E-05	NA	2E-04	NA	5E-04	NA	1E-05	NA	9E-09	NA	1E-03	NA	2E-03	0	2E-03	0
Selenium	4.5	NA	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.01	0E+00	0.01
Uranium	16	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.3	0E+00	0.3
Vanadium	35	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.01
Cumulative ILCR/HQ:		2E-05	0.6	2E-04	NA	5E-04	NA	1E-05	NA	2E-08	NA	1E-03	NA	2E-03	1	2E-03	0.3
Sandfill #2																	
Arsenic	6.4	2E-05	0.3	NA	NA	NA	NA	NA	NA	2E-08	NA	NA	NA	2E-05	0.3	5E-06	0.08
Radium-226	19	2E-05	NA	3E-04	NA	7E-04	NA	2E-05	NA	1E-08	NA	1E-03	NA	2E-03	0	2E-03	0
Selenium	3.4	NA	0.009	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.009	0E+00	0.007
Uranium	20	NA	0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.4	0E+00	0.4
Vanadium	42	NA	0.08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.08	0E+00	0.02
Cumulative ILCR/HQ:		3E-05	0.8	3E-04	NA	7E-04	NA	2E-05	NA	3E-08	NA	1E-03	NA	2E-03	0.8	2E-03	1

TABLE 4.19
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE
Shallow Soil - Hypothetical Future On-Site Residential Receptor - Scenario 2 - Native American Meat Ingestion

Location	Soil Concentration EPC[b]	Ingestion of Soil		Ingestion of Produce		Ingestion of Meat		Ingestion of Eggs		Inhalation of Fugitive Dust		External Exposure		Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard		Combined Pathway Risk and Hazard Estimates: Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
Sandfill #3																	
Arsenic	4.0	**9E-06**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**9E-06**	0.2	*-1E-06*	*-0.02*
Radium-226	69	**6E-05**	NA	**1E-03**	NA	**2E-03**	NA	**6E-05**	NA	4E-08	NA	**5E-03**	NA	**9E-03**	0	**9E-03**	0
Selenium	18	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	0E+00	0.05
Uranium	185	NA	**4**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	**4**	0E+00	**4**
Vanadium	55	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.1	0E+00	0.05
Cumulative ILCR/HQ:		**7E-05**	**4**	**1E-03**	NA	**2E-03**	NA	**6E-05**	NA	5E-08	NA	**5E-03**	NA	**9E-03**	**4**	**9E-03**	**4**
NEMSA																	
Arsenic	4.3	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	*-3E-07*	*-0.006*
Radium-226	42	**4E-05**	NA	**6E-04**	NA	**1E-03**	NA	**3E-05**	NA	3E-08	NA	**3E-03**	NA	**5E-03**	0	**5E-03**	0
Selenium	12	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.03
Uranium	75	NA	**2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	**2**	0E+00	**2**
Vanadium	36	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.01
Cumulative ILCR/HQ:		**5E-05**	**2**	**6E-04**	NA	**1E-03**	NA	**3E-05**	NA	4E-08	NA	**3E-03**	NA	**5E-03**	**2**	**5E-03**	**2**
Boneyard																	
Arsenic	5.5	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	**2E-06**	0.04
Radium-226	46	**4E-05**	NA	**7E-04**	NA	**2E-03**	NA	**4E-05**	NA	3E-08	NA	**4E-03**	NA	**6E-03**	0	**6E-03**	0
Selenium	11	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.03
Uranium	12	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.3	0E+00	0.2
Vanadium	37	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**5E-05**	0.6	**7E-04**	NA	**2E-03**	NA	**4E-05**	NA	4E-08	NA	**4E-03**	NA	**6E-03**	1	**6E-03**	0.3
Vents 3 & 8																	
Arsenic	4.4	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	*-2E-07*	*-0.003*
Radium-226	92	**8E-05**	NA	**1E-03**	NA	**3E-03**	NA	**7E-05**	NA	6E-08	NA	**7E-03**	NA	**1E-02**	0	**1E-02**	0
Selenium	27	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.07
Uranium	224	NA	**5**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	**5**	0E+00	**5**
Vanadium	47	NA	0.09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.09	0E+00	0.03
Cumulative ILCR/HQ:		**9E-05**	**5**	**1E-03**	NA	**3E-03**	NA	**7E-05**	NA	7E-08	NA	**7E-03**	NA	**1E-02**	**5**	**1E-02**	**5**
Trailer Park																	
Arsenic	6.1	**1E-05**	0.3	NA	NA	NA	NA	NA	NA	2E-08	NA	NA	NA	**1E-05**	0.3	**4E-06**	0.07
Radium-226	32	**3E-05**	NA	**5E-04**	NA	**1E-03**	NA	**3E-05**	NA	2E-08	NA	**2E-03**	NA	**4E-03**	0	**4E-03**	0
Selenium	71	NA	0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.2	0E+00	0.2
Uranium	96	NA	**2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	**2**	0E+00	**2**
Vanadium	69	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.1	0E+00	0.07
Cumulative ILCR/HQ:		**4E-05**	**3**	**5E-04**	NA	**1E-03**	NA	**3E-05**	NA	4E-08	NA	**2E-03**	NA	**4E-03**	**3**	**4E-03**	**2**
BACKGROUND																	
Arsenic	4.4	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	NA	NA
Molybdenum	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0	NA	NA
Radium-226	1.1	1E-06	NA	**2E-05**	NA	**4E-05**	NA	9E-07	NA	7E-10	NA	**8E-05**	NA	**1E-04**	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.1	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	**2E-05**	NA	**4E-05**	NA	9E-07	NA	1E-08	NA	**8E-05**	NA	**2E-04**	0.3	NA	NA
													USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

TABLE 4.19 SUMMARY OF HUMAN HEALTH RISK ESTIMATES - ON-SITE Shallow Soil - Hypothetical Future On-Site Residential Receptor - Scenario 2 - Native American Meat Ingestion																	
														Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Ingestion of Produce		Ingestion of Meat		Ingestion of Eggs		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4 or HQ of 1.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.

NA - Not applicable.
USEPA - U. S. Environmental Protection Agency

TABLE 4.20
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - WESTERN HOME SITES
Post-Removal Shallow Soil - Residential Receptor - Scenario 1

	Soil Concentration	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
HOME SITE #1									
Arsenic	4.6	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	5E-07	0.009
Radium-226	1.4	1E-06	NA	9E-10	NA	1E-06	0	3E-07	0
Selenium	0.25	NA	0.0006	NA	NA	0E+00	0.0006	0E+00	*-0.0007*
Uranium	1.2	NA	0.03	NA	NA	0E+00	0.03	0E+00	0.001
Vanadium	30	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.003
Cumulative ILCR/HQ:		**1E-05**	0.3	1E-08	NA	**1E-05**	0.3	8E-07	0.01
HOME SITE #2									
Arsenic	5.5	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	2E-06	0.04
Radium-226	0.90	8E-07	NA	6E-10	NA	8E-07	0	***-2E-07***	0
Selenium	0.97	NA	0.002	NA	NA	0E+00	0.002	0E+00	0.001
Uranium	1.0	NA	0.02	NA	NA	0E+00	0.02	0E+00	*-0.004*
Vanadium	37	NA	0.07	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**1E-05**	0.3	2E-08	NA	**1E-05**	0.3	**2E-06**	0.06
HOME SITE #3									
Arsenic	5.5	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	**2E-06**	0.04
Radium-226	1.2	**1E-06**	NA	7E-10	NA	1E-06	0	**8E-08**	0
Selenium	0.62	NA	0.002	NA	NA	0E+00	0.002	0E+00	0.0002
Uranium	1.3	NA	0.03	NA	NA	0E+00	0.03	0E+00	0.001
Vanadium	40	NA	0.07	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**1E-05**	0.3	2E-08	NA	**1E-05**	0.3	**3E-06**	0.07
HOME SITE #4									
Arsenic	3.9	**9E-06**	0.2	1E-08	NA	**9E-06**	0.2	-1E-06	-0.02
Radium-226	2.3	**2E-06**	NA	1E-09	NA	**2E-06**	0	**1E-06**	0
Selenium	0.8	NA	0.002	NA	NA	0E+00	0.002	0E+00	0.001
Uranium	1.5	NA	0.03	NA	NA	0E+00	0.03	0E+00	0.01
Vanadium	34	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.009
Cumulative ILCR/HQ:		**1E-05**	0.3	1E-08	NA	**1E-05**	0.3	**-2E-07**	-0.01

TABLE 4.20
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - WESTERN HOME SITES
Post-Removal Shallow Soil - Residential Receptor - Scenario 1

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
HOME SITE #5									
Arsenic	6.2	**1E-05**	0.3	2E-08	NA	**1E-05**	0.3	4E-06	0.08
Radium-226	1.8	**2E-06**	NA	1E-09	NA	**2E-06**	0	6E-07	0
Selenium	1.1	NA	0.003	NA	NA	0E+00	0.003	0E+00	0.001
Uranium	1.9	NA	0.04	NA	NA	0E+00	0.04	0E+00	0.02
Vanadium	32	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.006
Cumulative ILCR/HQ:		**2E-05**	0.4	2E-08	NA	**2E-05**	0.4	**5E-06**	0.1
BACKGROUND									
Arsenic	4.4	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	NA	NA
Radium-226	1.1	1E-06	NA	7E-10	NA	1E-06	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	1E-08	NA	**1E-05**	0.3	NA	NA
USEPA Risk Range:						10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.

TABLE 4.21
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - WESTERN HOME SITES
Post-Removal Shallow Soil - Residential Receptor - Scenario 2 - National Average Meat Consumption

Location	Soil Concentration EPC[b]	Ingestion of Soil		Ingestion of Produce		Ingestion of Meat		Ingestion of Eggs		Inhalation of Fugitive Dust		External Exposure		Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard		Combined Pathway Risk and Hazard Estimates: Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
HOME SITE #1																	
Arsenic	4.6	1E-05	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	1E-05	0.2	5E-07	0.009
Radium-226	1.4	1E-06	NA	2E-05	NA	5E-05	NA	1E-06	NA	9E-10	NA	1E-04	NA	2E-04	0	4E-05	0
Selenium	0.25	NA	0.0006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.0006	0E+00	*-0.0007*
Uranium	1.2	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.001
Vanadium	30	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.003
Cumulative ILCR/HQ:		1E-05	0.3	2E-05	NA	5E-05	NA	1E-06	NA	1E-08	NA	1E-04	NA	2E-04	0.3	4E-05	0.01
HOME SITE #2																	
Arsenic	5.5	1E-05	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	1E-05	0.2	2E-06	0.04
Radium-226	0.90	8E-07	NA	1E-05	NA	3E-05	NA	7E-07	NA	6E-10	NA	7E-05	NA	1E-04	0	*-3E-05*	0
Selenium	0.97	NA	0.002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.001
Uranium	1.0	NA	0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.02	0E+00	*-0.004*
Vanadium	37	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		1E-05	0.3	1E-05	NA	3E-05	NA	7E-07	NA	2E-08	NA	7E-05	NA	1E-04	0.3	*-2E-05*	0.06
HOME SITE #3																	
Arsenic	5.5	1E-05	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	1E-05	0.2	2E-06	0.04
Radium-226	1.2	1E-06	NA	2E-05	NA	4E-05	NA	9E-07	NA	7E-10	NA	9E-05	NA	2E-04	0	1E-05	0
Selenium	0.62	NA	0.002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.0002
Uranium	1.3	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.001
Vanadium	40	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		1E-05	0.3	2E-05	NA	4E-05	NA	9E-07	NA	2E-08	NA	9E-05	NA	2E-04	0.3	1E-05	0.07
HOME SITE #4																	
Arsenic	3.9	9E-06	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	9E-06	0.2	-1E-06	*-0.02*
Radium-226	2.3	2E-06	NA	3E-05	NA	8E-05	NA	2E-06	NA	1E-09	NA	2E-04	NA	3E-04	0	1E-04	0
Selenium	0.8	NA	0.002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.001
Uranium	1.5	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.01
Vanadium	34	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.009
Cumulative ILCR/HQ:		1E-05	0.3	3E-05	NA	8E-05	NA	2E-06	NA	1E-08	NA	2E-04	NA	3E-04	0.3	1E-04	*-0.01*
HOME SITE #5																	
Arsenic	6.2	1E-05	0.3	NA	NA	NA	NA	NA	NA	2E-08	NA	NA	NA	1E-05	0.3	4E-06	0.08
Radium-226	1.8	2E-06	NA	3E-05	NA	6E-05	NA	1E-06	NA	1E-09	NA	1E-04	NA	2E-04	0	9E-05	0
Selenium	1.1	NA	0.003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.003	0E+00	0.001
Uranium	1.9	NA	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.04	0E+00	0.02
Vanadium	32	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.006
Cumulative ILCR/HQ:		2E-05	0.4	3E-05	NA	6E-05	NA	1E-06	NA	2E-08	NA	1E-04	NA	2E-04	0.4	9E-05	0.1
BACKGROUND																	
Arsenic	4.4	1E-05	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	1E-05	0.2	NA	NA
Radium-226	1.1	1E-06	NA	2E-05	NA	4E-05	NA	9E-07	NA	7E-10	NA	8E-05	NA	1E-04	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		1E-05	0.3	2E-05	NA	4E-05	NA	9E-07	NA	1E-08	NA	8E-05	NA	2E-04	0.3	NA	NA
													USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

TABLE 4.21
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - WESTERN HOME SITES
Post-Removal Shallow Soil - Residential Receptor - Scenario 2 - National Average Meat Consumption

														Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Ingestion of Produce		Ingestion of Meat		Ingestion of Eggs		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4 or HQ of 1.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
NA - Not applicable.
USEPA - U. S. Environmental Protection Agency

TABLE 4.22
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - WESTERN HOME SITES
Post-Removal Shallow Soil - Residential Receptor - Scenario 2 -Native American Meat Consumption

Location	Soil Concentration EPC[b]	Ingestion of Soil		Ingestion of Produce		Ingestion of Meat		Ingestion of Eggs		Inhalation of Fugitive Dust		External Exposure		Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard		Combined Pathway Risk and Hazard Estimates: Incremental Cancer Risk and Hazard[c]	
		ILCR	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
HOME SITE #1																	
Arsenic	4.6	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	5E-07	0.009
Radium-226	1.4	1E-06	NA	**2E-05**	NA	**5E-05**	NA	1E-06	NA	9E-10	NA	**1E-04**	NA	**2E-04**	0	**4E-05**	0
Selenium	0.25	NA	0.0006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.0006	0E+00	*-0.0007*
Uranium	1.2	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.001
Vanadium	30	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.003
Cumulative ILCR/HQ:		**1E-05**	0.3	**2E-05**	NA	**5E-05**	NA	1E-06	NA	1E-08	NA	**1E-04**	NA	**2E-04**	0.3	**4E-05**	0.01
HOME SITE #2																	
Arsenic	5.5	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	**2E-06**	0.04
Radium-226	0.90	8E-07	NA	**1E-05**	NA	**3E-05**	NA	7E-07	NA	6E-10	NA	**7E-05**	NA	**1E-04**	0	*-3E-05*	0
Selenium	0.97	NA	0.002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.001
Uranium	1.0	NA	0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.02	0E+00	*-0.004*
Vanadium	37	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**1E-05**	0.3	**1E-05**	NA	**3E-05**	NA	7E-07	NA	2E-08	NA	**7E-05**	NA	**1E-04**	0.3	*-2E-05*	0.06
HOME SITE #3																	
Arsenic	5.5	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	**2E-06**	0.04
Radium-226	1.2	1E-06	NA	**2E-05**	NA	**4E-05**	NA	9E-07	NA	7E-10	NA	**9E-05**	NA	**2E-04**	0	**1E-05**	0
Selenium	0.62	NA	0.002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.0002
Uranium	1.3	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.001
Vanadium	40	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**1E-05**	0.3	**2E-05**	NA	**4E-05**	NA	9E-07	NA	2E-08	NA	**9E-05**	NA	**2E-04**	0.3	**1E-05**	0.07
HOME SITE #4																	
Arsenic	3.9	**9E-06**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**9E-06**	0.2	-1E-06	*-0.02*
Radium-226	2.3	**2E-06**	NA	**3E-05**	NA	**8E-05**	NA	**2E-06**	NA	1E-09	NA	**2E-04**	NA	**3E-04**	0	**1E-04**	0
Selenium	0.8	NA	0.002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.001
Uranium	1.5	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.01
Vanadium	34	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.009
Cumulative ILCR/HQ:		1E-05	0.3	**3E-05**	NA	**8E-05**	NA	**2E-06**	NA	1E-08	NA	**2E-04**	NA	**3E-04**	0.3	**1E-04**	*-0.01*
HOME SITE #5																	
Arsenic	6.2	**1E-05**	0.3	NA	NA	NA	NA	NA	NA	2E-08	NA	NA	NA	**1E-05**	0.3	**4E-06**	0.08
Radium-226	1.8	**2E-06**	NA	**3E-05**	NA	**6E-05**	NA	**1E-06**	NA	1E-09	NA	**1E-04**	NA	**2E-04**	0	**9E-05**	0
Selenium	1.1	NA	0.003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.003	0E+00	0.001
Uranium	1.9	NA	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.04	0E+00	0.02
Vanadium	32	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.006
Cumulative ILCR/HQ:		**2E-05**	0.4	**3E-05**	NA	**6E-05**	NA	**1E-06**	NA	2E-08	NA	**1E-04**	NA	**2E-04**	0.4	**9E-05**	0.1
BACKGROUND																	
Arsenic	4.4	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	NA	NA
Radium-226	1.1	1E-06	NA	**2E-05**	NA	**4E-05**	NA	9E-07	NA	7E-10	NA	**8E-05**	NA	**1E-04**	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		1E-05	0.3	**2E-05**	NA	**4E-05**	NA	9E-07	NA	1E-08	NA	**8E-05**	NA	**2E-04**	0.3	NA	NA
													USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

TABLE 4.22
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - WESTERN HOME SITES
Post-Removal Shallow Soil - Residential Receptor - Scenario 2 -Native American Meat Consumption

														Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Ingestion of Produce		Ingestion of Meat		Ingestion of Eggs		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4 or HQ of 1.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
NA - Not applicable.
USEPA - U. S. Environmental Protection Agency

TABLE 4.23
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - EASTERN HOME SITES
Post-Removal Shallow Soil - Residential Receptor - Scenario 1

	Soil Concentration	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
HOME SITE #6									
Radium-226	0.90	8E-07	NA	6E-10	NA	**8E-07**	0	**-2E-07**	0
Cumulative ILCR/HQ:		8E-07	NA	6E-10	NA	8E-07	NA	-1E-05	NA
HOME SITE #7									
Radium-226	0.78	7E-07	NA	5E-10	NA	**7E-07**	0	**-3E-07**	0
Cumulative ILCR/HQ:		7E-07	NA	5E-10	NA	7E-07	NA	**-1E-05**	NA
HOME SITE #8									
Radium-226	0.90	**8E-07**	NA	6E-10	NA	**8E-07**	0	**-2E-07**	0
Cumulative ILCR/HQ:		8E-07	NA	6E-10	NA	8E-07	NA	**-1E-05**	NA
HOME SITE #9									
Radium-226	0.84	**8E-07**	NA	5E-10	NA	**8E-07**	0	**-2E-07**	0
Cumulative ILCR/HQ:		8E-07	NA	5E-10	NA	8E-07	NA	**-1E-05**	NA
BACKGROUND									
Arsenic	4.4	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	NA	NA
Radium-226	1.1	1E-06	NA	7E-10	NA	1E-06	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	1E-08	NA	**1E-05**	0.3	NA	NA
USEPA Risk Range:						10-6 - 10-4	1	10-6 - 10-4	1

TABLE 4.23 SUMMARY OF HUMAN HEALTH RISK ESTIMATES - EASTERN HOME SITES Post-Removal Shallow Soil - Residential Receptor - Scenario 1									
		Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.

TABLE 4.24
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - EASTERN HOME SITES
Post-Removal Shallow Soil - Residential Receptor - Scenario 2 - National Average Meat Consumption

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]: Ingestion of Soil ILCR	Ingestion of Soil HQ	Ingestion of Produce ILCR	Ingestion of Produce HQ	Ingestion of Meat ILCR	Ingestion of Meat HQ	Ingestion of Eggs ILCR	Ingestion of Eggs HQ	Inhalation of Fugitive Dust ILCR	Inhalation of Fugitive Dust HQ	External Exposure ILCR	External Exposure HQ	Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard ILCR	Total Cancer Risk and Hazard HQ	Incremental Cancer Risk and Hazard [c] ILCR	Incremental Cancer Risk and Hazard [c] HQ
HOME SITE #6																	
Radium-226	0.90	8E-07	NA	**1E-05**	NA	**3E-05**	NA	7E-07	NA	6E-10	NA	**7E-05**	NA	**1E-04**	0	-3E-05	0
Cumulative ILCR/HQ:		8E-07	NA	**1E-05**	NA	**3E-05**	NA	7E-07	NA	6E-10	NA	**7E-05**	NA	**1E-04**	NA	-4E-05	NA
HOME SITE #7																	
Radium-226	0.78	7E-07	NA	**1E-05**	NA	**3E-05**	NA	6E-07	NA	5E-10	NA	**6E-05**	NA	**1E-04**	0	-4E-05	0
Cumulative ILCR/HQ:		7E-07	NA	**1E-05**	NA	**3E-05**	NA	6E-07	NA	5E-10	NA	**6E-05**	NA	**1E-04**	NA	-5E-05	NA
HOME SITE #8																	
Radium-226	0.90	8E-07	NA	**1E-05**	NA	**3E-05**	NA	7E-07	NA	6E-10	NA	**7E-05**	NA	**1E-04**	0	-2E-05	0
Cumulative ILCR/HQ:		8E-07	NA	**1E-05**	NA	**3E-05**	NA	7E-07	NA	6E-10	NA	**7E-05**	NA	**1E-04**	NA	-4E-05	NA
HOME SITE #9																	
Radium-226	0.84	8E-07	NA	**1E-05**	NA	**3E-05**	NA	7E-07	NA	5E-10	NA	**6E-05**	NA	**1E-04**	0	-3E-05	0
Cumulative ILCR/HQ:		8E-07	NA	**1E-05**	NA	**3E-05**	NA	7E-07	NA	5E-10	NA	**6E-05**	NA	**1E-04**	NA	-4E-05	NA
BACKGROUND																	
Arsenic	4.4	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	NA	NA
Radium-226	1.1	1E-06	NA	**2E-05**	NA	**4E-05**	NA	9E-07	NA	7E-10	NA	**8E-05**	NA	**1E-04**	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	**2E-05**	NA	**4E-05**	NA	9E-07	NA	1E-08	NA	**8E-05**	NA	**2E-04**	0.3	NA	NA
													USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4 or HQ of 1.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
NA - Not applicable.
USEPA - U. S. Environmental Protection Agency

TABLE 4.25
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - EASTERN HOME SITES
Post-Removal Shallow Soil - Residential Receptor - Scenario 2 - Native American Meat Consumption

		Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]												Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Ingestion of Produce		Ingestion of Meat		Ingestion of Eggs		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
HOME SITE #6																	
Radium-226	0.90	8E-07	NA	**1E-05**	NA	**3E-05**	NA	7E-07	NA	6E-10	NA	**7E-05**	NA	**1E-04**	0	-3E-05	0
Cumulative ILCR/HQ:		8E-07	NA	**1E-05**	NA	**3E-05**	NA	7E-07	NA	6E-10	NA	**7E-05**	NA	**1E-04**	NA	-4E-05	NA
HOME SITE #7																	
Radium-226	0.78	7E-07	NA	**1E-05**	NA	**3E-05**	NA	6E-07	NA	5E-10	NA	**6E-05**	NA	**1E-04**	0	-4E-05	0
Cumulative ILCR/HQ:		7E-07	NA	**1E-05**	NA	**3E-05**	NA	6E-07	NA	5E-10	NA	**6E-05**	NA	**1E-04**	NA	-5E-05	NA
HOME SITE #8																	
Radium-226	0.90	8E-07	NA	**1E-05**	NA	**3E-05**	NA	7E-07	NA	6E-10	NA	**7E-05**	NA	**1E-04**	0	-3E-05	0
Cumulative ILCR/HQ:		8E-07	NA	**1E-05**	NA	**3E-05**	NA	7E-07	NA	6E-10	NA	**7E-05**	NA	**1E-04**	NA	-4E-05	NA
HOME SITE #9																	
Radium-226	0.84	8E-07	NA	**1E-05**	NA	**3E-05**	NA	7E-07	NA	5E-10	NA	**6E-05**	NA	**1E-04**	0	-3E-05	0
Cumulative ILCR/HQ:		8E-07	NA	**1E-05**	NA	**3E-05**	NA	7E-07	NA	5E-10	NA	**6E-05**	NA	**1E-04**	NA	-4E-05	NA
BACKGROUND																	
Arsenic	4.4	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	NA	NA
Radium-226	1.1	1E-06	NA	**2E-05**	NA	**4E-05**	NA	9E-07	NA	7E-10	NA	**8E-05**	NA	**1E-04**	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	**2E-05**	NA	**4E-05**	NA	9E-07	NA	1E-08	NA	**8E-05**	NA	**2E-04**	0.3	NA	NA
													USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4 or HQ of 1.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
NA - Not applicable.
USEPA - U. S. Environmental Protection Agency

TABLE 4.26
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - Unnamed Arroyc
Future Livestock Grazer - Scenario 1

Depth	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a] — Ingestion of Soil ILCR	Ingestion of Soil HQ	Inhalation of Fugitive Dust ILCR	Inhalation of Fugitive Dust HQ	Combined Pathway Risk and Hazard Estimates — Total Cancer Risk and Hazard ILCR	Total Cancer Risk and Hazard HQ	Incremental Cancer Risk and Hazard [c] ILCR	Incremental Cancer Risk and Hazard [c] HQ
Surface Soil									
Radium-226	19	9E-07	NA	8E-10	NA	9E-07	0	9E-07	0
Cumulative ILCR/HQ:		9E-07	NA	8E-10	NA	9E-07	0	6E-07	0
Subsurface Soil									
Arsenic	4.1	2E-07	0.001	7E-11	NA	2E-07	0.001	*-2E-08*	*-0.0001*
Radium-226	1.1	5E-08	NA	4E-11	NA	5E-08	0	0E+00	0
Selenium	6.9	NA	0.0001	NA	NA	0E+00	0.0001	0E+00	0.0001
Uranium	33	NA	0.006	NA	NA	0E+00	0.006	0E+00	0.005
Vanadium	30	NA	0.0004	NA	NA	0E+00	0.0004	0E+00	0.00002
Cumulative ILCR/HQ:		3E-07	0.008	1E-10	NA	3E-07	0.008	*-2E-08*	0.005
BACKGROUND									
Arsenic	4.4	2E-07	0.002	7E-11	NA	2E-07	0.002	NA	NA
Radium-226	1.1	5E-08	NA	4E-11	NA	5E-08	0	NA	NA
Selenium	0.53	NA	0.00001	NA	NA	0E+00	0.00001	NA	NA
Uranium	1.2	NA	0.0002	NA	NA	0E+00	0.0002	NA	NA
Vanadium	29	NA	0.0004	NA	NA	0E+00	0.0004	NA	NA
Cumulative ILCR/HQ:		3E-07	0.002	1E-10	NA	3E-07	0.002	NA	NA
USEPA Risk Range:						10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
NA - Not applicable.

TABLE 4.27
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - Unnamed Arroyc
Future Livestock Grazer - Scenario 2

Depth	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a] Ingestion of Soil ILCR	Ingestion of Soil HQ	Inhalation of Fugitive Dust ILCR	Inhalation of Fugitive Dust HQ	External Exposure ILCR	External Exposure HQ	Combined Pathway Risk and Hazard Estimates Total Cancer Risk and Hazard ILCR	Total Cancer Risk and Hazard HQ	Incremental Cancer Risk and Hazard [c] ILCR	Incremental Cancer Risk and Hazard [c] HQ
Surface Soil											
Radium-226	19	9E-07	NA	8E-10	NA	**9E-05**	NA	**9E-05**	0	**9E-05**	0
Cumulative ILCR/HQ:		9E-07	NA	8E-10	NA	**9E-05**	NA	**9E-05**	0	**9E-05**	0
Subsurface Soil		**C**									
Arsenic	4.1	2E-07	0.001	7E-11	NA	NA	NA	2E-07	0.001	*-2E-08*	*-0.0001*
Radium-226	1.1	5E-08	NA	4E-11	NA	**5E-06**	NA	**5E-06**	0	0E+00	0
Selenium	6.9	NA	0.0001	NA	NA	NA	NA	0E+00	0.0001	0E+00	0.0001
Uranium	33	NA	0.006	NA	NA	NA	NA	0E+00	0.006	0E+00	0.005
Vanadium	30	NA	0.0004	NA	NA	NA	NA	0E+00	0.0004	0E+00	0.00002
Cumulative ILCR/HQ:		3E-07	0.008	1E-10	NA	**5E-06**	NA	**6E-06**	0.008	*-2E-08*	0.005
BACKGROUND											
Arsenic	4.4	2E-07	0.002	7E-11	NA	NA	NA	2E-07	0.002	NA	NA
Radium-226	1.1	5E-08	NA	4E-11	NA	**5E-06**	NA	**5E-06**	0	NA	NA
Selenium	0.53	NA	0.00001	NA	NA	NA	NA	0E+00	0.00001	NA	NA
Uranium	1.2	NA	0.0002	NA	NA	NA	NA	0E+00	0.0002	NA	NA
Vanadium	29	NA	0.0004	NA	NA	NA	NA	0E+00	0.0004	NA	NA
Cumulative ILCR/HQ:		3E-07	0.002	1E-10	NA	**5E-06**	NA	**6E-06**	0.002	NA	NA
					USEPA Risk Range:		**USEPA Risk Range:**	10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

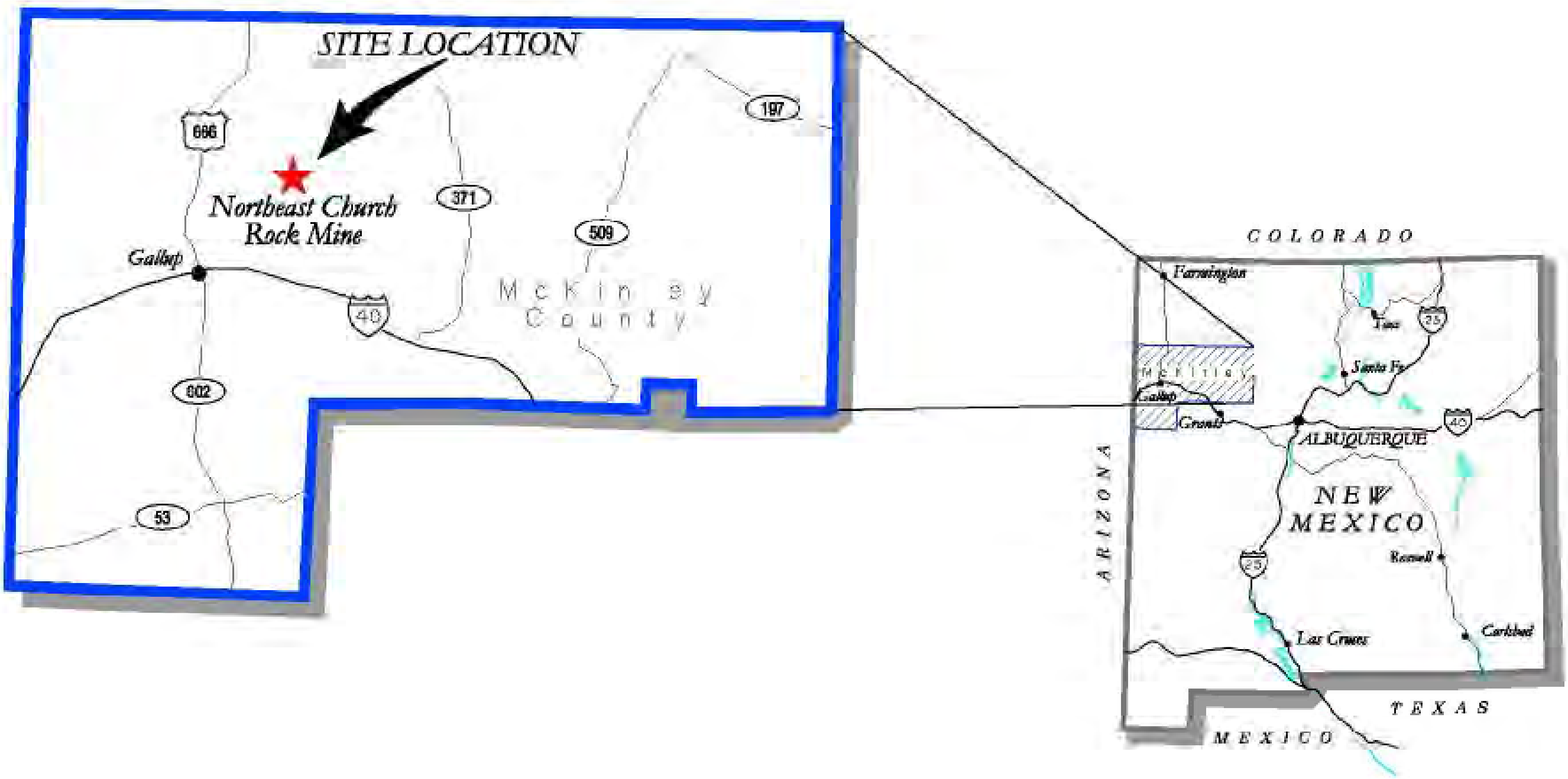
[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.
Highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.
NA - Not applicable.

FIGURES

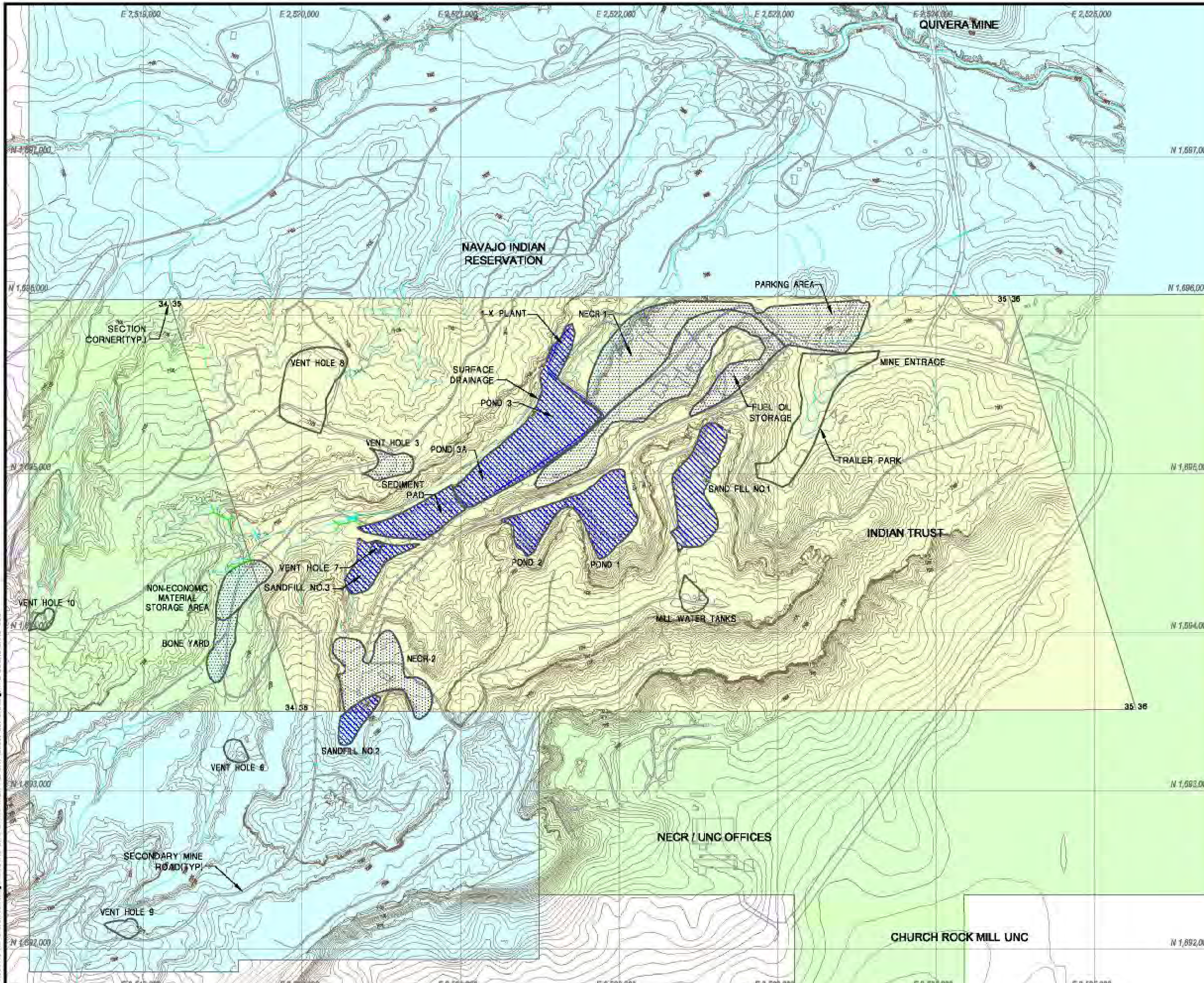


REMOVAL SITE EVALUATION REPORT

SITE LOCATION

MWH

Not To Scale



LEGEND

- ROADS
- MINE PERMIT AREA
- FORMER NRC REGULATED AREA
- LAND OWNERSHIP - NAVAJO INDIAN RESERVATION
- LAND OWNERSHIP - UNC
- LAND OWNERSHIP - INDIAN TRUST

NOTES:

1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83.
2. NOT ALL AREAS IDENTIFIED DURING THE RSE ARE SHOWN ON THIS FIGURE.
3. THE AREA BOUNDARIES SHOWN HERE ARE THE ORIGINAL BOUNDARIES, WHICH WERE ADJUSTED SLIGHTLY DURING THE RSE. (SEE SUBSEQUENT FIGURES)

SCALE
600' 0 600'
CONTOUR INTERVAL 5FT.

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REMOVAL SITE EVALUATION REPORT

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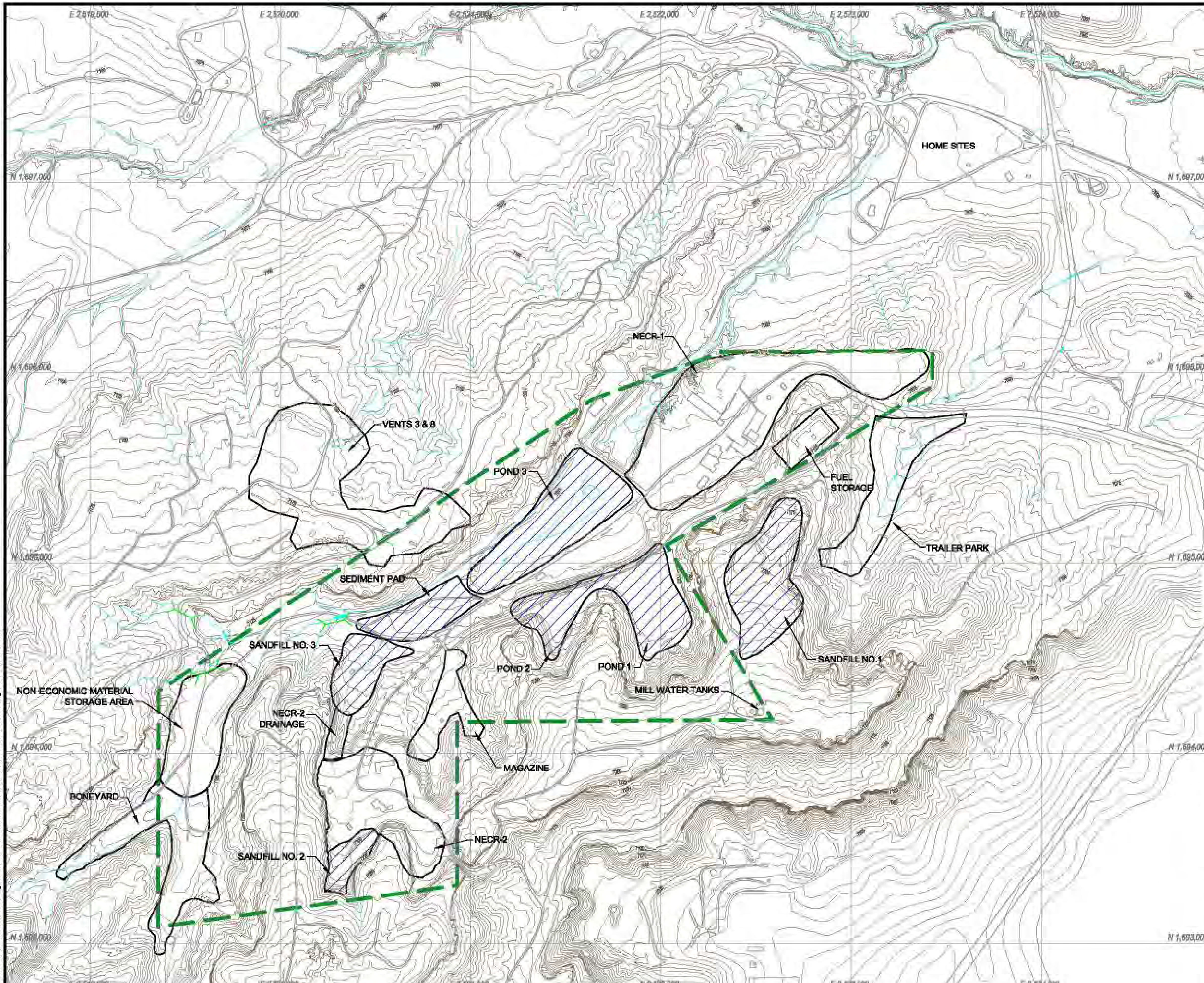
Sheet 1 Of 1 Sheets
SCALE: As Shown
FIGURE No. 1-2



LEGEND

- PERMIT BOUNDARY
- FACILITY OR FEATURE BOUNDARY (Approx.)
- NRC REGULATED AREAS RECLAIMED UNDER JURISDICTION OF NRC RADIOACTIVE MATERIAL LISCENSE SUA-1475.
- CULVERT
- STRUCTURE

NOTES:

1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83.

N

SCALE

500' 0 500'

CONTOUR INTERVAL 5FT.

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REMOVAL SITE EVALUATION REPORT

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SITE LAYOUT

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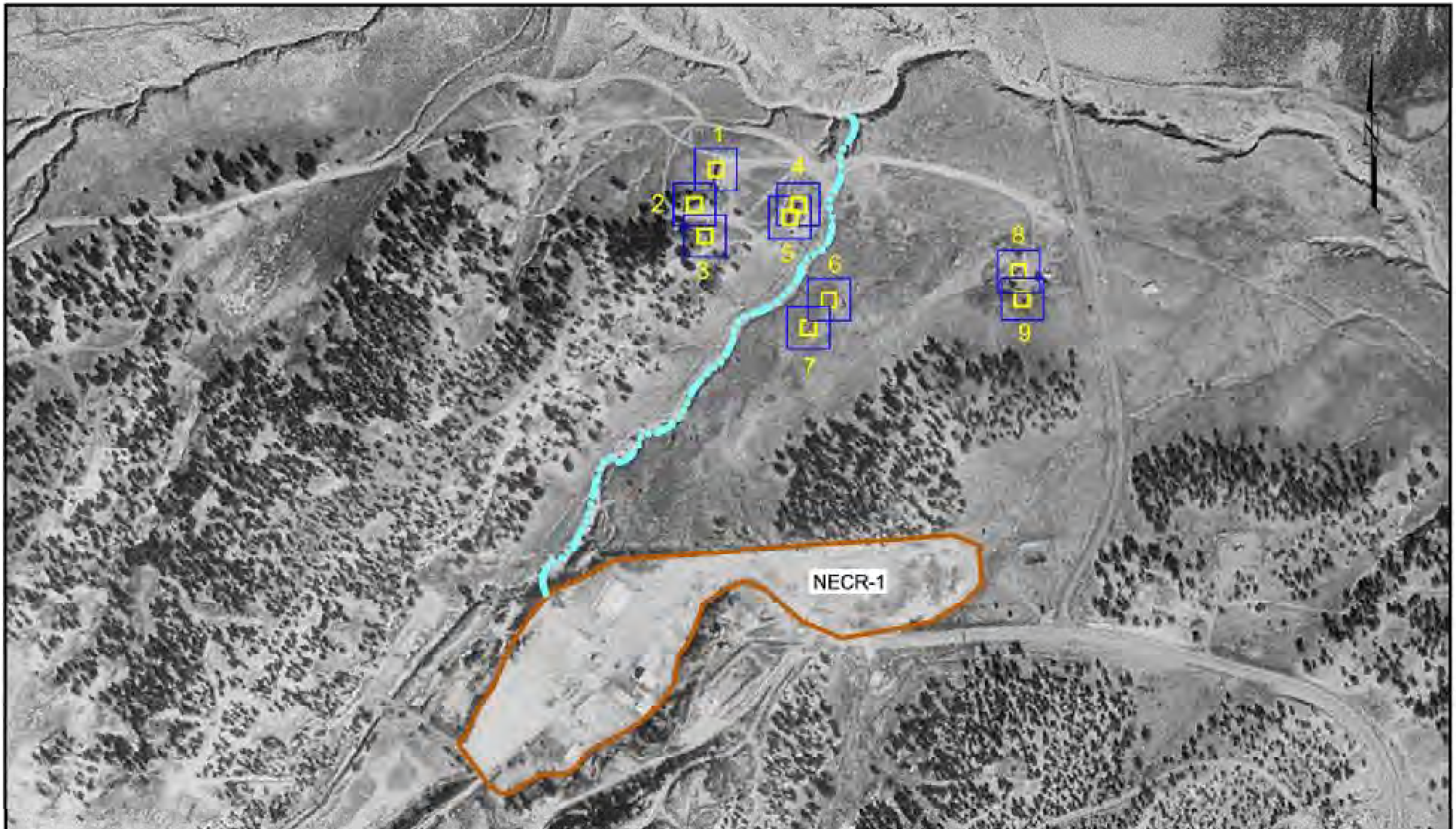
FIGURE No. 1-3

L:\1005168 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Set Drawings\1-3 SITE LAYOUT



LEGEND

UNNAMED ARROYO
APPROXIMATE SURVEY BOUNDARY
SAMPLING AREAS
HOME SITES
HOME SITE NUMBER

SCALE
0 250' 500'
Feet

NOTE: THE UNNAMED ARROYO CONTINUES SOUTHWEST ALONG THE NORTHWEST SIDE OF THE MINESITE.

0	Issued For Final	[illegible]	[illegible]	C.Fowler	[illegible]
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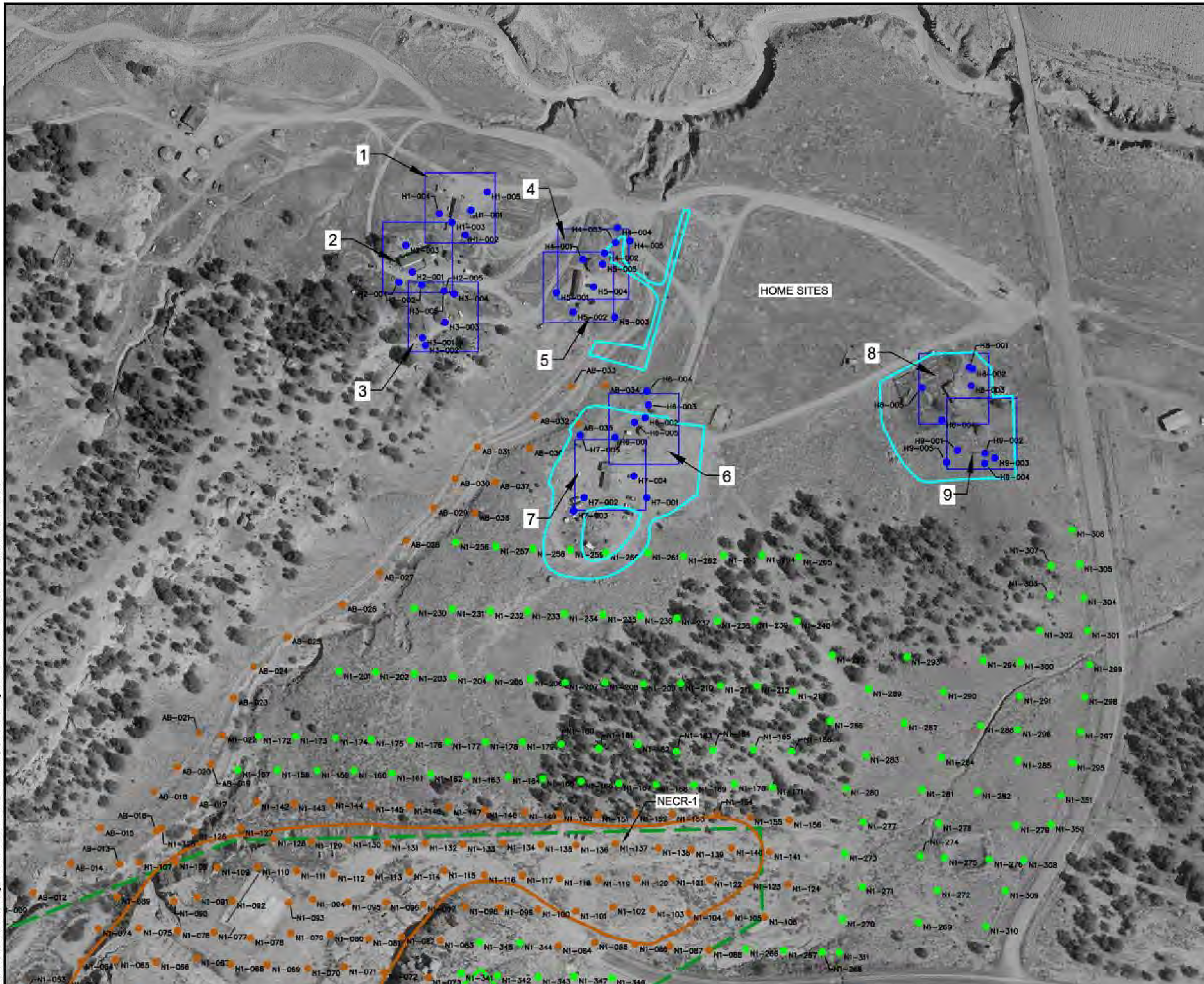
AutoCAD FILE: [illegible]
SCALE: As Shown
FIGURE No. 1-4

REMOVAL SITE EVALUATION REPORT

LOCATIONS OF HOME SITES



LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- GAMMA PRIMARY LOCATION
- GAMMA STEP-OUT LOCATION
- GAMMA HOMESITE LOCATION
- HOME SITE 0.5 ACRE SURVEY AREA BOUNDARY
- 8 HOME SITE NUMBER
- EPA REMOVAL ACTION BOUNDARY (APPROXIMATE)

NOTES:

1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83.
2. LOCATION IDs ARE ABBREVIATED TO PREVENT OVERLAPPING LABELS.
3. STATIC GAMMA MEASUREMENT LOCATIONS FOR HOME SITES 4,6,7,8,9 WERE ASSUMED TO HAVE BEEN EXCAVATED BY THE EPA (SEE APPENDIX D).
4. EPA REMOVAL ACTION BOUNDARIES ARE BASED ON HAND-SKETCH MAPS AND ARE OF QUESTIONABLE ACCURACY.

N

SCALE

200' 0 200'

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STATIC GAMMA MEASUREMENT LOCATIONS

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Sheet 1 Of 4 Sheets

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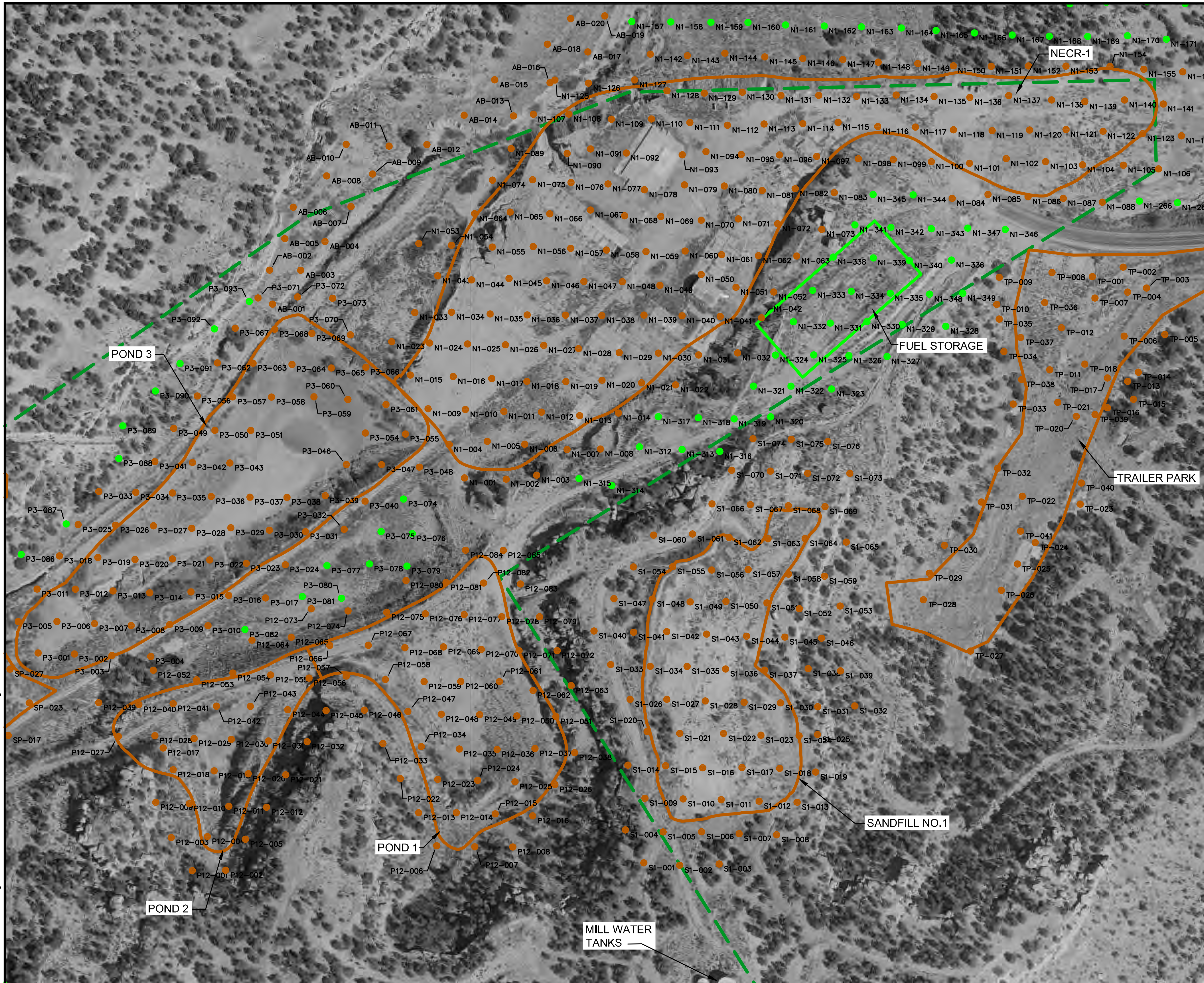
FIGURE No. 2-1

L:\1005148 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Set Drawings\2-1-1 STATIC GAMMA MEASUREMENT LOCATIONS HOMESITES



LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- GAMMA PRIMARY LOCATION
- GAMMA STEP-OUT LOCATION

NOTES:

1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83.
2. LOCATION IDs ARE ABBREVIATED TO PREVENT OVERLAPPING LABELS.

N

SCALE

200' 0 200'

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STATIC GAMMA MEASUREMENT LOCATIONS

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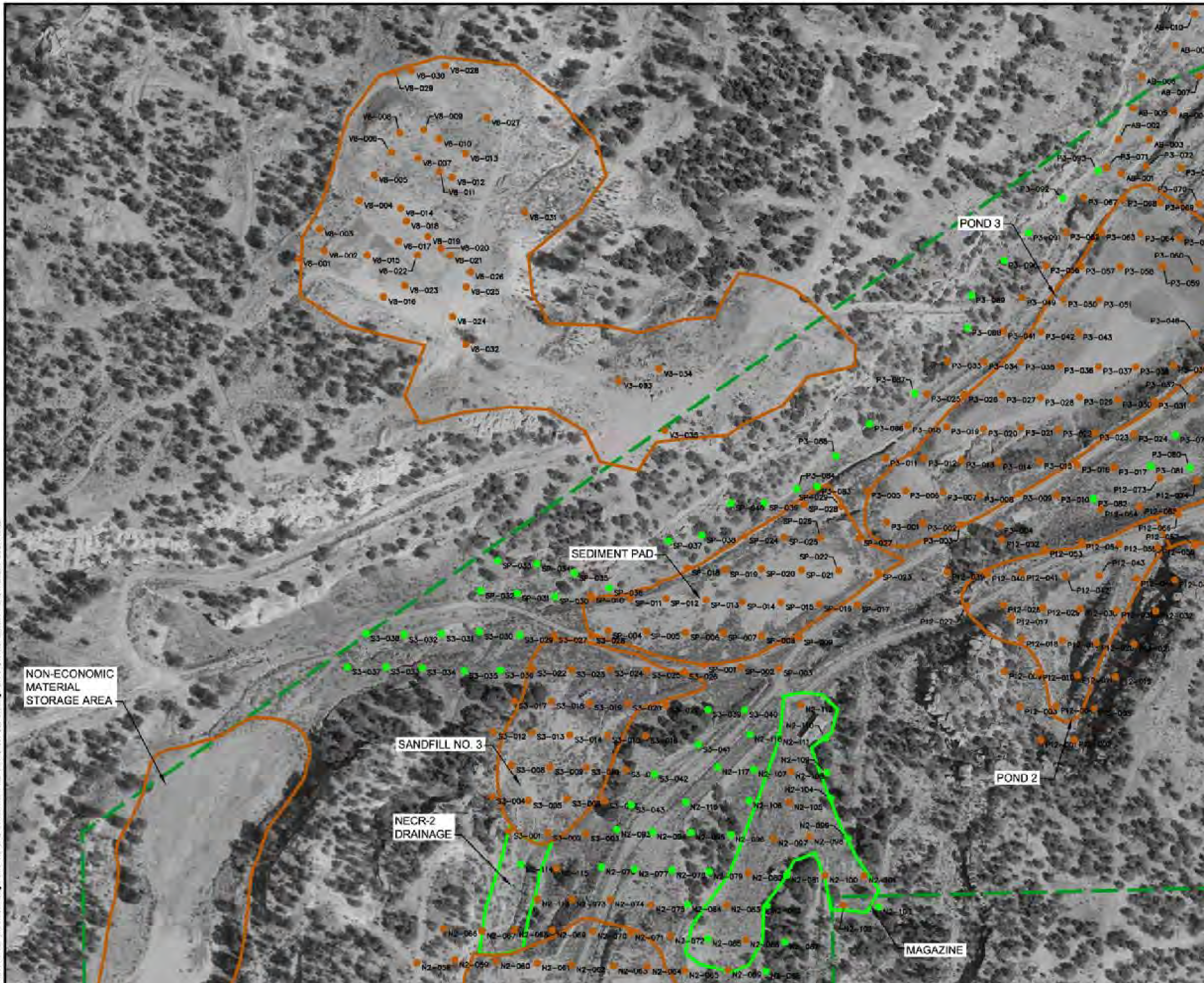
Sheet 2 Of 4 Sheets
SCALE: As Shown
FIGURE No. 2-1

L:\1005146 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Set Drawings\2-1-2 STATIC GAMMA MEASUREMENT LOCATIONS



LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- GAMMA PRIMARY LOCATION
- GAMMA STEP-OUT LOCATION

NOTES:

1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83.
2. LOCATION IDs ARE ABBREVIATED TO PREVENT OVERLAPPING LABELS.

N

SCALE

200' 0 200'

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Sheet 3 Of 4 Sheets

SCALE: As Shown

FIGURE No. 2-1

L:\1005146 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Set Drawings\3-1-3 STATIC GAMMA MEASUREMENT LOCATIONS

LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- GAMMA PRIMARY LOCATION
- GAMMA STEP-OUT LOCATION

NOTES:

1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83.
2. LOCATION IDs ARE ABBREVIATED TO PREVENT OVERLAPPING LABELS.

N

SCALE
200' 0 200'

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STATIC GAMMA MEASUREMENT LOCATIONS

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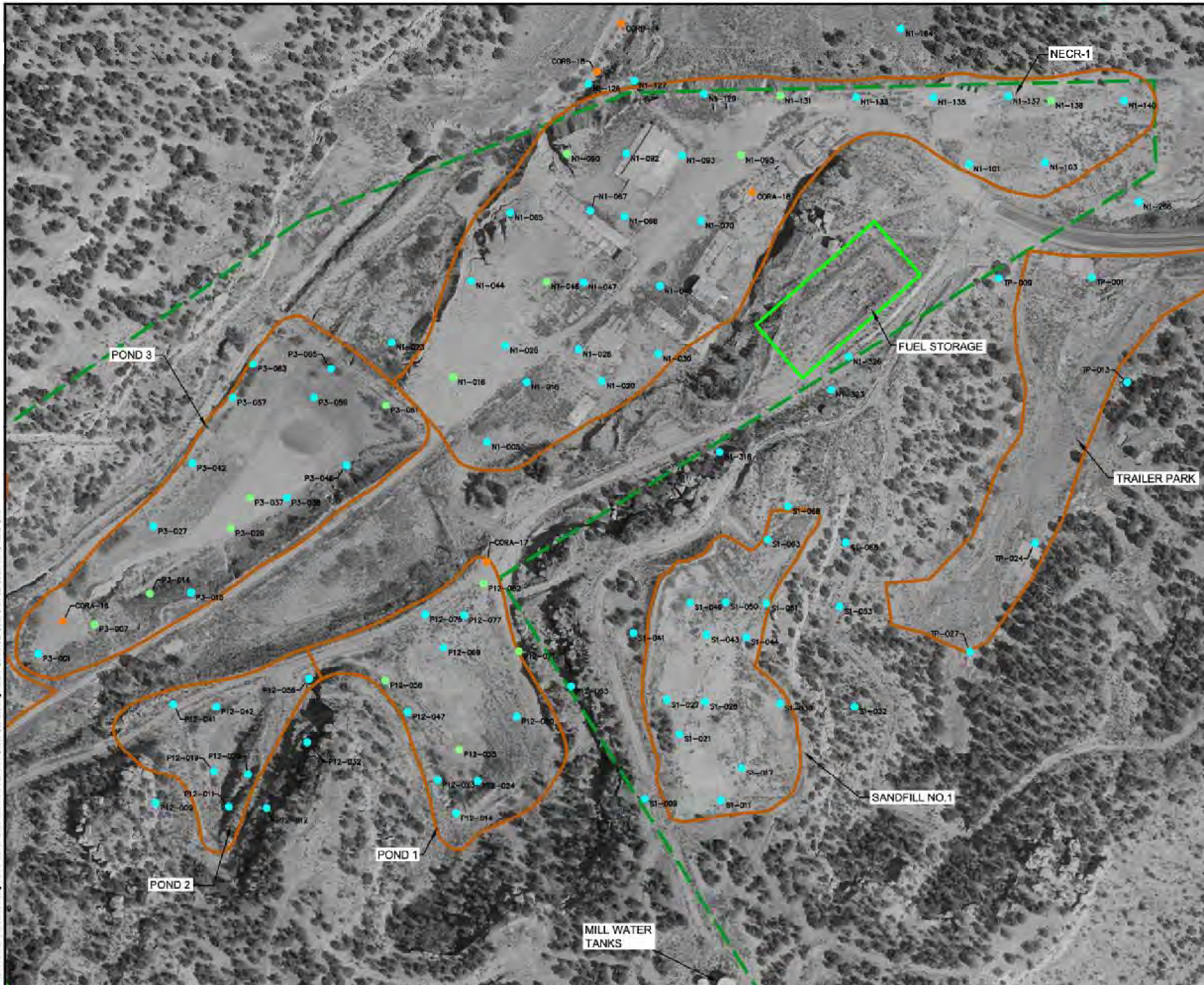
Sheet 4 Of 4 Sheets
SCALE: As Shown
FIGURE No. 2-1

L:\1005146 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Set Drawings\2-1-4 STATIC GAMMA MEASUREMENT LOCATIONS



LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- SURFACE SOIL SAMPLE LOCATION
- CORRELATION SAMPLE LOCATION
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION

NOTES:
1. LOCATION IDs ARE ABBREVIATED TO PREVENT OVERLAPPING LABELS.
2. ADDITIONAL SAMPLE LOCATIONS ASSOCIATED WITH NECR-1 AND LOCATED TO THE NORTH ARE SHOWN ON FIGURE 2-3.

N

SCALE

200' 0 200'

CONTOUR INTERVAL

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DRAWING TITLE:
SURFACE SOIL SAMPLE LOCATIONS MINE SITE

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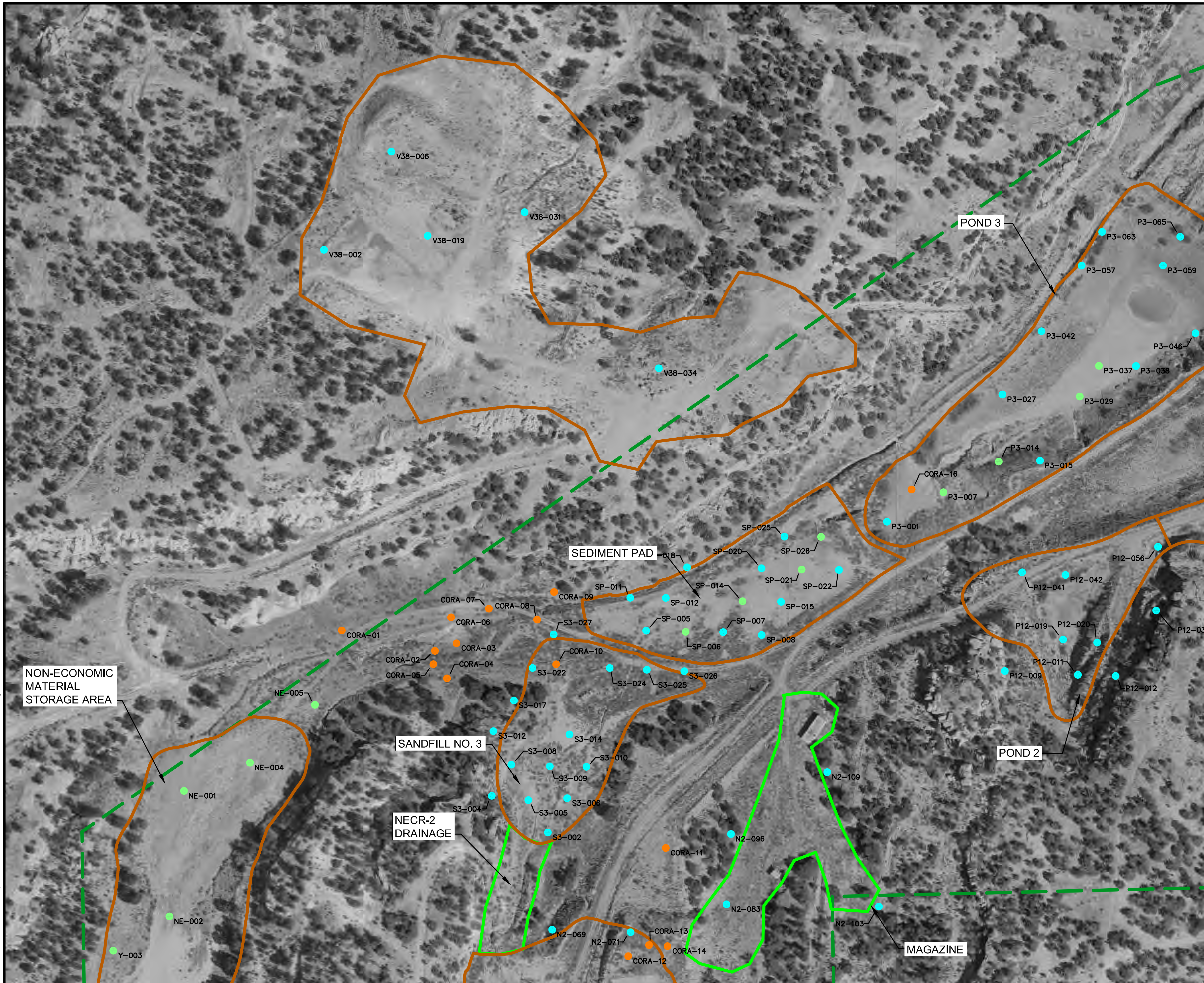
Sheet 1 Of 3 Sheets
SCALE: As Shown
FIGURE No. 2-2



LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- SURFACE SOIL SAMPLE LOCATION
- CORRELATION SAMPLE LOCATION
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION

NOTES:
1. LOCATION IDs ARE ABBREVIATED TO PREVENT OVERLAPPING LABELS.
2. ADDITIONAL SAMPLE LOCATIONS ASSOCIATED WITH NECR-1 AND LOCATED TO THE NORTH ARE SHOWN ON FIGURE 2-3.

SCALE
200' 0 200'

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DRAWING TITLE:
SURFACE SOIL SAMPLE LOCATIONS MINE SITE

MWH

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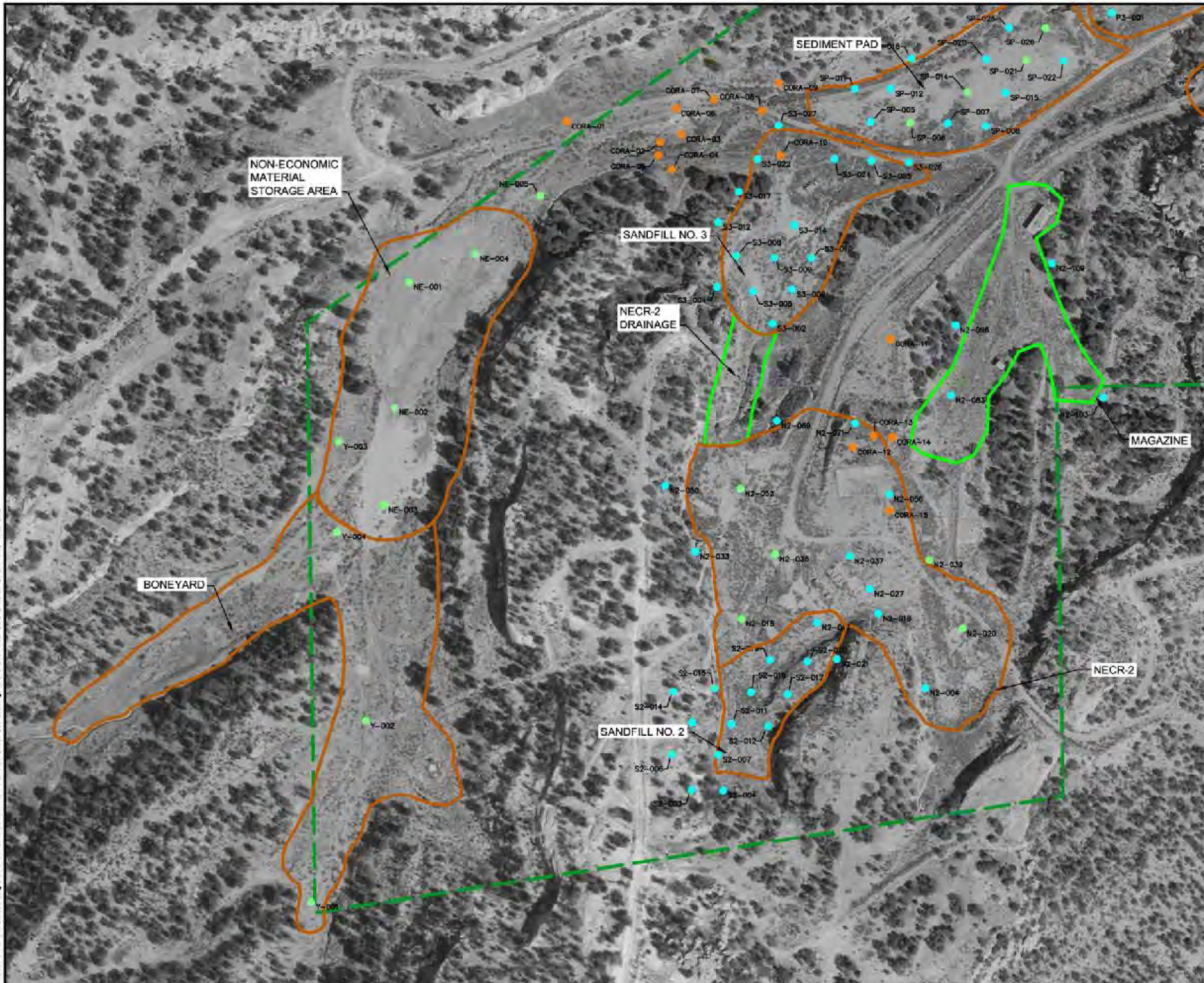
SCALE: As Shown
FIGURE No. 2-2

L:\1005146 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Set Drawings\2-2-2 SURFACE SOIL SAMPLE LOCATIONS MINE SITE



LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- SURFACE SOIL SAMPLE LOCATION
- CORRELATION SAMPLE LOCATION
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION

NOTES:
1. LOCATION IDs ARE ABBREVIATED TO PREVENT OVERLAPPING LABELS.
2. ADDITIONAL SAMPLE LOCATIONS ASSOCIATED WITH NECR-1 AND LOCATED TO THE NORTH ARE SHOWN ON FIGURE 2-3.

N

SCALE
200' 0 200'

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DRAWING TITLE:
SURFACE SOIL SAMPLE LOCATIONS MINE SITE

MWH

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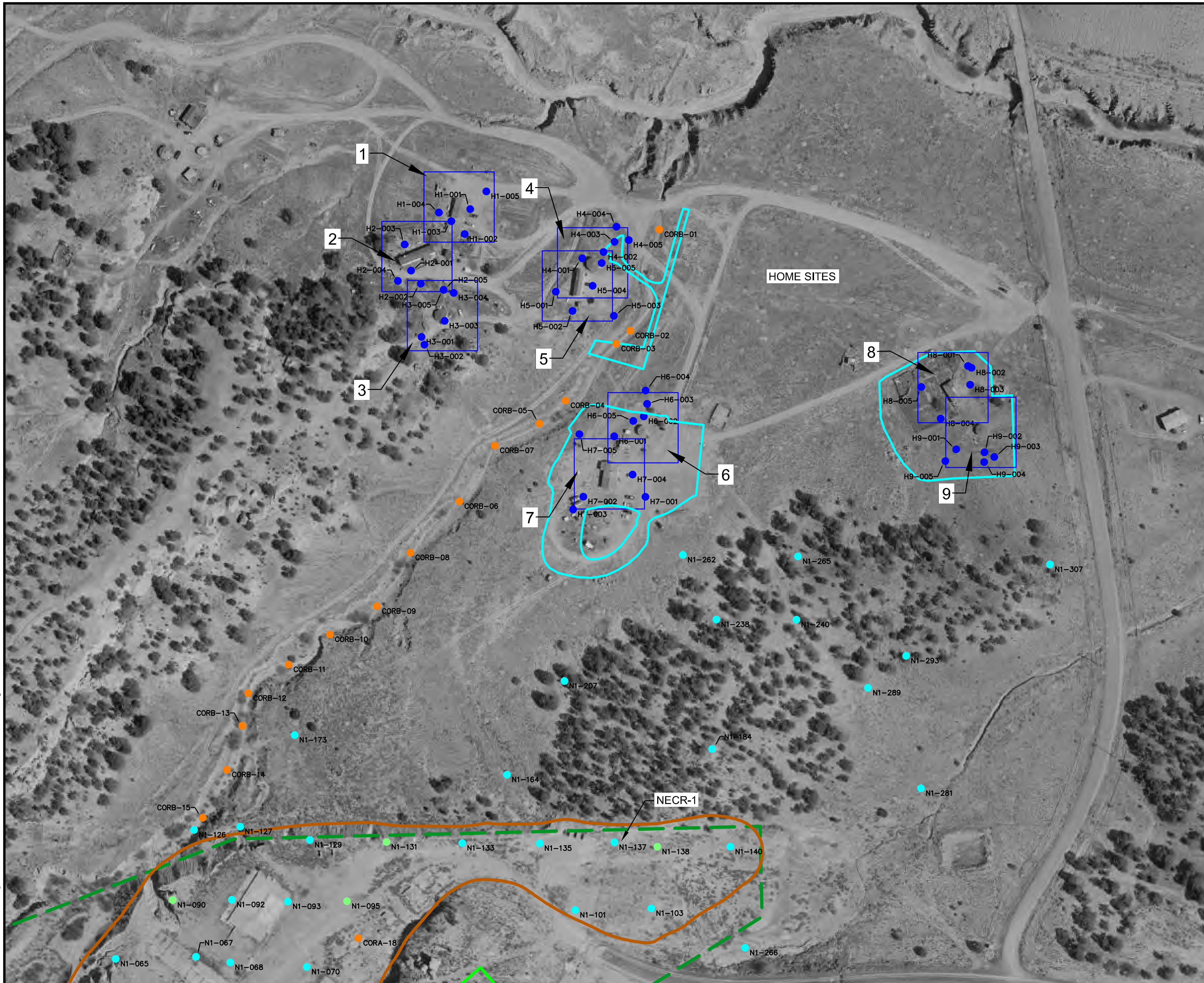
SCALE: As Shown
FIGURE No. 2-2

L:\1005148 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Set Drawings\2-2-3 SURFACE SOIL SAMPLE LOCATIONS MINE SITE



LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- SOIL SAMPLE LOC.,HOME SITES
- SOIL SAMPLE LOCATION, NECR-1
- CORRELATION SAMPLE LOCATION
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- HOME SITE 0.5 ACRE SURVEY AREA BOUNDARY
- 8 HOME SITE NUMBER
- EPA REMOVAL ACTION BOUNDARY (APPROXIMATE)

NOTES:

1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83.
2. LOCATION IDs ARE ABBREVIATED TO PREVENT OVERLAPPING LABELS.
3. SURFACE SOIL SAMPLES COLLECTED AT HOME SITES 4,6,7,8,9 WERE ASSUMED TO HAVE BEEN EXCAVATED BY THE EPA (SEE APPENDIX D).
4. EPA REMOVAL ACTION BOUNDARIES ARE BASED ON HAND-SKETCH MAPS AND ARE OF QUESTIONABLE ACCURACY.

N

SCALE

200' 0 200'

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SURFACE SOIL SAMPLE LOCATIONS HOME SITES

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SCALE: As Shown

FIGURE No. 2-3

L:\1005146 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Set Drawings\2-3 SURFACE SOIL SAMPLE LOCATIONS HOME SITES

LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- ARROYO
- TEST PIT LOCATION
- SOIL BORING LOCATION

N

SCALE

200' 0 200'

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DRAWING TITLE:
SUBSURFACE SOIL SAMPLE LOCATIONS MINE SITE

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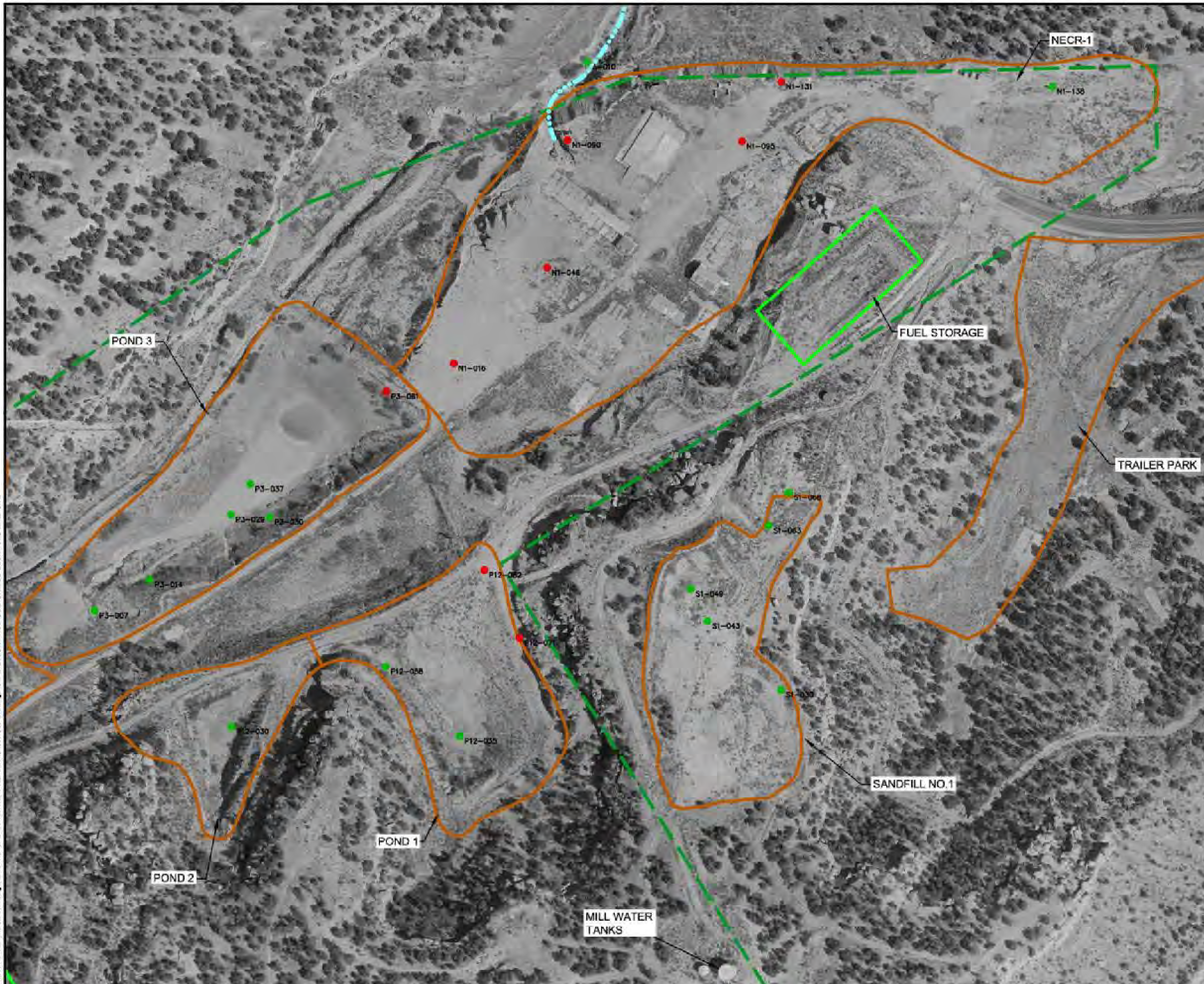
SCALE: As Shown

FIGURE No. 2-4

L:\1005146 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Set Drawings\2-4-1 SUBSURFACE SOIL SAMPLE LOCATIONS MINE SITE



LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- ARROYO
- TEST PIT LOCATION
- SOIL BORING LOCATION

SCALE

200' 0 200'

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SUBSURFACE SOIL SAMPLE LOCATIONS MINE SITE

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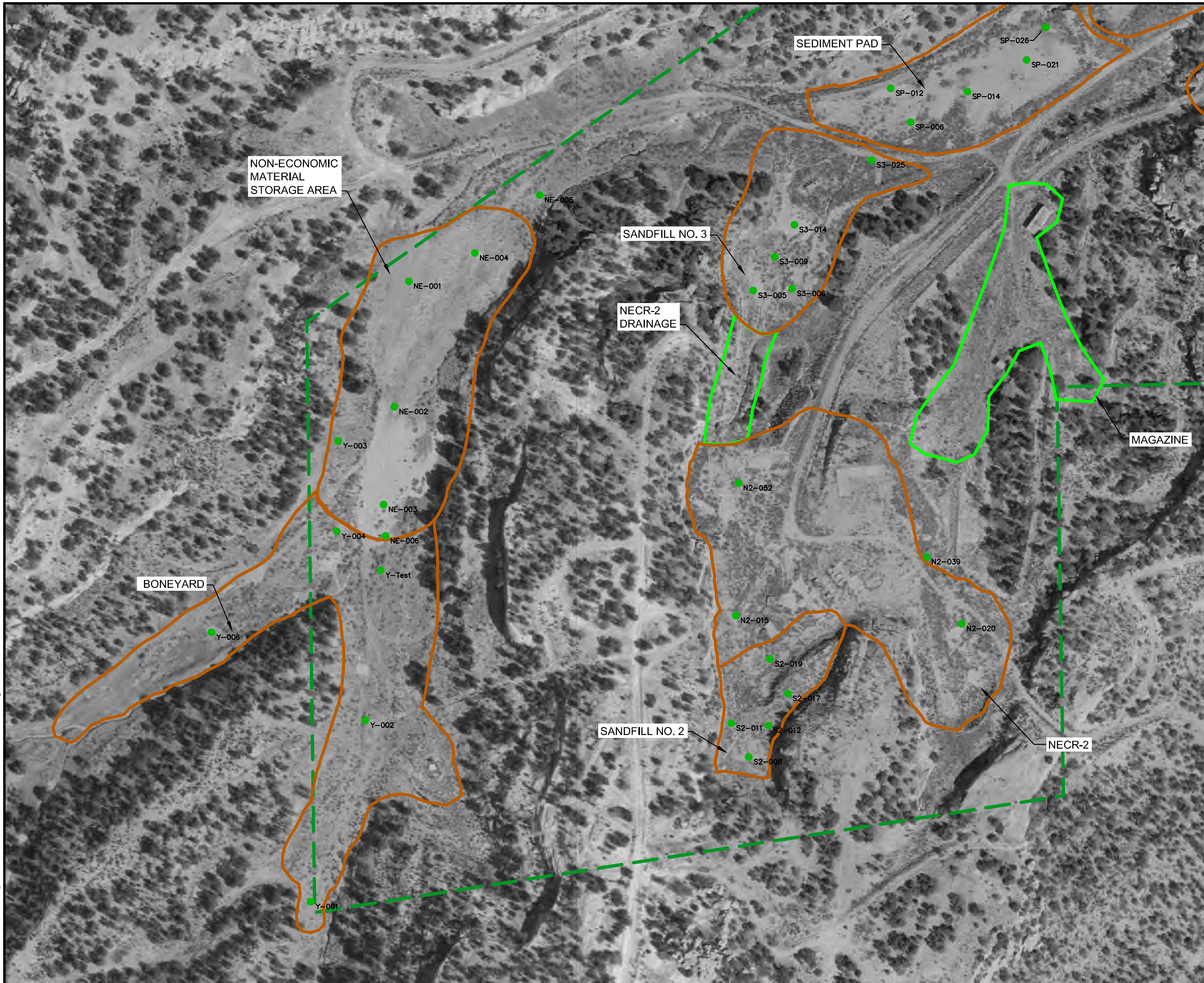
SCALE: As Shown

FIGURE No. 2-4



LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- TEST PIT LOCATION
- SOIL BORING LOCATION

N

SCALE

200' 0 200'

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DRAWING TITLE:
SUBSURFACE SOIL SAMPLE LOCATIONS MINE SITE

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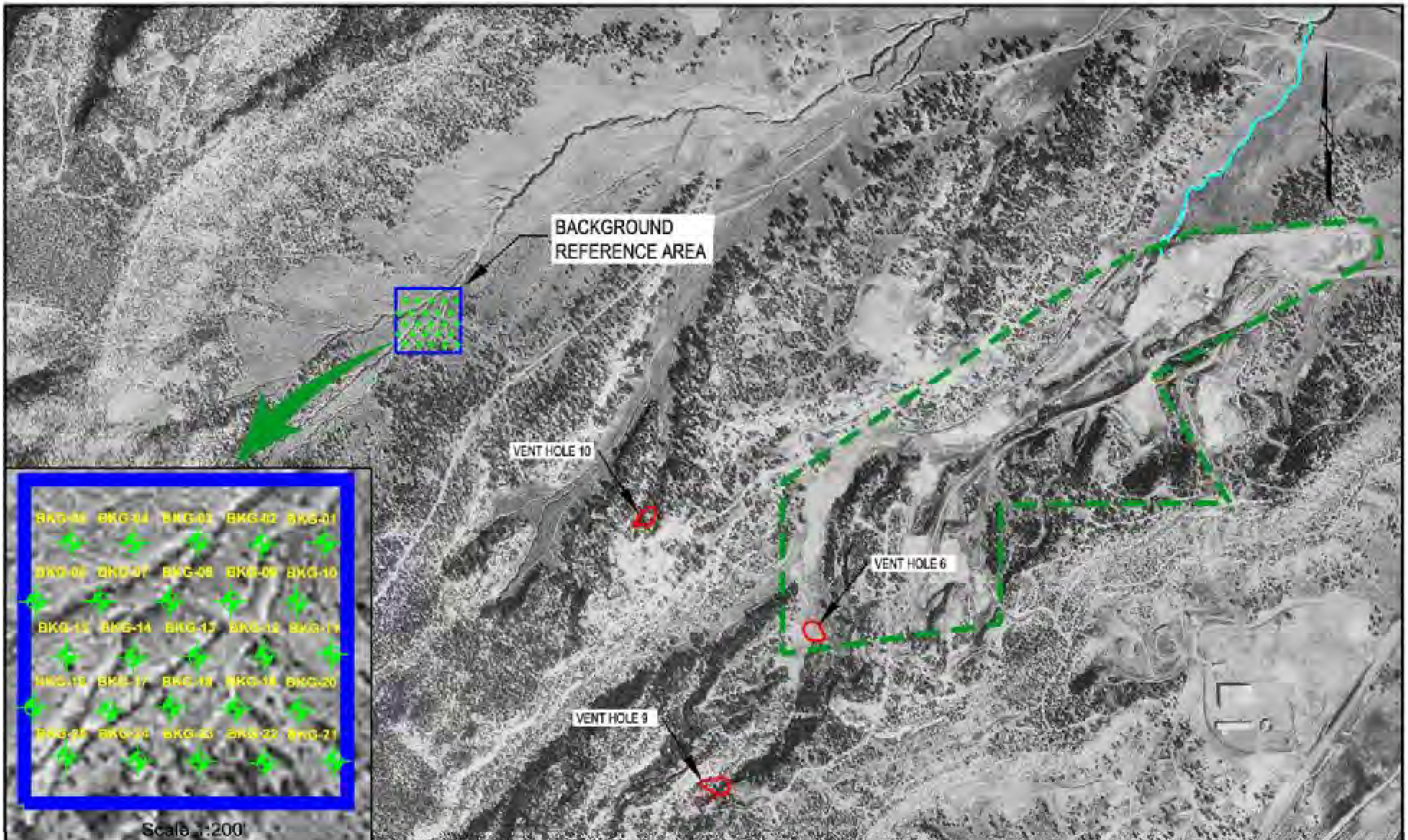
SCALE: As Shown
FIGURE No. 2-4

L:\1005146 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Set Drawings\2-4-3 SUBSURFACE SOIL SAMPLE LOCATIONS MINE SITE



LEGEND

UNNAMED ARROYO

PERMIT BOUNDARY

SURFACE SOIL SAMPLE LOCATION

SCALE

0 500' 1000'

Feet

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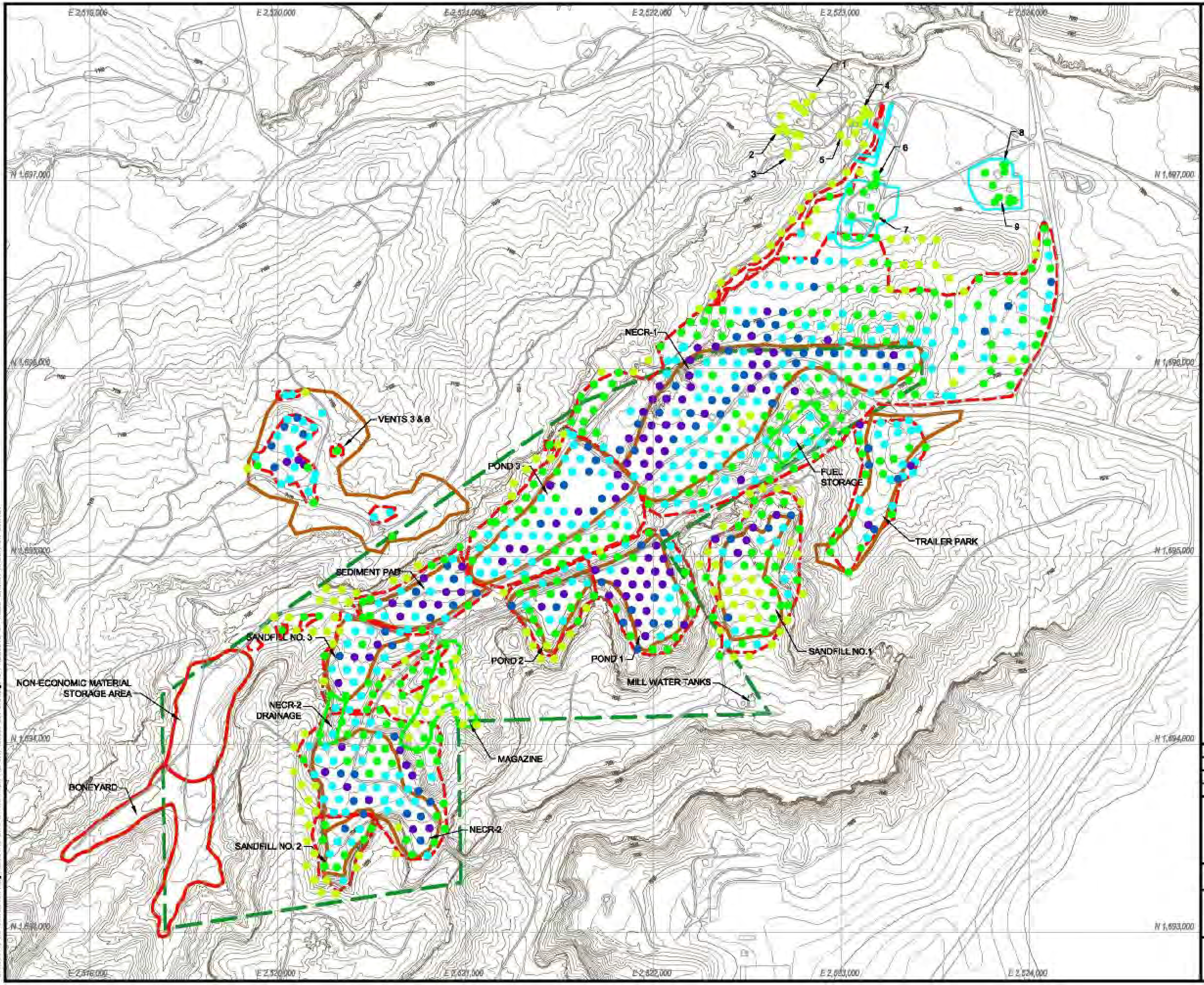
AutoCAD FILE:

SCALE: As Shown

FIGURE No. 2-5

UNC REMOVAL SITE EVALUATION REPORT

SURFACE SOIL SAMPLE LOCATIONS BACKROUND REFERENCE AREA



LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- AREAS ABOVE FIELD SCREENING LEVEL
- 8 HOME SITE NUMBER
- EPA REMOVAL ACTION BOUNDARY (APPROXIMATE)

STATIC GAMMA MEASUREMENT LOCATIONS SHOWING EQUIVALENT Ra-226 (pCi/g) CONCENTRATION

- < 2.24
- 2.25 ~ 6.72
- 6.73 ~ 22.4
- 22.4 ~ 50
- > 50

NOTES:

1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83.
2. EQUIVALENT Ra-226 CONCENTRATION (pCi/g) BASED ON CORRELATION WITH GAMMA (CPM) READINGS FROM STATIC SURVEY.
3. STATIC GAMMA MEASUREMENT LOCATIONS FOR HOME SITES 4,6,7,8,9 WERE ASSUMED TO HAVE BEEN EXCAVATED BY THE EPA (SEE APPENDIX D).
4. EPA REMOVAL ACTION BOUNDARIES ARE BASED ON HAND-SKETCH MAPS AND ARE OF QUESTIONABLE ACCURACY.

N

SCALE

500' 0 500'

CONTOUR INTERVAL 5FT.

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REMOVAL SITE EVALUATION REPORT

DRAWING TITLE:
RESULTS OF FIELD GAMMA RADIATION SURVEY

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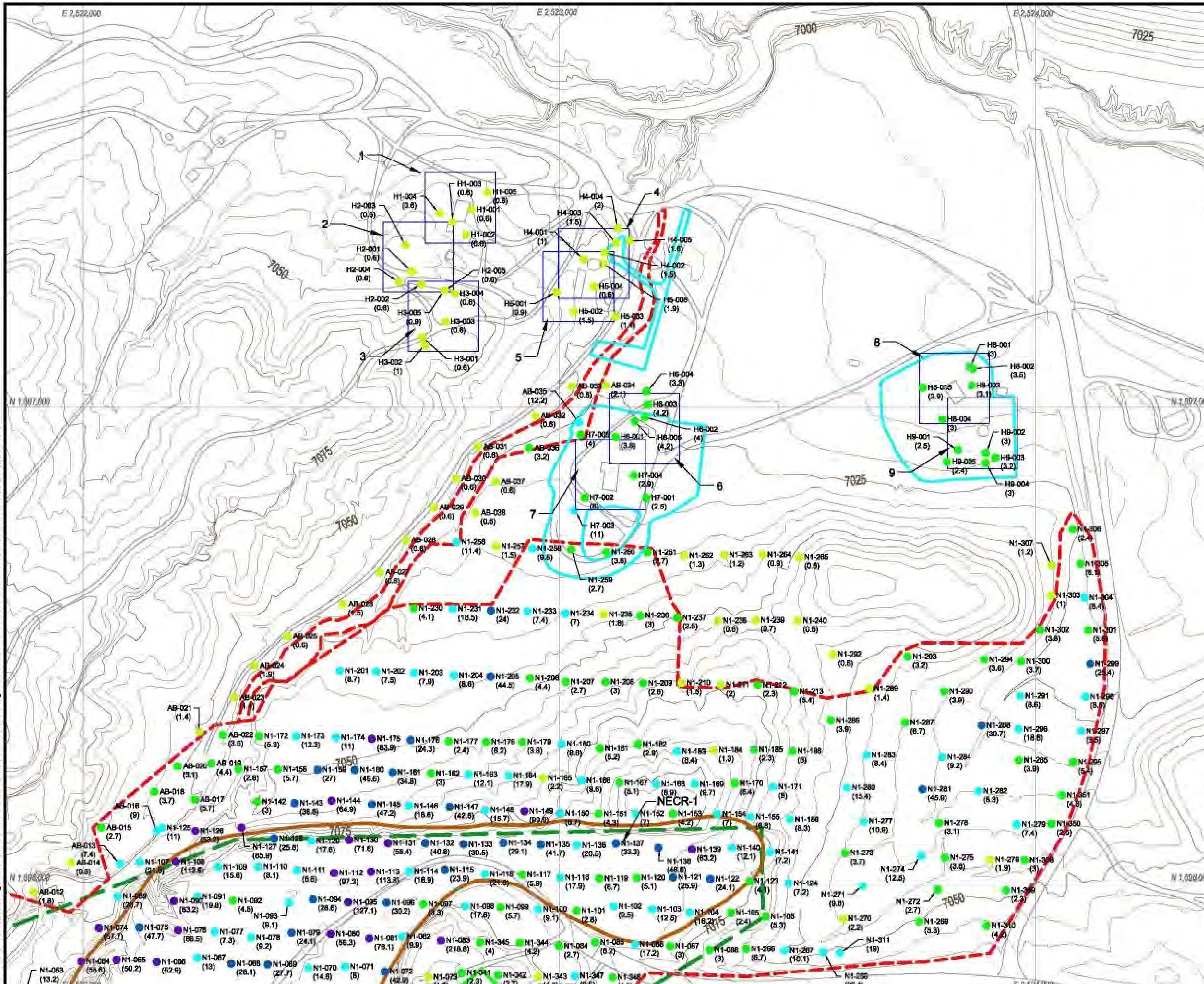
SCALE: As Shown

FIGURE No. 3-1

L:\1005140 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Set Drawings\3-1 RESULTS OF FIELD GAMMA RADIATION SURVEY



LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- AREAS ABOVE FIELD SCREENING LEVEL
- HOME SITE 0.5 ACRE SURVEY AREA BOUNDARY
- 8 HOME SITE NUMBER
- EPA REMOVAL ACTION BOUNDARY (APPROXIMATE)

STATIC GAMMA MEASUREMENT LOCATIONS SHOWING EQUIVALENT Ra-226 (pCi/g) CONCENTRATION

- < 2.24
- 2.25 ~ 6.72
- 6.73 ~ 22.4
- 22.4 ~ 50
- > 50

(1.3) Ra-226 LABORATORY RESULTS (pCi/g)

NOTES:

1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83.
2. THE FSC BOUNDARY IS BASED ON SOIL ANALYTICAL RESULTS AND GAMMA MEASUREMENTS SHOWN ON FIGURE 3-1.
3. SAMPLE LOCATIONS SHOWN FOR HOME SITES 4,6,7,8,9 WERE ASSUMED TO HAVE BEEN EXCAVATED BY THE EPA (SEE APPENDIX D).
4. EPA REMOVAL ACTION BOUNDARIES ARE BASED ON HAND-SKETCH MAPS AND ARE OF QUESTIONABLE ACCURACY.

SCALE

200' 0 200'

CONTOUR INTERVAL 5FT.

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REMOVAL SITE EVALUATION REPORT

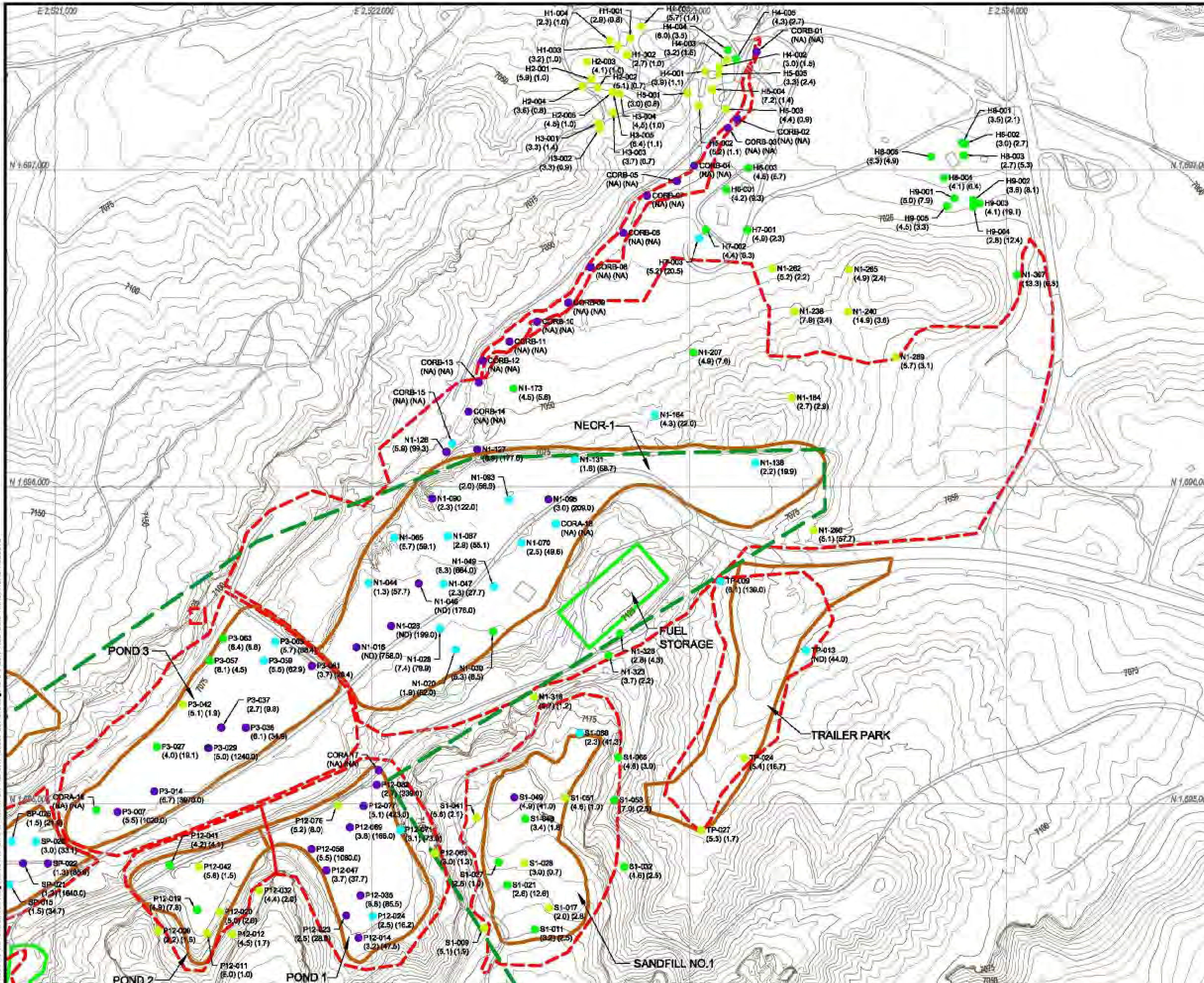
DRAWING TITLE:
RESULTS OF GAMMA SURVEY AND SOIL SAMPLING AT THE HOME SITES

MWH

Sheet 1 Of 1 Sheets

SCALE: As Shown

FIGURE No. 3-2



LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- AREAS ABOVE FIELD SCREENING LEVEL
- HOME SITE 0.5 ACRE SURVEY AREA BOUNDARY
- 8 HOME SITE NUMBER
- EPA REMOVAL ACTION BOUNDARY (APPROXIMATE)

SURFACE SOIL SAMPLE LOCATIONS SHOWING Ra-226 LABORATORY RESULTS (pCi/g)

- < 2.24
- 2.25 ~ 6.72
- 6.73 ~ 22.4
- 22.4 ~ 50
- > 50

(2.7,5.3) AS, U (mg/Kg)

NA NOT-ANALYZED

NOTES:

1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83.
2. EQUIVALENT Ra-226 CONCENTRATION (pCi/g) BASED ON CORRELATION WITH GAMMA (CPM) READINGS FROM STATIC SURVEY.
3. THE FSC BOUNDARY IS BASED ON SOIL ANALYTICAL RESULTS AND GAMMA MEASUREMENTS SHOWN ON FIGURE 3-1.
4. SAMPLE LOCATIONS SHOWN FOR HOME SITES 4,6,7,8,9 WERE ASSUMED TO HAVE BEEN EXCAVATED BY THE EPA (SEE APPENDIX D).
5. EPA REMOVAL ACTION BOUNDARIES ARE BASED ON HAND-SKETCH MAPS AND ARE OF QUESTIONABLE ACCURACY.

SCALE

300' 0 300'

CONTOUR INTERVAL 5FT.

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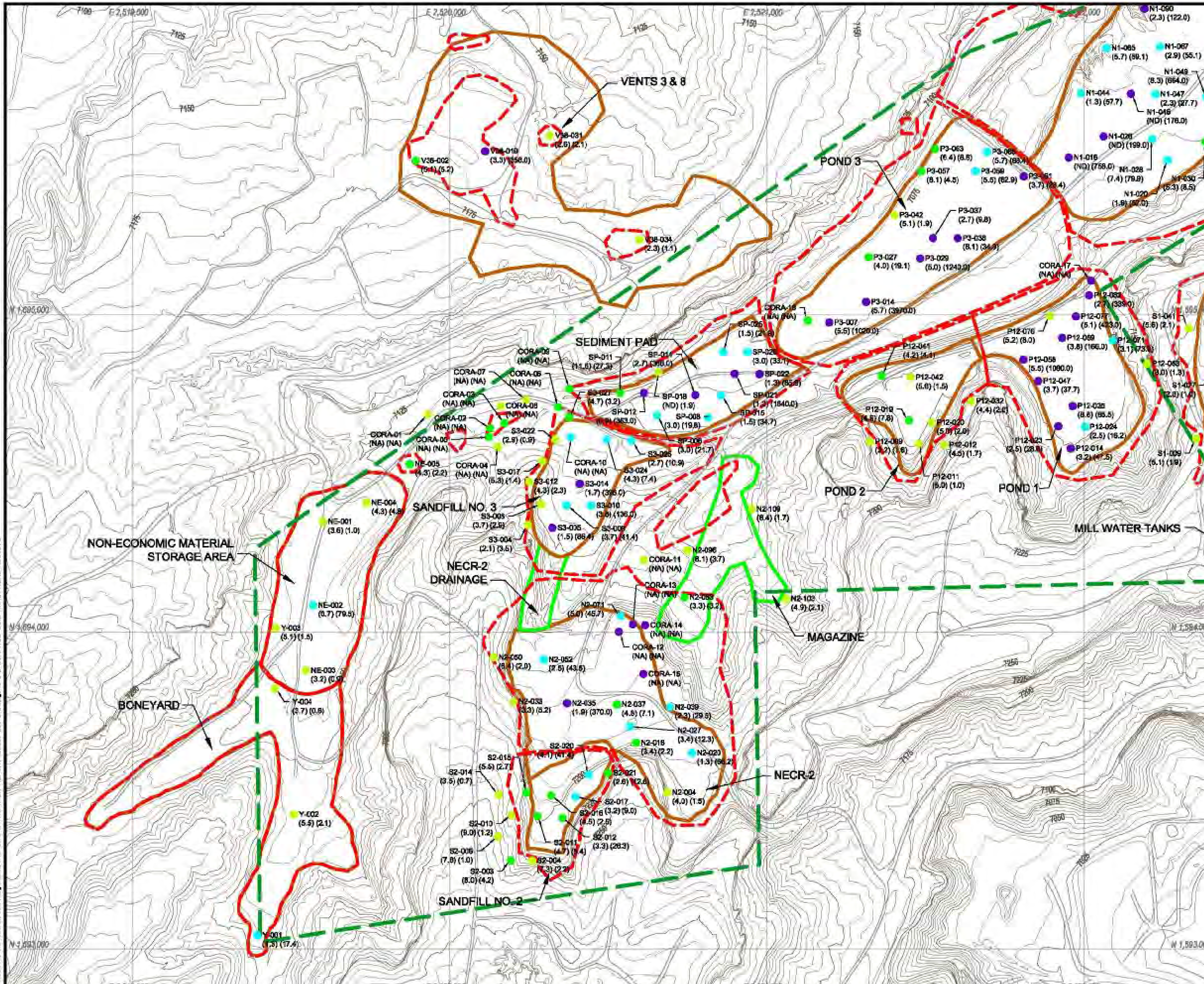
SCALE: As Shown

FIGURE No. 3-3

L:\1006168 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Soil Drawings\3-3.1 SURFACE SOIL ANALYTICAL RESULTS



LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- AREAS ABOVE FIELD SCREENING LEVEL

SURFACE SOIL SAMPLE LOCATIONS SHOWING Ra-226 LABORATORY RESULTS (pCi/g)

- < 2.24
- 2.25 ~ 6.72
- 6.73 ~ 22.4
- 22.4 ~ 50
- > 50

(2.7,5.3) AS, U (mg/Kg)

NA NOT-ANALYZED

NOTES:

1. SURFACE TOPOGRAPHY GENERATED FROM AERIAL PHOTOGRAPHS DATED MAY 2007 BY COOPER AERIAL SURVEYS CO. NEW MEXICO WEST STATE PLANE COORDINATES, NAD 83.
2. EQUIVALENT Ra-226 CONCENTRATION (pCi/g) BASED ON CORRELATION WITH GAMMA (CPM) READINGS FROM STATIC SURVEY.
3. THE FSC BOUNDARY IS BASED ON SOIL ANALYTICAL RESULTS AND GAMMA MEASUREMENTS SHOWN ON FIGURE 3-1.
4. SAMPLE LOCATIONS SHOWN FOR HOME SITES 4,6,7,8,9 WERE ASSUMED TO HAVE BEEN EXCAVATED BY THE EPA (SEE APPENDIX D).
5. EPA REMOVAL ACTION BOUNDARIES ARE BASED ON HAND-SKETCH MAPS AND ARE OF QUESTIONABLE ACCURACY.

SCALE

300' 0 300'

CONTOUR INTERVAL 5FT.

REV NO.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
0	Issued For Final	06/07	T.Lessor	C.Fowler	T.Lessor

UNC

P.O. BOX 3077
Gallup, New Mexico 87305-3077

PROJECT:
REMOVAL SITE EVALUATION REPORT

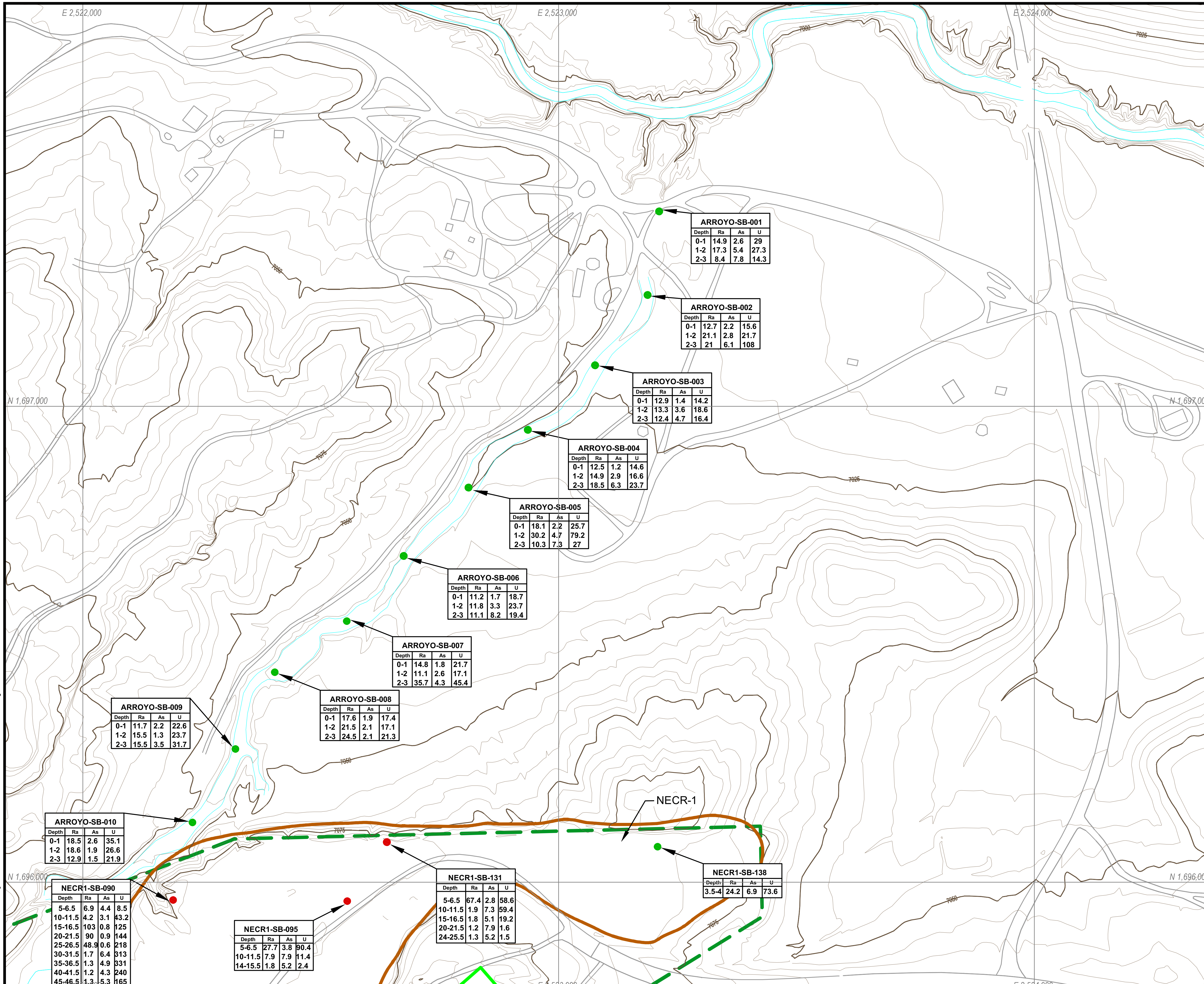
DRAWING TITLE:
SURFACE SOIL ANALYTICAL RESULTS

MWH

Sheet 2 Of 2 Sheets

SCALE:	FIGURE No.
As Shown	3-3

L:\1009168 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Soil Drawings\3-3-2 SURFACE SOIL ANALYTICAL RESULTS



ARROYO-SB-001

Depth	Ra	As	U
0-1	14.9	2.6	29
1-2	17.3	5.4	27.3
2-3	8.4	7.8	14.3

ARROYO-SB-002

Depth	Ra	As	U
0-1	12.7	2.2	15.6
1-2	21.1	2.8	21.7
2-3	21	6.1	108

ARROYO-SB-003

Depth	Ra	As	U
0-1	12.9	1.4	14.2
1-2	13.3	3.6	18.6
2-3	12.4	4.7	16.4

ARROYO-SB-004

Depth	Ra	As	U
0-1	12.5	1.2	14.6
1-2	14.9	2.9	16.6
2-3	18.5	6.3	23.7

ARROYO-SB-005

Depth	Ra	As	U
0-1	18.1	2.2	25.7
1-2	30.2	4.7	79.2
2-3	10.3	7.3	27

ARROYO-SB-006

Depth	Ra	As	U
0-1	11.2	1.7	18.7
1-2	11.8	3.3	23.7
2-3	11.1	8.2	19.4

ARROYO-SB-007

Depth	Ra	As	U
0-1	14.8	1.8	21.7
1-2	11.1	2.6	17.1
2-3	35.7	4.3	45.4

ARROYO-SB-008

Depth	Ra	As	U
0-1	17.6	1.9	17.4
1-2	21.5	2.1	17.1
2-3	24.5	2.1	21.3

ARROYO-SB-009

Depth	Ra	As	U
0-1	11.7	2.2	22.6
1-2	15.5	1.3	23.7
2-3	15.5	3.5	31.7

ARROYO-SB-010

Depth	Ra	As	U
0-1	18.5	2.6	35.1
1-2	18.6	1.9	26.6
2-3	12.9	1.5	21.9

NECR1-SB-090

Depth	Ra	As	U
5-6.5	6.9	4.4	8.5
10-11.5	4.2	3.1	43.2
15-16.5	103	0.8	125
20-21.5	90	0.9	144
25-26.5	48.9	0.6	218
30-31.5	1.7	6.4	313
35-36.5	1.3	4.9	331
40-41.5	1.2	4.3	240
45-46.5	1.3	5.3	165

NECR1-SB-095

Depth	Ra	As	U
5-6.5	27.7	3.8	90.4
10-11.5	7.9	7.9	11.4
14-15.5	1.8	5.2	2.4

NECR1-SB-131

Depth	Ra	As	U
5-6.5	67.4	2.8	58.6
10-11.5	1.9	7.3	59.4
15-16.5	1.8	5.1	19.2
20-21.5	1.2	7.9	1.6
24-25.5	1.3	5.2	1.5

NECR1-SB-138

Depth	Ra	As	U
3.5-4	24.2	6.9	73.6

LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- TEST PIT LOCATION
- SOIL BORING LOCATION

NOTES:
1. Ra-226 CONCENTRATIONS ARE IN pCi/g ; AS AND U ARE IN mg/Kg.
2. DEPTH IN FEET bgs.

N

SCALE
200' 0 200'

CONTOUR INTERVAL 5FT

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
0	Issued For Final	09/07	T.Leeson	C.Fowler	T.Leeson

unc
P.O. BOX 3077
Gallup, New Mexico 87305-3077

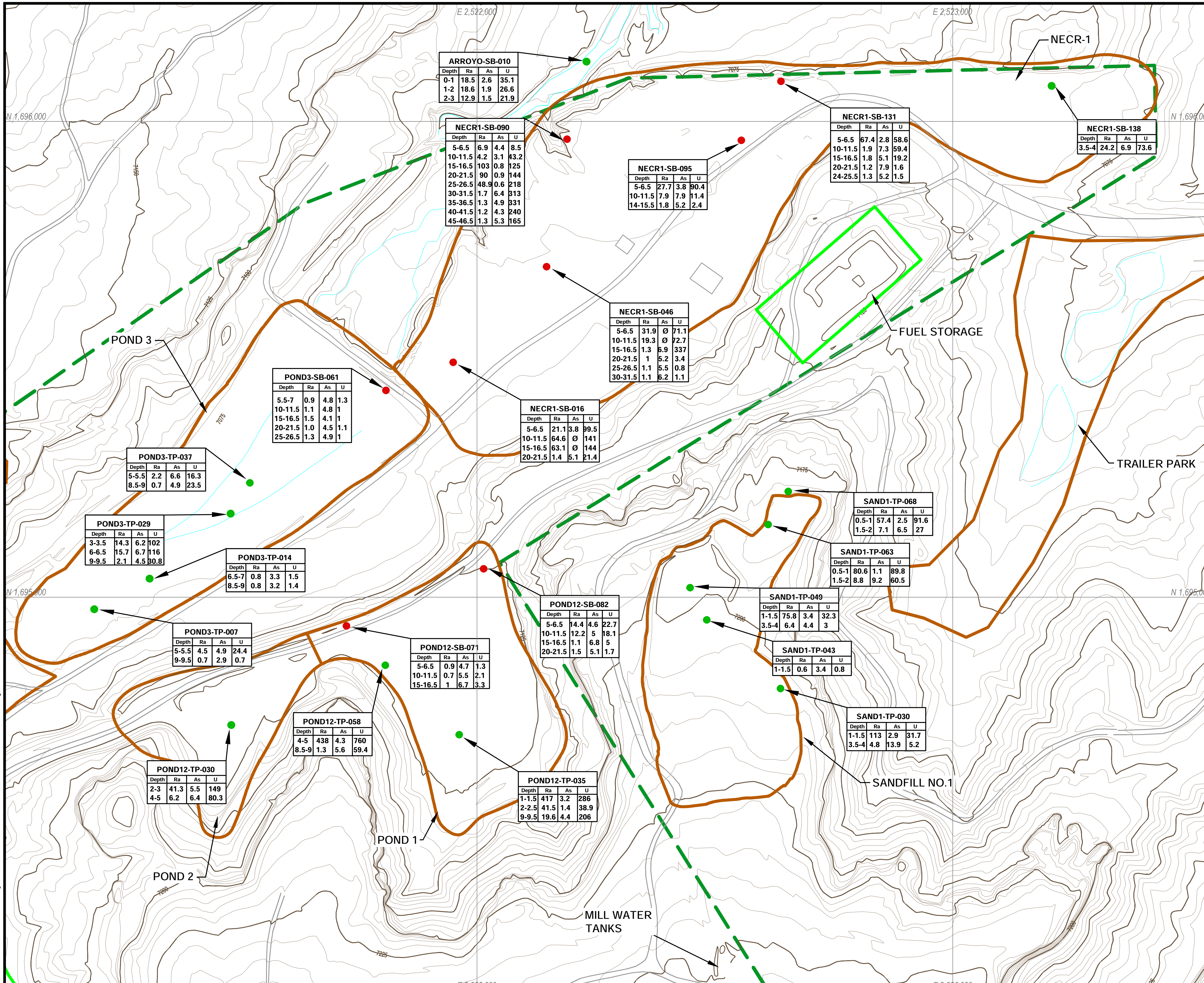
PROJECT:
REMOVAL SITE EVALUATION REPORT

DRAWING TITLE:
SUBSURFACE SOIL ANALYTICAL RESULTS

MWH

Sheet 1 Of 3 Sheets
SCALE: As Shown
FIGURE No. 3-4

L:\1005146 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Set Drawings\3-4-1 SUBSURFACE SOIL ANALYTICAL RESULTS



ARROYO-SB-010

Depth	Ra	As	U
0-1	18.5	2.6	35.1
1-2	18.6	1.9	26.6
2-3	12.9	1.5	21.9

NECR1-SB-090

Depth	Ra	As	U
5-6.5	6.9	4.4	8.5
10-11.5	4.2	3.1	43.2
15-16.5	103	0.8	125
20-21.5	90	0.9	144
25-26.5	48.9	0.6	218
30-31.5	1.7	6.4	313
35-36.5	1.3	4.9	331
40-41.5	1.2	4.3	240
45-46.5	1.3	5.3	165

NECR1-SB-095

Depth	Ra	As	U
5-6.5	27.7	3.8	90.4
10-11.5	7.9	7.9	11.4
14-15.5	1.8	5.2	2.4

NECR1-SB-131

Depth	Ra	As	U
5-6.5	67.4	2.8	58.6
10-11.5	1.9	7.3	59.4
15-16.5	1.8	5.1	19.2
20-21.5	1.2	7.9	1.6
24-25.5	1.3	5.2	1.5

NECR1-SB-138

Depth	Ra	As	U
3.5-4	24.2	6.9	73.6

NECR1-SB-046

Depth	Ra	As	U
5-6.5	31.9	Ø	71.1
10-11.5	19.3	Ø	72.7
15-16.5	1.3	6.9	337
20-21.5	1	5.2	3.4
25-26.5	1.1	5.5	0.8
30-31.5	1.1	6.2	1.1

POND3-SB-061

Depth	Ra	As	U
5.5-7	0.9	4.8	1.3
10-11.5	1.1	4.8	1
15-16.5	1.5	4.1	1
20-21.5	1.0	4.5	1.1
25-26.5	1.3	4.9	1

NECR1-SB-016

Depth	Ra	As	U
5-6.5	21.1	3.8	99.5
10-11.5	64.6	Ø	141
15-16.5	63.1	Ø	144
20-21.5	1.4	5.1	21.4

POND3-TP-037

Depth	Ra	As	U
5-5.5	2.2	6.6	16.3
8.5-9	0.7	4.9	23.5

POND3-TP-029

Depth	Ra	As	U
3-3.5	14.3	6.2	102
6-6.5	15.7	6.7	116
9-9.5	2.1	4.5	30.8

POND3-TP-014

Depth	Ra	As	U
6.5-7	0.8	3.3	1.5
8.5-9	0.8	3.2	1.4

POND3-TP-007

Depth	Ra	As	U
5-5.5	4.5	4.9	24.4
9-9.5	0.7	2.9	0.7

POND12-SB-082

Depth	Ra	As	U
5-6.5	14.4	4.6	22.7
10-11.5	12.2	5	18.1
15-16.5	1.1	6.8	5
20-21.5	1.5	5.1	1.7

POND12-SB-071

Depth	Ra	As	U
5-6.5	0.9	4.7	1.3
10-11.5	0.7	5.5	2.1
15-16.5	1	6.7	3.3

POND12-TP-058

Depth	Ra	As	U
4-5	438	4.3	760
8.5-9	1.3	5.6	59.4

POND12-TP-030

Depth	Ra	As	U
2-3	41.3	5.5	149
4-5	6.2	6.4	80.3

POND12-TP-035

Depth	Ra	As	U
1-1.5	417	3.2	286
2-2.5	41.5	1.4	38.9
9-9.5	19.6	4.4	206

SAND1-TP-068

Depth	Ra	As	U
0.5-1	57.4	2.5	91.6
1.5-2	7.1	6.5	27

SAND1-TP-063

Depth	Ra	As	U
0.5-1	80.6	1.1	89.8
1.5-2	8.8	9.2	60.5

SAND1-TP-049

Depth	Ra	As	U
1-1.5	75.8	3.4	32.3
3.5-4	6.4	4.4	3

SAND1-TP-043

Depth	Ra	As	U
1-1.5	0.6	3.4	0.8

SAND1-TP-030

Depth	Ra	As	U
1-1.5	113	2.9	31.7
3.5-4	4.8	13.9	5.2

LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- ARROYO
- TEST PIT LOCATION
- SOIL BORING LOCATION

NOTES:
1. Ra-226 CONCENTRATIONS ARE IN pCi/g ; AS AND U ARE IN mg/Kg.
2. DEPTH IN FEET bgs.

N

SCALE
200' 0 200'

CONTOUR INTERVAL 5FT

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
0	Issued For Final	09/07	T.Leeson	C.Fowler	T.Leeson

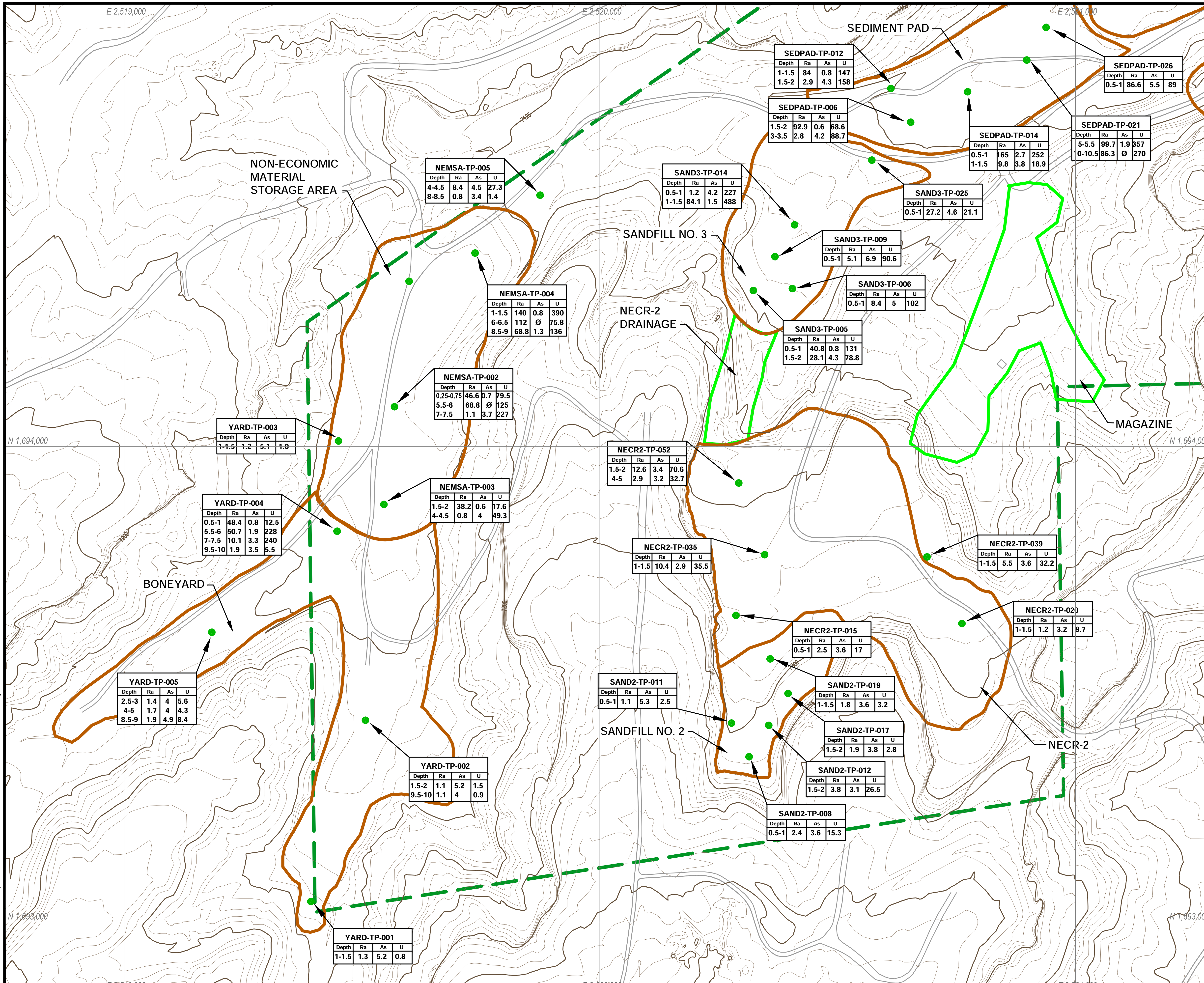
unc
P.O. BOX 3077
Gallup, New Mexico 87305-3077

PROJECT:
REMOVAL SITE EVALUATION REPORT

DRAWING TITLE:
SUBSURFACE SOIL ANALYTICAL RESULTS

MWH

Sheet 2 Of 3 Sheets
SCALE: As Shown
FIGURE No. 3-4



SEDPAD-TP-012

Depth	Ra	As	U
1-1.5	84	0.8	147
1.5-2	2.9	4.3	158

SEDPAD-TP-006

Depth	Ra	As	U
1.5-2	92.9	0.6	68.6
3-3.5	2.8	4.2	88.7

SEDPAD-TP-026

Depth	Ra	As	U
0.5-1	86.6	5.5	89

SEDPAD-TP-021

Depth	Ra	As	U
5-5.5	99.7	1.9	357
10-10.5	86.3	Ø	270

SEDPAD-TP-014

Depth	Ra	As	U
0.5-1	165	2.7	252
1-1.5	9.8	3.8	18.9

NEMSA-TP-005

Depth	Ra	As	U
4-4.5	8.4	4.5	27.3
8-8.5	0.8	3.4	1.4

SAND3-TP-014

Depth	Ra	As	U
0.5-1	1.2	4.2	227
1-1.5	84.1	1.5	488

SAND3-TP-025

Depth	Ra	As	U
0.5-1	27.2	4.6	21.1

SAND3-TP-009

Depth	Ra	As	U
0.5-1	5.1	6.9	90.6

SAND3-TP-006

Depth	Ra	As	U
0.5-1	8.4	5	102

NEMSA-TP-004

Depth	Ra	As	U
1-1.5	140	0.8	390
6-6.5	112	Ø	75.8
8.5-9	68.8	1.3	136

SAND3-TP-005

Depth	Ra	As	U
0.5-1	40.8	0.8	131
1.5-2	28.1	4.3	78.8

NEMSA-TP-002

Depth	Ra	As	U
0.25-0.75	46.6	0.7	79.5
5.5-6	68.8	Ø	125
7-7.5	1.1	3.7	227

YARD-TP-003

Depth	Ra	As	U
1-1.5	1.2	5.1	1.0

NECR2-TP-052

Depth	Ra	As	U
1.5-2	12.6	3.4	70.6
4-5	2.9	3.2	32.7

YARD-TP-004

Depth	Ra	As	U
0.5-1	48.4	0.8	12.5
5.5-6	50.7	1.9	228
7-7.5	10.1	3.3	240
9.5-10	1.9	3.5	5.5

NEMSA-TP-003

Depth	Ra	As	U
1.5-2	38.2	0.6	17.6
4-4.5	0.8	4	49.3

NECR2-TP-035

Depth	Ra	As	U
1-1.5	10.4	2.9	35.5

NECR2-TP-039

Depth	Ra	As	U
1-1.5	5.5	3.6	32.2

NECR2-TP-020

Depth	Ra	As	U
1-1.5	1.2	3.2	9.7

NECR2-TP-015

Depth	Ra	As	U
0.5-1	2.5	3.6	17

YARD-TP-005

Depth	Ra	As	U
2.5-3	1.4	4	5.6
4-5	1.7	4	4.3
8.5-9	1.9	4.9	8.4

SAND2-TP-011

Depth	Ra	As	U
0.5-1	1.1	5.3	2.5

SAND2-TP-019

Depth	Ra	As	U
1-1.5	1.8	3.6	3.2

SAND2-TP-017

Depth	Ra	As	U
1.5-2	1.9	3.8	2.8

YARD-TP-002

Depth	Ra	As	U
1.5-2	1.1	5.2	1.5
9.5-10	1.1	4	0.9

SAND2-TP-012

Depth	Ra	As	U
1.5-2	3.8	3.1	26.5

SAND2-TP-008

Depth	Ra	As	U
0.5-1	2.4	3.6	15.3

YARD-TP-001

Depth	Ra	As	U
1-1.5	1.3	5.2	0.8

LEGEND

- PERMIT BOUNDARY
- SURVEY AREA BOUNDARY
- MINE FEATURE BOUNDARY
- TEST PIT LOCATION

NOTES:
1. Ra-226 CONCENTRATIONS ARE IN pCi/g ; AS AND U ARE IN mg/Kg.
2. DEPTH IN FEET bgs.

N

SCALE
200' 0 200'

CONTOUR INTERVAL 5FT

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
0	Issued For Final	09/07	T.Leeson	C.Fowler	T.Leeson

unc

P.O. BOX 3077
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PROJECT:
REMOVAL SITE EVALUATION REPORT

DRAWING TITLE:
SUBSURFACE SOIL ANALYTICAL RESULTS

MWH

Sheet 3 Of 3 Sheets

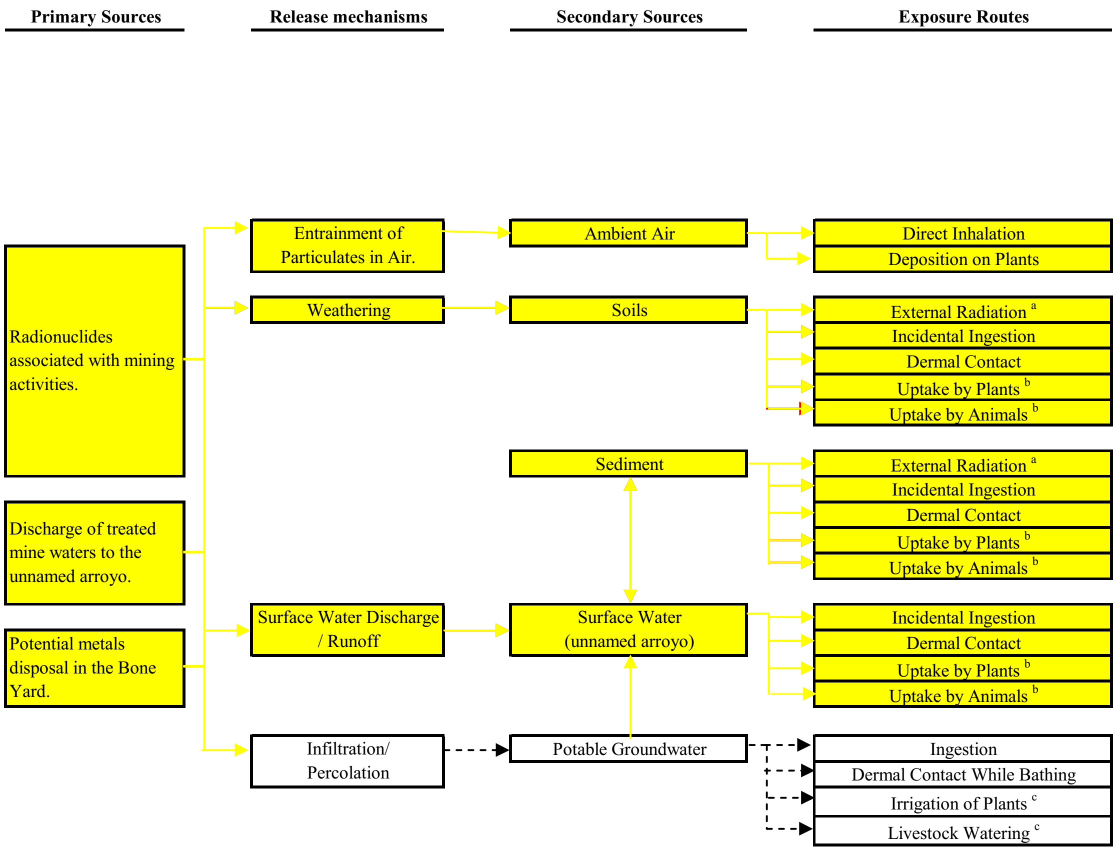
SCALE: As Shown

FIGURE No. 3-4

L:\1005146 NE Churchrock\dwg\REMOVAL SITE EVALUATION REPORT\Sheet Set Drawings\3-4-3 SUBSURFACE SOIL ANALYTICAL RESULTS

FIGURE 4-1

HUMAN HEALTH CONCEPTUAL SITE MODEL (SCENARIO 1)
NORTHEAST CHURCH ROCK MINE
NEW MEXICO



Potential Receptors – Human

Secondary Source	Exposure Route	Current: Onsite UNC Maintenance Worker	Current: Offsite Resident	Future: Onsite UNC Maintenance Worker	Future: Onsite Livestock Grazer	Future: Offsite Resident	Future: Hypothetical Onsite Resident
Ambient Air	Direct Inhalation	●	●	●	●	●	●
Ambient Air	Deposition on Plants	●	●	●	●	●	●
Soils	External Radiation [a]	●	●	●	●	●	●
Soils	Incidental Ingestion	●	●	●	●	●	●
Soils	Dermal Contact	●	●	●	●	●	●
Soils	Uptake by Plants [b]	○	●	○	●	●	●
Soils	Uptake by Animals [b]	○	●	○	●	●	●
Sediment	External Radiation [a]	●	●	●	●	●	●
Sediment	Incidental Ingestion	●	●	●	●	●	●
Sediment	Dermal Contact	●	●	●	●	●	●
Sediment	Uptake by Plants [b]	○	●	○	●	●	●
Sediment	Uptake by Animals [b]	○	●	○	●	●	●
Surface Water (unnamed arroyo)	Incidental Ingestion	●	●	●	●	●	●
Surface Water (unnamed arroyo)	Dermal Contact	●	●	●	●	●	●
Surface Water (unnamed arroyo)	Uptake by Plants [b]	○	●	○	●	●	●
Surface Water (unnamed arroyo)	Uptake by Animals [b]	○	●	○	●	●	●
Potable Groundwater	Ingestion	○	○	○	○	○	○
Potable Groundwater	Dermal Contact While Bathing	○	○	○	○	○	○
Potable Groundwater	Irrigation of Plants [c]	○	○	○	○	○	○
Potable Groundwater	Livestock Watering [c]	○	○	○	○	○	○

Complete Exposure Pathway
Potentially Complete but Insignificant Pathway
Incomplete Pathway
● Complete Exposure Pathway
● Potentially Complete but Insignificant Pathway
○ Incomplete Exposure Pathway

Notes:

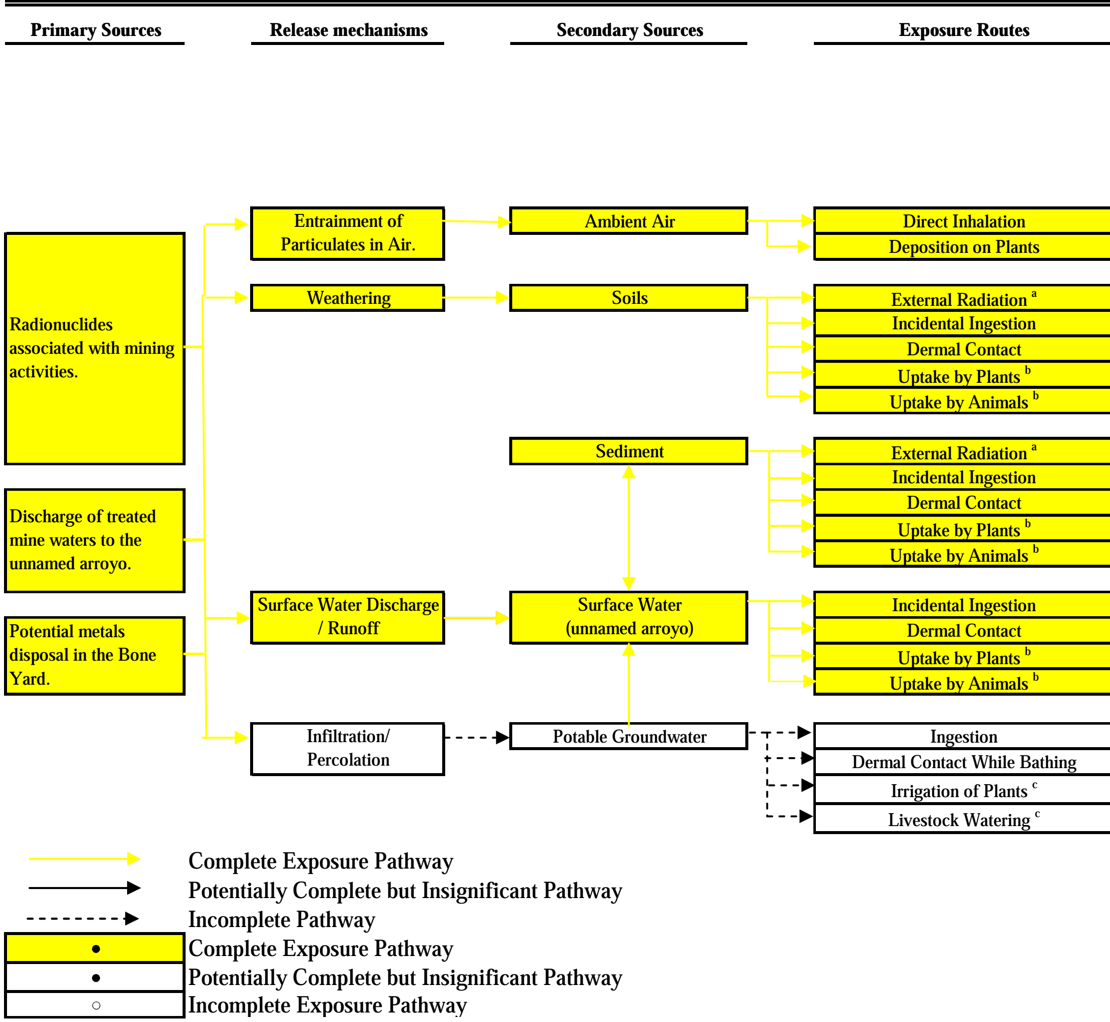
[a] This pathway represents direct gamma radiation to an individual from radionuclides in soil.

[b] This pathway refers to the comsumption of home-grown produce and locally raised meat and eggs.

[c] Potable groundwater is present at a depth of 1,500 to 1,800 feet below ground surface, and is separated from shallow non-potable groundwater by several hundred to 1,000 ft. of aquitard. Therefore, domestic and agricultural groundwater pathways are considered incomplete.

FIGURE 4-2

HUMAN HEALTH CONCEPTUAL SITE MODEL (SCENARIO 2)
NORTHEAST CHURCH ROCK MINE
NEW MEXICO



		Potential Receptors – Human					
		Current		Future			
Secondary Sources	Exposure Routes	Onsite UNC Maintenance Worker	Offsite Resident	Onsite UNC Maintenance Worker	Onsite Livestock Grazer	Offsite Resident	Hypothetical Onsite Resident
Ambient Air	Direct Inhalation	●	●	●	●	●	●
	Deposition on Plants	●	●	●	●	●	●
Soils	External Radiation [a]	●	●	●	●	●	●
	Incidental Ingestion	●	●	●	●	●	●
	Dermal Contact	●	●	●	●	●	●
	Uptake by Plants [b]	○	●	○	●	●	●
	Uptake by Animals [b]	○	●	○	●	●	●
Sediment	External Radiation [a]	●	●	●	●	●	●
	Incidental Ingestion	●	●	●	●	●	●
	Dermal Contact	●	●	●	●	●	●
	Uptake by Plants [b]	○	●	○	●	●	●
	Uptake by Animals [b]	○	●	○	●	●	●
Surface Water (unnamed arroyo)	Incidental Ingestion	●	●	●	●	●	●
	Dermal Contact	●	●	●	●	●	●
	Uptake by Plants [b]	○	●	○	●	●	●
	Uptake by Animals [b]	○	●	○	●	●	●
Potable Groundwater	Ingestion	○	○	○	○	○	○
	Dermal Contact While Bathing	○	○	○	○	○	○
	Irrigation of Plants [c]	○	○	○	○	○	○
	Livestock Watering [c]	○	○	○	○	○	○

Notes:

[a] This pathway represents direct gamma radiation to an individual from radionuclides in soil.

[b] This pathway refers to the comsumption of home-grown produce and locally raised meat and eggs, with the exception of the Onsite Livestock Grazer where only meat consumption is considered complete between the plant and animal uptake pathways.

[c] Potable groundwater is present at a depth of 1,500 to 1,800 feet below ground surface, and is separated from shallow non-potable groundwater by several hundred to 1,000 ft. of aquitard. Therefore, domestic and agricultural groundwater pathways are considered incomplete.

APPENDICES

APPENDIX A

LAND USE INFORMATION

THIS INDENTURE, Made this fourteenth day of May, one thousand, nine hundred and twenty-nine, by and between the SANTA FE PACIFIC RAILROAD COMPANY, a corporation, duly incorporated by Act of Congress approved March 3, 1897, party of the first part, and hereinafter designated the first party, and the UNITED STATES OF AMERICA, IN TRUST FOR THE NAVAJO TRIBE, party of the second part, and hereinafter designated the second party.

WITNESSETH, that the said first party for and in consideration of the sum of forty-two thousand, ninety-nine and 71/100 dollars, ($42,099.71), to it in hand paid by the second party, the receipt whereof is hereby acknowledged, hath granted, bargained and sold, and by these presents doth grant, bargain, sell and convey, subject to the reservations and conditions hereinafter contained, unto the said second party, its successors and assigns, that certain real property situated in the County of McKinley and State of New Mexico, and more particularly described as follows, to wit:

NEW MEXICO MERIDIAN, NEW MEXICO.

Township seventeen north, range fourteen west.

Lots one, two, three, four of section one, containing two and two hundredths acres; lots one, two, three, four of section thirteen, containing seven and thirty-two hundredths acres; lots one, two, three, four of section twenty-five, containing eleven and fifty-eight hundredths acres; lots one, two, three, four, south half of the south half of section thirty-one, containing three hundred twenty-one and sixty hundredths acres; lots one, two, three, four, south half of the south half of section thirty-three, containing three hundred seventeen and seventy-six hundredths acres; and lots one, two, three, four, south half of the south half of section thirty-five, containing three hundred eighteen and twenty hundredths acres.

Township seventeen north, range fifteen west.

Lots one, two, three, four, south half of the south half of section thirty-one, containing three hundred fifteen and twenty hundredths acres; lots one, two, three, four, south half of the south half of section thirty-three, containing three hundred seventeen and ninety-eight hundredths acres; and lots one, two, three, four, south half of the south half of section thirty-five, containing three hundred fifteen and twenty hundredths acres.

Township fifteen north, range sixteen west.

Section one, containing six hundred thirty-nine and fifty-two hundredths acres; section three, containing six hundred forty-one and ninety hundredths acres; section five, containing six hundred thirty-eight and eighty-two hundredths acres; section seven, containing six hundred sixteen and eighteen hundredths acres; section nine, containing six hundred forty acres; section eleven, containing six hundred forty acres; lots one, two, three, four of section thirteen, containing one hundred ninety-five and sixty hundredths acres; lots one, two, three, four section fifteen, containing one hundred eighty-five and twenty-eight hundredths acres; and lots one, two, three, four of section seventeen, containing one hundred seventy-four and sixteen hundredths acres.

Township sixteen north, range sixteen west.

Section one, containing five hundred ninety-five and twenty hundredths acres; section three, containing six hundred one and eighty hundredths acres; section five, containing six hundred six and eighty-eight hundredths acres; section seven, containing five hundred ninety-five and ninety-two hundredths acres; section nine, containing six hundred forty acres; section eleven, containing six hundred forty acres; section thirteen, containing six hundred forty acres; section fifteen, containing six hundred forty acres; section seventeen, containing six hundred forty acres; section nineteen, containing six hundred two and fifty-two hundredths acres; section twenty-one, containing six hundred forty acres; section twenty-three, containing six hundred forty acres, section twenty-five, containing six hundred forty acres; section twenty-seven, containing six hundred forty acres; section twenty-nine, containing six hundred forty acres; section thirty-one, containing six hundred eleven and twelve hundredths acres; section thirty-three, containing six hundred forty acres; and section thirty-five, containing six hundred forty acres.

Township seventeen north, range sixteen west.

Lots one, two, three, four, south half of the south half of section thirty-one, containing three hundred five and twenty-eight hundredths acres; lots one, two, three, four, south half of the south half of section thirty-three, containing three hundred eight and twenty-one hundredths acres; and lots one, two, three, four, south half of the south half of section thirty-five, containing three hundred ten and seventy-eight hundredths acres.

Township fourteen north, range seventeen west.

Lots one, two, three, four, five, southwest quarter of the northwest quarter, west half of the southwest quarter of section three, containing two hundred thirty-five and fifty-six hundredths acres; section five, containing six hundred thirty-eight and eighty-eight hundredths acres; section seven, containing six hundred thirty-eight and twelve hundredths acres; section nine, containing six hundred forty acres; lots one, two, three, four, west half of the west half of section fifteen, containing two hundred thirty-six and eighty-eight hundredths acres; section seventeen, containing six hundred forty acres; section nineteen, containing six hundred forty and eighty-eight hundredths acres; section twenty-one, containing six hundred forty acres; lots one, two, three, four, west half of the west half of section twenty-seven, containing two hundred thirty-nine and ninety-two hundredths acres; north half, and southwest quarter of section twenty-nine, containing four hundred eighty acres; and south half of section thirty-three, containing three hundred twenty acres.

Township fifteen north, range seventeen west.

Section one, containing six hundred eighty-nine and eighty-four hundredths acres; section three, containing six hundred forty and forty-two hundredths acres; section five, containing six hundred thirty-nine and ninety-two hundredths acres; section seven, containing six hundred thirty-nine and ninety-four hundredths acres; northeast quarter and south half of section nine, containing four hundred eighty acres; lots one, two, three, four of section thirteen, containing one hundred sixty-four and forty-eight hundredths acres; lots one, two, three, four, five, six, west half of the west half of section fifteen, reserving and excepting therefrom all that part of said section included between lines parallel with and two hundred feet each side of the center line of the original main track of The Atchison, Topeka and Santa Fe Railway Company, containing an area of twenty-four and twenty-four hundredths acres, more or less; said original main track being the present eastbound main track, containing three hundred and thirty-seven hundredths acres; lots one, two, east half, east half of the northwest quarter of section nineteen, containing four hundred eighty-one and nine hundredths acres; east half, west half of the northwest quarter, south half of the southwest quarter of section twenty-one, containing four hundred eighty acres; west half of the southwest quarter of section twenty-seven, containing eighty acres; section twenty-nine, containing six hundred forty acres; and section thirty-one, containing six hundred thirty-eight and eighty-four hundredths acres.

Township sixteen north, range seventeen west.

Section one, containing six hundred fourteen and forty hundredths acres; section three, containing six hundred twenty-two and four hundredths acres; section five, containing six hundred twenty-four and fifty-two hundredths acres; section seven, containing six hundred thirty-two and fifty-two hundredths acres; section nine, containing six hundred forty acres; section eleven, containing six hundred forty acres; section thirteen, containing six hundred forty acres; section fifteen, containing six hundred forty acres; section seventeen, containing six hundred forty acres; section nineteen, containing six hundred thirty-six and forty-four hundredths acres; section twenty-one, containing six hundred forty acres; section twenty-three, containing six hundred forty acres; section twenty-five, containing six hundred forty acres; section twenty-seven, containing six hundred forty acres; section twenty-nine, containing six hundred forty acres; section thirty-one, containing six hundred thirty seven and forty-four hundredths acres; section thirty-three, containing six hundred forty acres; and section thirty-five, containing six hundred forty acres.

Township seventeen north, range seventeen west.

Lots one, two, three, four, south half of the south half of section thirty-one, containing two hundred ninety-seven and thirty-eight hundredths acres; lots one, two, three, four, south half of the south half of section thirty-three, containing three hundred seven and seventy-eight hundredths acres; and lots one, two, three, four, south half of the south half of section thirty-five, containing three hundred six and two hundredths acres.

Containing in the aggregate forty-two thousand, ninety-nine and seventy-one hundredths acres.

Excepting and reserving to the grantor, its successors and assigns all oil, gas, coal and minerals whatsoever, already found or which may hereafter be found, upon or under said lands with the right to prospect for, mine and remove the same and to use so much of the surface of said lands as shall be necessary and convenient for shafts, wells, tanks, pipe lines, rights of way, railroad tracks, storage purposes and other and different structures and purposes necessary and convenient for the digging, drilling, and working of any mines or wells which may be operated on said lands. The grantor, its successors or assigns, will pay to the grantee, its successors or assigns the fair value of the surface of all lands with improvements thereon appropriated under this exception and reservation. If the parties cannot agree on such value it shall be fixed by three appraisers, of whom each party shall appoint one and the two so appointed shall appoint the third.

Reserving and excepting, however, from the said real property above described, and from the operation of this deed, any portion or portions of the said property above described, if any such there be, which are situated within two lines drawn parallel to and distant from each other two hundred feet, and each distant one hundred feet from the center line of the railroad of The Atchison, Topeka and Santa Fe Railway Company, as now constructed, and including in addition thereto all existing grounds now used for stations, workshops, depots, machine shops, switches, side-tracks, turn-tables or water stations; also reserving and excepting any portion or portions of such property as are now used, occupied or enjoyed by The Atchison, Topeka and Santa Fe Railway Company for other railroad purpose or purposes incidental thereto, or in any manner or degree devoted to such purposes; and excepting and reserving also such portions of said real property as may have been appropriated or dedicated or otherwise acquired for public roads and highways, or other public uses.

TO HAVE AND TO HOLD the said real property above described, and its appurtenances, unto the said second party, its successors and assigns forever, subject always, however, to the reservations, exceptions, covenants and conditions above contained and hereinafter set forth.

And the said first party doth hereby covenant with the said second party, its successors and assigns, that it is lawfully seized of the aforesaid real property, and that the same is free and clear of all incumbrances whatsoever, and that it will forever warrant and defend the title to the said real proper[illegible] said second party, its successors and assigns, ag[illegible] persons lawfully claiming or to claim the same, except taxes th[illegible] be levied after December 31st, 1929, provided, however, that it is expressly understood and agreed between the par[illegible] that in case the title to any of such land intended hereby to be conveyed should fail, or the second party should be evicted therefrom, or from any portion thereof, by any person or persons holding title paramount to the title so intended hereby to be conveyed, that then and in such event, the measure of damages on account thereof, as well as for the breach of any covenant of warranty contained in this deed, whether expressed or implied, shall be such sum, and no more, as will be produced by multiplying the number of acres to which such title shall have failed by the average price per acre paid by the second party to the first party for the whole of said real property; and in no event shall the amount of damages which the second party shall be entitled to receive or recover from the first party, on account of any breach or breaches in the covenant or covenants contained in this deed, whether expressed or implied, exceed the said amount above expressed as the consideration hereof, to wit, the sum of forty-two thousand, ninety-nine and 71/100 dollars ($42,099.71), and interest on such amount from the date of the payment thereof at the rate of six per cent per annum.

IN WITNESS WHEREOF, The said SANTA FE PACIFIC RAILROAD COMPANY, the first party, has caused this deed to be signed by its Vice President and attested by its Assistant Secretary, and its seal to be duly affixed, the day and year first above written.

SANTA FE PACIFIC RAILROAD COMPANY.

(Signed) E. J. ENGEL

By

Vice President.

SEAL

Attest:

Signed E L Copeland

Assistant Secretary.

State of Illinois,)
: ss.
County of Cook.)

On this 14th day of June 1929, before me appeared ~~W. B. STOREY~~ E J Engel, to me personally known, who, being by me duly sworn, did say that he is the Vice President of the SANTA FE PACIFIC RAILROAD COMPANY, a corporation organized and existing under and by virtue of an Act of Congress approved March 3, 1897, and that the seal affixed to said instrument is the corporate seal of said corporation, and that said instrument was signed and sealed in behalf of said corporation by authority of its board of directors, and said ~~W. B. STOREY~~ E J Engel, acknowledged said instrument to be the free act and deed of said corporation.

WITNESS my hand and seal notarial this 14th day of June, A. D. 1929.

Seal

<Sgd Rudolph G. Rydin.
Notary Public.

My commission expires September 19, 1930.

Lee F. English

Form 5-5515
ATTACH FORM 5-5521 FOR
ON-AND-OFF PERMITS

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
GRAZING PERMIT

OMB Control No. 1076-0157
Expires 09/30/2014

Contract No. CP-06-16-173 An execution fee shall be payable annually in advance pursuant to 25 CFR 166.26.

(WRITE ALL NAMES IN FULL)

1621-001
(Range unit number or name)

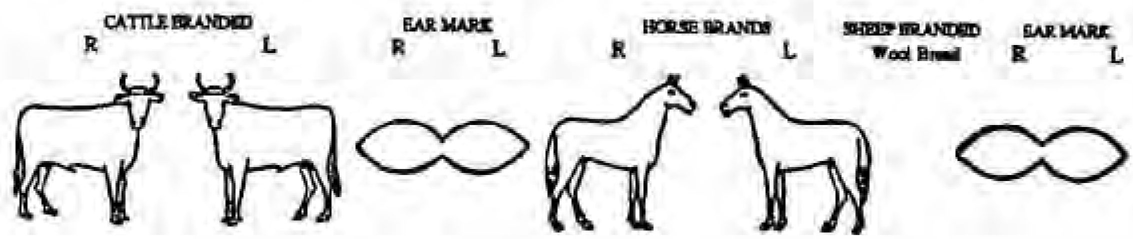
EASTERN NAVAJO (Agency) **NAVAJO –PINEDALE** (Reservation) **NAVAJO** (Tribe)

By authority of law and under the regulations (25 CFR 166) prescribed by the Secretary of the Interior, ALTA L. YAZZIE, DELBERT YAZZIE & TONY TOM (Name of permittee)

PO Box 784 Church Rock, NM 87311 (Post-office) is hereby granted permission to hold and graze livestock on the Trust Indian and Government owned lands in the foregoing range unit of the said Reservation, a schedule of which is attached and made a part of this permit, for a period beginning **OCTOBER 01, 2005** (Date), and terminating not later than **SEPTEMBER 30, 2014** (Date).

CLASS OR USE FOR RENTAL, CHARGES STOCKING, ETC.	NUMBER OF HEAD	KIND OF STOCK	GRAZING SEASON		*ANNUAL RENTAL	
			From --	To --	Amount	Date Payable
Regular Fees			10-01-05	09-30-2014	$45.74	10-01-05
Other		SHEEP UNIT				
Allottee Use						
On-and-Off						
Total	85					

Brands.---Unless authorized by the Superintendent of the Agency in writing, only livestock bearing the brands and marks herein shown shall be grazed under authority of this permit:



Issued at the above Indian Agency this 1st day of **OCTOBER, 2005** Month/Year

*Payment

To: Bureau of Indian Affairs $ 137.24

Tribal Treasurer $ 0.00

[SEAL]
(Superintendent)

I accept this permit and the attached stipulations.

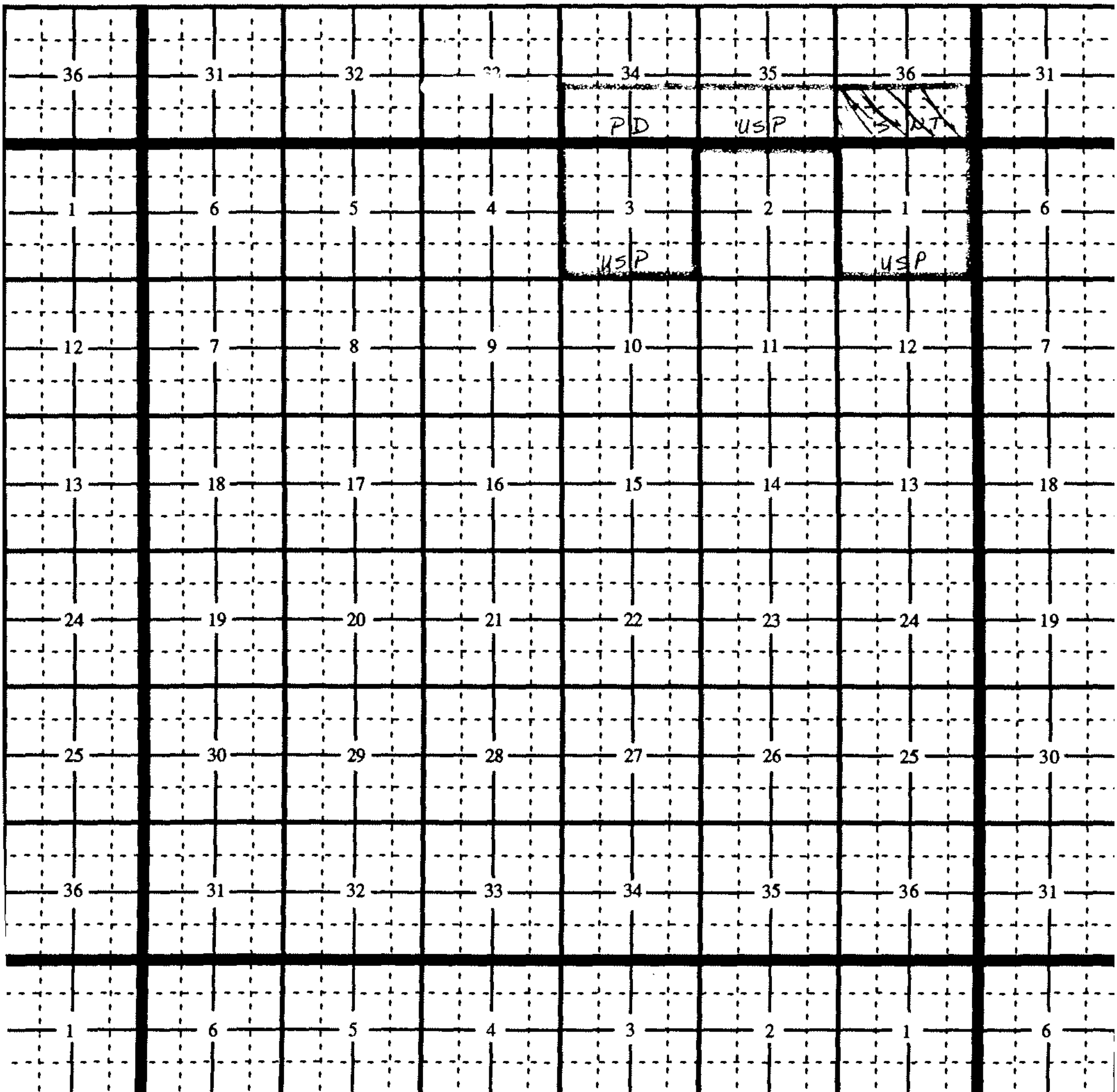
Witness ______________________

Witness ______________________ ______________________ [SEAL]
(Permittee)

(SEE REVERSE FOR ADDITIONAL TERMS AND CONDITIONS)

Township 16 & 17 NORTH **County** MCKINLEY

Range 16 WEST **State** NEW MEXICO



Permittee(s): ALTA L. YAZZIE ~~Mr. & Mrs. Billie Yazzie,~~ Tony Tom & Delbert Yazzie

Range Unit # 01

Community: PINEDALE

DI-1040
Revised
(Aug. 1973)

OFFICIAL RECEIPT

Bill No. N3446007348C

Make Remittance Payable To: BUREAU OF INDIAN AFFAIRS Date 10-31-2006
(Bureau or Office)

Mail Payment To: BIA-DIVISION OF NATURAL RESOURCES, PO BOX 328, CROWNPOINT, NM 87313
(Address)

PAYER:

ALTA L. YAZZIE
PO BOX 784
CHURCH ROCK, NM 87311

To be issued as official receipt for all cash remittances and for all other remittances when required by applicable procedures.

Amount of Payment $ 137.24

Date	DESCRIPTION	Quantity	Unit Price Cost	Unit Price Per	Amount	
	GRAZING RENTAL FEE FROM OCTOBER 01, 2006 TO	1817.76	.07	AC	127	24
	SEPTEMBER 30, 2007 FOR RANGE UNIT #01,					
	PINEDALE GRAZING COMMUNITY.					
	ADMINISTRATIVE FEE				10	00
	RECEIVED ALLSUP'S MO #43820747, IN THE AMOUNT OF $137.24, DATED 10/31/06.					
	N34 460 2006/2007 96520 5000 - $137.24					
				AMOUNT DUE THIS BILL,	$ 137	24

RECEIVED as payment on above bill, $ 137.24

Date 11/01/06 Signature [signature] Title Collection Officer

Edward Livingston
505 786 6130
BIA Nat. Resources
Crpt N.M.

PINEDALE I

ABANDONMENT AND RECLAMATION PLAN

Church Rock I, IE and II Mines
Navajo Nation Lease 14-20-20603-9988

Quivira Mining Company
Church Rock, New Mexico

January, 1987

ABANDONMENT AND RECLAMATION PLAN
Church Rock I, IE and II Mines
Navajo Nation Lease 14-20-20603-9988
Quivira Mining Company
Church Rock, New Mexico

1.0 INTRODUCTION

Upon termination of the uranium mining leases with the Navajo Nation and abandonment of the Church Rock I, IE and II mines, Quivira Mining Company will reclaim and stabilize the mine sites in accordance with this plan. The plan complies with the original lease terms and requirements contained in Quivira's mining plan approved by the USGS which was succeeded by U.S. BLM.

The mines were placed in a "standby mode" on January 31, 1985 and the following steps have been taken:

1. All mining, electrical and haulage equipment were removed from the mine and stored at surface facilities.

2. At the request of the Bureau of Land Management (BLM), fire doors in the station areas were welded shut and reinforced with steel beams. Underground openings to ventilation bore holes were closed with chain link fencing or ventilation control doors.

These closures were inspected and approved by the U.S. BLM.

3. Mine dewatering pumps were removed from the mine in January 1986. The mine water treatment ponds are drying.

4. Buildings and permanently installed equipment (hoists, compressors, generators, etc.) were stabilized for possible future use.

5. 24-Hour security has been maintained at the property.

The following steps will be taken to end the standby mode, complete the mines abandonment and reclaim the sites:

1. All ventilation bore holes and mine shafts will be filled with mine water sediments, protore and mine excavation wastes. Reinforced concrete plugs will be installed at the openings and covered with a minimum of one foot of topsoil.

2. The remaining mine excavation wastepiles will be generally reduced to 3h:1v slope, covered with a

3. The remaining mining equipment (hoists, compressors, headframes, generators, etc.) will be removed from the property.

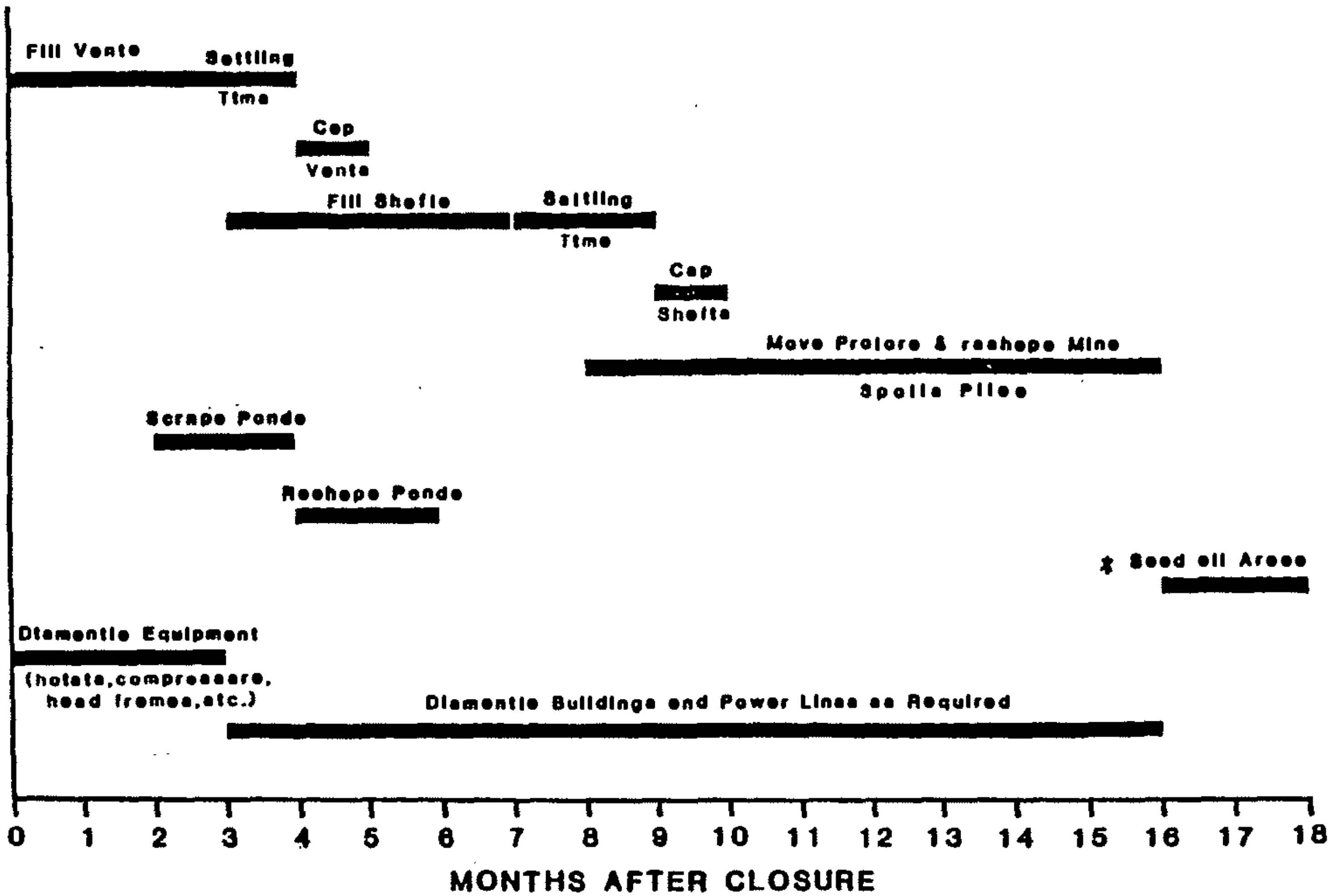
4. Buildings, as designated by the Navajo Nation, will be removed and the foundations destroyed.

5. Final land reclamation will include appropriate steps to insure that radioactive and chemical materials will be contained as required by federal or state regulations.

6. All disturbed areas will be re-seeded to produce natural vegetation after stabilization.

2.0 VENTILATION BORE HOLES

The bore hole foundations supporting the casing will remain in place. The surface ventilation fans, transformers, switches, ductwork, electrical cables and fences will be removed from the bore hole area.



* May depend on weather and time of year.

SCHEDULE 1
CHURCH ROCK MINE CLOSURE

March 4, 1986

UNC 67134

The concrete piers and foundations used to support the ventilation equipment will be demolished and placed in the bore hole as fill.

The bore hole will be filled within four feet of the surface with protore or waste materials from the mine spoils pile. Water may be added to material during placement to facilitate settling prior to setting the final cap. A settling time of six to eight weeks will be allowed, and additional mine waste materials will then be added if required.

The four-foot thick concrete plug will be secured to the casing by welding 3/4-inch rebar to the casing on 12-inch by 15-inch centers as indicated in Figure 1. The cemented bore hole will then be covered with fill and topsoil and contoured to blend with the local landscape.

Finally, the area will be seeded (See Section 10).

3.0 MINE SHAFTS

In accordance with BLM requirements, bulkheads have been installed on the mining levels by welding in a

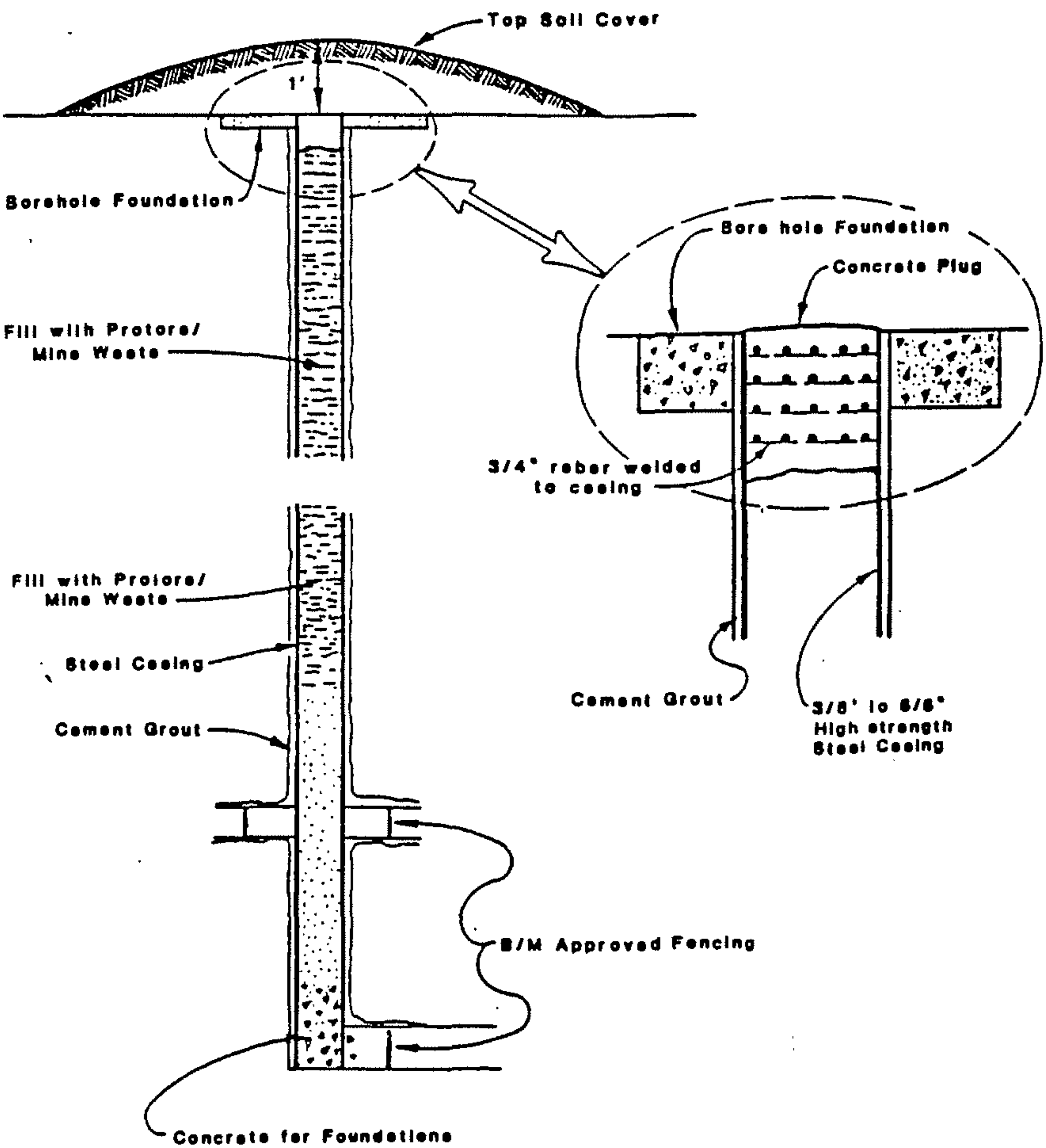


FIGURE 1
VENT HOLE CROSS SECTION
CHURCH ROCK MINE
NO SCALE

March 4,1988

UNC 67136

closed position the steel fire doors at the station levels and reinforcing them with four steel beams. Materials in the shaft, pipe, ladders, and steel sets will not be removed.

The shaft will be filled with mine water sediment, protore and mine waste materials up to the lower sub-collar elevation. The sub-collar and collar foundation will be left intact to provide support to the final concrete plug (See Figure 2). Water may be added to the fill material during placement to accelerate natural settling and compaction.

After six to eight weeks, the time allowed for final settling, eight steel beams will be welded in place on the sub-collar foundation, and a four-foot concrete cap will be poured and keyed into the sub-collar as a final cap.

The concrete plug and the immediate shaft pad will then be covered with one foot of earth. The area will be re-seeded as per Section 10 of this plan.

4.0 PERMANENT BUILDINGS AND STRUCTURES

The permanent buildings will remain subject to requests

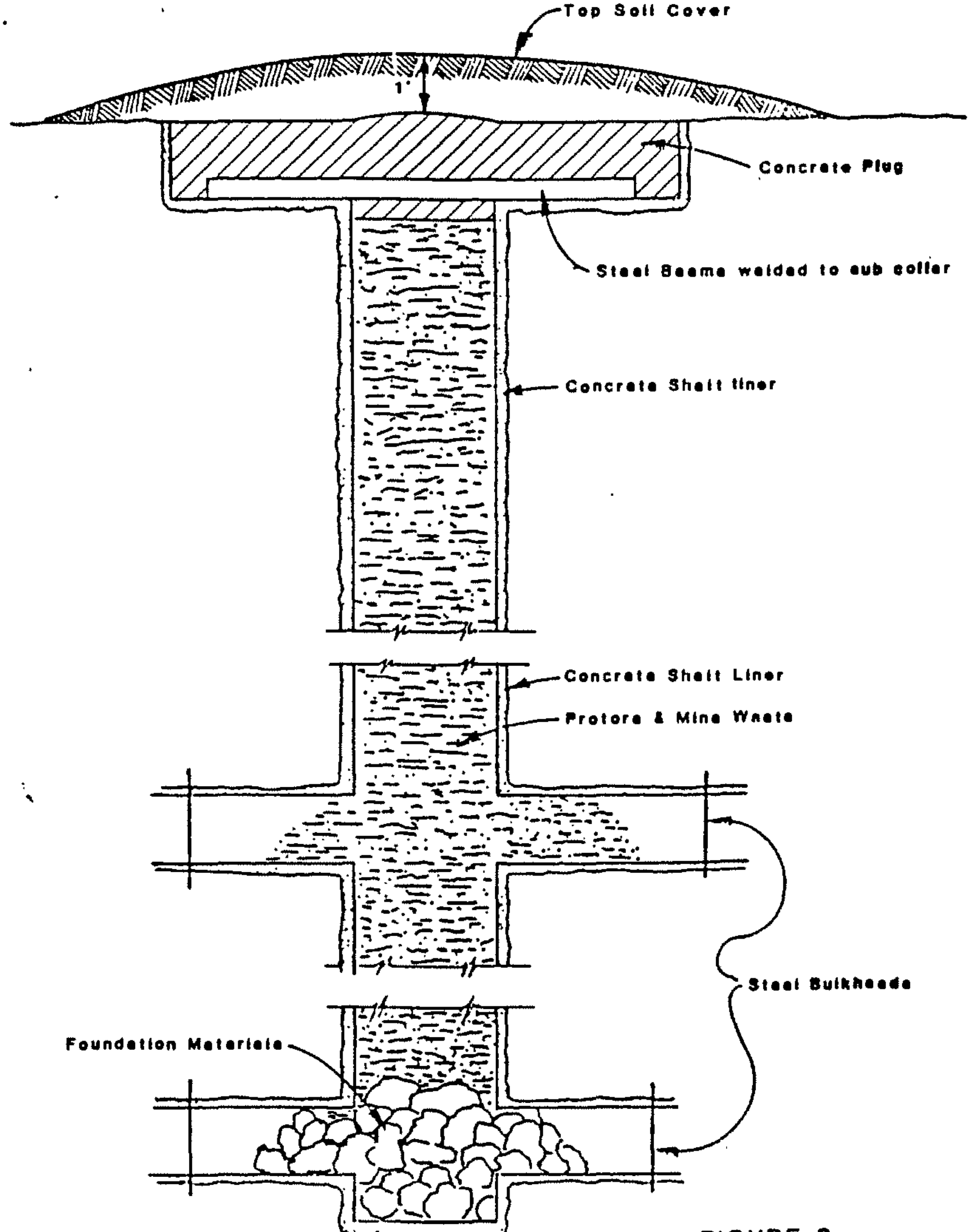


FIGURE 2

MAIN SHAFTS CROSS SECTION
CHURCH ROCK MINE
NO SCALE

March 4,1988

UNC 67138

of the Navajo Nation. All buildings will be surveyed for possible contamination. The outcome of this survey will determine the final decommissioning of the buildings for release for other uses (See Section 9). All other buildings, trailers and structures will be removed from the leases. Foundations, pads, and concrete piers will be demolished and placed in the shafts and ventilation bore holes for fill or used as riprap in the final spoils pile reclamation.

The two sewage treatment facilities that serve the buildings at the Church Rock I and Church Rock IE shaft will be left in place in good operating order if so requested by the Navajo Nation. If the Nation desires they be removed, they will be dismantled in accordance with New Mexico Environmental Improvement Division regulations for such systems.

5.0 MINE PONDS

The ponds used as settling basins for mine solids and the radium treatment facility will be drained and allowed to dry. All sludge and settled solids will be scraped from the side and bottoms of the ponds. The material will be used as backfill in the mine shafts or vent holes. Once the area has been cleaned, the ponds will be closed by folding in the pond berms. The area will then be contoured and seeded in accordance with Section 10 of this plan. Contoured slopes will generally not exceed 3h:1v.

6.0 ROADS

All roadways that are not desired by the Navajo Nation will be removed. A radiation survey will be made of the area to identify any radioactive materials. Any radioactive material with radiation above the limits established in Section 9 will be returned to the mine site in accordance with good practice. The roads will be recontoured, blended into the surrounding environment, and seeded in accordance with Section 10 of this plan.

7.0 FENCES

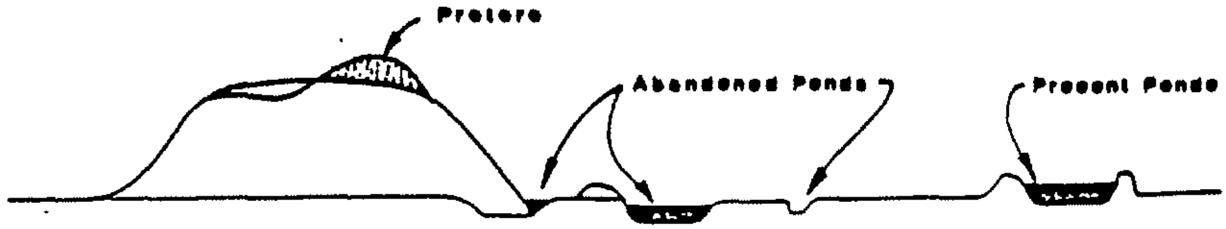
All fences around the mine site and pond areas will be removed unless they are to remain per the request of the Navajo Nation. The fences may aid in land reclamation by keeping livestock and other animals from areas until re-vegetation takes place.

8.0 MINE SPOILS PILES

After the shafts and the ventilation bore holes have been filled, any remaining mine development wastes and protore will be reclaimed. The protore will be relocated over the abandoned ponds (See Figure 3) and covered with waste rock from the Church Rock I site. The spoil piles at Church Rock Mine I and IE will then be contoured and compacted to blend with the surrounding environment, covered with approximately one foot of topsoil and re-seeded per Section 10 of this plan. Contoured slopes will generally not exceed 3h:1v. All contouring will be done to minimize erosion potential with riprap added where required along the major watercourse channels in the area.

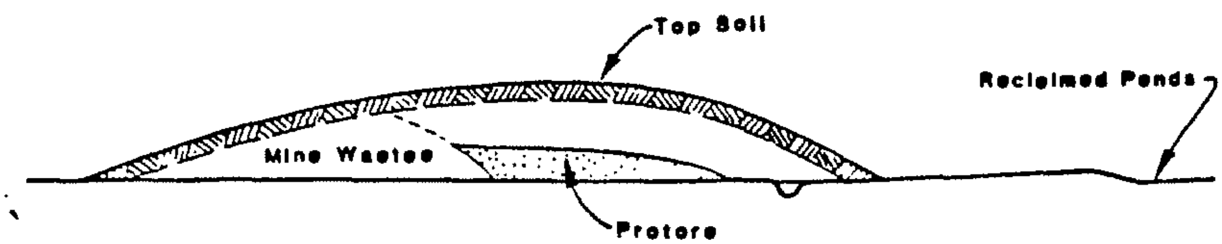
9.0 RADIOACTIVE DECONTAMINATION

A pre-stabilization survey was completed during the summer of 1985 in the area using gamma measurements 1 meter above the ground at specified grid points. As the mines are in a "standby mode" no changes have occurred. The data from this survey were plotted on 200-scale maps, and gamma isopleths developed to



Present Cross Section of CR-1 Mine Waste Dump

No Scale



ReClaimed Cross Section of CR-1 Mine Waste Dump

No Scale

FIGURE 3
MINE RECLAMATION PLAN
CHURCH ROCK 1E MINE

March 4,1986

estimate the areas of contamination. The survey indicates approximately 21 acres will require some reclamation efforts. All radioactive material will be moved and stabilized in accordance with appropriate health physics and engineering practices.

These practices will follow guides set by Federal and State agencies for the protection of public health and the environment and will be used in this plan as follows:

1. Mine Spoils Areas

   Depending on the materials available, gamma radiation will be reduced to 57*uR/hr. above the natural background of 9uR/hr.

   *NOTE: All measurements to be taken 1 meter above the ground level. The 57 uR/hour limit assures individual members of the public not exceed the New Mexico and Federal (NRC) limit of 0.5 mem/yr.

2. Roadways, Fencelines, Vent Holes, Protore Storage Areas and Mine Ponds.

Gamma radiation levels will be reduced to 50uR/hr.

3. In any building left on site

a. Effort shall be made to achieve an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 working levels (WL). In any case where radon decay product concentration (including background) exceeds 0.03 WL, the building will be demolished.

b. The level of gamma radiation shall not exceed the background level by more than 20 uR/hr. within a building. In any case where gamma levels cannot be reduced below this level the building will be demolished.

Qualified environmental health physics personnel will monitor the program to insure good practices are followed, and the personnel performing the work are adequately protected.

10. FINAL CONTOURING AND SEEDING

All areas will be contoured to blend with the surrounding topography and, to the extent practicable, prevent erosion. Areas around buildings will be sloped to promote drainage away from the structures. Berms will be constructed to divert natural run-off and prevent erosion.

The following horticultural practices will be used for the establishment of natural vegetation after the final earthwork is complete.

1. Fertilizer type and rate will be spread as required. Amount and chemical content will be determined by soil analysis.

2. Discing will be used to break clods and turn soil.

3. Contour furrowing will be used to minimize soil erosion and increase water retention.

4. Rangeland type drill will be used to set seeds and insure adequate soil cover.

5. Mulch (straw) at the rate of 2.5 tons per acre will be blown on the area after seeding for temporary ground cover.

6. All disturbed areas will be seeded with western crested wheat to establish a perennial vegetation cover until such time as natural vegetation cover is re-established. Planting time will be limited from June to September to take advantage of the natural rains.

11.0 CHURCH ROCK II MINE SITE

The site of the proposed Church Rock II Mine Site will require contouring to blend with the environment. The original top soil that was stockpiled on site will be used for final cover and reseeded in accordance with Part 10 of this plan.

The mine hoist building will be removed or allowed to remain depending upon the wishes of the Navajo Nation. Ventilation casing now being stored at the site will be removed. Since there was no mining activity at this site no radioactive decontamination will be required.

12.0 GROUNDWATER ASSESSMENT

HYDROLOGIC SETTING FOR WESTWATER CANYON AQUIFER IN THE CHURCH ROCK AREA

pressure relief cone of about 400 feet of depression produced at a distance of 7 miles and about 100 feet produced at a distance of 18 miles from the mining area.

When the pumping in the mining area stopped in early 1986, several related changes began to occur. First, the lowest-level mine workings rapidly flooded in a matter of days. However, this flooding and associated rise in water level quickly brought about a reduced groundwater gradient in the immediate area around the mine and inflow rates began to decrease. Subsequent fill-up of the higher mine workings, vent holes and shafts took much longer. By late 1986 all mine workings were filled with water.

The aquifer more distant from the mining area will gradually adjust to the cessation of pumping as groundwater moves toward a recovering depression rather than a sustained withdrawal point. Total recovery of the depression cone will be on the order of several hundred years because the more advanced recovery becomes, the flatter the gradient toward the depression becomes. Computer model studies by several companies as well as the New Mexico State

Engineer have predicted this slow recovery phenomena around all similar mines or pumping centers in the San Juan Basin. These computer models are based on the physical laws of fluid flow through permeable rock.

2. Groundwater Quality Conditions

Under natural conditions, groundwater in the Westwater aquifer is good in quality near the recharge areas. As groundwater moves in the aquifer to deeper portions of the basin and is in longer contact with the aquifer rock, the fresh water gradually becomes brackish. The groundwater in the Westwater aquifer near the center of the San Juan Basin is considerably higher in dissolved salts than is acceptable for drinking water.

The Church Rock mining area is located sufficiently close to the aquifer recharge sites to recover essentially fresh, potable water. However, opening of the uranium ore body by mine workings and exposure of these rocks to atmospheric conditions has brought about an altered environment for the rock, allowing elements such as uranium and radium to be released from the rock into the mine waters and radon to be released into the circulating air. Since pumping has stopped and the mine is now flooded, the mine workings are no longer exposed to atmospheric conditions and the mobility of these elements will gradually return to conditions similar to that found in the aquifer during pre-mining time.

If some reduced amount of pumping is continued from the mine shafts or vent holes for non-mining purposes, it would be no different than removing water from a Westwater well except that the well would be very efficient, creating very little drawdown for the amount of water produced. This would be due to the well being fed by the large man-made underground reservoir (the mine) cut into the aquifer.

Water wells in the Westwater aquifer outside the mining area but within the area of mine pumping influence will experience a gradual rise in static water level due to the cessation of mine pumping. These wells should not experience any notable change in water quality.

3. Conclusions

Groundwater in the Westwater Canyon aquifer in the Church Rock area has always been of good quality and will continue to be of good quality after mining is stopped. The mining activity did not introduce any foreign materials into the aquifer. Mine dewatering and rock removal produced a temporary change in environment of the host rock, which allowed some natural release of uranium, radium and radon. The aquifer environment is expected to return to near natural conditions with the cessation of mine pumping.

Groundwater movement over a large area has been inward toward the mining area for the past 18 years as a large pressure relief cone has developed. With the cessation of pumping, groundwater is now moving at slower and slower rates toward the depression created by the mine dewatering. With the exception of overall reduced water levels in the aquifer in the area, no other effects of mining will be evident.

13.0 OTHER

The Friendship II water well located north of the Church

Rock I mine site will be left in operating condition with the diesel generator and pump. Electric service lines will be removed or left at the discretion of the Navajo Nation. Where necessary, the rights of way to these lines will be reclaimed and seeded.

14.0 RECLAMATION COST

The estimated volumes required to fill the shafts and bore holes are based on physical dimensions and fill of the underground shaft stations. Fill requirements are as follows:

Estimated Fill Required

Church Rock I Shaft	10,550 yd^3
Church Rock I Station	19,300 yd^3
Church Rock I-E Shaft	6,490 yd^3
Church Rock I-E Station	4,000 yd^3
Mine Vent Holes	8,870 yd^3
Total Estimated Volumes	49,210 yd^3

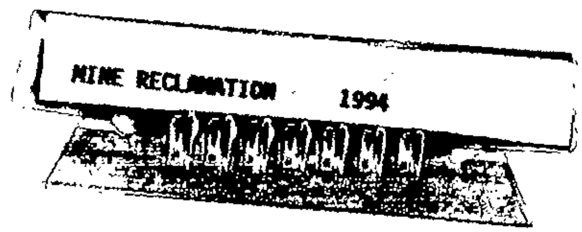
The protore and mine wastes would be used for shaft and bore hole backfill. After completion of this phase the final reclamation will require the transfer of any remaining protore or pond solids to the east toe of the mine spoils pile as indicated in Figure 3. This material would then be covered with mine wastes and final shaping, contouring and vegetation completed.

Stabilization	$ 207,000
Reseed	14,000
Shaft & Vent Plug	17,000
Foundation/Mine Eq. Removal	78,000
Building & Misc. Disposal	30,000
Environmental/Oversite	50,000
	$ 396,000
Contingency	79,000
TOTAL	$ 475,000

15.0 MANPOWER

It is anticipated that the majority of the reclamation work will be accomplished with the five Church Rock company employees including four Navajos. Management and technical support will be supplied from Quivira Mining Company personnel located at Ambrosia Lake.

END


MINE RECLAMATION 1994

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

November 7, 2005

Mr. Steven Etsitty
Executive Director
Navajo Nation
Environmental Protection Agency
P.O. Box 9000
Window Rock, AZ 86515

Dear Mr. Etsitty:

Thank you for your letter of March 22, 2005 requesting the United States Environmental Protection Agency (EPA) Region 9 take the lead for cleanup of the Northeast Church Rock Mine (NECR) Site near Gallup, New Mexico.

Pursuant to your request, EPA Region 9 will proceed as the lead regulatory Agency for the Northeast Church Rock Mine site in New Mexico. This action is also consistent with my May 11th letter and the general consensus developed by all State and Federal agencies and other parties at the June 23rd meeting in Albuquerque. The EPA has recently received a letter from the New Mexico Environment Department (NMED) requesting assistance from EPA Region 9 to conduct a response action at the NECR site. The EPA recognizes this letter as the formal request from the State of New Mexico to assume the lead for this site. The EPA Region 9 will assume the lead for this site using our authority under CERCLA on all lands recognized as Navajo Nation land.

It is our hope to proceed with response actions at this Site by working on legal and technical issues in addition to collaborating on and finalizing the consultation plan. We look forward to working with NNEPA in the near future on response actions and are eager to carry the project forward. Thank you for your help in this matter.

Sincerely,

Keith Takata,
Superfund Division Director

Enclosure

cc: Samuel J. Coleman, Director
Superfund Division, U.S. EPA Region 6

Derrith Watchman-Moore
Deputy Secretary
New Mexico Environment Department

Arlene Luther, Department Manager
Waste Programs Regulatory Compliance
Navajo Nation Environmental Protection Agency

David Taylor, Attorney
Natural Resources Unit, Navajo Nation Department of Justice

Bill Brancard, Director
New Mexico Mining and Minerals Division

Elouise Chircharello, Regional Director
Navajo Regional Area, BIA

Steven Spencer, Regional Environmental Officer
U.S. Department of the Interior

NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

Bill Richardson
Governor
Joanna Prukop
Cabinet Secretary

Bill Brancard
Director
Mining and Minerals Division

December 16, 2005

Larry Bush, President
United Nuclear Corp.
P.O. Box 3077
Gallup, NM 87305

Re: Permit MK004RE, Northeast Church Rock Mine Facility.

Dear Mr. Bush:

The Mining and Minerals Division (MMD) recently received a letter from the United States Environmental Protection Agency, Region 9 (EPA), notifying us that EPA will take the lead in investigating and cleaning up United Nuclear Corporation's (UNC's) Northeast Church Rock Mine Facility (the Mine). A copy of the letter is enclosed for your reference.

Up to now, UNC has been working with MMD and the New Mexico Environment Department (NMED) to obtain closeout and discharge permits for the Mine, as required by the New Mexico Mining Act and the New Mexico Water Quality Act. In light of EPA's recent notification, MMD will defer further permitting action for the Mine, pending UNC's successful completion of the EPA process. You may wish to contact NMED to confirm what position it may be taking with respect to its separate state permit requirements.

It is our expectation that the completion of a response action by EPA at the Mine will address New Mexico Mining Act reclamation requirements. Nevertheless, we reserve the right to make that determination once UNC obtains final release from EPA for the Mine.

MMD will forward to EPA all information provided by UNC to MMD for the Mine in the interests of avoiding unnecessary duplication. MMD will also be available to provide EPA any clarification or assistance necessary to ensure UNC's successful clean up of the Mine.

MMD will continue to work directly with UNC on the St. Anthony Mine and Section 27 Mine to complete closeout plans for those two facilities, as well as oversee the implementation and successful completion of those plans.

Mining and Minerals Division * 1220 South St. Francis Drive * Santa Fe, New Mexico 87505
* Phone: (505) 476-3400 * Fax (505) 476-3402* http://www.emnrd.state.nm.us

If you have any questions regarding this letter, please feel free to contact Mine Reclamation Bureau Chief Karen Garcia, Mining Act Reclamation Program Manager Holland Shepherd, or me.

Sincerely,

Bill Brancard

Bill Brancard
Director

cc: Wayne Nastri, Regional Administrator, EPA, Region 9
Joanna Prukop, Secretary, EMNRD
Ron Curry, Secretary, NMED
Steven Etcitty, Navajo Nation EPA
Harrison Karr, Counsel, EPA, Region 9
Bill Killoran, General Electric

APPENDIX B

RADIATION SURVEY, LABORATORY ANALYTICAL, AND DATA VALIDATION RESULTS

Instrumentation and Minimum Detectable Concentration Calculations

A1.1 Instrumentation

Since NECR is a mine site, small piles of ore rocks may be scattered about the site, and there are some localized areas (hot spots) where the Ra-226 concentration in soil is significantly elevated compared to adjacent areas. Shine from such nearby localized hot spots may interfere with gamma radiation level measurement at an area of interest, as the high-energy gamma radiation can travel long distances in air, up to 50 feet, before it loses its energy by ionizing air molecules or other airborne particulates. Therefore, any such shine interference was reduced by placing the 2x2 NaI detectors in a 0.5-inch thick lead collimator, which was housed in a marlex casing for protection. A Ludlum Model 19 µR meter (exposure rate meter) was also used to identify surface soil sample locations to retrieve the desired range of concentrations from background to about 25 pCi/g for the correlation survey and soil sampling.

Prior to any gamma radiation survey in the field, the instruments were either calibrated in accordance with the SOP-01 or by the vendor. The instrument calibrations included operation calibration for Ludlum 2221 Scaler/Ratemeter, the 2x2 NaI detector high voltage and background calibration, the 2x2 NaI detector efficiency calibration using Department of Energy (DOE) uranium ore calibration pads, and establishing operational function check parameters. The calibration certificates are included in Appendix A-1, *Calibration/Function Checks*. As specified in SOP-02 and SOP-03 of the RSEWP, daily operational function checks of instruments were performed. The daily function check forms are included in Appendix A-2.

A1.2 Instrumentation Minimum Detectable Concentration

Minimum Detectable Concentration (MDC) is the activity level that the instrumentation is expected to detect 95% of the time. The RSEWP specified a gamma radiation survey instrument MDC of 50% of the Derived Concentration Guideline Limit (DCGL). The $DCGL_W$ was specified in the RSEWP to be 1.24 pCi/g corresponding to the 10^{-4} risk criterion assuming a residential exposure scenario. Therefore, an instrumentation MDC of 0.61 pCi/g (50% of the 1.24 pCi/g) was specified for the static gamma radiation survey.

MDCs for the static survey were calculated using the equation provided in Section 9.1 of SOP-01 in the RSEWP (equation 6-7 from the MARSSIM [EPA, 2000a]).

A1.2.1 Calculation

MDC for Static Gamma Radiation Measurement (for a 0.05 probability for both false positive and false negative errors)

$$MDC = C \times [3 + 4.65\,(B^{0.5})]$$

Where,

C = Detector calibration factor, pCi/gm/cpm (for this survey as determined above).

B = Number of background counts that are expected to occur while performing a sample measurement.

Example:

a. If the background count from the function check for the bare detector (#408522-33) is 7861 cpm, and the C, slope value is 0.00139 pCi/gm/cpm (721 cpm/pCi/gm), then the MDC for a one-minute static measurement would be:

MDC = (0.0014 pCi/gm/cpm) x [3 + 4.65 (7862 cpm)$^{0.5}$] = 0.58 pCi/gm

b. If the background count from the function check for the collimated detector (#408522-33) is 2889 cpm, and the C, slope value is 0.0023 pCi/gm/cpm (432 cpm/pCi/gm), then the MDC for a one-minute static measurement would be:

MDC = (0.0023 pCi/gm/cpm) x [3 + 4.65 (2889 cpm)$^{0.5}$] = 0.58 pCi/gm

A1.2.2 MDC for Scan Gamma Radiation survey

The scan MDC is assumed for a scan rate of about one foot per second, three-second interval (based on detector focuses on about 36 inches diameter area at about 18 inches from ground surface). Also, a surveyor efficiency (p) of 0.5 is assumed. First calculate the Minimum Detectable Count Rate (MDCR) as follow:

MDCR = d' x (bi$^{0.5}$) x (60/i)

Where,

d' = value for true positive and false positive proportion. A value of 1.38 will be used for 95% true and 60% false positive proportion.
bi = number of background counts in the interval i (bi = (bkg cpm) x (i , scan interval) x 60/i)
i = 3 for one ft per second scan rate for an observation area of about 36 inch diameter.

For the bare detector (#408522-33) background count of 7861 cpm, the MDCR for one-foot per second scan rate (three second interval) would be:

MDCR cpm = (1.38) x [(7861 cpm) x (3 secs) x (1 min/60 sec)]$^{0.5}$ x (60 sec per min/3 secs) = 547 cpm.

Then calculate the MDCR $_{surveyor}$ using surveyor efficiency (p) of 0.5 as follow:

MDCR $_{surveyor}$ = MDCR/(p$^{0.5}$) = 547 cpm/(0.5$^{0.5}$) = 773 cpm.

From the MDCR $_{surveyor}$, calculate the scan MDC using the following:

Scan MDC = (MDCR $_{surveyor)}$ cpm)x (C, pCi/gm/cpm)

Where,

C = Detector calibration factor, pCi/gm/cpm (for this survey as determined by calibration at DOEs Grants calibration pad GPL)

For a C of 0.00139 pCi/gm/cpm (721 cpm/pCi/gm), the Scan MDC would be:

Scan MDC = (547 cpm) x (0.00139 pCi/gm/cpm) = 1.07 pCi/gm

The detector background counting rates (determined during the daily instrument function checks), and the detector efficiency were determined using DOE's calibration pad GPL (87.78 pCi/g) at the Grants calibration Pad Site. The calculated scan MDCs ranged from 1.02 to 1.07 pCi/g for the bare SPA-3, 2x2 NaI detector #408522-33 used during the field scan gamma radiation survey at the Site. The calculated MDC is just slightly above the specified MDC of 1.0 pCi/g in the RSEWP.

Instrument Calibration Worksheets
Instrument Daily Function Check Logs

Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

JSTOMER AVM ENVIRONMENTAL SERVICES ORDER NO. 260080 / 304342

g. Ludlum Measurements, Inc. Model 19 Serial No. 76248

g. Model Serial No.

ıl. Date 26-Jul-06 Cal Due Date 26-Jul-07 Cal. Interval 1 Year Meterface 202-016

ck mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 70 °F RH 43 % Alt 699.8 mm Hg

New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
F/S Resp. ck ☑ Reset ck. ☐ Window Operation ☐ Geotropism
Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck. (Min. Volt) 2.2 VDC

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☑ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

ıment Volt Set 900 V Input Sens. 38 mV Det. Oper. V at mV Threshold Dial Ratio = mV

☐ HV Readout (2 points) Ref./Inst. / V Ref./Inst. / V

MMENTS:

ı Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
5000	4000 uR/hr	4300	4000
5000	1000 uR/hr	1100	1000
500	400 uR/hr = 70,800 cpm	400	400
500	100 uR/hr	100	100
250	200 uR/hr = 36,200 cpm	200	200
250	100 uR/hr	100	100
50	7080 cpm	40	40
50	1770 cpm	10	10
25	3620 cpm	20	20
25	905 cpm	5	5

*Uncertainty within ± 10% C.F. within ± 20% 50, 25 **Range(s) Calibrated Electronically**

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
ıl oul				Log Scale			

Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of ternational Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. bration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978
State of Texas Calibration License No. LO-1963

rence Instruments and/or Sources: ☐ S-394 ☐ 1122 ☐ 781
7 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☑ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

Alpha S/N ☐ Beta S/N ☐ Other

m 500 S/N 189506 ☐ Oscilloscope S/N ☑ Multimeter S/N 57390613

orated By: William Tinsley Date 26-July-06

iewed By: WJ Blair Date 27 July 06

ı C22A 06/02/2006

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

AVM Environmental Services Inc.
Grants NM, 87020

Rate Meter/Scaler Calibration

Model Ludlum 2221 S/N 68782

Calibration Source Ludlum Pulser 500 S/N 114513 (cal. June 9, 06)

Threshold (input sensitivity), Found at 100 mV Left or Set at 100 mV

Window, In/Out Out Window N/A mV

Pulser Amplitude Set @ 200 mV

Range/Mode	Calibration Point (Pulser Setting) cpm x multiplier	As Found Reading	Left or Set Reading
Digital Rate Meter	260 cpm x 1	261 CPM	261 CPM
	260 CPM x 10	2601 CPM	2601 CPM
	260 CPM x 100	25,950 CPM	25,950 CPM
	260 cpm x 1000	259,503 CPM	259,503 CPM
Scaler 1 minute Intergration	260 CPM x 1	260 counts	260 counts
	260 CPM x 10	2596 counts	2596 counts
	260 CPM x 100	25956 counts	25956 counts
	260 CPM x 1000	259578 counts	259578 counts

HV Set @ 900 VDC

Date 7/20/06 Calibrated By

CERTIFICATE OF CALIBRATION

POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Model No. / Serial No. 500 / 114513

CUSTOMER AVM ENVIRONMENTAL SERVICES CUSTOMER PO N/A ORDER NO. 257138 / 303202

Cal. Date 14-Jun-06 Cal Due Date 14-Jun-07 Cal. Interval 1 Year Procedure M500, Rev. 5

☐ New Instrument Instrument Received ☑ Within Tolerance ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See Comments

T. 71 °F RH 42 % Alt 702.8 mm Hg ☑ Meter Zeroed ☑ Mechanical Check

PULSE WIDTH

	As Found	As Left	Acceptable Range (μs) ± 10%
NEG PULSE	1.5	1.7	1.5 - 1.9
POS PULSE	1.4	1.6	< 2.25

PULSE AMPLITUDE

Reference Amplitude	As Found Amplitude Reading	As Left Amplitude Reading	Acceptable Range ± 10%	Reference Amplitude	As Found Amplitude Reading	As Left Amplitude Reading	Acceptable Range ± 10%
1 V	1 V	1 V	0.9 - 1.1	4 V	4.2 V	4.2 V	3.6 - 4.4
100 mV	100 mV	100 mV	90 - 110	400 mV	420 mV	420 mV	360 - 440
10 mV	10 mV	10 mV	9 - 11	40 mV	42 mV	42 mV	36 - 44
1 mV	1.1 mV	1.1 mV	0.9 - 1.1	4 mV	4.2 mV	4.2 mV	3.6 - 4.4

PULSE FREQUENCY (PERIOD)

Pulser Range	As Found Period	As Left Period	Acceptable Range ± 2%
x 10K	6.704	6.666	6.534 - 6.8
x 1K	67.04	66.66	65.34 - 68
x 100	670.4	666.6	653.4 - 680
x 10	6704	6666	6534 - 6800
x 1	67.04	66.66	65.34 - 68
x 0.1	90	90	88.2 - 91.8 Counts

Reference Voltage	As Found Voltage Reading	As Left Voltage Reading	Acceptable Range ± 5%
500 V	500	500	475 - 525
2000 V	1990	1990	1900 - 2100

CPM Reading	As Found cpm Reading	As Left cpm Reading	Acceptable Range ± 10%
MAX	992	992	981 - 999
MIN	1	1	0 - 1*

* READING OF 0-99 IS ACCEPTABLE FOR INSTRUMENTS WITH A S/N 100000 AND BELOW AND MAIN BOARD = 5208-066

COMMENTS:

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978.

Reference Instruments:

	Model	S/N	Cal Date
Frequency Counter	1900 A	280869	6-7-06
Oscilloscope	V-1560	9084101	2-2-06
Voltmeter	Fluke 75	57390613	12-19-05

Calibrated By: William Tinsley Date 14-June-06

Reviewed By: [signature] Date 14 June 06

AC Inst. Only ☑ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

AVM Environmental Services Inc.
Scaler/Ratemeter - Detector Calibration Form

Scaler/Ratemeter Ludlum 2221 S/N 68782
Detector SPA-3 S/N 408522-33

Source: Uranium Ore in can Strength: 1%

Scaler/Ratemeter Threshhold set @ 100 mV, Window IN/OUT Out, Window N/A mV

HV	Reading, CPM (Source)	Reading, CPM (Background)
500	6751	322
550	17174	769
600	36973	1351
650	53201	2565
700	67819	3750
750	82852	4673
800	89072	5411
850	91533	5710
900	92051	5728
950	92806	5742
1000	93251	5759
1050	93172	5862
1100	98695	5950
1150	111462	6072
1200	139290	6456
1250	173405	7309
1300		9575
1350		12206
1400		

Background reading at designated function check location in office.

Count #	Reading (CPM) Bare	Collimate
1	7768	2819
2	7823	2923
3	7851	2860
4	8034	2846
5	7832	2997
Average	7861	2889
20% Range	6369-9433	2311-3466

Count Readings with 1 percent U_3O_8 can directly under shielded probe on designated function check location in office.

Count #	Reading (CPM)
1	94520
2	94703
3	94951
4	94709
5	95028
Average	

HV Set @ 900 VDC (Instrument) 910 VDC (DVM Fluke 8020B)

Input Sensitivity (THR), mV 100

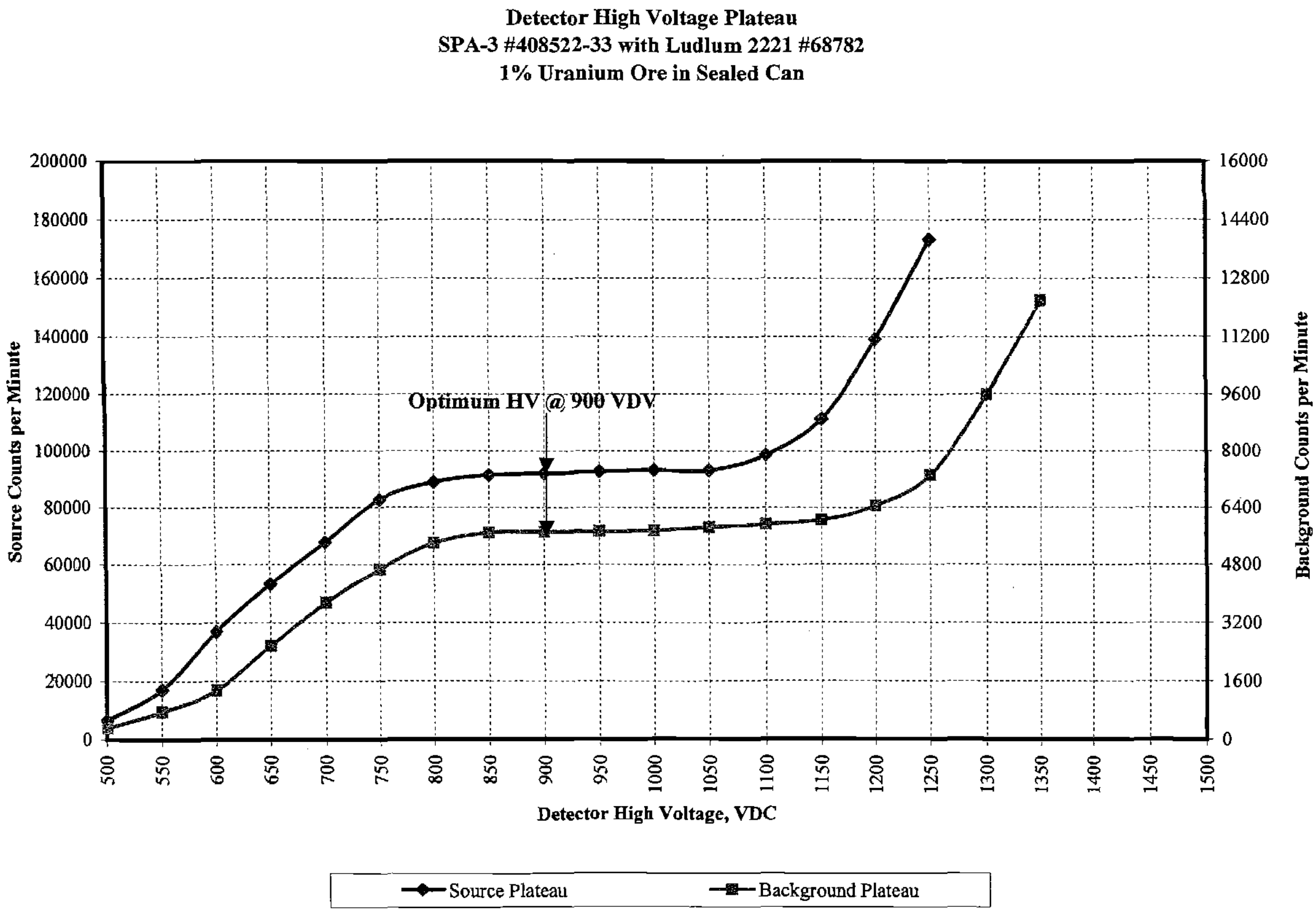
Function Check with 1 percent U_3O_8 ore in can. Can Directly under the detector.
Acceptable Function check range is: 75834 to 113750 CPM

Count Readings for Calibration Pad GPL (87.78 pCi/gm Ra-226)

	Bare (Uncollimated)		Collimated	
#1	62540	cpm	36994	cpm
#2	63982	cpm	38766	cpm
#3	63513	cpm	37880	cpm
#4	63013	cpm	38075	cpm
#5	63261	cpm	37685	cpm
Average	63262	cpm	37880	cpm
Eff(avg cpm/87.78 pCi/gm)	721	cpm/pCi/gm	432	cpm/pCi/gm

Date 7-21-06
8-4-06 (Cal Pad)

By [signature]


Detector High Voltage Plateau
SPA-3 #408522-33 with Ludlum 2221 #68782
1% Uranium Ore in Sealed Can
Optimum HV @ 900 VDV
Source Counts per Minute
Background Counts per Minute
Detector High Voltage, VDC
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
16000
14400
12800
11200
9600
8000
6400
4800
3200
1600
0
500
550
600
650
700
750
800
850
900
950
1000
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
Source Plateau
Background Plateau

Certificate of Calibration

Ratemeter / Scaler Certificate of Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Manufacturer: Ludlum Model: 2221 Serial No.: 117336

All Ranges Calibrated Electronically; Ludlum Pulser Generator S.N. ☐ 97743 ☑ 201932

Reset ☑ Audio ☑ Mechanical ☑ Battery ☑ Threshold / Window Operation ☑

High Voltage 500v ☑ 1000v ☑ 1500v ☑

Instrument found within tolerance (+/- 10%) Yes ☑ No ☐

Reference Setting	Ratemeter	Instrument "As found reading"
400 Kcpm	400Kcpm	+/-10%
100 Kcpm	100Kcpm	
40 Kcpm	40Kcpm	
10 Kcpm	10Kcpm	
4 Kcpm	4Kcpm	
1 Kcpm	1Kcpm	
400 cpm	400cpm	
100 cpm	100cpm	

Reference Setting	Integrated Counts (1-minute count)	Log Scale Count Rate	Instrument "As found reading"
400 Kcpm	399397	400Kcpm	+/-10%
40 Kcpm	39944	40Kcpm	
4 Kcpm	3995	4Kcpm	
400 cpm	400	400cpm	

The calibration system conforms to the requirements of ANSI N323-1997

Calibrated By: [signature] Calibration Date: 8/3/06

Calibration Due: 8/3/07

Reviewed By: [signature] Date: 8/4/06

ERG Form 1.02B

AVM Environmental Services Inc.
Scaler/Ratemeter - Detector Calibration Form

Scaler/Ratemeter Ludlum 2221 S/N 68782
Detector SPA-3 S/N 408522-30

Source: Uranium Ore in Can

Strength: 1%

Scaler/Ratemeter Threshhold set @ 100 mV, Window IN/OUT Out, Window N/A mV

HV	Reading, CPM (Source)	Reading, CPM (Background)
500	15554	594
550	33800	1194
600	55071	3000
650	75568	4451
700	85994	4933
750	91776	5245
800	93842	5402
850	95218	5550
900	95413	5595
950	95465	5610
1000	97605	5750
1050	105064	5900
1100	128553	6204
1150	157153	7450
1200	190000	8763
1250		10502
1300		12579
1350		
1400		

Background reading at designated function check location in office.

Count #	Bare Reading (CPM)	Collimat
1	7920	2779
2	7894	2840
3	7943	2887
4	7746	2899
5	7807	2886
Average	7862	2858
20% range	6290-9434	2286-343

Count Readings with 1 percent U_3O_8 can directly under shielded probe on designated function check location in office.

Count #	Reading (CPM)
1	95318
2	95188
3	95202
4	95016
5	95264
Average	95198

HV Set @ 900 VDC (Instrument) 908 VDC (DVM Fluke 8020I

Input Sensitivity (THR), mV 100

Function Check with 1 percent U_3O_8 ore in can. Can Directly under the detector.
Acceptable Function check range is: 76158 to 114238 CPM

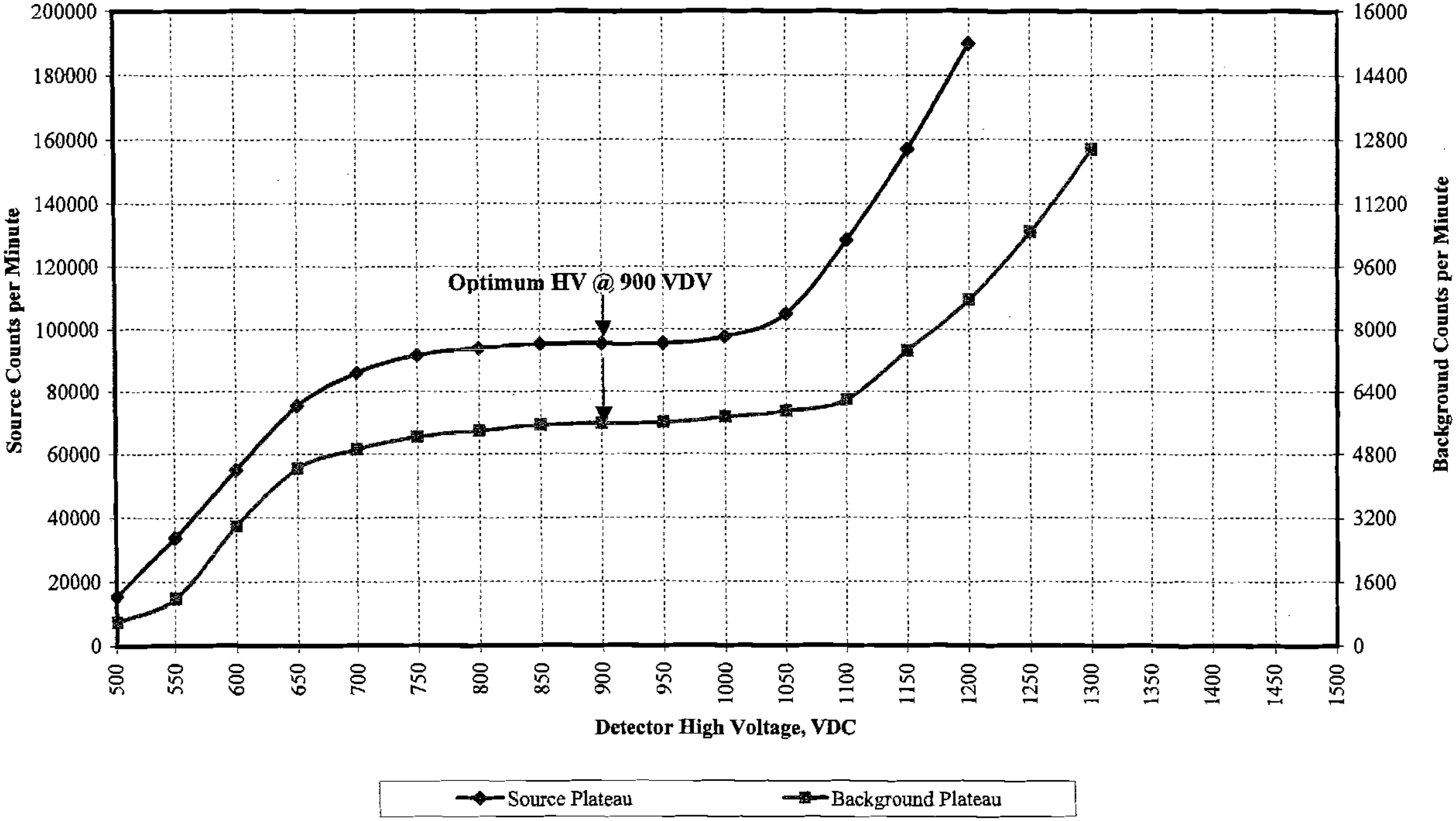
Count Readings for Calibration Pad GPL (87.78 pCi/gm Ra-226)

	Bare (Uncollimated)		Collimated	
#1	61908	cpm	35952	cpm
#2	61050	cpm	36265	cpm
#3	61885	cpm	36477	cpm
#4	62715	cpm	36297	cpm
#5	61908	cpm	36077	cpm
Average	61893	cpm	36214	cpm
Eff(avg cpm/87.78 pCi/gm	705	cpm/pCi/gm	413	cpm/pCi/gm

Date 7-21-06

By [signature] / [signature]

Detector High Voltage Plateau
SPA-3 #408522-30 with Ludlum 2221 #68782
1% Uranium Ore in Sealed Can



Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER ENVIRONMENTAL RESTORATION GRP ORDER NO. 262705

Mfg. Ludlum Measurements, Inc. Model 2221 Serial No. 228808

Mfg. ______ Model ______ Serial No. ______

Cal. Date 2-Oct-06 Cal Due Date 2-Oct-07 Cal. Interval 1 Year Meterface 202-159

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 34 % Alt 704.8 mm Hg

☑ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☑ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☑ Window Operation ☑ Geotropism
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck. (Min. Volt) 4.4 VDC

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 900 V Input Sens. 10 mV Det. Oper. ______ V at ______ mV Threshold Dial Ratio 100 = 10 mV

☑ HV Readout (2 points) Ref./Inst. 500 / ______ V Ref./Inst. 2000 / ______ V

COMMENTS:

Firmware #: 26107?

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X 1K	400kcpm		400
X 1K	100kcpm		100
X 100	40kcpm		400
X 100	10kcpm		100
X 10	4kcpm		400
X 10	1kcpm		100
X 1	400cpm		400
X 1	100cpm		100

*Uncertainty within ± 10% C.F. within ± 20% ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400kcpm		40074 (0)	Log Scale	500kcpm		450k
	40kcpm		4007 (0)		50kcpm		47.5k
	4kcpm		400 (0)		5kcpm		5k
	400cpm		40 (0)		500cpm		500
	40cpm		4 (0)		50cpm		52

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: ☐ S-394 ☐ 1122 ☐ 781
Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ______ ☐ Beta S/N ______ ☐ Other ______

☑ m 500 S/N 38120 ☐ Oscilloscope S/N ______ ☑ Multimeter S/N 84260131

Calibrated By: Laura Ortega Date 2-Oct-06

Reviewed By: Diana De Loera Date 3 Oct 06

FORM C22A 06/02/2006

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed: ______

AVM Environmental Services, Inc.
Micro R Meter Function Check Form
UNC's NECR Mine Site

Micro R Meter: Ludlum 19, SR#76248

Function Check Source ID: 1% U_3O_8 Ore in Sealed can *Calibrated by Ludlum on 7/26/06*

Function Check @ Calibration *90 uR/hr. Established on July 31, 2006 AP.*

Acceptable Function Check Reading (uR/hr) Range (20%) *72* to *108*

Date	Physical Check	Cal Date	Battery[1] Volts or OK	BKG Reading uR/hr	Source Reading [2] uR/hr	Within Acceptable Range Y or N	Cal Due	Tech
7-31-06	OK	7-26-06	OK	9 uR/hr @ AVM's office	90	Y	7-26-07	AP
8-16-06	OK	7-26-06	OK	8 uR/hr @ UNC office	90	Y	7-26-07	VP
8-17-06	OK	7-26-06	OK	8 uR/hr @ UNC office	90	Y	7-26-07	VP
8-18-06	OK	7-26-06	OK	9 uR/hr UNC office	90	Y	7-26-07	AP
11-13-06	OK	7-26-06	OK	8 uR/hr @ UNC office	92	Y	7-26-07	ANP
11-14-06	OK	7-26-06	OK	8 uR/hr UNC office	91	Y	7-26-07	AP
11-15-06	OK	7-26-06	OK	9 uR/hr UNC office	92	Y	7-26-07	AP
11-16-06	OK	7-26-06	OK	10 uR/hr UNC office	92	Y	7-26-07	AP
11-20-06	OK	7-26-06	OK	9 uR/hr office	91	Y	7-27-07	AP
11-28-06	OK	7-26-06	OK	9 uR/hr	92	Y	7-27-07	AP

Note: (1) Battery Voltage must be within BAT TEST Range (2) Function Check Source must be placed in the circle on the front side of the meter

AVM Environmental Services, Inc.
Scaler/Ratemeter - 2" x 2" NaI Detector Function Check
UNC's NECR Mine Site

Scaler/Ratemeter ID: Ludlum 2221, SR# 68782

2" x 2" Detector ID: SPA-3, SR# 408522-33

Function Check Source ID: 1% U_3O_8 Ore in Sealed can

Acceptable background Count (cpm) Range (20%) 6389 to 9433 (Bare); 2311 to 3467 (Collimated)

Acceptable Source Count (cpm) Range (20%) 75834 to 113750

Date	Physical Check	Cal Due	Battery(1) Volts or OK	HV Volts	Threshhold mV (2)	Window In or OUT(3)	C.C.(4)	BKG Counts cpm	Source Counrts cpm	Within Acceptable Range Y or N	Static MDC pCi/gm	Tech
8-4-06	OK	8-3-07	5.7	900	100	out	—	7795 (Bare) 2904 (Coll)	94833	Y	6	VP
8-16-06	OK	8-3-07	5.7	900	101	out	—	7780 (Bare) 2928 (collimat)	94785	Y	"	VP
8-17-06	OK	Jul 2007	5.7	897	100	out	—	7092 (Bare) 2575 (collimat)	92656	Y	"	VP
8-18-06	OK	8-3-07	5.6	900	100	out	—	7195 (bare) 2355 (collimat)	92500	Y	"	VP
11-07-06	OK	8-3-07	5.7	901	100	out	—	2804 (collimat)	93992	Y	"	VP
11-08-06	OK	8-3-07	5.6	899	100	out	—	2846 (coll)	93724	Y	"	VP
11-09-06	OK	8-3-07	5.5	900	100	out	—	2858 (coll)	92357	Y	"	V
11-10-06	OK	8-3-07	6.2	901	100	out	—	2820 (col)	93618	Y	"	VP
11-13-06	OK	8-3-07	6.1	902	100	out	—	2895 (coll)	96602	Y	"	VP
11-14-06	OK	8-3-07	6.0	901	100	out	—	2862 (col)	94681	Y	"	VP
11-15-06	OK	8-3-07	5.4	902	100	out	—	7459 (Bare) 2866 (Col)	94432	Y	"	VP
11-16-06	OK	8-3-07	5.8	901	100	out	—	7800 B. 2819 col	94118	Y	"	VP
11-17-06	OK	8-3-06	5.8	901	100	out	—	7960 (Bare) 2844 Col.	94356	Y	"	VP
11-20-06	OK	8-3-06	5.8	901	100	out	—	7320 Bare	94936	Y	"	VP
11-27-06	OK	8-3-06	5.7	901	100	out	—	7401 Bare 2814 (Col)	94833	Y	"	VP
11-28-06	OK	8-3-07	5.8	901	100	out	—	7398 Bare 2844 Col.	94948	Y	"	VP
12-1-06	OK	8-3-07	5.7	901	100	out	—	2835 7406	94661	Y	"	VP

Note: (1) Battery Voltage for Ludlum 2221 must be >5.3 volts; (2) Threshhold must be at 100 mV; (3) Window Position must be OUT; (4) C.C. for Eberline ESP scaler must be 1.0+00

AVM Environmental Services, Inc.
Scaler/Ratemeter - 2" x 2" NaI Detector Function Check
UNC's NECR Mine Site

Scaler/Ratemeter ID: Ludlum 2221, S/N# 68782 Function Check Source ID: 1% U_3O_8 Ore in Sealed can

6290 cpm to 9434 (Bare detector)

2" x 2" Detector ID: SPA-3, S/N# 408522-30

Acceptable background Count (cpm) Range (20%) 2286 cpm to 3430 cpm (Collimated)

Acceptable Source Count (cpm) Range (20%) 76158 to 114238

Date	Physical Check	Cal Due	Battery[1] Volts or OK	HV Volts	Threshhold mV [2]	Window In or OUT[3]	C.C.[4]	BKG Counts cpm	Source Counrts cpm	Within Acceptable Range Y or N	Static MDC pCi/gm	Tech
7-21-06	OK	07/07	5.7	900	100	out	N/A	7918	95190	Y	0.6	VP
↓	✓	✓	✓	✓	✓	✓	✓	2842 (Collimated	✓	Y	0.6	VP
8-16-06	OK	08/07	6.0	900	102	OUT	N/A	7933 (Bare) 2800 (collimated)	95009	Y	0.6	VP
8-17-06	ok	08/07	5.9	899	101	out	N/A	7127 (Bare) 2844 (Collimated)	94278	Y	0.6	VP
8-18-06	ok	08/07	5.9	901	100	out	N/A	7934 (Bare) 2831 (Collimated)	98333	Y	0.6	VP
11-07-06	OK	08/07	6.2	902	101	Out	N/A	3061 (collimated)	97253	Y	0.6	VP
11-08-06	OK	08/07	6.2	901	100	out	N/A	3042 (col)	97622	Y	0.6	VP
11-9-06	OK	08/07	6.2	901	100	out	N/A	2705 (Collimated)	98357	Y	0.6	VP
11-10-06	OK	08/07	6.1	901	100	out	N/A	2813 (col)	98102	Y	0.6	VP
11-14-06	OK	08/03/07	6.2	900	100	out	N/A	2905 (col)	99942	Y	0.6	VP
11-15-06	OK	08/03/07	6.3	902	100	out	N/A	7313 (Bare) 2855 (col)	97314	Y	0.6	VP
11-16-06	OK	8/3/07	6.2	900	100	out	N/A	7605 Bare 2852 col	98224	Y	0.6	VP
11-16-06	OK	8/3/07	6.2	900	100	out	N/A	7911 Bare 2948 col	97896	Y	0.6	VP
11-28-06	OK	8/3/07	6.0	900	100	out	N/A	7806 Bare 2805 col	97860	Y	0.6	VP

Note: (1) Battery Voltage for Ludlum 2221 must be >5.3 volts; (2) Threshhold must be at 100 mV; (3) Window Position must be OUT; (4) C.C. for Eberline ESP scaler must be 1.0+00

Gamma Radiation Level to Surface Soil Ra-226 Correlation
Field Data Update for Backup Detector

Gamma Radiation Level to Surface Soil Ra-226 Correlation

A correlation between the gamma radiation levels in CPM and surface soil Ra-226 concentrations was performed prior to the field gamma radiation survey for a site-specific calibration of the 2x2 NaI detectors. The results were provided in *Results of Background and Radium Correlation Sampling Northeast Church Rock Mine Site Technical Memorandum* (MWH, 2006b). The gamma radiation CPM equivalent to the Ra-226 field screening level (FSL) was necessary prior to conducting the actual surveys in order to identify area boundaries and identify locations above the FSL during the radiation survey. This required performing the necessary gamma radiation level measurements and soil sampling for Ra-226 to determine a correlation between gamma radiation level CPM and Ra-226 concentration in surface soils.

The FSL (2.24 pCi/g) for Ra-226 was defined as the $DCGL_w$ (1.24 pCi/g) above the mean background Ra-226 concentration (1.0 pCi/g), as discussed in more detail in Section 2.4.

The gamma radiation survey and surface soil sample locations were identified to retrieve the desired range of concentrations in surface soils with no subsurface soil contamination. The selected sampling locations were all on relatively flat terrain, and were large enough so that moving around several steps in each direction did not affect the readings significantly. The contamination distribution for the gamma radiation survey using this correlation procedure is assumed to be in the surface soil and fairly homogenous within the detector observation area. Any subsurface contamination deeper than six inches during the field survey would skew the radiation survey results and possibly cause an over-estimation of the equivalent surface soil Ra-226 concentration.

The gamma radiation level measurements and Ra-226 soil sampling for the correlation were conducted from August 16 through August 18, 2006 in accordance with SOP-02 of the RSEWP. Results of the correlation gamma radiation level survey and soil sampling are presented in detail in the correlation technical memorandum (MWH, 2006b). In addition to obtaining a correlation for a bare (unshielded) detector, a correlation was also developed for a lead collimated detector by obtaining gamma radiation level measurements for both bare (uncollimated) and collimated detectors at each location. A radiation survey in the arroyo for bed sediment would require different geometry of the survey system detector compared to surface soils in a fairly plain geometry. During the radiation survey for the Unnamed Arroyo bed sediments, gamma radiation shine from the arroyo banks would also interfere with the survey. Therefore, a separate correlation with soil samples and gamma radiation levels was developed for surveying in the arroyo sediment bed.

During the August 16 to 18, 2006 correlation radiation survey and soil sampling, gamma radiation level measurements with the primary SPA-3 detector (#408522-33) were collected at 15 soil sampling locations, as indicated in SOP-02 of the RSEWP. Gamma radiation level measurements with the backup SPA-3 detector (#408522-30) were performed at only four locations for correlation. Following a review of the correlation technical memorandum (MWH, 2006b), the EPA commented that unless additional correlation data is obtained (to meet the minimum quantity as indicated in SOP-2 of the RSEWP) correlation data from this instrument (#408522-30) should not be used as screening data. Therefore, on November 7, 2006, gamma radiation levels were obtained with the collimated backup detector (#408522-30) from the remainder of the correlation soil sampling locations to complete correlation in order to enable use of the backup detector, as necessary, during the field survey. The field survey form containing this data is included in Appendix B. Table 2.1, *Gamma Radiation Levels vs. Ra-226 Soil Concentrations, Mine Site*, includes the gamma radiation level measurements for the backup detector on November 7, 2006, as well as the correlation field data and soil sampling results performed during August 16 to 18, 2006. The correlation technical memorandum (MWH, 2006b) included field data and results of the correlation for the Unnamed Arroyo bed sediments. However, no gamma radiation survey was performed in the Unnamed Arroyo, as the August 2006 correlation sampling indicated that all fifteen locations in the sediment bed exceeded the FSL (MWH, 2006b).

Gamma radiation levels versus surface soil Ra-226 concentrations linear regressions for the 19 locations with surface soil Ra-226 concentrations ranging from background to 185 pCi/g, and the 15 locations with Ra-226 concentrations ranging up to 10.3 pCi/g, as specified in the SOP-02, for bare and collimated detector SPA-3 #408522-33 were presented in the correlation technical memorandum (MWH, 2006b). These figures are included in Appendix B as Figure B-1, *Gamma Radiation Level to Ra-226 Concentration Regression Analysis for On-site Areas, Entire Range* and Figure B-2, *Gamma Radiation Level to Ra-226 Concentration Regression Analysis for On-site Areas, Background to 10 pCi/g Range.* The R^2 values for all of these linear regressions for detector #408522-33 exceeded the specified value of 0.80.

Linear regression analysis for gamma radiation levels (obtained on November 7, 2006) to surface soil Ra-226 concentrations for all 19 locations with surface soil Ra-226 concentrations ranging from background to 185 pCi/g, as well as for 15 locations with Ra-226 concentrations ranging up to 10.3 pCi/g for the collimated backup detector SPA-3 #408522-30 are summarized on Figure B-3, *Gamma Radiation Level to Ra-226 Concentration Regression Analysis for On-site Areas, Background to 10 pCi/g Range*, and Figure B-4, *Gamma Radiation Level to Ra-226 Concentration Regression Analysis for On-site Areas, Background to 10 pCi/g Range.* The R^2 values for all of these liner regressions exceeded the specified value of 0.80.

Based on linear regressions, the following equations were initially used to calculate surface soil Ra-226 concentrations from the gamma radiation level measurements obtained in CPM at the NECR:

1. Surface Soil Ra-226 pCi/g = (0.0021 x CPM) – 7.4151 (R^2 = 0.866) for collimated SPA-3 #408522-33 (low range shown on Figure B-2) for use with gamma radiation levels below 10,000 CPM, which were expected to be below 10 pCi/g.
   (2.24 pCi/g FSL is equivalent to 4600 CPM)

2. Surface Soil Ra-226pCi/g = (0.0020 x CPM) – 7.5289 f (R^2 = 0.873) for collimated SPA-3 #408522-30 (low range shown on Figure B-4) for use with gamma radiation levels below 10,000 CPM, which were expected to be below 10 cPi/g..
   (2.24 pCi/g FSL equivalents to 4884 CPM)

3. Surface Soil Ra-226pCi/g = (0.0026 x CPM) – 11.592 (R^2 = 0.974) for collimated SPA-3 #408522-33 (entire range shown on Figure B-1) for use with gamma radiation levels above 10,000 CPM, which were expected to be above 10 pCi/g..
   (2.24 pCi/g FSL equivalents to 5320 CPM)

4. Surface Soil Ra-226pCi/g = (0.0024 x CPM) – 11.567 (R^2 = 0.972) for collimated SPA-3 #408522-30 (entire range shown on Figure B-3) for use with gamma radiation levels above 10,000 CPM, which were expected to be above 10pCi/g.
   (2.24 pCi/g FSL equivalents to 5753 CPM)

5. Surface Soil Ra-226pCi/g = (0.0005 x CPM) – 6.0697 (R^2 = 0.847) for bare SPA-3 #408522-33 (shown on Figure B-2) for use with gamma radiation levels below 40,000 CPM.
   (2.24 pCi/g FSL equivalents to 16,619 CPM)

6. Surface Soil Ra-226pCi/g = (0.0009 x CPM – 16.284 (R^2 = 0.966) for bare SPA-3 #408522-33 (shown on Figure B-1) for use with gamma radiation levels above 40,000 CPM.
   (2.24 pCi/g FSL equivalents to 20,582 CPM)

No linear regression equation is included above for the bare (uncollimated) detector #408522-30 since this detector was not used for any uncollimated radiation survey.

The static gamma radiation reading counts obtained with the collimated 2x2 NaI detectors were initially converted to surface soil Ra-226 concentrations using applicable linear regression equations (e.g., #1 through #4) shown above. Surface soil samples submitted for laboratory analysis were collected from 218 of the 819 static gamma radiation survey points in the on-site areas. The results showed that the converted Ra-226 surface soil concentrations were generally higher, by an average of about 56%, than the laboratory soil sampling results at these 218 locations. The primary reason for the higher converted Ra-226 surface soil results is due to the presence of elevated levels of Ra-226 in subsurface soils, as deep as 20 feet in the on-site areas as confirmed by the subsurface soil sampling. As discussed in Section 2.2.2, the gamma radiation survey was designed and correlated for surface soil Ra-226 characterization. Significant levels of subsurface Ra-226 were not expected at most of the survey areas on the Site. Gamma radiation levels due to elevated Ra-226 in subsurface soils were converted to equivalent surface soil concentrations using appropriate regression equations, as described in the following paragraph.

An analysis of numerous linear regressions for gamma radiation levels to surface soil Ra-226 correlations was performed and provided to EPA on February 15, 2007. This analysis included a linear regression for 101 points with gamma radiation levels over 10,000 CPM within the on-site areas with elevated levels of Ra-226 in subsurface soil. This resulted in a correlation that would account for, and minimize, interferences at locations with elevated readings (above 10,000 CPM) due to the presence of significant subsurface Ra-226 concentrations within the initial area boundaries. The analysis also included a linear regression of 18 points with low-level gamma radiation readings (below 10,000 CPM) within the NECR-1 step-out area where elevated levels of Ra-226 in subsurface soil was not expected. On February 16, 2007, EPA agreed with the analysis and notified that the field gamma radiation survey results equal to or less than 10,000 CPM were converted to surface soil Ra-226 concentrations according to the linear regression for the 18 points at the NECR-1 step-out survey area. The field gamma radiation survey results over 10,000 CPM were converted according to the linear regression for the 101 points with gamma radiation levels over 10,000 CPM within the on-site areas. Efficiencies and background counting rates of the two collimated 2x2 NaI detectors (primary SPA-3 #408522-33 and the backup #408522-30) are similar (<5% difference), as shown in the calibration certificates provided in Appendix B-1; therefore, EPA also agreed that these correlations would be appropriate for both of the collimated detectors.

The field gamma radiation survey results and soil sampling results for the applicable correlations are provided in Table 2.2, *Gamma Radiation Levels Versus Surface Soil Ra-226 Concentrations Regression Data*. The summarized linear regression for <10,000 CPM and >10,000 CPM are shown on Figure B-5, *Gamma Radiation Levels vs Surface Soil Ra-226 Concentration Regression Data, NECR-1 Step Out Survey Points for <10K CPM Correlation with Collimated 2x2 NaI Detector,* and Figure B-6, *Gamma Radiation Level to Surface Soil Ra-226 Regression On-site Areas >10K Survey Points for >10K CPM Correlation with Collimated 2x2 NaI Detector*, respectively, included in Appendix B. All static gamma radiation survey readings were converted to surface soil Ra-226 concentration using the following equations, and are discussed in Section 3.1:

- Surface soil Ra-226 pCi/g = (0.0024 x CPM) – 11.608 (R^2 = 0.98) for collimated 2x2 NaI detectors (shown on Figure B-5 of Appendix B) with gamma radiation levels below 10,000 CPM. (2.24 pCi/g FSL equivalents to 5,770 CPM)

- Surface soil Ra-226 pCi/g = (0.0016 x CPM) – 13.909 (R^2 = 0.74) or collimated 2x2 NaI detectors (shown on Figure B-6 of Appendix B) with gamma radiation levels above 10,000 CPM. (2.24 pCi/g FSL equivalents to 10,093 CPM)

The first linear regression analysis shown above was used to estimate low levels of surface soil Ra-226 concentrations (i.e., near the FSL) in areas such as the step-outs where Ra-226 impacts were expected to be in surface soil only with gamma radiation levels generally below 10,000 CPM, yielded a regression with a low R^2 value significantly below the specified value of 0.80. This could be due to elevated variance and error associated with measurements at low levels. Therefore, two survey points collected from the step-out survey area (where Ra-226 contamination is in surface soil only) with Ra-226 concentrations above 10,000 CPM were included in the liner regression to improve the R^2 value. Although, this biased regression produced an R^2 value of 0.98, the data obtained by the field instrumentation was of estimated quality for field screening purposes.

The second linear regression analysis shown above which was used for correlation at locations with gamma radiation measurements above 10,000 CPM for the on-site areas, had an R^2 value of 0.74, lower than the 0.80 value specified in the RSEWP. A revision to the correlation was necessary to minimize interference and over estimation of surface soil Ra-226 from significantly elevated levels of subsurface Ra-226.

The field gamma radiation survey measurements provided data of a quality sufficient for field screening. The data collected with field instruments have the potential for error and low accuracy and are considered to be estimated values, especially, in areas with different contamination distribution than the instrument calibration/correlation assumptions. This was the case for most of the on-site survey areas, where significantly elevated levels of Ra-226 are present in the subsurface. The initial correlation was developed prior to the field survey for Ra-226 in surface soils (less than six inches deep) with fairly homogeneous distribution. The initial correlation did not expect and account for the elevated gamma radiation shine from the subsurface Ra-226, and thus, the Ra-226 concentrations for surface soils determined by the gamma radiation survey using the initial correlations were higher compared to the single point soil sampling results. The correlations were revised and biased to account for the elevated gamma radiation levels in the subsurface, and to obtain more representative Ra-226 surface soil concentrations and improve the quality of the gamma radiation survey data. However, the revised correlation, which would account for subsurface Ra-226 interference, does not account for any variation in gamma radiation shine interference due to variation in subsurface Ra-226 concentrations at different on-site area locations. Therefore, the data obtained by field instrumentation with revised correlations is estimated data suitable for field screening purposes.

AVM Environmental Services, Inc.
Gamma Radiation Survey @ UNC's NECR Mine Site
Static Gamma Radiation Survey Field Form For Correlation

Instrumentation : Scaler/Ratemeter Ludlum 2221 (228800), Detector SPA-3 #408522-30

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

Survey Area/Unit Decsription NECR Onsite Area

Survey Date	Survey Point & Sample ID/Description	Survey Point Coordinate (State Plain, NAD 1983)		Gamma Rad Level (cpm) SPA-3, SR# 408522-30		Comments/Notes
		Northing (ft)	Easting (ft)	Lead Collimated	Average	
11-02-06	NECR-COR-A-01	1694684.2	2519951.2	4128 4096 4102	4109	
"	NECR-COR-A-02	1694640.6	2520126.9	7109 7192 7144	7148 mp ~~7165~~	
"	NECR-COR-A-03	1694656.8	2520172.1	6705 6664 6735	6702	
"	NECR-COR-A-04	1694584.9	2520152.3	5177 5034 5118	5110	
"	NECR-COR-A-05	1694612.9	2520123.6	5503 5434 5409	5449	
"	NECR-COR-A-06	1694712.1	2520161.1	4294 4278 4296	4289	
"	NECR-COR-A-07	1694730.6	2520240.4	4755 4687 4602	4681	
"	NECR-COR-A-09	1694765.2	2520377.4	7422 7508 7468	7466	
"	NECR-COR-A-11	1694226.3	2520612.6	5104 5067 5033	5068	
"	NECR-COR-A-12	1693999.1	2520533.3	6402 6432 6483	6439	
"	NECR-COR-A-13	1694022.9	2520577.1	7168 7206 7251	7208	
"	NECR-COR-A-14	16940220.2	2520615.7	8802 8754 8780	8779	
"	NECR-COR-A-16	1694980.1	2521129.5	6838 6744 6808	6797	
"	NECR-COR-A-17	1695105.8	2522020.4	77091 76034 76010	76378	
"	NECR-COR-A-18	1695882.2	2522579.6	31655 31448 30500	31201	

Technician Signature [signature], Reviewed by [signature]

Table 1
Gamma Radiation Level to Surface Soil Ra-226 Concentration Field Data for NECR

Survey Date	Gamma Rad Survey Point & Sample ID/Description	Survey Point Coordinate (State Plane, NAD 1983, NM West)		Gamma Rad Level (cpm) DECTECTOR: SPA-3, SR# 408522-33				Gamma Rad Level (cpm) DETECTOR: SPA-3, SR# 408522-30[1]				Soil Sample Ra-226 (pCi/gm)		Comments/Notes
				Lead Collimated		Bare (Uncollimated)		Lead Collimated		Bare (Uncollimated)				
		Northing (ft)	Easting (ft)	cpm	Average	cpm	Average	cpm	Average	cpm	Average	Conc.	Error	
08/17/06	NECR-COR-A-01	1,694,683.9	2,519,931.2	3,808 3,856 3,857	3,840	13,992 13,892 13,573	13,819	4,128 4,096 4,102	4,109	- - -	-	1.9	0.3	16-17 uR/hr, soil sample @1428
08/17/06	NECR-COR-A-02	1,694,640.9	2,520,126.9	6,794 6,728 6,779	6,767	22,199 22,519 22,478	22,399	7,109 7,192 7,144	7,148	- - -	-	5.4	0.8	23-26 uR/hr, soil sample @1440
08/17/06	NECR-COR-A-03	1,694,656.8	2,520,172.2	6,315 6,332 6,337	6,335	21,525 21,524 21,764	21,604	6,705 6,664 6,738	6,702	- - -	-	4.5	0.7	25 uR/hr, soil sample @1450
08/17/06	NECR-COR-A-04	1,694,583.1	2,520,152.4	4,809 4,823 4,873	4,835	17,195 16,869 16,990	17,018	5,177 5,034 5,118	5,110	- - -	-	1.8	0.4	20 uR/hr, soil sample @1500
08/17/06	NECR-COR-A-05	1,694,613.0	2,520,123.6	5,256 5,122 5,057	5,145	18,268 18,357 18,639	18,421	5,503 5,434 5,409	5,449	- - -	-	3.7	0.8	22 uR/hr, soil sample @1514
08/17/06	NECR-COR-A-06	1,694,711.4	2,520,161.0	4,111 4,074 3,922	4,036	15,318 15,219 15,430	15,322	4,274 4,298 4,296	4,289	- - -	-	1.1	0.3	20 uR/hr, soil sample @1527
08/17/06	NECR-COR-A-07	1,694,729.7	2,520,240.3	4,339 4,502 4,390	4,410	16,497 16,555 16,839	16,630	4,755 4,687 4,602	4,681	- - -	-	1.5	0.4	29-20 uR/hr, soil sample @1540
08/17/06	NECR-COR-A-08	1,694,706.7	2,520,341.8	5,798 5,861 5,977	5,879	23,880 23,686 23,959	23,842	6,279 6,231 6,202	6,237	24,386 24,319 24,249	24,318	3.5	0.7	28 uR/hr, soil sample @1604
08/17/06	NECR-COR-A-09	1,694,764.8	2,520,377.4	7,045 7,188 6,960	7,064	29,267 29,505 28,733	29,168	7,422 7,508 7,468	7,466	- - -	-	6.6	0.9	32 uR/hr, soil sample @1615
08/17/06	NECR-COR-A-10	1,694,612.8	2,520,381.7	21,588 21,377 21,623	21,529	64,550 65,569 64,340	64,820	22,970 22,448 22,803	22,740	65,453 65,176 65,774	65,468	31.6 32.3	3.6 3.7	75 uR/hr, soil sample @1635, Dup sampl designated as NECR-COR-A-50 @1640
08/18/06	NECR-COR-A-11	1,694,226.8	2,520,612.1	4,750 4,881 4,737	4,789	20,267 20,165 19,996	20,143	5,104 5,067 5,033	5,068	- - -	-	1.9	0.6	22 uR/hr, soil sample @0848
08/18/06	NECR-COR-A-12	1,693,999.4	2,520,533.1	6,061 6,205 5,993	6,086	25,597 25,634 25,241	25,491	6,402 6,432 6,483	6,439	- - -	-	6.8	0.9	32 uR/hr, soil sample @0914
08/18/06	NECR-COR-A-13	1,694,023.0	2,520,577.0	6,662 6,547 6,871	6,693	27,457 27,273 27,667	27,466	7,168 7,206 7,251	7,208	- - -	-	8.9	1.1	32 uR/hr, soil sample @0922
08/18/06	NECR-COR-A-14	1,694,020.4	2,520,615.8	8,258 8,314 8,354	8,309	29,400 29,178 29,031	29,203	8,802 8,754 8,780	8,779	- - -	-	10.3	1.3	28 uR/hr, soil sample @0930
08/18/06	NECR-COR-A-15	1,693,866.4	2,520,610.5	7,086 7,361 7,349	7,265	30,194 29,917 29,735	29,949	7,616 7,681 7,649	7,649	29,230 29,721 30,080	29,677	9.2 8.8	1.1 0.5	32 uR/hr, soil sample @0945, Dup sampl designated as NECR-COR-A-55 @0950
08/18/06	NECR-COR-A-16	1,694,980.0	2,521,128.8	6,441 6,580 6,287	6,436	24,754 24,852 23,833	24,480	6,838 6,744 6,808	6,797	- - -	-	6.2	0.4	40 uR/hr, soil sample @1014
08/18/06	NECR-COR-A-17	1,695,105.6	2,522,020.4	71,402 71,884 72,894	72,060	208,986 205,275 214,062	209,441	77,091 76,034 76,010	76,378	- - -	-	185.0	8.7	220 uR/hr, soil sample @1037
08/18/06	NECR-COR-A-18	1,695,882.4	2,522,579.5	29,639 28,306 28,737	28,894	92,060 91,682 91,822	91,855	31,655 31,448 30,500	31,201			40.4	1.9	110 uR/hr, soil sample @1103
08/18/06	NECR-COR-A-19	1,695,550.1	2,516,985.6	3,676 3,902 3,618	3,732	11,798 12,139 12,150	12,029	3,941 3,894 3,992	3,942	12,310 12,145 12,271	12,242	1.0	0.1	Near NECRBKG20 @ backg area, 15 uR/hr, soil sample @1200

Note (1) Gamma radiation level measurements with Detector #408522-30 for locations NECR-COR-A-01, 02, 03, 04, 05, 06, 07, 09, 11,12,13,14,16, and 18 were performed on November 7, 2006

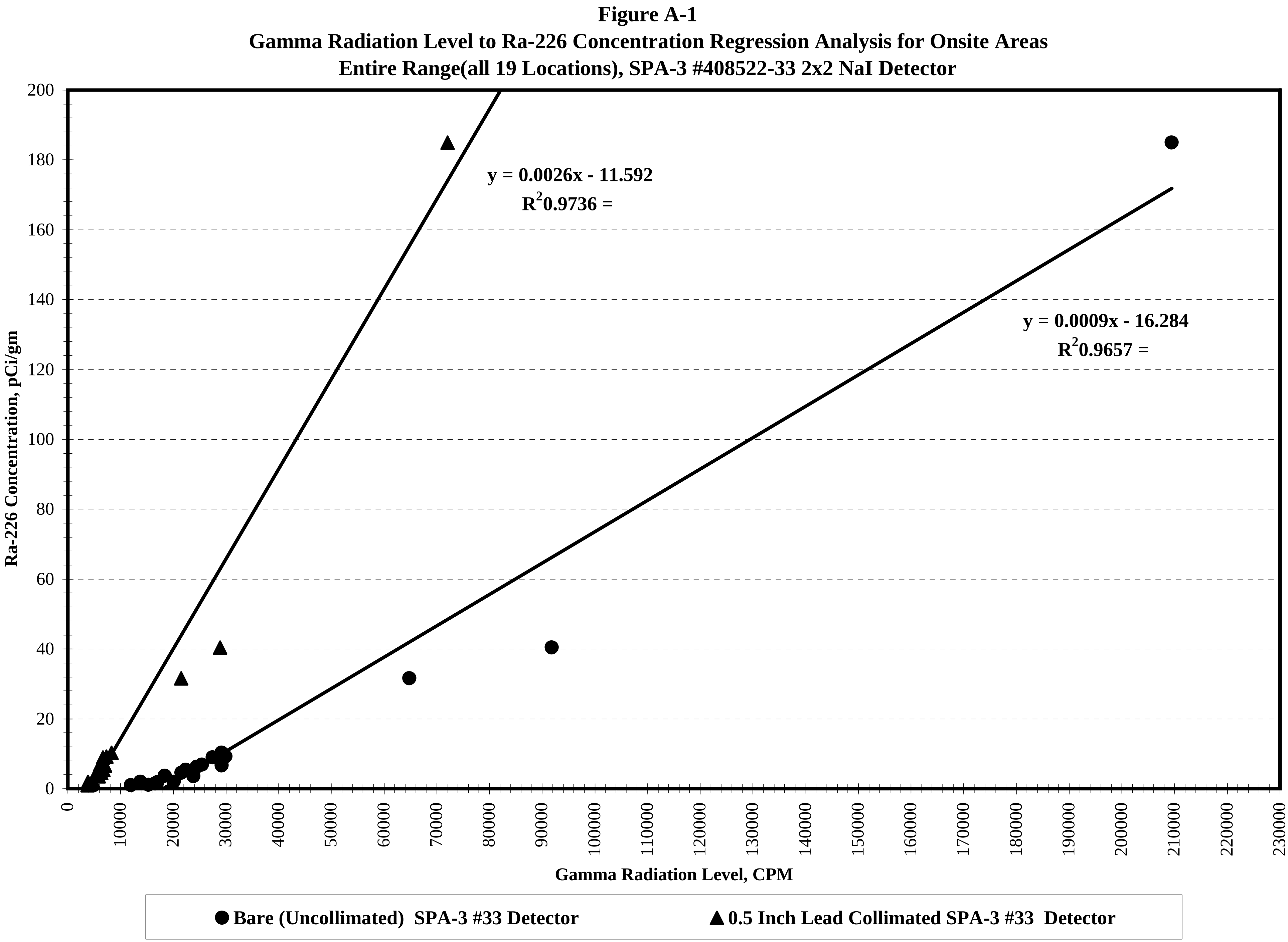


Figure A-1
Gamma Radiation Level to Ra-226 Concentration Regression Analysis for Onsite Areas
Entire Range(all 19 Locations), SPA-3 #408522-33 2x2 NaI Detector
y = 0.0026x - 11.592
R20.9736 =
y = 0.0009x - 16.284
R20.9657 =
Ra-226 Concentration, pCi/gm
Gamma Radiation Level, CPM
0
20
40
60
80
100
120
140
160
180
200
0
10000
20000
30000
40000
50000
60000
70000
80000
90000
100000
110000
120000
130000
140000
150000
160000
170000
180000
190000
200000
210000
220000
230000
Bare (Uncollimated) SPA-3 #33 Detector
0.5 Inch Lead Collimated SPA-3 #33 Detector

Figure A-2
Gamma Radiation Level to Ra-226 Concentration Regression Analysis for Onsite Areas
Background to 10 pCi/gm Range, SPA-3 #408522-33 2x2 NaI Detector

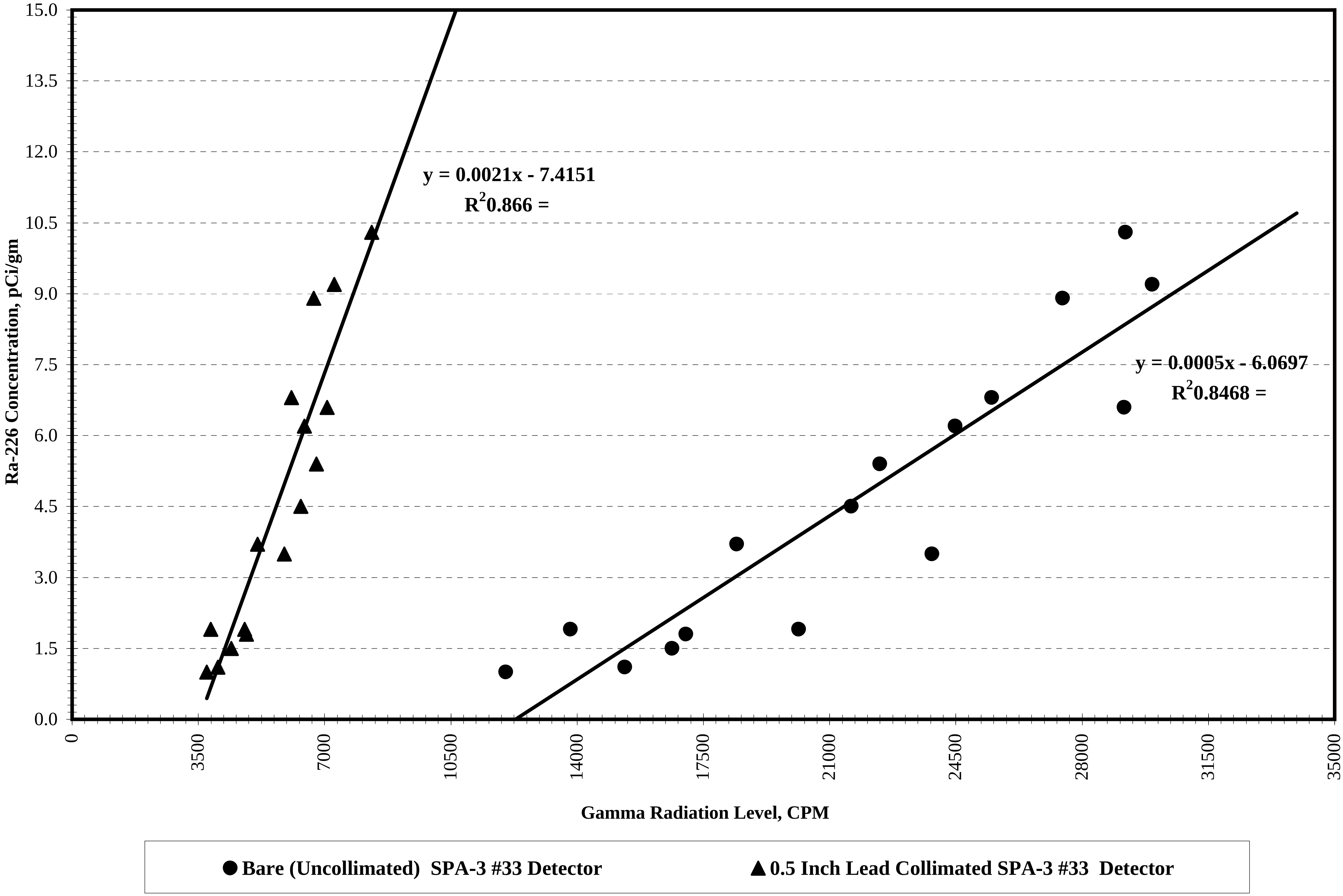


Figure A-3
Gamma Radiation Level to Ra-226 Concentration Regression Analysis for Onsite Areas
Entire Range, SPA-3 #408522-30 2x2 NaI Detector

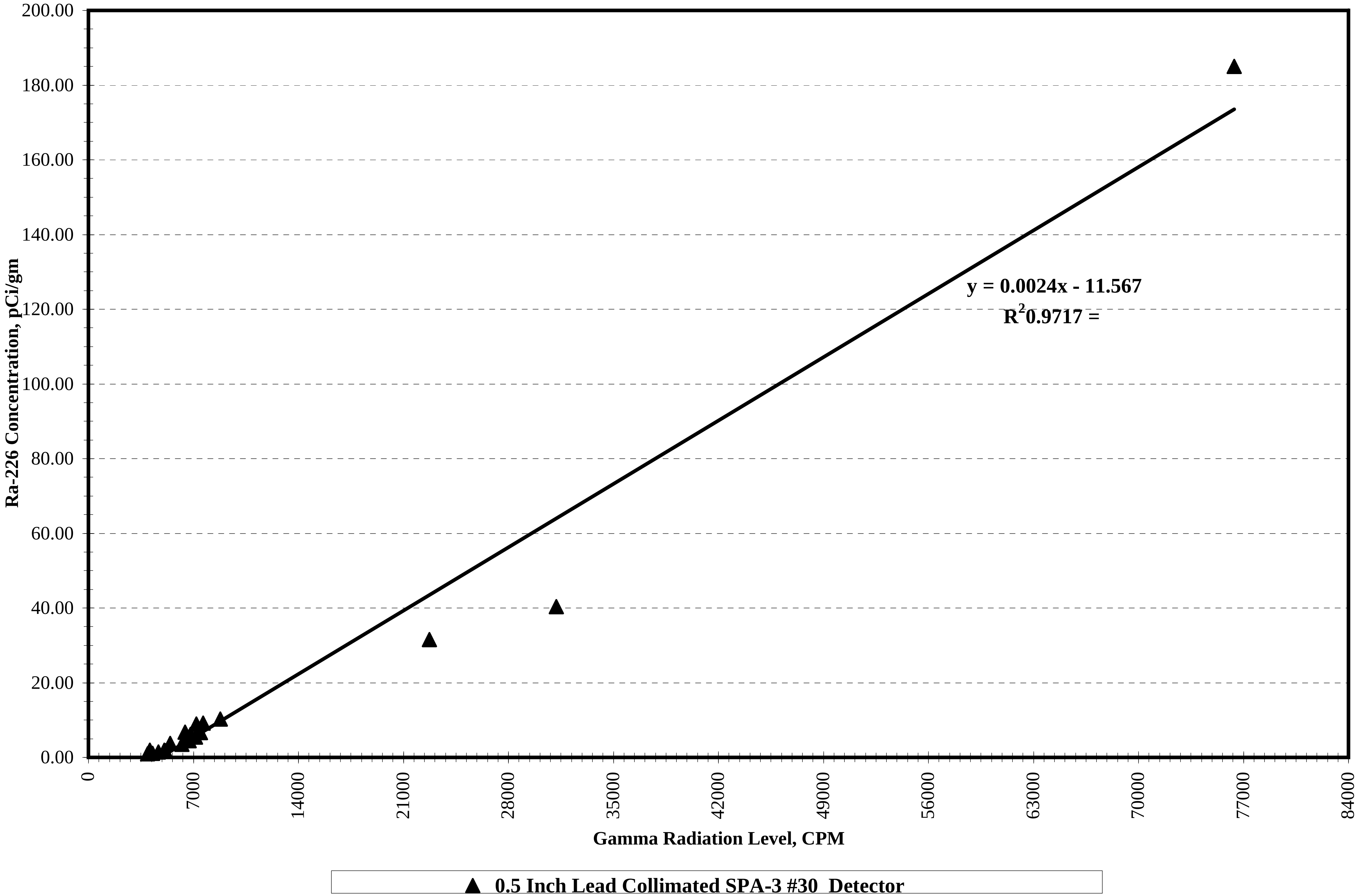


Figure A-4
Gamma Radiation Level to Ra-226 Concentration Regression Analysis for Onsite Areas
Background to 10 pCi/gm Range, SPA-3 #408522-30 2x2 NaI Detector

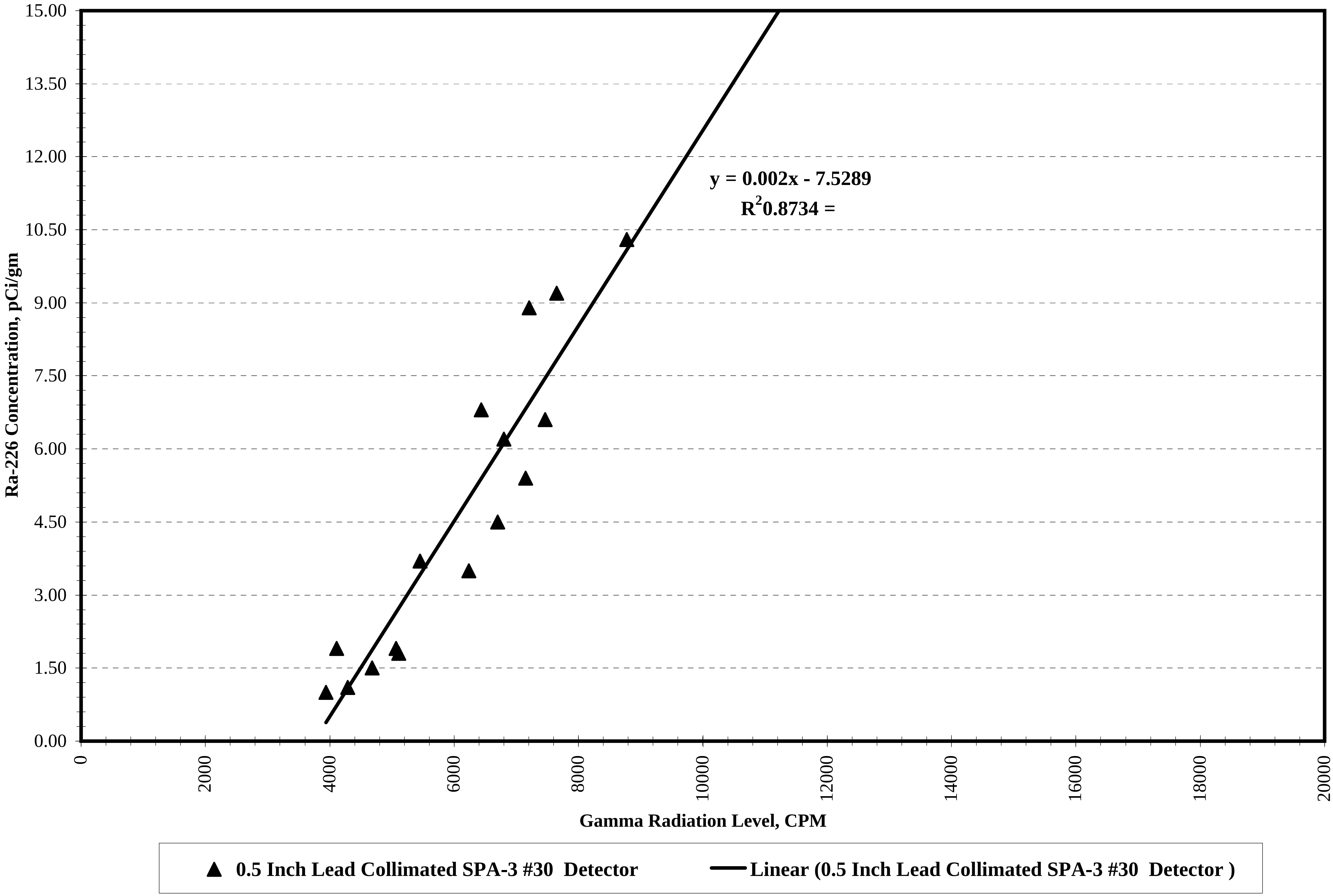


Figure A-5
Gamma Radaiation Level to Surface Soil Ra-226 Concentration Regression
NECR-1 Step Out Survey Points for <10K CPM Correlation with Collimated 2x2 NaI Detector

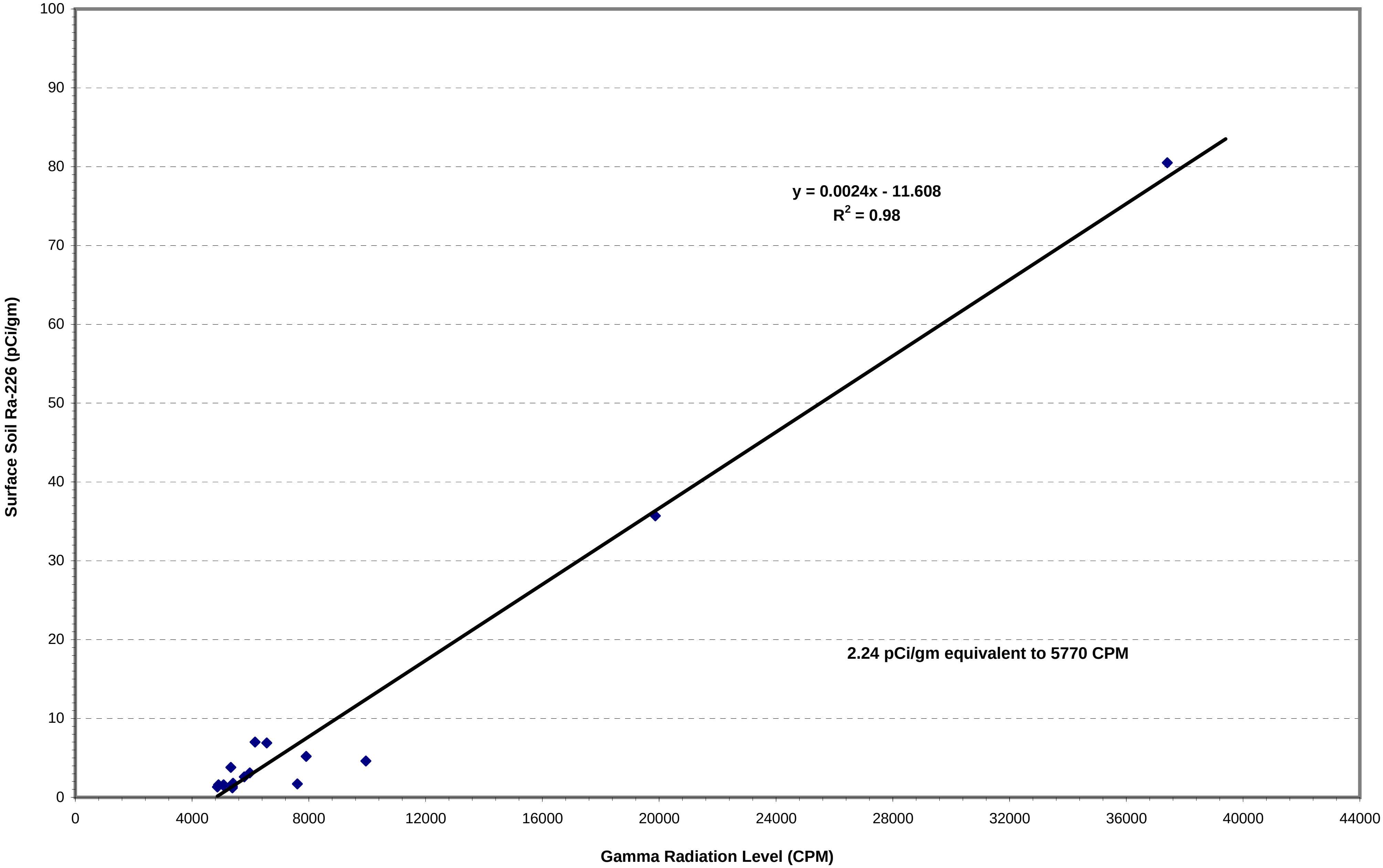
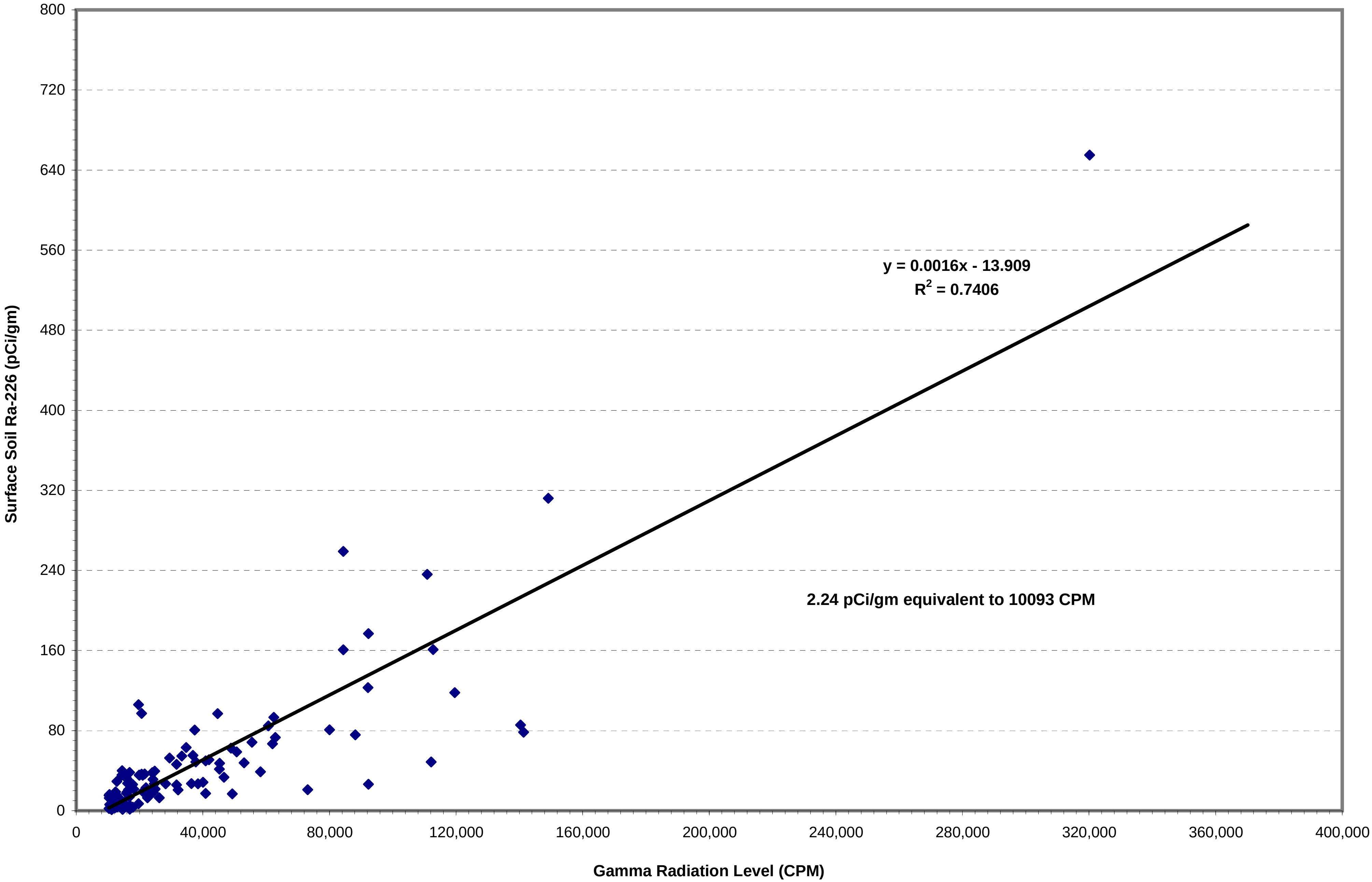


Figure A-6
Gamma Radiation Level to Surface Soil Ra-226 Regression
On Site Areas >10K Survaey Pointds for >10K CPM Correlation with Collimated 2x2 NaI Detector



Static Gamma Radiation Field Forms

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (65782), Detector SPA-3, 2x2" NaI #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Decsription NECR-1 Onsite Area

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-07-06	NECR-1-137			29493	Blue
11-07-06	NECR-1-136			21509	
11-07-06	NECR-1-135			34742	Blue
11-07-06	NECR-1-134			26907	
11-07-06	NECR-1-133			33510	Blue
11-07-06	NECR-1-132			34165	
11-07-06	NECR-1-131			45205	Blue
11-07-06	NECR-1-130(B)			53449	red
11-07-06	NECR-1-129(B)			19698	blue
11-07-06	NECR-1-128			24809	
~~11-07-06~~	~~NECR-1-127~~				~~blue~~
11-07-06	NECR-1-109			18421	
11-07-06	NECR-1-110			8220	
11-07-06	NECR-1-111			7679	
11-07-06	NECR-1-112			69475	
11-07-06	NECR-1-113			79793	
11-07-06	NECR-1-114			19244	
11-07-06	NECR-1-115			23626	
11-07-06	NECR-1-116			22297	
11-07-06	NECR-1-117			7309	
11-07-06	NECR-1-118			19873	
11-07-06	NECR-1-119			7647	
11-07-06	NECR-1-101			10437	blue
11-07-06	NECR-1-100			8633	
11-07-06	NECR-1-99			7204	
11-07-06	NECR-1-98			19799	
11-07-06	NECR-1-97			10754	
11-07-06	NECR-1-96			27587	
11-07-06	NECR-1-95			88148	blue
11-07-06	NECR-1-94			26588	
11-07-06	NECR-1-93			14402	blue

Technician Signature ______________, Reviewed by ______________

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (C8782) Detector SPA-3, 2x2" NaI #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Decsription NECR-1 Onsite Area

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-7-06	NECR-1-92			6827	blue
11-7-06	NECR-1-91			21054	
11-7-06	NECR-1-90			60717	blue
11-7-06	NECR-1-75			38489	
11-7-06	NECR-1-76			51493	
11-7-06	NECR-1-77			13265	
11-7-06	NECR-1-78			14469	
11-7-06	NECR-1-79			23748	
11-7-06	NECR-1-80			43850	
11-7-06	NECR-1-81			56281	
11-7-06	NECR-1-82			8975	
11-7-06	NECR-1-83			145474	
11-7-06	NECR-1-84			10375	
11-7-06	NECR-1-85			12551	
11-7-06	NECR-1-86			19431	
11-7-06	NECR-1-87			6101	
11-7-06	NECR-1-88			10556	
11-7-06	NECR-1-106			7051	
11-7-06	NECR-1-105			5852	
11-7-06	NECR-1-104			18823	
11-7-06	NECR-1-103			16490	blue
11-7-06	NECR-1-102			3777	
11-7-06	NECR-1-120			11851	
11-7-06	NECR-1-121			24860	
11-7-06	NECR-1-122			23760	
11-7-06	NECR-1-123			11268	
11-7-06	NECR-1-124			7852	
11-7-06	NECR-1-141			7820	
11-7-06	NECR-1-140			9890	blue
11-7-06	NECR-1-139			48~~0~~202*	48202
11-7-06	NECR-1-138			37798	blue

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3 2x2" NaI #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription NECR-1 Onsite Area

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet — Northing	Easting	Gamma Radiation Reading, CPM	Comments/Notes
11-7-06	NECR-1-156			13907	gr
11-7-06	NECR-1-155			12924	gr
11-8-06	NECR-1-154			7733	gr
* 11-8-06	NECR-1-153			6566	gr
11-8-06	NECR-1-152			7752	gr
11-8-06	NECR-1-151			11364	gr
11-8-06	NECR-1-150			14110	gr
11-8-06	NECR-1-149			71156	gr
11-8-06	NECR-1-148			18496	gr
11-8-06	NECR-1-147			35327	gr
11-8-06	NECR-1-146			~~200~~ 20300	gr
11-8-06	NECR-1-145			38198	gr
11-8-06	NECR-1-144			49257	gr
11-8-06	NECR-1-143			31568	gr
11-8-06	NECR-1-142			10596	gr
11-8-06	NECR-1-127			62399	blue
11-8-06	NECR-1-126			41946	blue
lo * 11-8-06	NECR-1-108			79701	
11-8-06	NECR-1-107			22186	gr
11-8-06	NECR-1-89			21626	gr
11-8-06	NECR-1-74			44786	gr
11-8-06	NECR-1-64			43422	
11-8-06	NECR-1-54			53886	
11-8-06	NECR-1-43			39276	gr
11-8-06	NECR-1-33			47725	gr
11-8-06	NECR-1-23			24299	gr
11-8-06	NECR-1-53			16935	gr
11-8-06	NECR-1-125			9426	gr
11-8-06	NECR-1-73			5637	
* 11-8-06	NECR-1-63			6388	
11-8-06	NECR-1-52			6751	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68783) Detector SPA-3, 2x2 NaI #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription NECR-1 Quonset area

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-8-06	NECR-1-72			35498	
11-8-06	NECR-1-71			8163	
11-8-06	NECR-1-70			17802	Blue
11-8-06	NECR-1-69			26006	
11-8-06	NECR-1-68			26252	Blue
11-8-06	NECR-1-67			16829	Blue - off concrete pad
11-8-06	NECR-1-66			41761	
11-8-06	NECR-1-65			40047	
11-8-06	NECR-1-55			37553	
11-8-06	NECR-1-56			15136	
11-8-06	NECR-1-57			35129	
11-8-06	NECR-1-58			48986	off concrete pad
11-8-06	NECR-1-59			24949	
11-8-06	NECR-1-60			11705	
11-8-06	NECR-1-61			4396	concrete sample
11-8-06	NECR-1-62			10902	
11-8-06	NECR-1-51			8537	
11-8-06	NECR-1-50			4572	corner of blue bldg. ~~concrete pad~~
11-8-06	NECR-1-49			12820	Blue
11-8-06	NECR-1-48			13183	
11-8-06	NECR-1-47			24256	Blue
11-8-06	NECR-1-46			50688	Blue
11-8-06	NECR-1-45			51944	
11-8-06	NECR-1-44			53006	Blue
11-8-06	NECR-1-34			49355	
11-8-06	NECR-1-35			45420	
11-8-06	NECR-1-36			38089	
11-8-06	NECR-1-37			19606	
11-8-06	NECR-1-38			21243	
11-8-06	NECR-1-39			11917	
11-8-06	NECR-1-40			9768	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3 #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription NECR-1 Onsite Area

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-8-06	NECR-1-41			17532	
11-8-06	NECR-1-42			8022	
11-8-06	NECR-1-32			17145	
11-8-06	NECR-1-31			16751	off concrete pad
11-8-06	NECR-1-30			8914	Blue
11-8-06	NECR-1-29			16286	
11-8-06	NECR-1-28			16041	Blue
11-8-06	NECR-1-27			20946	
11-8-06	NECR-1-26			55532	Blue
11-8-06	NECR-1-25			58768	
11-8-06	NECR-1-24			39603	
11-8-06	NECR-1-15			65159	
11-8-06	NECR-1-16			80015	Blue
11-8-06	NECR-1-17			72378	
11-8-06	NECR-1-18			18184	Blue
11-8-06	NECR-1-19			15502	
11-8-06	NECR-1-20			31670	Blue
11-8-06	NECR-1-21			13018	
11-8-06	NECR-1-22			6581	
11-8-06	NECR-1- 14			6339	Green
11-8-06	NECR-1- 13			10469	on concrete
11-8-06	NECR-1- 12			9282	
11-8-06	NECR-1- 11			8225	
11-8-06	NECR-1- 10			49353	on road
11-8-06	NECR-1- 9			22595	
11-8-06	NECR-1- 4			12376	
11-8-06	NECR-1- 5			8766	blue
11-8-06	NECR-1- 6			9241	
11-8-06	NECR-1- 3			17937	green
11-8-06	NECR-1- 7			7381	green
11-8-06	NECR-1- 8			7187	green

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, 2x2 NaI, #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription NECR-1 Onsite Area

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-8-06	NECR-1-2			8481	Green
11-8-06	NECR-1-1			11507	

Technician Signature ____________________, Reviewed by ____________________

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, 2x2 NaI, # 408522-33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription NECR-1 SO,

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-13-06	NECR-1 # 201			14153	51899
11-13-06	NECR-1 # 202			7961	36959
11-13-06	NECR-1 # 203			13606	55218
11-13-06	NECR-1 # 204			8432	36149
11-13-06	NECR-1 #205			36494	111121
11-13-06	NECR-1 # 206			6654	26130
11-13-06	NECR-1 #207			5977	23185
11-13-06	NECR-1 #208			6103	23157
11-13-06	NECR-1 #209			5940	21283
11-13-06	NECR-1 # 210			5482	20387
11-13-06	NECR-1 # 211			5684	20294
11-13-06	NECR-1 # 212			5786	20867
11-13-06	NECR-1 # 213			7087	23427
"	NECR-1 # 240			5073	18097
"	NECR-1 # 239			5115	17713
"	NECR-1 # 238			5080	18064
"	NECR-1 # 237			5863	19560
"	NECR-1 # 236			6067	20517
"	NECR-1 # 235			5595	21068
"	NECR-1 # 234			7750	26350
"	NECR-1 # 233			7928	31308
"	NECR-1 # 232			23723	74632
"	NECR-1 # 231			20281	64828
"	NECR-1 # 230			6557	26520
"	NECR-1 # 256			9588	32923
"	NECR-1 # 257			5471	21344
"	NECR-1 # 258			14804	47769
"	NECR-1 # 259			5944	21710
"	NECR-1 # 260			~~6066~~ 6184 SE	~~21494~~ SE 21595
"	NECR-1 # 261			5966	20909
11-13-06	NECR-1 #262			5383	18601

Technician Signature ______________________, Reviewed by ______________________

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782) Detector SPA-3, 2x2 NaI #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Description NECR-1, SD

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	ETH Secondary Comments/Notes
		Northing	Easting		
11-13-06	NECR-1 #157			10339	42463
11-13-06	NECR-1 #158			7204	37517
11-13-06	NECR-1 #159			25545	92213
11-13-06	NECR-1 #160			37812	130507
11-13-06	NECR-1 #161			30446	107023
11-13-06	NECR-1 #162			10548	48017
11-13-06	NECR-1 #163			16230	57564
11-13-06	NECR-1 #164			19872	60484
11-13-06	NECR-1 #165			10640	41852
11-13-06	NECR-1 #166			8919	32276
11-13-06	NECR-1 #167			6956	26705
11-13-06	NECR-1 #168			8529	30618
11-13-06	NECR-1 #169			8896	27382
11-13-06	NECR-1 #170			7520	29286
11-13-06	NECR-1 #171			8180	32570
* 11-13-06	NECR-1 #186			7840	28349
11-13-06	NECR-1 #185			5775	23289
11-13-06	NECR-1 #184			5380	20464
11-13-06	NECR-1 #183			8326	27381
11-13-06	NECR-1 #182			6038	22052
11-13-06	NECR-1 #181			7019	26515
11-13-06	NECR-1 #180			8416	31242
11-13-06	NECR-1 #179			11081	43015
11-13-06	NECR-1 #178			12550	46505
11-13-06	NECR-1 #177			10183	40879
11-13-06	NECR-1 #176			23864	82050
11-13-06	NECR-1 #175			61150	176051
11-13-06	NECR-1 #174			9405	46783
11-13-06	NECR-1 #173			9954	46951
* 11-13-06	NECR-1 #172			7060	31722

Technician Signature ____________, Reviewed by ____________

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, 2x2 NaI, #408522-33

Instrument Calibration Date: 8-3 06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription NECR-1 50

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-13-06	NECR-1 #263			5352	18325
11-13-06	NECR-1 #264			5220	17468
11-13-06	NECR-1 # 265			4908	17108
	266	3948996.6	~~[illegible]~~ 725802.3		
	267	"	725826.6		
	268	"	725850.9		
	269	3949017.6	725838.9		
	270	"	725863.2		
	~~271~~	~~"~~			
	271	3949038.7	725857.0		
	272	"	725875.3		
	273	3949080.9	725510.2		
	274	"	725534.5		
	275	"	725558.8		
	276	3949059.8	725838.9		
	277	"	725863.2		

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, 2x2 NaI, # 408522-33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Decsription NECR-1 SO

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-14-06	NECR-1 266	3948996.6	725802.3	7610	Appears to be fill material
"	" 267	"	725826.6	9057.	
"	" 268	"	725850.9	21443.	
"	" 269	3949017.6	725 ~~838.6~~	7047	725911.9
"	" 270		725863.2	10077	
"	" 271	3949038.7	725851.0	8904.	
"	" 272	"	725875.3	5967.	923.775
"	" 273	3949059.8	~~725838.9~~	6368.	725863.2
"	" 274	"	725 ~~863.2~~	16578	
"	" 275	"	725887.5	6410.	
"	" 276	~~3949080.9~~	725851.0	5614	
"	" 277	"	~~725875.3~~	9384.	
"	" 278	"	725 ~~825.0~~	10609.	725924
"	" 279	"	725972.	7905	
"	" 282	3949102	725948.0	8298	
"	" 281	"	725911	37406	grey tint on the area.
"	" 280	"	725863	18294	
"	" 283	3949123.1	725875	8327.	
"	" 284	"	725923	6666.	
"	" 285	"	725972	6452	4...
"	" 288	3949144.2	725948	27874 *	
"	" 287	"	725899	15234 *	2 min 7617 cpm
"	" 286	"	725851	12891 *	2 min 6445 cpm
"	" 289	3949165.3	725875	5400	
"	" 290	"	725923	9467	
"	" 291	"	725972	14088	
"	# 294	3949186.4	725948	6353	
"	293	"	725899	6158	
"	292.	"	725851	5050	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA 3, 2x2 NaI, # 408522-33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription NECR-1 SO

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet: Northing	Easting	Gamma Radiation Reading, CPM	Comments/Notes
11-16-06	NECR-1-293			5863	
"	NECR-1-294			6835	
"	NECR-1-295			7101	
"	NECR-1-296			20349	
"	NECR-1-297			8397	
"	NECR-1-298			8367	
"	NECR-1-299			24537	
"	NECR-1-300			6387	
"	NECR-1-301			12180	
"	NECR-1-302			6428	
"	NECR-1-303			5243	
"	NECR-1-304			8326	
"	NECR-1-305			7381	
"	NECR-1-306			5827	
"	NECR-1-307			5331	
"	NECR-1-308			6076	
"	NECR-1-309			5799	
"	NECR-1-310			6602	
"	NECR-1-311			20578	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68?) , Detector SPA-3 #33

Instrument Calibration Date: 8-3-06 ; Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Decsription NECR-1, 50s South Side.

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-28-06	NECR-1-312			8602	
11	313			8483	
11	314			8858	
12-1-06	NECR-1-315			9876	
11	316			4865	
11	317			9901	
11	318			62291	
11	319			20850	
11	320			6899	
11	321			18342	
11	322			7021	
11	323			5789	
11	324			14578	
11	325			22182	
11	326			7908	
11	327			5887	
11	328			5775	
11	329			7666	
11	330			14672	
11	331			8792	
11	332			11642	
11	333			8579	
11	334			11592	
11	335			9754	
11	338			5242	
11	339			9561	
11	340			6942	
11	341			5808	
11	342			5971	
11	343			5474	
Note: ~~#336~~ #337 were rescanned further South if can be obtained					

Technician Signature [signature] , Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3 #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Decsription NECR-1 SOs Southside

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet: Northing	Survey Point Coordinate NAD 1983 NM State Plane, feet: Easting	Gamma Radiation Reading, CPM	Comments/Notes
12-1-06	NECR-1-344			6583	
"	345			6521	
"	346			6820	
"	347			8779	
"	348			6451	
"	349			5976	
"	336			6852	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, 2x2 NaI, # 408522-33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription NECR-2

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-9-06	NECR 2-40			37549	GR
11-9-6	NECR 2-39			19939	Rd
11-9-6	NECR-2-49			51947	GR
11-9-6	NECR-2-48			15967	Rd
11-9-6	NECR 2-57			60240	GR
11-9-6	NECR-2-56			7314	BLUE
11-9-6	NECR 2-65			55096	GR
11-9-6	NECR-2-72			33150	GR
11-9-6	NECR-2-64			7019	Rd
11-9-6	NECR-2-71			14523	BLUE
11-9-6	NECR-2-63			10520	
11-9-6	NECR-2-55			11111	
11-9-6	NECR-2-47			17041	
11-9-6	NECR-2-38			19234	
11-9-6	NECR-2 28			18668	
11-9-6	NECR-2-27			21010	
11-9-6	NECR-2-26			41158	
11-9-6	NECR-2-25			32328	
11-9-6	NECR-2-24			13046	
11-9-6	NECR-2-23			9472	
11-9-6	NECR-2-15			20677	Blue
11-9-6	NECR-2-08			7080	
11-9-6	NECR-2-16			8266	
11-9-6	NECR-2-17			36878	
11-9-6	NECR-2-37			8943	
11-9-6	NECR-2-46			11566	
11-9-6	NECR-2-36			22723	
11-9-6	NECR-2-35			84399	
11-9-6	NECR-2-34			16700	
11-9-6	NECR-2-42			9070	
11-9-6	NECR-2-43			143215	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3 2x2 NaI #408522-33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Decsription NECR-2

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-9-06	NECR2-58			4086	GR
11-9-06	NECR2-07			4736	GR
"	" -13			3831	GR
"	" -14			5753	GR
"	" -22			5391	GR
"	" -33			4837	BL
"	" -32			5068	GR
"	" -41			4652	GR
"	" -50			6122	BL
"	" -59			7950	RD
"	" -66			4622	GR
"	" -67			11626	GR
"	" -68			15477	GR
"	" -69			12599	BL
"	" -73			9176	GR
"	" -74			9150	GR
"	" -75			6003	GR
"	" -31			12034	GR
"	" -21			6764	GR
"	" -12			6484	GR
"	" -06			5926	GR
"	" -03			8719	GR
"	" -02			6418	GR
"	" -05			25943	RD
"	" -11			58213	RD
"	" -30			24444	GR
"	" -20			24011	BL
"	" -10			99457	RD
"	" -04			6256	BL
"	" -19			34105	RD
"	" -29			21008	RD

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68072) Detector SPA-3, 2x2 NaI #408522-33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription NECR-2

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-9-06	NECR-2-44			23195	
11-9-6	NECR-2-45			35142	
11-9-6	NECR-2-54			8739	
11-9-6	NECR-2-53			10395	
11-9-6	NECR-2-52			22046	
11-9-6	NECR-2-51			18901	
11-9-6	NECR-2-60			20112	
11-9-6	NECR-2-61			46882	
~~11-9-6~~	~~NECR-2-~~				GN
11/10/06	NECR-2-62			13887	
11/10/06	NECR-2-69			12576	rechecked 11/10/ blue
11/10/06	NECR-2-70			11172	drums noted in wash
11/10/06	NECR-2-18			17871	Blue
11/10/06	NECR-2-9			5367	contact drum ink
11/10/06	NECR-2-1			5709	
/					

Technician Signature [signature], Reviewed by [signature]

Gamma Radiation Survey @ UNC's NECR Mine Site

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68783), Detector SPA-3, 2x2 NaI #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription NECR-2, SO

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-14-06	NECR-2-76	3948457	724924	7113	
"	-77	"	724951	6352	
"	-78	"	724975	5122	
"	-79	"	724999	5544	
"	-80	"	725024	5454	
"	-81	"	725049	5634	
"	-82	3948436	~~724986~~ 725038	6048	
"	-83	"	725072	5587	
"	-84	"	724986	6864	
"	-85	3948415	724999	5344	
"	86	"	725024	5989	
"	87	3948415	725049	6205	
"	88	3948394	725038	7012	
"	89	3948394	725013	6343	
"	90	3948373	725024	6232	
→ "	91	3948373	725049	6797	
"	92	3948351	725038	15635	
"	93	~~3948481~~	724938	7061	3948481
"	94	"	724963	5585	
"	95	"	724987	5776	
"	96	"	725013	5429	
"	97	"	725038	5178	
11-16-06	NECR-2-98	"	725062	4862	
"	99	"	725086	5054	
"	100			4742	
"	101			4824	
"	102			4976	
"	103			4999	
"	104			5174	
"	105			5504	
"	106			6941	

Technician Signature [signature], Reviewed by [signature]

Gamma Radiation Survey @ UNC's NECR Mine Site

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 222 (68783) Detector SPA-3, 2x2 NaI, # 408522-33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription NECR-2 SO

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-16-06	NECR-2-107			5877	
"	NECR-2-108			5775	
"	NECR-2-109			4945	
"	NECR-2-110			5300	
"	NECR-2-111			6935	
"	NECR-2-112			11055	
"	NECR-2-113			7521	
"	NECR-2-114			20672	
"	NECR-2-115			7858	

Technician Signature [illegible], Reviewed by [illegible]

Gamma Radiation Survey @ UNC's NECR Mine Site
Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (6803) Detector SPA-3 #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Description NECR-2, 50s

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-28-06	NECR-2-116			7268	
"	-117			7488	
"	-118			7459	

Technician Signature ______________, Reviewed by ______________

Gamma Radiation Survey @ UNC's NECR Mine Site

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, # 408522 # 33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription Sand fill #1

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11/10/06	SF#1 - 1			5836	
11/10/06	SF1 - 2			3616	
11/10/06	SF1 - 3			3717	
11/10/06	SF1 - 8			3769	
11/10/06	SF1 - 7			9517	
11/10/06	SF1 - 6			5787	
11/10/06	SF1 - 5			8811	
11/10/06	SF1 - 4			4085	
11/10/06	SF1 - 9			4954	blue
11/10/06	SF1 - 10			5391	
11/10/06	SF1 - 11			7128	blue
11/10/06	SF1 - 12			7203	
11/10/06	SF1 - 13			4898	
11/10/06	SF1 - 19			5401	
11/10/06	SF1 - 18			11335	
11/10/06	SF1 - 17			4933	blue
11/10/06	SF1 - 16			5152	
11/10/06	SF1 - 15			28900	
11/10/06	SF1 - 14			6176	
11/10/06	SF1 - 20			4978	
11/10/06	SF1 - 21			4459	blue
11/10/06	SF1 - 22			5168	
11/10/06	SF1 - 23			10646	
11/10/06	SF1 - 24			12287	
11/10/06	SF1 - 25			6823	moved - cliff
11/10/06	SF1 - 31			8919	32 beyond cliff
11/10/06	SF1 - 30			12777	blue
11/10/06	SF1 - 29			5714	
11/10/06	SF1 - 28			4103	blue
11/10/06	SF1 - 27			4975	blue
11/10/06	SF1 - 26			5086	

Technician Signature AWB, Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68832) Detector SPA-3, #408522 #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Decsription Sandfill #1

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11/10/06	SF1-33			10214	
11/10/06	SF1-40			3649	
11/10/06	SF1-47			4665	
11/10/06	SF1-41			4649	blue
11/10/06	SF1-54			41325	
11/10/06	SF1-60			5223	
11/10/06	SF1-61			7147	
11/10/06	SF1-66			4673	
11/10/06	SF1-34			7376	
11/10/06	SF1-35			4299	
11/10/06	SF1-36			3833	
11/10/06	SF1-37			6511	
11/10/06	SF1-45			6032	
11/10/06	SF1-44			6711	Blue
11/10/06	SF1-43			10879	Blue
11/10/06	SF1-42			15910	
11/10/06	SF1-48			9809	Blue
11/10/06	SF1-49			49290	
11/10/06	SF1-50			12689	
11/10/06	SF1-51			6227	blue
11/10/06	SF1-52			4406	
11/10/06	SF1-58			8058	
11/10/06	SF1-63			32153	blue
11/10/06	SF1-64			8593	
11/10/06	SF1-69			23833	
11/10/06	SF1-72			6120	
11/10/06	SF1-68			45274	Blue
11/10/06	SF1-67			7028	
11/10/06	SF1-62			48250	
11/10/06	SF1-57			15436	
11/10/06	SF1-56			56195	

Technician Signature [signature], Reviewed by [signature]

Gamma Radiation Survey @ UNC's NECR Mine Site

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, 2x2 NaI #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription Sandfill-1, onsite Area

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11/10/06	SF-1 #55			30719	
11/10/06	SF-1 #70			6174	
11/10/06	SF-1 #74			5637	
11/10/06	SF-1 #75			4337	
11/10/06	SF-1 #76			4219	
11/10/06	SF-1 #73			5139	
11/10/06	SF-1 #65			6188	
11/10/06	SF-1 #59			5197	
11/10/06	SF-1 #53			5277	
11/10/06	SF-1 #46			8185	
11/10/06	SF-1 #39			7114	
11/10/06	SF-1 #38			9557	
11/10/06	SF-1 #32			5666	
11/10/06	SF-1 #71			10523	
~~11/10/06~~					

Technician Signature [signature], Reviewed by [signature]

Gamma Radiation Survey @ UNC's NECR Mine Site

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 ( ), Detector SPA-3, 2x2 NaI 40(522#33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Decsription Sand fill #2

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11/10/06	Sandfill 2 #13			5263	
11/10/06	Sand fill #9			4926	
11-10-06	SP #1 (SF2)			~~5347~~	Sep out SF2 - cliff
11-10-06	Sand fill 2 #2			4634	
11-10-06	Sand fill #1			4813	
11-10-06	Sand fill 2 #3			4124	blue
11-10-06	Sand fill 2 #6			4285	blue
11-10-06	Sand fill 2 #10			5385	blue
11-10-06	Sand fill #2 #14			4094	blue
11-10-06	" #4			5211	blue
11-10-06	" #5			7707	
11/10/06	SF2 #15			6792	blue
11/10/06	SF2 #7			10505	blue
11/10/06	SF2 #11			15498	blue
11/10/06	SF2 #8			7597	
11/10/06	SF2 #12			10566	blue
11/10/06	SF2 #17			20647	blue
11/10/06	SF2 #20			18347	
11/10/06	SF2 #21			6984	moved b/c cliff
11/10/06	SF2 #18			6062	moved "
11/10/06	SF2 #16			8197	
11/10/06	SF2 #19			24945	blue

Technician Signature [illegible], Reviewed by [illegible]

Static Gamma Radiation Survey Field Form

Instrumentation : Sealer/Ratemeter LUDLUM 2221 (228808) Detector SPA 3 2"x2" NaI (#30)

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Decsription Sandfill NO. 3 (onsite area)

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-09-06	SANDFILL 3 - 28			10797	
11-09-06	SANDFILL 3 - 27			8780	blue
11-09-06	SANDFILL 3 - 22			5414	blue
11-09-06	SANDFILL 3 - 23			22347	
11-09-06	SANDFILL 3 - 24			16201	blue
11-09-06	SANDFILL 3 - 25			24640	blue
11-09-06	SANDFILL 3 - 26			21274	blue
11-09-06	SANDFILL 3 - 21			25727	
11-09-06	SANDFILL 3 - 20			48099	
11-09-06	SANDFILL 3 - 19			10120	
11-09-06	SANDFILL 3 - 18 dwm 11/9/06			14648	
11-09-06	SANDFILL 3 - 17			5074	blue - ridge
11-09-06	SANDFILL 3 - 12			5935	ridge
11-09-06	SANDFILL 3 - 4			5280	ridge ~~tt~~ dwm 11/9/06
11-09-06	SANDFILL 3 - 1			6466	ridge
11-09-06	SANDFILL 3 - 13			24495	
11-09-06	SANDFILL 3 - 14			92167	blue
11-09-06	SANDFILL 3 - 15			43425	
11-09-06	SANDFILL 3 - 10			15681	blue
11-09-06	SANDFILL 3 - 09			16019	blue
11-09-06	SANDFILL 3 - 08			14637	blue
11-09-06	SANDFILL 3 - 05			62004	blue
11-09-06	SANDFILL 3 - 02			10387	blue
11-09-06	SANDFILL 3 - 03 dwm 11/09/06			16040	
11-09-06	SANDFILL 3 - 11			8166	
11-09-06	SANDFILL 3 - 16			9885	
11-09-06	SANDFILL 3 - 7			10445	
11-09-06	SANDFILL 3 - 6			15867	blue
		Start 10:45 am	finish	6:00 pm	

Technician Signature Leah Wolf Martin, Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68787), Detector SPA-3, 2x2 NaI, # 405522-30

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Decsription Sand Fill-3 SO

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-16-06	SandF.11-3-29			5469	
"	" -30			7612	
"	" 31			5934	
"	" 32			5478	
"	" 33			7298	
"	" 34			5184	
"	" 35			4485	
"	" 36			5008	
11-17-06	" 37			4997	
"	" 38			4352	

Technician Signature [signature], Reviewed by [signature]

Gamma Radiation Survey @ UNC's NECR Mine Site
Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3 #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription Sandfill-3, 50s

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-28-06	SF3-40			6652	
"	-41			5724	
"	-42			4948	
"	-43			5812	
"	-39			17982	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (228808), Detector SPA-3 # 408522 #30

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Decsription Pond 1-2, Onsite Area

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-9-06	Pond 1-2 # 82			92284	
"	" #85			24915	
"	" #81			35022	~~blue~~
"	" #76			10358	blue
"	" #77			112122	blue
"	" #78			48662	
"	" #71			40879	
"	" #62			13864	
"	" #26			72749	
"	" #37			8143	
"	" #50			16747	blue
"	" #61			68437	blue
"	" #70			48368	
"	" #69			112771	blue
"	" #60			92295	
"	" #49			25210	blue
"	" #36			19222	
"	" #25			26902	
"	" #16			11908	
"	" #15			8918	
"	" #24			28230	blue
"	" #35			141363	
"	" #48			75125	
"	" #59			264301	
"	" #68			79437	
"	" #58			320161	blue
"	" #47			62918	blue
"	" #67			19517	
"	" #83			8859	
"	" #79			14503	
"	" #72			6489	

Technician Signature [signature], Reviewed by [signature]

Gamma Radiation Survey @ UNC's NECR Mine Site

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter [illegible] 2221(228808), Detector SPA-3 40852230

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated X Yes or ___ No.

Survey Area/Unit Decsription Pond 1-2

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-10-06	POND 1-2 #63			5911	
"	" #51			7555	
"	" #38			6744	
"	" #8			6187	
"	" #6			37608	
"	" #7			7641	
"	" #13			12151	
"	" #14			44649	Blue
"	" #22			33905	
"	" #33			7591	
"	" #46			94508	
"	" #57			22989	
"	" #34			36539	
"	" #23			48888	Blue
"	" #80			15174	
"	" #74			7598	
"	" #73			8154	
"	" #65			8502	
"	" #64			7871	
"	" #52			6558	
"	" #39			5322	
"	" #28			8411	
"	" #27			32613	
"	" #40			6334	blue
"	" #41			7325	blue
"	" #54			10271	
"	" #53			7715	
"	" #55			9984	
"	" #56			14024	blue
"	" #45			[illegible]33	
"	#32			5610	

Technician Signature ____________, Reviewed by ____________

Gamma Radiation Survey @ UNC's NECR Mine Site

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 / 223803, Detector SPA-3 408522 30

Instrument Calibration Date: 8-2-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated × Yes or ____ No.

Survey Area/Unit Decsription Pond 1-2

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-10-06	Pond 1-2 #21			6387	
"	" #12			5565	
"	" #5			5373	
"	" #2			4260	
"	" #1			4330	
"	" #3			5472	
"	" #9			5461	
"	" #17			6452	
"	" #18			7521	
"	" #10			6577	
"	" #4			5610	
"	" #11			6902	blue
"	" #20			8732	blue.
"	" # ~~39~~ 31			7134	
"	" #44			10041	
"	" #43			111328	
"	" #30			39539	
"	" #19			17022	blue
"	" #29			67837	
"	" #66			71850	
"	" #84			12841	
11-17-06	" #42			11158	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (LS 782), Detector SPA-3, 2x2" NaI #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription POND-3

START @ 3:30pm Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet Northing	Easting	Gamma Radiation Reading, CPM	Comments/Notes
11-7-06	POND-3-3			14774	
11-7-06	POND-3-2			8225	
11-7-06	POND-3-1			21120	blue
11-7-06	POND-3-5			10598	
11-7-06	POND-3-6			13688	
11-7-06	POND-3-7			84406	blue
11-7-06	POND-3-8			9176	
11-7-06	POND-3-4			8031	
11-7-06	POND-3-9			8939	
11-7-06	POND-3-10			10533	
11-7-06	POND-3-17			6493	
11-7-06	POND-3-16			~~105~~ 10185	
11-7-06	POND-3-15			12447	blue
11-7-06	POND-3-14			191805	
11-7-06	POND-3-13			51324	blue
11-7-06	POND-3-12			12978	
11-7-06	POND-3-11			8277	
11-7-06	POND-3-18			9632	
11-7-06	POND-3-19			15329	
11-7-06	POND-3-20			20579	
11-7-06	POND-3-21			20599	
11-7-06	POND-3-22			16408	
11-7-06	POND-3-23			10490	
11-7-06	POND-3-24			12075	
11-7-06	POND-3-32			9632	
11-7-06	POND-3-31			~~14079~~ ←	17609
11-8-06	POND-3-30			17619	
11-8-06	POND-3-29			149128	blue
11-8-06	POND-3-28			37176	
11-8-06	POND-3-27			11737	blue
11-8-06	POND-3-26			8923	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68284), Detector SPA-3, 2x2 NaI #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ___ No.

Survey Area/Unit Decsription POND 3, Onsite Area

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-8-06	POND-3-25			6343	
11-8-06	POND-3-33			6491	
11-8-06	POND-3-34			10990	
11-8-06	POND-3-35			12609	
11-8-06	POND-3-36			12938	
11-8-06	POND-3-37			14837	
11-8-06	POND-3-38			73114	Blue
11-8-06	POND-3-39			26927	
11-8-06	POND-3-40			14619	
11-8-06	POND-3-48			~~190200~~	19020
11-8-06	POND-3-47			47734	
11-8-06	POND-3-46			23486	
11-8-06	POND-3-43			11628	#44 & #45 are in water
11-8-06	POND-3-42			8802	Blue
11-8-06	POND-3-41			5902	
11-8-06	POND-3-49			6120	
11-8-06	POND-3-50			70038	
11-8-06	POND-3-51			25334	
11-8-06	POND-3-54			9367	#52 & #53 are in water
11-8-06	POND-3-55			40556	
11-9-06	POND-3-61			40887	BLUE
11-9-06	POND-3-60			9044	
11-9-06	POND-3-59			38463	BLUE
11-9-06	POND-3-58			17038	
11-9-06	POND-3-57			12207	BLUE
11-9-06	POND-3-56			6072	
11-9-06	POND-3-62			5080	
11-9-06	POND-3-67			5170	
11-9-06	POND-3-71			8454	
11-9-06	POND-3-72			6594	
11-9-06	POND-3-73			7572	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, 2x2NaI, #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Description Pond-3, Onsite Area

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-9-06	POND-3-70			21270	
11-9-06	POND-3-69			29797	
11-9-06	POND-3-68			13478	
11-9-06	POND-3-63			16625	BLUE
11-9-06	POND-3-64			13079	
11-9-06	POND-3-65			24776	BLUE
11-9-06	POND-3-66			19312	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (C6782), Detector SPA-3, 2x2 NaI, # 408522-33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription POND-3 50

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-16-06	POND-3-74			15883	
"	POND-3-75			6707	
"	POND-3-76			8057	
"	POND-3-77			6163	
"	POND-3-78			10638	
"	POND-3-79			6146	
"	POND-3-80			10045	
"	POND-3-81			7323	
"	POND-3-82			6400	
"	~~POND-3-83~~ AP				
"	~~POND-3-~~ AP				

Technician Signature [signature], Reviewed by [signature]

Gamma Radiation Survey @ UNC's NECR Mine Site
Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, 2x2 NaI, # 408522-33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Decsription Pond-3 SO

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet — Northing	Easting	Gamma Radiation Reading, CPM	Comments/Notes
11-17-06	Pond 3/S. #83			9045	
"	" #84			7028	
"	" 85			6728	
"	" 86			6858	
"	" 87			5853	
"	" 88			5035	
"	" 89			5338	
"	" 90			4837	
"	" 91			5238	
"	" 92			5872	
"	" 93			5458	

Technician Signature HH/[signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (228808), Detector SPA-3, 2"x2" NaI #30

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated X Yes or ______ No.

Survey Area/Unit Decsription Sediment Pad :- ONsite Area

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-09-06	SEDPAD-27			18,861	
11-09-06	SEDPAD-23			28304	
11-09-06	SEDPAD-29			49847	
11-09-06	SED-PAD-28			33476	
11-09-06	SEDPAD-24			40518	wash
11-09-06	SEDPAD-25			21621	blue
11-09-06	SEDPAD-26			36363	blue
11-09-06	SEDPAD-22			87831	blue
11-09-06	SEDPAD-21			140404	blue
11-09-06	SEDPAD-20			22537	blue
11-09-06	SEDPAD-19			28154	
11-09-06	SEDPAD-18			16887	blue, wash
11-09-06	SEDPAD-10			7037	blue
11-09-06	SEDPAD-11			12946	
11-09-06	SEDPAD-12			119627	blue
11-09-06	SEDPAD-13			23842	
11-09-06	SEDPAD-14			110907	blue
11-09-06	SEDPAD-15			46708	blue
11-09-06	SEDPAD-16			32486	
11-09-06	SEDPAD-17			10882	
11-09-06	SEDPAD-09			8503	
11-09-06	SEDPAD-08			dwm 11/9/06 31~~67~~701	blue
11-09-06	SEDPAD-07			19678	
11-09-06	SEDPAD-06			58230	blue
11-09-06	SEDPAD-05			22191	blue
11-09-06	SEDPAD-04			7279	
11-09-06	SEDPAD-01			131604	
11-09-06	SEDPAD-02			10535	
11-09-06	SEDPAD-03			8757	
	started 11/09/06 09:30		finished	11/09/06	10:30am

Technician Signature Leah Wolf Martin, Reviewed by

Gamma Radiation Survey @ UNC's NECR Mine Site
Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, 2x2 NaI #408522-39

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Description Sediment Pad Stepout

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-17-06	Sed Pad #30			4844	
"	" " 31			5015	
"	" " 32			4499	
"	33			5341	
"	" " 34			4192	
"	" " 35			5397	
"	" " 36			6099	
"	" " 37			4997	
"	" " 38			5458	
"	" 39			7091	
"	" " 40			5576	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (8782), Detector SPA-3 #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ____ Yes or ✓ No.

Survey Area/Unit Decsription Venthole 8/3

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet — Northing	Easting	Gamma Radiation Reading, CPM	Comments/Notes
11-28-06	VH8 - 1			11591	
"	" 2			17428	
"	" 3			43246	in Sump
"	" 4			63134	
"	" 5			43002	
"	" 6			62224	Berm
"	" 7			35341	Berm
"	" 8			44967	Berm
"	" 9			96977	Berm
"	" 10			50093	Berm
"	" 11			70053	Berm
"	" 12			33682	Berm
"	" 13			48082	Berm
"	" 14			30871	
"	" 15			109314	
"	" 16			36571	
"	" 17			123717	
"	" 18			53573	
"	" 19			155342	
"	" 20			119493	
"	" 21			22271	
"	" 22			31906	
"	" 23			43824	
"	" 24			43650	
"	" 25			51748	
"	" 26			38302	
"	" 27			27621	
"	" 28			14631	
"	" 29			32155	
"	" 30			43502	
"	" 31			18200	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68182), Detector SPA #3 # 33

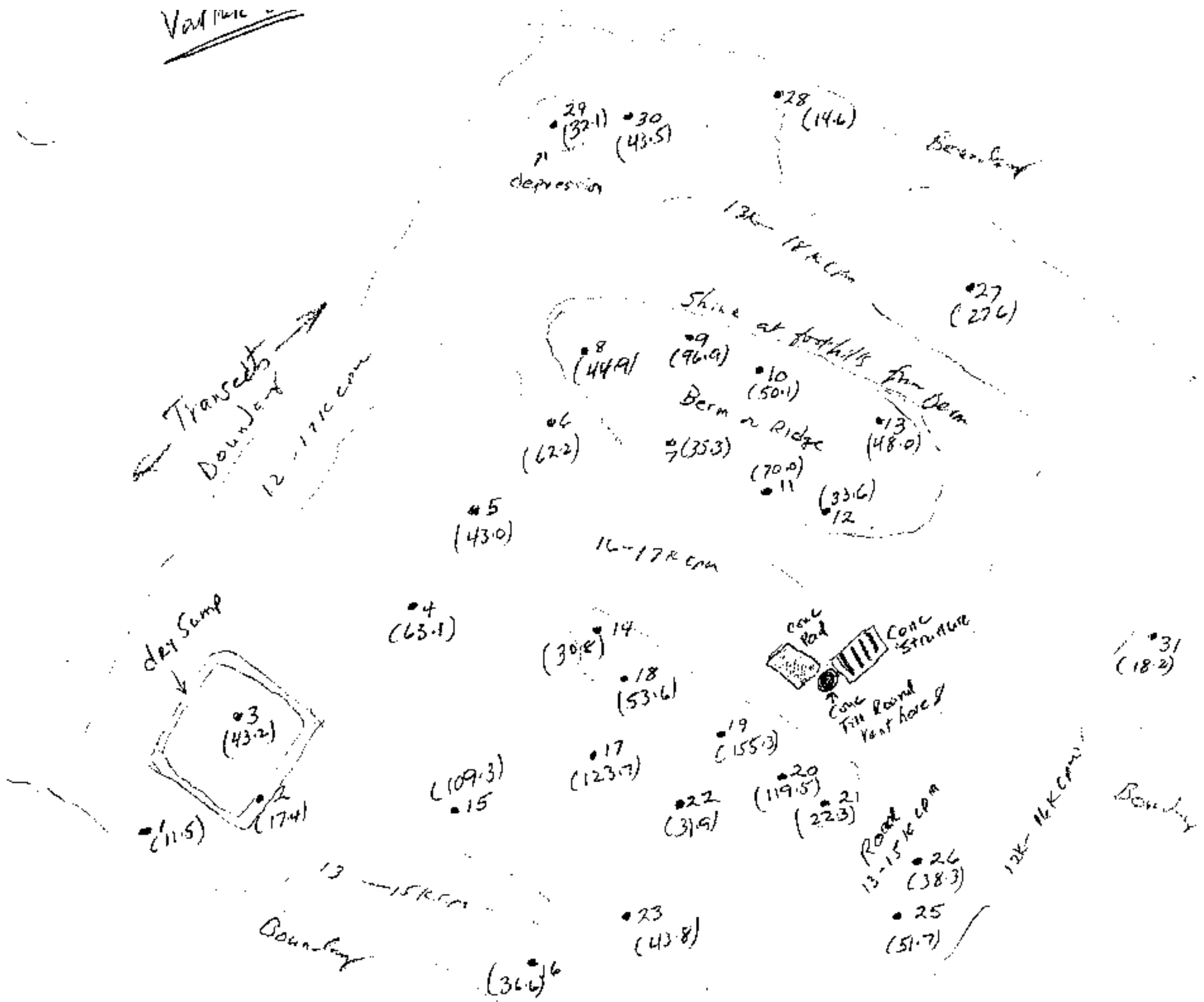
Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ______ Yes or ✓ No.

Survey Area/Unit Decsription Vent hole 8/3

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-28-06	VH3-32			21351	Hawleys Rd.
"	" 33			28730	
"	" 34			42160	middle of VH-3
"	" 35			20810	

Technician Signature [signature], Reviewed by [signature]



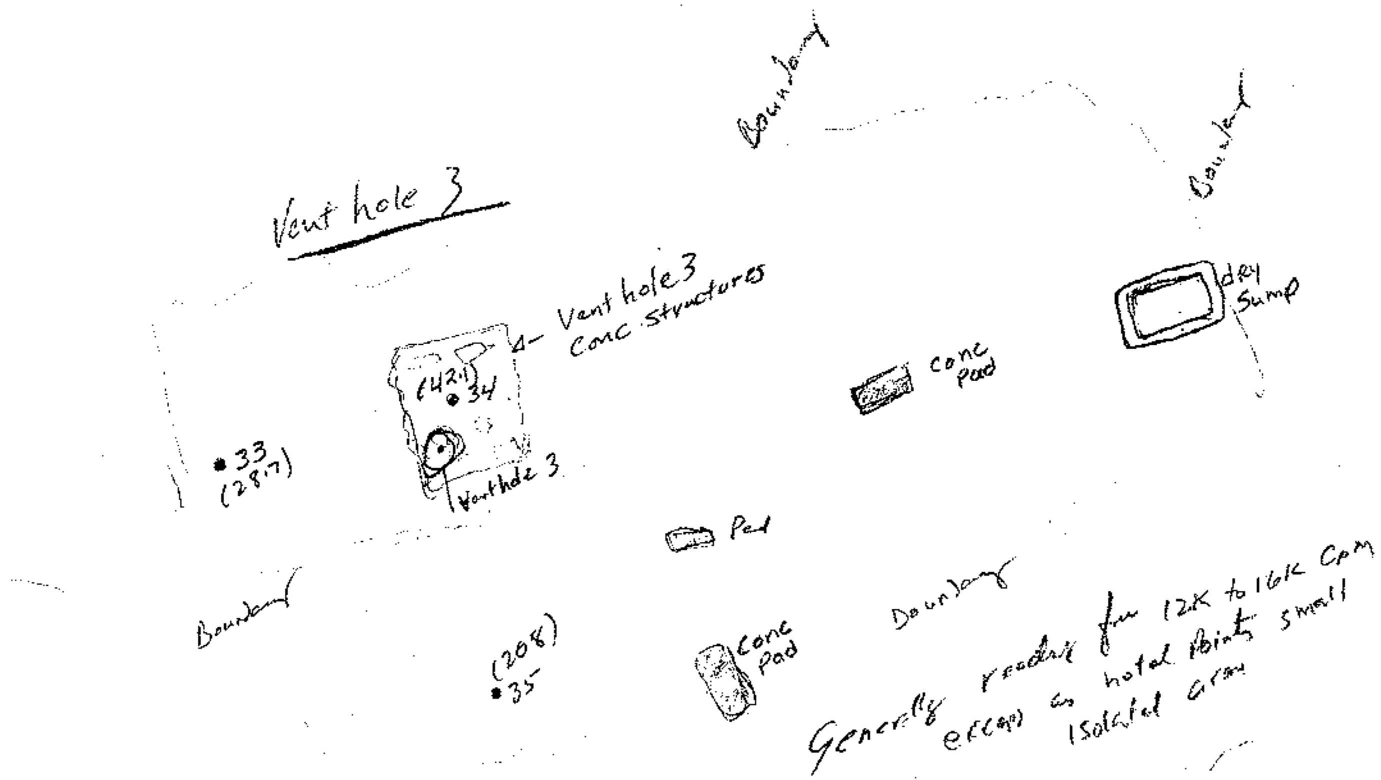
SPA-3 Bare
Transects = 10' at 30, ≤ 1.0 ft/Sec
Generally Reads ≈ 12k-17k cpm
except in noted areas, except noted berms and ridges, shown points are small isolated areas
Bkg 13.5
Scan 17k

Bare (Uncollimated) 2x2 NaI Detector #408522-33

8/3/06 [signature]

[redacted]

Vent hole 3


Boundary
Boundary
Vent hole 3
Conc Structures
(42.1)
34
33
(28.7)
Vent hole 3
Conc Pad
dry Sump
Pad
Boundary
Boundary
(208)
35
Conc Pad
Generally reading for 12K to 16K Cpm
except as noted Points small
isolated area

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3 #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ______ Yes or ✓ No.

Survey Area/Unit Decsription Trailer Park Scan / Static

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-20-06	TP-1			42600	
"	-2			57040	
"	-3			33200	
"	-4			40166	
"	-5			20640	
"	-6			23165	
"	-7			57140	
"	-8			40170	
"	-9			229480	
"	-10			26810	
"	-11			23110	
"	-12			27060	
"	-13			124460	
"	-14			35940	
"	-15			39710	
"	-16			43430	
"	-17			34850	
"	-18			21020	
"	-20			27105	
"	-21			21460	
"	-22			45200	
"	-23			18100	
"	-24			62250	
"	-25			46388	
"	-26			18015	
"	-27			17070	
"	-28			22980	
"	-29			21940	
"	-30			20130	
"	-31			20110	
"	-32			32300	

Technician Signature ______ MP ______, Reviewed by ______ [signature] ______

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3 #33

Instrument Calibration Date: 8-3-04, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ______ Yes or ✓ No.

Survey Area/Unit Decsription Trailer Park, Scan / Static

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet: Northing	Easting	Gamma Radiation Reading, CPM	Comments/Notes
11-20-04	TP-33			23300	
"	TP-34			20380	
"	TP-35			21840	

Technician Signature LP, Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, #33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

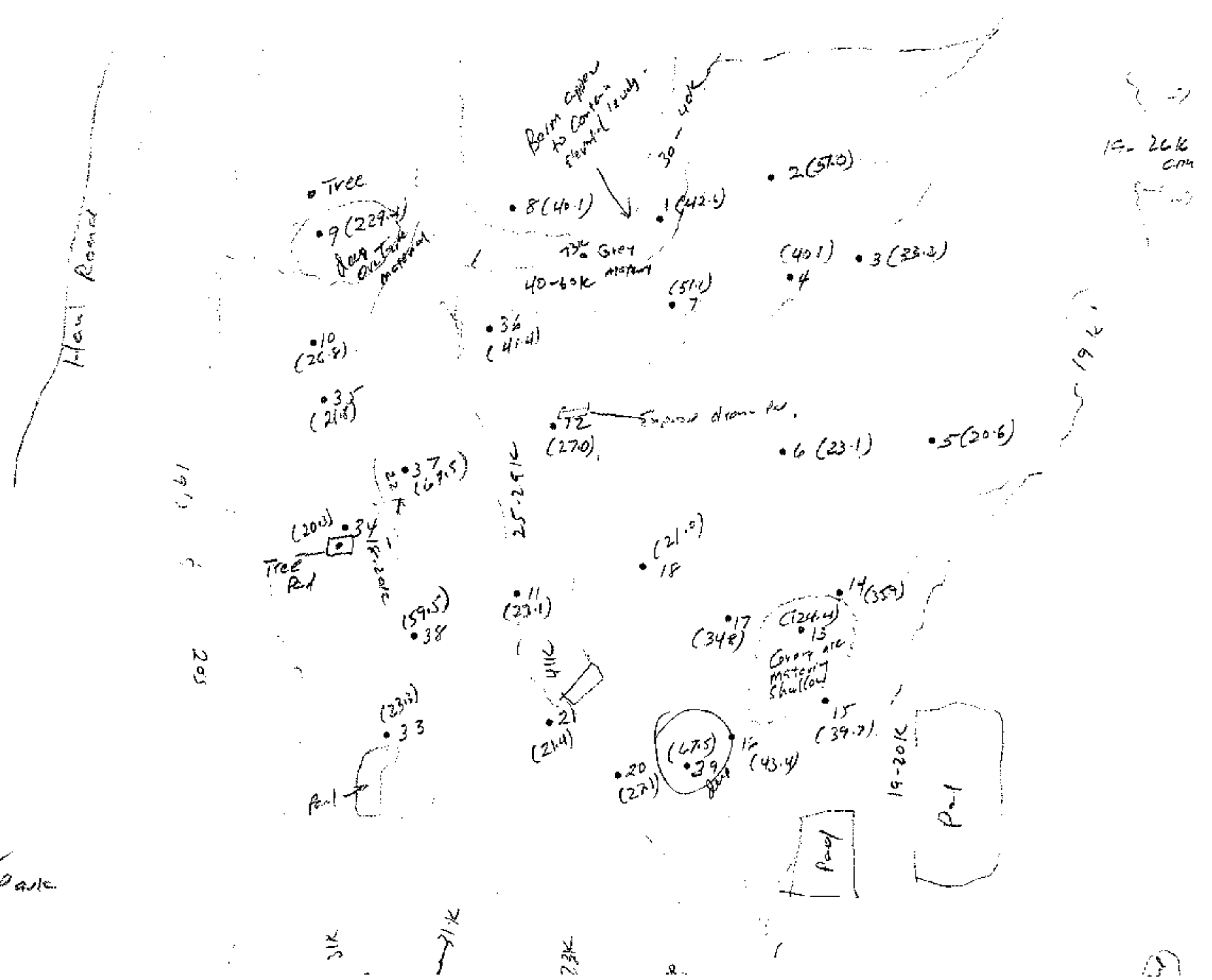
2"x2" NaI Detector Collimated ____ Yes or ✓ No.

Survey Area/Unit Description Trailer Park

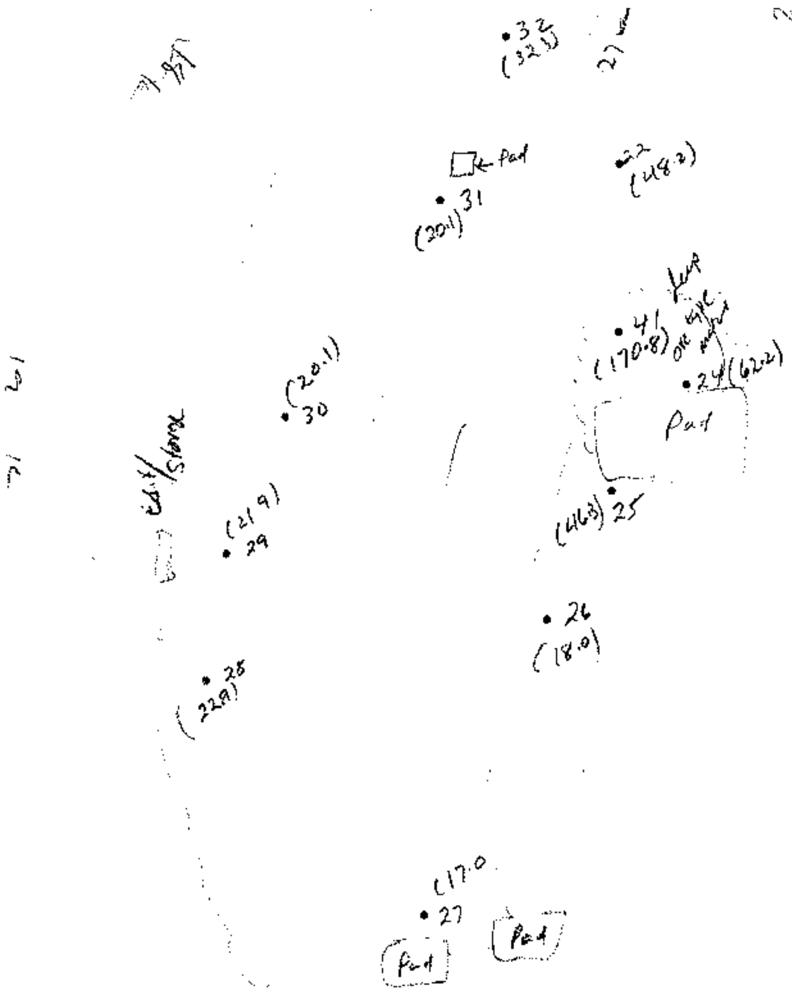
Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11-27-06	TP-36	3448,929.4	725, 743.5	41420	
11-27-06	TP-37	" 906.5	728.8	67531	
11-27-06	TP-38	" 879.6	730.3	59576	
11-27-06	TP-39	" 858.7	778.1	67501	
11-27-06	TP-40	" 814.6	770.7	49696	
11-27-06	TP-41	" 782.5	732.8	170865	

Technician Signature [signature], Reviewed by [signature]

Trailer Park, NECR



Page-1/2
Trailer Park



Bare (uncollimated) SPA-3 2x2 NaI
P05322-33

Notes: Transect Scan ≃ 10'

about 25 transects

East & West foot hills starts about 19K cpm

Elevated Reading @ Falls, New Road Rte

1-7, 9, 34 35, 37 etc #40K cpm (15+ ...)

Pad @ 41 & 24 filled with elevated material

General flat area within trailer park (unfilled)

In 20-25K, impacted due to wind blown

or erosion of filled material

area ~~....~~ @ #13 bordered by 14, 15, 16 & 4

17 higher Grey material

Most of the elevated material @

[signature]

Page 2/2
Trailer Park

NECR Mine Site

Home Sites Coordinate, UTM 1983, distance-meters

ID	*Easting*	*Northing*	NW		NE		SW		SE	
			Easting	*Northing*	*Easting*	*Northing*	*Easting*	*Northing*	*Easting*	*Northing*
H1	725,604.4	3,949,469.0	725,581.9	3,949,491.5	725,626.9	3,949,491.5	725,581.9	3,949,446.5	725,626.9	3,949,446.5
H2	725,579.9	3,949,435.3	725,557.4	3,949,457.7	725,602.4	3,949,457.7	725,557.4	3,949,412.8	725,602.4	3,949,412.8
H3	725,595.5	3,949,395.5	725,573.0	3,949,418.0	725,618.0	3,949,418.0	725,573.0	3,949,373.0	725,618.0	3,949,373.0
H4	725,692.1	3,949,431.8	725,669.6	3,949,454.2	725,714.6	3,949,454.2	725,669.6	3,949,409.3	725,714.6	3,949,409.3
H5	725,683.3	3,949,418.8	725,660.8	3,949,441.2	725,705.7	3,949,441.2	725,660.8	3,949,396.3	725,705.7	3,949,396.3
H6	725,726.2	3,949,327.5	725,703.7	3,949,350.0	725,748.7	3,949,350.0	725,703.7	3,949,305.0	725,748.7	3,949,305.0
H7	725,706.8	3,949,298.5	725,684.3	3,949,321.0	725,729.3	3,949,321.0	725,684.3	3,949,276.0	725,729.3	3,949,276.0
H8	725,921.1	3,949,360.3	725,898.6	3,949,382.7	725,943.6	3,949,382.7	725,898.6	3,949,337.8	725,943.6	3,949,337.8
H9	725,932.3	3,949,327.0	725,909.8	3,949,349.5	725,954.7	3,949,349.5	725,909.8	3,949,304.5	725,954.7	3,949,304.5

Gamma Radiation Survey @ UNC's NECR Mine Site
Scan/Walkthrough Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, 2x2 NaI, #408522-33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ____ Yes or ✓ No.

Survey Area/Unit Decsription Homesite ~~H9~~

Survey Date	Survey Area-Transect ID/Description	Gamma Radiation Reading Range CPM	Comments/Notes
11/15/06	H9 North.	12900-17400	undisturbed area, 14K near hogan. debris, concrete, and cinder blocks around hogan, lower rdg near structures.
"	"		rdg from 14500 - 18000 cpm bare in H9 generally around 16500 5 locations.
"	H8	14000-18500 bare.	high rdg on gravel in driveway (21K)
"	H7	14500 -17000	Elevated Rdg SW corner ē Homesite 34K
"	H6	14500 - 20000	21K high ...
"	H5 H4	13500 to 15000 cpm	No Significant deviations. total of 10 sample locations with highest Reading between both homes.
"	H 1	13000 to 14000 cpm	12.8 K to 14K. No significant deviation. Sample located based on traffic around homesite
"	H 2	12600 to 13500 cpm	Low Rdg fr 12.6K to 13.5K. Samples Located based on homesite area use and traffic
"	H3	12500 to 14000 cpm	12.5K to 14K Cpm with No Significant deviation, samples based on traffic and Use of homesite yard

Technician Signature ______, Reviewed by ______

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (18284), Detector SPA-3 # 408522-33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ____ Yes or ✓ No.

Survey Area/Unit Decsription Home Sites

Survey Date	Soil Sample Points Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet		Gamma Radiation Reading, CPM	Comments/Notes
		Northing	Easting		
11/15/06	H9-1	3949319.8	725926.9	17657	
"	H9-2	3949318.6	725945.1	18128	
"	H9-3	3949315.7	725951.5	18609	
"	H9-4	3949312.3	725945.1	18115	
"	H9-5	3949312.1	725920.2	16910	
"	H8-1	3949373.5	725932.7	18235	
"	H8-2	3949372.4	725935.0	19201	
"	H8-3	3949361.5	725934.5	18271	
"	H8-4	3949339.2	725916.3	18232	
"	H8-5	3949359.1	725903.3	18032	
"	H7-1	3949283.0	725728.9	17088	
"	H7-2	3949281.8	725689.1	24045	
"	H7-3	3949273.5	725682.8	34047	
"	H7-4	3949297.0	725720.2	13024	
"	H7-5	3949321.8	725685.3	20174	
	H6-1	3949321.1	725707.6	19807	
"	H6-2	3949334.5	725726.1	20100	
"	H6-3	3949342.6	725728.0	20665	
"	H6-4	3949351.1	725726.8	18754	
"	H6-5	3949331.3	725719.5	20843	
"	H5-1	3949412.5	725667.2	13931	
"	H5-2	3949400.5	725678.3	15079	
"	H5-3	3949398.3	725705.0	14931	
"	H5-4	3949417.1	725690.7	13240	
"	H5-5	3949431.8	725696.0	15959	

Technician Signature [signature], Reviewed by [signature]

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, #408522-33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ____ Yes or ✓ No.

Survey Area/Unit Decsription Home Sites.

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet Northing	Easting	Gamma Radiation Reading, CPM	Comments/Notes
11/15/06	H4-1	3949434.4	725683.5	14077	
"	H4-2	3949438.9	725697.0	15112	
"	H4-3	3949445.7	725703.8	15049	
"	H4-4	3949455.4	725704.7	16175	
"	H4-5	3949447.1	725712.9	15439	
"	H3-1	3949380.8	725582.2	13426	
"	H3-2	3949375.9	725584.2	14124	
"	H3-3	3949391.5	725596.6	13349	
"	H3-4	3949409.7	725601.9	13360	
"	H3-5	3949411.4	725595.3	13875	
"	H2-1	3949423.0	725574.1	13082	
"	H2-2	3949414.9	725580.6	12914	
"	H2-3	3949439.7	725569.4	12981	
"	H2-4	3949416.2	725565.8	13256	
"	H2-5	3949411.4	725595.3	12976	
"	H1-1	3949463.6	725610.7	13251	
"	H1-2	3949447.6	725607.7	13027	
"	H1-3	3949455.5	725598.9	13292	
"	H1-4	3949460.8	725590.7	13201	
"	H1-5	3949475.3	725620.7	12831	

Technician Signature [signature], Reviewed by [signature]

Gamma Radiation Survey @ UNC's NECR Mine Site

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (8784), Detector SPA-3, # 408522-33

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ______ No.

Survey Area/Unit Decsription Arroyo Bank

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet — Northing	Easting	Gamma Radiation Reading, CPM	Comments/Notes
~~NECR1-50~~	HH				
~~11-17-06~~	~~NECR1-50~~			~~8814~~	HH
	~~172~~				HH
11-17-06	ABI-1			8814	IX Plant Area
"	-2			6028	"
"	-3			6445	"
"	-4			7017	"
"	-5			6701	"
"	-6			7321	"
"	-7			6108	"
"	-8			6682	"
"	-9			7018	"
"	-10			5361	"
"	-11			6542	"
"	-12			5594	"
"	-13			7909	Arroyo Bank Area
"	-14			5182	
"	-15			5965	
"	-16			8571	
"	-17			7206	
"	-18			6397	
"	-19			6684	
"	-20			6123	
"	-21			5419	
"	-22			6275	
"	-23			5431	
"	-24			5628	
"	-25			4820	
"	-26			5480	
"	-27			5089	
"	-28			4861	

Technician Signature HH ______, Reviewed by ______

Static Gamma Radiation Survey Field Form

Instrumentation : Scaler/Ratemeter Ludlum 2221 (68782), Detector SPA-3, # 408522-37

Instrument Calibration Date: 8-3-06, Instrument Daily Function Check Performed: ✓

2"x2" NaI Detector Collimated ✓ Yes or ____ No.

Survey Area/Unit Decsription Arroyo Banks.

Survey Date	Survey Point ID/Description	Survey Point Coordinate NAD 1983 NM State Plane, feet — Northing	Survey Point Coordinate NAD 1983 NM State Plane, feet — Easting	Gamma Radiation Reading, CPM	Comments/Notes
11-17-06	AB - 29			~~5089~~ AP	4913 Arroyo Bank Area
11	AB - 30			4826	
11	-31			4584	
11	-32			5043.	
11	-33			4889.	
11	-34			5705	
11	-35			9940.	
11	-36			6174	
11	-37			4904	
11	-38			4807	

Technician Signature [signature], Reviewed by [signature]

SAMPLE SUMMARY TABLES

Table B.1 Surface Soil Sample Summary			
Surface Sample Number	**Location Identification**	**Analytical Suite**	**Notes**
NECR-1			
1	NECR1-005	COPCs	
2	NECR1-016	COPCs	
3	NECR1-018	COPCs	
4	NECR1-020	COPCs	EPA split
5	NECR1-023	COPCs	
6	NECR1-026	COPCs	
7	NECR1-028	COPCs, Agronomics	
8	NECR1-030	COPCs	duplicate
9	NECR1-044	COPCs, Agronomics	
10	NECR1-046	COPCs	
11	NECR1-047	COPCs	EPA split
12	NECR1-049	COPCs	
13	NECR1-065	COPCs	EPA split
14	NECR1-067	COPCs	
15	NECR1-068	COPCs	
16	NECR1-070	COPCs	
17	NECR1-090	COPCs	
18	NECR1-092	COPCs	
19	NECR1-093	COPCs	
20	NECR1-095	COPCs	
21	NECR1-101	COPCs	
22	NECR1-103	COPCs	duplicate
23	NECR1-126	COPCs	EPA split
24	NECR1-127	COPCs, Agronomics	
25	NECR1-129	COPCs	
26	NECR1-131	COPCs	
27	NECR1-133	COPCs	EPA split
28	NECR1-135	COPCs	
29	NECR1-137	COPCs	
30	NECR1-138	COPCs	
31	NECR1-140	COPCs	
NECR-1 Stepouts			
1	NECR1-164	COPCs	
2	NECR1-173	COPCs	
3	NECR1-184	COPCs	
4	NECR1-207	COPCs	
5	NECR1-238	COPCs	
6	NECR1-240	COPCs, SPLP	duplicate
7	NECR1-262	COPCs	EPA split
8	NECR1-265	COPCs	
9	NECR1-266	COPCs	
10	NECR1-281	COPCs	
11	NECR1-289	COPCs	EPA split
12	NECR1-293	COPCs	
13	NECR1-307	COPCs, SPLP	
14	NECR1-316	COPCs	
15	NECR1-323	COPCs	EPA split
16	NECR1-326	COPCs	

Table B.1 Surface Soil Sample Summary			
Surface Sample Number	Location Identification	Analytical Suite	Notes
NECR-2			
1	NECR2-004	COPCs	
2	NECR2-015	COPCs, Agronomics	EPA split
3	NECR2-017	COPCs	EPA split
4	NECR2-018	COPCs	EPA split?
5	NECR2-020	COPCs	
6	NECR2-027	COPCs	
7	NECR2-033	COPCs	
8	NECR2-035	COPCs	EPA split
9	NECR2-037	COPCs	EPA split
10	NECR2-039	COPCs	duplicate
11	NECR2-050	COPCs	
12	NECR2-052	COPCs	
13	NECR2-056	COPCs, Agronomics	
14	NECR2-069	COPCs	
15	NECR2-071	COPCs	EPA split
NECR-2 Stepouts			
1	NECR2-083	COPCs	
2	NECR2-096	COPCs, SPLP	
3	NECR2-103	COPCs	
4	NECR2-109	COPCs, SPLP	EPA split
Ponds 1 and 2			
1	POND1/2-011	COPCs	
2	POND1/2-014	COPCs	
3	POND1/2-019	COPCs	duplicate
4	POND1/2-020	COPCs, Agronomics	
5	POND1/2-023	COPCs	EPA split
6	POND1/2-024	COPCs	EPA split
7	POND1/2-035	COPCs, SPLP	duplicate, EPA split
8	POND1/2-041	COPCs	EPA split
9	POND1/2-042	COPCs	
10	POND1/2-047	COPCs, Agronomics	
11	POND1/2-050	COPCs	
12	POND1/2-056	COPCs	
13	POND1/2-058	COPCs, SPLP	EPA split
14	POND1/2-061	COPCs	EPA split
15	POND1/2-069	COPCs	
16	POND1/2-071	COPCs	ss for subsurface loc
17	POND1/2-076	COPCs	
18	POND1/2-077	COPCs	
19	POND1/2-082	COPCs	ss for subsurface loc
Pond 1 and 2 Boundary Confirmation			
1	POND1/2-009	COPCs	
2	POND1/2-012	COPCs	
3	POND1/2-032	COPCs	
4	POND1/2-063	COPCs	

Table B.1 Surface Soil Sample Summary			
Surface Sample Number	**Location Identification**	**Analytical Suite**	**Notes**
Pond 3/3a			
1	POND3/3a-001	COPCs	
2	POND3/3a-007	COPCs	EPA split
3	POND3/3a-014	COPCs, SPLP	
4	POND3/3a-015	COPCs	
5	POND3/3a-027	COPCs	EPA split
6	POND3/3a-029	COPCs	EPA split
7	POND3/3a-037	COPCs	
8	POND3/3a-038	COPCs	EPA split
9	POND3/3a-042	COPCs	
10	POND3/3a-046	COPCs, Agronomics	
11	POND3/3a-057	COPCs, SPLP, Agronomics	
12	POND3/3a-059	COPCs	duplicate, EPA split
13	POND3/3a-061	COPCs	
14	POND3/3a-063	COPCs	
15	POND3/3a-065	COPCs	
Sediment Pad			
1	SEDPAD-005	COPCs	EPA split
2	SEDPAD-006	COPCs	
3	SEDPAD-008	COPCs	
4	SEDPAD-011	COPCs, SPLP	
5	SEDPAD-012	COPCs	
6	SEDPAD-014	COPCs	EPA split
7	SEDPAD-015	COPCs	EPA split
8	SEDPAD-018	COPCs, SPLP	
9	SEDPAD-020	COPCs	
10	SEDPAD-021	COPCs, Agronomics	
11	SEDPAD-022	COPCs	duplicate, EPA split
12	SEDPAD-025	COPCs	EPA split
13	SEDPAD-026	COPCs	
Sand Backfill No. 1			
1	SAND1-009	COPCs	EPA split
2	SAND1-011	COPCs	
3	SAND1-017	COPCs, Agronomics	
4	SAND1-021	COPCs	
5	SAND1-027	COPCs	
6	SAND1-028	COPCs, Agronomics	EPA split
7	SAND1-030	COPCs	
8	SAND1-041	COPCs	
9	SAND1-043	COPCs	EPA split
10	SAND1-044	COPCs	
11	SAND1-049	COPCs	duplicate
12	SAND1-050	COPCs	
13	SAND1-051	COPCs	
14	SAND1-063	COPCs	EPA split
15	SAND1-068	COPCs	EPA split
Sand Backfill No. 1 Boundary Confirmation			
1	SAND1-032	COPCs	
2	SAND1-053	COPCs	

Table B.1 Surface Soil Sample Summary			
Surface Sample Number	**Location Identification**	**Analytical Suite**	**Notes**
3	SAND1-065	COPCs	
Sand Backfill No. 2			
1	SAND2-003	COPCs, SPLP	
2	SAND2-004	COPCs	
3	SAND2-006	COPCs	EPA split
4	SAND2-007	COPCs	
5	SAND2-010	COPCs, SPLP	
6	SAND2-011	COPCs	EPA split
7	SAND2-012	COPCs	duplicate, EPA split
8	SAND2-014	COPCs, Agronomics	
9	SAND2-015	COPCs	EPA split
10	SAND2-016	COPCs	
11	SAND2-017	COPCs	
12	SAND2-019	COPCs	EPA split
13	SAND2-020	COPCs	
Sand Backfill No. 3			
1	SAND3-002	COPCs	EPA split
2	SAND3-005	COPCs	
3	SAND3-006	COPCs	
4	SAND3-008	COPCs	EPA split
5	SAND3-009	COPCs	
6	SAND3-010	COPCs	EPA split
7	SAND3-014	COPCs	duplicate, EPA split
8	SAND3-017	COPCs, SPLP, Agronomics	
9	SAND3-022	COPCs	EPA split
10	SAND3-024	COPCs	
11	SAND3-025	COPCs	
12	SAND3-026	COPCs	
13	SAND3-027	COPCs, Agronomics	
Sand Backfill No. 3 Boundary Confirmation			
1	SAND3-004	COPCs	
2	SAND3-012	COPCs	
Non-Economic Material Storage Area			
1	NEMSA-001	COPCs, Agronomics	
2	NEMSA-002	COPCs	
3	NEMSA-003	COPCs, Agronomics	
4	NEMSA-004	COPCs	
5	NEMSA-005	COPCs	
Boneyard			
1	YARD-001	COPCs, Agronomics	
2	YARD-002	COPCs	
3	YARD-003	COPCs	
4	YARD-004	COPCs, Agronomics	
5	YARD-005	COPCs, Agronomics	

Table B.1 Surface Soil Sample Summary			
Surface Sample Number	**Location Identification**	**Analytical Suite**	**Notes**
Home Sites			
1	HOME1-001	COPCs	
2	HOME1-002	COPCs	
3	HOME1-003	COPCs	
4	HOME1-004	COPCs	
5	HOME1-005	COPCs	
6	HOME2-001	COPCs	
7	HOME2-002	COPCs	
8	HOME2-003	COPCs	
9	HOME2-004	COPCs	duplicate
10	HOME2-005	COPCs	
11	HOME3-001	COPCs	
12	HOME3-002	COPCs	
13	HOME3-003	COPCs	
14	HOME3-004	COPCs	
15	HOME3-005	COPCs	
16	HOME4-001	COPCs	
17	HOME4-002	COPCs	duplicate
18	HOME4-003	COPCs	
19	HOME4-004	COPCs	
20	HOME4-005	COPCs	
21	HOME5-001	COPCs	
22	HOME5-002	COPCs	
23	HOME5-003	COPCs	
24	HOME5-004	COPCs	
25	HOME5-005	COPCs	
26	HOME6-001	COPCs	
27	HOME6-002	COPCs	
28	HOME6-003	COPCs	
29	HOME6-004	COPCs	
30	HOME6-005	COPCs	
31	HOME7-001	COPCs	
32	HOME7-002	COPCs	
33	HOME7-003	COPCs	
34	HOME7-004	COPCs	
35	HOME7-005	COPCs	
36	HOME8-001	COPCs	
37	HOME8-002	COPCs	
38	HOME8-003	COPCs	
39	HOME8-004	COPCs	
40	HOME8-005	COPCs	
41	HOME9-001	COPCs	
42	HOME9-002	COPCs	
43	HOME9-003	COPCs	
44	HOME9-004	COPCs	
45	HOME9-005	COPCs	

Table B.1 Surface Soil Sample Summary			
Surface Sample Number	**Location Identification**	**Analytical Suite**	**Notes**
Vent Holes 3 & 8			
1	VENT8-002	COPCs	duplicate
2	VENT8-006	COPCs	
3	VENT8-019	COPCs	EPA split
4	VENT8-031	COPCs	
5	VENT3-034	COPCs	EPA split
Trailer Park			
1	TP-001	COPCs	EPA split
2	TP-009	COPCs	
3	TP-013	COPCs	
4	TP-024	COPCs	duplicate
5	TP-027	COPCs	EPA split

Table B.2 Subsurface Soil Sample Summary				
Sample ID	Lab ID	Depth (fbgs)	Analytical Suite	Notes
NECR-1 Soil Borings				
NECR1-SB-016	C06111057-012	0.5	COPCs	
NECR1-SB-016 [5.0]	C06111057-014	5.0	COPCs	
NECR1-SB-016 [10.0]	C06111057-015	10.0	COPCs	
NECR1-SB-016 [15.0]	C06111057-016	15.0	COPCs	
NECR1-SB-016 [20.0]	C06111057-017	20.0	COPCs	
NECR1-SB-046	C06111057-003	0.5	COPCs	
NECR1-SB-046 [5.0]	C06111057-044	5.0	COPCs	
NECR1-SB-046 [10.0]	C06111057-045	10.0	COPCs	
NECR1-SB-046 [15.0]	C06111057-046	15.0	COPCs	
NECR1-SB-046 [20.0]	C06111057-047	20.0	COPCs	
NECR1-SB-046 [25.0]	C06111057-048	25.0	COPCs	
NECR1-SB-046 [30.0]	C06111057-049	30.0	COPCs	
NECR1-SB-90 [5.0]	C06111057-021	5.0	COPCs	
NECR1-SB-90 [10.0]	C06111057-022	10.0	COPCs	
NECR1-SB-90 [15.0]	C06111057-023	15.0	COPCs	
NECR1-SB-90 [20]	C06111057-024	20.0	COPCs	
NECR1-SB-90 [25]	C06111057-025	25.0	COPCs	
NECR1-SB-90 [30.0]	C06111057-026	30.0	COPCs	
NECR1-SB-90 [35.5]	C06111057-027	35.0	COPCs	
NECR1-SB-90 [40]	C06111057-028	40.0	COPCs	
NECR1-SB-90 [45]	C06111057-029	45.0	COPCs	
NECR1-SB-095 [0.5]	C06111057-078	0.5	COPCs	
NECR1-SB-095 [5.0]	C06111057-018	5.0	COPCs	
NECR1-SB-095 [10.0]	C06111057-019	10.0	COPCs	
NECR1-SB-095 [14.0]	C06111057-020	14.0	COPCs	
NECR1-SB-131 [5.0]	C06111057-117	5.0	COPCs	
NECR1-SB-131 [10.0]	C06111057-118	10.0	COPCs	
NECR1-SB-131 [15.0]	C06111057-119	15.0	COPCs	
NECR1-SB-131 [20]	C06111057-120	20.0	COPCs	
NECR1-SB-131 [24]	C06111057-121	24.0	COPCs, TPH, VOCs	
NECR1-TP-138	C06120405-010	3.5-4.0		
NECR-2 Test Pits				
NECR 2-TP-015	C06110906-021	0.5-1.0	COPCs	
NECR 2-TP-020	C06110906-018	1.0-1.5	COPCs	
NECR 2-TP-035	C06110906-015	1.0-1.5	COPCs	
NECR 2-TP-039	C06110906-019	1.0-1.5	COPCs	duplicate
NECR 2-TP-052	C06110906-016	1.5-2.0	COPCs	
NECR 2-TP-052	C06110906-017	4.0-5.0	COPCs	
Sand Backfill No. 1 Test Pits				
SAND1-TP-030	C06120405-011	1-1.5	COPCs, SPLP	
SAND1-TP-030	C06120405-020	3.5-4.0	COPCs	
SAND1-TP-043	C06120405-012	1-1.5	COPCs	
SAND1-TP-049	C06120405-013	1-1.52	COPCs	
SAND1-TP-049	C06120405-014	3.5-4	COPCs	duplicate
SAND1-TP-063	C06120405-016	0.5-1.0	COPCs, SPLP	
SAND1-TP-063	C06120405-017	1.5-2.0	COPCs	
SAND1-TP-068	C06120405-018	0.5-1.0	COPCs	
SAND1-TP-068	C06120405-019	1.5-2.0	COPCs	
Sand Backfill No. 2 Test Pits				
SAND 2-TP-008	C06110906-026	0.5-1.0	COPCs	
SAND 2-TP-011	C06110906-022	0.5-1.0	COPCs	
SAND 2-TP-012	C06110906-023	1.5-2.0	COPCs	
SAND 2-TP-017	C06110906-024	1.5-2.0	COPCs	

Table B.2 Subsurface Soil Sample Summary				
Sample ID	**Lab ID**	**Depth (fbgs)**	**Analytical Suite**	**Notes**
SAND 2-TP-019	C06110906-025	1.0-1.5	COPCs	
Sand Backfill No. 3 Test Pits				
SAND3-TP-005	C06120235-066	0.5-1.0	COPCs	
SAND3-TP-005	C06120235-067	1.5-2.0	COPCs	
SAND3-TP-006	C06120235-068	0.5-1.0	COPCs	
SAND3-TP-009	C06120235-069	0.5-1.0	COPCs, SPLP	
SAND3-TP-014	C06120235-070	0.5-1.0	COPCs	
SAND3-TP-014	C06120235-075	1.0-1.5	COPCs	
SAND3-TP-025	C06120235-071	0.5-1.0	COPCs	
Ponds 1 and 2 Soil Borings				
1/2-SB-71 [10.0]	C06111057-071	10.0	COPCs	
1/2-SB-71 [15.0]	C06111057-072	15.0	COPCs	
1/2-SB-82	C06111057-073	0.5	COPCs	
1/2-SB-82 [5.0]	C06111057-074	5.0	COPCs	
1/2-SB-82 [10.0]	C06111057-075	10.0	COPCs	
1/2-SB-82 [15]	C06111057-076	15.0	COPCs	
1/2-SB-82 [20]	C06111057-077	20.0	COPCs	
Pond12-SB-071	C06111057-069	0.5	COPCs	
Pond12-SB-71 [5.0]	C06111057-070	5.0	COPCs	
Ponds 1 and 2 Test Pits				
POND12-TP-030	C06120235-057	2.0-3.0	COPCs	
POND12-TP-030	C06120235-058	4.5-5.0	COPCs	
POND12-TP-035	C06120235-059	1.0-1.5	COPCs	
POND12-TP-035	C06120235-060	2.0-2.5	COPCs	
POND12-TP-035	C06120235-061	9.0-9.5	COPCs	
POND12-TP-058	C06120235-062	4.5-5.0	COPCs	
POND12-TP-058	C06120235-063	8.5-9.0	COPCs	
Pond 3/3a Soil Borings				
3/3a-SB-61	C06111057-111	0.5	COPCs	
3/3a-SB-61 [5.5]	C06111057-112	5.5	COPCs	
3/3a-SB-61 [10.0]	C06111057-113	10.0	COPCs	
3/3a-SB-61 [15.0]	C06111057-114	15.0	COPCs	
3/3a-SB-61 [20.0]	C06111057-115	20.0	COPCs	
3/3a-SB-61 [25.0]	C06111057-116	25.0	COPCs	
Pond 3/3a Test Pits				
POND3-TP-007	C06120336-042	5.0-5.5	COPCs	
POND3-TP-007	C06120336-043	9.0-9.5	COPCs	
POND3-TP-014	C06120336-044	6.5-7.0	COPCs	
POND3-TP-014	C06120336-045	8.5-9.0	COPCs	
POND3-TP-029	C06120336-046	3.0-3.5	COPCs	
POND3-TP-029	C06120336-047	6.0-6.5	COPCs	
POND3-TP-029	C06120336-048	9.0-9.5	COPCs	
POND3-TP-037	C06120336-049	0-0.5	COPCs	
POND3-TP-037	C06120336-050	5.0-5.5	COPCs	
POND3-TP-037	C06120336-051	8.5-9.0	COPCs	
Sediment Pad Test Pits				
SEDPAD-TP-006	C06120405-001	1.5-2.0	COPCs	
SEDPAD-TP-006	C06120405-002	3.0-3.5	COPCs	
SEDPAD-TP-012	C06120405-003	1.0-1.5	COPCs	
SEDPAD-TP-012	C06120405-004	1.5-2.0	COPCs	
SEDPAD-TP-014	C06120405-005	0.5-1.0	COPCs	
SEDPAD-TP-014	C06120405-006	1.0-1.5	COPCs	
SEDPAD-TP-021	C06120405-007	5.0-5.5	COPCs	
SEDPAD-TP-021	C06120405-008	10.0-10.5	COPCs	
SEDPAD-TP-026	C06120405-009	0.5-1.0	COPCs	

Table B.2 Subsurface Soil Sample Summary				
Sample ID	Lab ID	Depth (fbgs)	Analytical Suite	Notes
Unnamed Arroyo Soil Borings				
ARROYO-SB-001	C06120235-072	0-1.0	COPCs	
ARROYO-SB-001	C06120235-073	1.0-2.0	COPCs	
ARROYO-SB-001	C06120235-074	2.0-3.0	COPCs	
ARROYO-SB-002	C06120336-001	0-1.0	COPCs	
ARROYO-SB-002	C06120336-002	1.0-2.0	COPCs	
ARROYO-SB-002	C06120336-003	2.0-3.0	COPCs	
ARROYO-SB-003	C06120336-004	0-1.0	COPCs	
ARROYO-SB-003	C06120336-005	1.0-2.0	COPCs	
ARROYO-SB-003	C06120336-006	2.0-3.0	COPCs	
ARROYO-SB-004	C06120336-007	0-1.0	COPCs	
ARROYO-SB-004	C06120336-008	1.0-2.0	COPCs	
ARROYO-SB-004	C06120336-009	2.0-3.0	COPCs	
ARROYO-SB-005	C06120336-010	0-1.0	COPCs	
ARROYO-SB-005	C06120336-011	1.0-2.0	COPCs	
ARROYO-SB-005	C06120336-012	2.0-3.0	COPCs	
ARROYO-SB-006	C06120336-013	0-1.0	COPCs	
ARROYO-SB-006	C06120336-014	1.0-2.0	COPCs	
ARROYO-SB-006	C06120336-015	2.0-3.0	COPCs	
ARROYO-SB-007	C06120336-016	0-1.0	COPCs	
ARROYO-SB-007	C06120336-017	1.0-2.0	COPCs	
ARROYO-SB-007	C06120336-018	2.0-3.0	COPCs	
ARROYO-SB-008	C06120336-019	0-1.0	COPCs	
ARROYO-SB-008	C06120336-020	1.0-2.0	COPCs	duplicate
ARROYO-SB-008	C06120336-021	2.0-3.0	COPCs	duplicate
ARROYO-SB-009	C06120336-024	0-1.0	COPCs	
ARROYO-SB-009	C06120336-025	1.0-2.0	COPCs	
ARROYO-SB-009	C06120336-026	2.0-3.0	COPCs	
ARROYO-SB-010	C06120336-027	0-1.0	COPCs	
ARROYO-SB-010	C06120336-028	1.0-2.0	COPCs	
ARROYO-SB-010	C06120336-029	2.0-3.0	COPCs	
NEMSA Soil Borings				
NEMSA-TP-001	C06110906-027	0-0.5	COPCs	
NEMSA-TP-001	C06110906-028	1.0-1.5	COPCs	
NEMSA-TP-001	C06110906-029	4.0-5.0	COPCs	
NEMSA-TP-001	C06110906-030	6.0-6.5	COPCs	
NEMSA-TP-002	C06120336-030	0-0.25	COPCs	
NEMSA-TP-002	C06120336-031	0.25-0.75	COPCs	
NEMSA-TP-002	C06120336-032	5.5-6.0	COPCs	
NEMSA-TP-002	C06120336-033	7.0-7.5	COPCs	
NEMSA-TP-003	C06120336-034	0-0.5	COPCs	
NEMSA-TP-003	C06120336-035	1.5-2.0	COPCs	
NEMSA-TP-003	C06120336-036	4.0-4.5	COPCs	
NEMSA-TP-004	C06120336-037	0-0.5	COPCs	
NEMSA-TP-004	C06120336-052	1.0-1.5	COPCs	
NEMSA-TP-004	C06120336-053	6.0-6.5	COPCs	
NEMSA-TP-004	C06120336-038	8.5-9.0	COPCs	
NEMSA-TP-005	C06120336-039	0-0.5	COPCs	
NEMSA-TP-005	C06120336-040	4.0-4.5	COPCs	
NEMSA-TP-005	C06120336-041	8.0-8.5	COPCs	
Boneyard Test Pits				
YARD-TP-001	C06110906-031	0-0.5	COPCs, TCLP	TCLP SampID C06120227-001
YARD-TP-001	C06120235-021	1.0-1.5	COPCs	
YARD-TP-002	C06120235-023	0-0.5	COPCs	
YARD-TP-002	C06120235-024	1.5-2.0	COPCs, TCLP	TCLP SampID C06120227-002

Table B.2 Subsurface Soil Sample Summary				
Sample ID	**Lab ID**	**Depth (fbgs)**	**Analytical Suite**	**Notes**
YARD-TP-002	C06120235-025	9.5-10.0	COPCs, TCLP	TCLP SampID C06120227-011
YARD-TP-003	C06120235-026	0-0.5	COPCs	
YARD-TP-003	C06120235-027	1.0-1.5	COPCs, TCLP	TCLP SampID C06120227-010
YARD-TP-004	C06120235-022	0-0.5	COPCs	
YARD-TP-004	C06120235-028	0.5-1.0	COPCs, TCLP	TCLP SampID C06120227-003
YARD-TP-004	C06120235-029	5.5-6.0	COPCs, TCLP	TCLP SampID C06120227-004
YARD-TP-004	C06120235-030	7.0-7.5	COPCs, TCLP	TCLP SampID C06120227-007
YARD-TP-004	C06120235-031	9.5-10.0	COPCs, TCLP	duplicate, TCLP SampID C06120227-006
YARD-TP-005	C06120235-033	0-0.5	COPCs	
YARD-TP-005	C06120235-034	2.5-3.0	COPCs, TCLP	TCLP SampID C06120227-005
YARD-TP-005	C06120235-035	4.5-5.0	COPCs, TCLP	TCLP SampID C06120227-008
YARD-TP-005	C06120235-036	8.5-9.0	COPCs, TCLP	TCLP SampID C06120227-009

DATA VALIDATION REPORT

B1.0 DATA VERIFICAITON

B1.1 INTRODUCTION

This report presents a summary of the verification results for the sample data collected as part of Removal Site Evaluation performed for United Nuclear Corporation (UNC) specific to the Northeast Church Rock (NECR) site.

Samples were analyzed by Energy Laboratories Incorporated of Casper, Wyoming. Samples were analyzed for at least one of the following:

- Various agronomic methods
- Volatile Organic Compounds (VOCs) by U.S. EPA method SW-846 8260B
- Semi-Volatile Organic Compounds (SVOCs) by U.S. EPA method SW-846 8270C
- Metals by U.S. EPA methods SW846 6010B, 6020, 7470A, and 7471A
- Radium-226 by U.S. EPA methods
- Toxicity Characteristic Leaching Procedure (TCLP) metals by U.S. EPA method SW1311/6010B
- Synthetic Precipitation Leaching Procedure (SPLP) metals by U.S. EPA method SW1312/6020
- Synthetic Precipitation Leaching Procedure (SPLP) radium-226 by U.S. EPA method SW1312/903.0.

The analytical results are expressed in terms of precision, accuracy, representativeness, comparability, and completeness (PARCC). This data evaluation is presented in terms of the PARCC criteria and was based on the specific criteria presented in the *Quality Assurance Project Plan, United Nuclear Corporation, Northeast Church rock Site (QAPP)*, (MWH 2006):

The analytical data were verified and qualified based on the results of the following data evaluation parameters or quality control (QC) samples:

- Compliance with the QAPP
- Sample preservation
- Sample extraction and analytical holding times
- Method, equipment rinseate, and initial/continuing calibration blank (ICB/CCB) sample results
- Reporting limits (RL)
- Field replicate sample results

- Instrument tune results (gas chromatography/mass spectroscopy [GC/MS] analyses only)
- Initial calibration (ICAL), initial calibration verification (ICV), and continuing calibration verification standards (CVS) results
- Interference check samples (ICS) (metals analysis only)
- Surrogate spike recoveries (organic analyses only)
- Matrix spike/matrix spike duplicate (MS/MSD) sample results
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCD) results
- Internal standard (IS) results (GC/MS analyses only)
- Laboratory replicate results.

Data verification for all VOC, SVOC, and metals methods were performed the MWH Project Chemist. Data verification of the radium-226 data was performed Laboratory Data Consultants of Carlsbad, California. A level III verification was performed on all sample data with a Level IV data verification for ten percent of the data. The data from agronomic methods were not verified because QC criteria are not established for the methods.

As discussed previously, a Level IV verification was conducted for 10 percent of the data in accordance with the QAPP. In addition to the QC parameters reviewed during the Level III verification process, the following data review was conducted as part of the Level IV verification:

- Review of raw data from the instrument (i.e. chromatograms, quantitation reports, spectra)
- Back check of all calculations
- Review of sample preparation and analytical logs.

The following sections describe the data verification procedures, discuss data that have significant QC problems (i.e., rejected data), and describe any analytical method or QAPP deviations.

The results of the sample analyses are summarized in the main body of this report. Sample data qualified due to the data verification are presented in Table B.3.

B2.0 DATA VERIFICATION RESULTS

B2.1 COMPLETENESS EVALUATION

B2.1.1 Sampling Completeness

B2.1.1.1 All samples and QC samples were collected as scheduled resulting in 100 percent completeness for this project.

B2.1.2 Analytical Completeness

B2.1.2.1. Analytical completeness was evaluated on a per analyte basis using the following equation:

$$\text{Completeness} = \frac{\text{Number of valid data points}}{\text{Total number of measurements}} \times 100$$

Where: The number of valid data points is the total number of valid analytical measurements based on the precision, accuracy, and holding time evaluation.

Based on the results of the data verification described in the following sections, all data are considered valid as qualified. Analytical completeness was 100 percent, which met the 95 percent analytical completeness goal established in the QAPP.

B2.2 REPRESENTATIVENESS EVALUATION

Representativeness is a qualitative expression of the degree to which sample data accurately and precisely represent a characteristic of a population, a sampling point, or an environmental condition. Representativeness is maximized by ensuring that, for a given project, the number and location of sampling points and the sample collection and analysis techniques are appropriate for the specific investigation, and that the sampling and analysis program provides information that reflects "true" site conditions. Laboratory data were evaluated for representativeness by assessing compliance with the following:

- Laboratory compliance with the QAPP
- Sample preservation
- Sample extraction and analyses holding times
- Method blank, equipment rinseate blank, and ICB/CCB sample results
- Reporting limits
- Field replicates.

B2.2.1 Quality Assurance Project Plan Compliance Evaluation

Based on the data verification, all samples were analyzed following the quality control criteria specified in the QAPP, with the following exception. The VOC samples were prepared using the high soil concentration method. This caused an increase in the RLs which is discussed later in the section B2.2.8 of this report.

B2.2.2 Sample Preservation Evaluation

All samples were preserved as specified in the QAPP.

B2.2.3 Holding Time Evaluation

Holding time reflects the length of time after sample collection that a sample or extract remains representative of environmental conditions. Depending on the analysis, either one, two, or three holding times were evaluated.

- For the VOC and metals analyses, the length of time between sample collection and sample analysis was evaluated.
- For the SVOC analysis the length of time from sample collection to sample extraction, and the length of time from sample extraction to sample analysis was evaluated.
- For the SPLP and TCLP analyses the length of time from sample collection to sample leaching, and the length of time from sample leaching to sample analysis was evaluated.

Holding times were compared to standard method specific holding times specified in the QAPP. All holding times were met except for one VOC sample that was analyzed one day beyond the established holding time from sample collection to analysis. Because the sample collection to analysis holding time was exceeded by only one day and the sample preservation criterion was met, it is the professional judgment of the Project Chemist that the data are representative of the sample and therefore the no sample data were qualified.

B2.2.4 Method, Equipment Rinseate, and ICB/CBB Blank Evaluation. If target analytes were detected in a blank and an associated investigative sample, data were evaluated and qualified using the following criteria:

- **Non-Common Laboratory Contaminants.** If a target analyte was detected in a blank and in an associated sample, and the concentration of the analyte in the environmental sample was less than five times the concentration detected in the blank, the detection of the analyte in the sample was considered a false positive. The sample datum was qualified with a "UB" flag to indicate that the datum is considered not detected at the concentration reported based on blank data. If the concentration of a target analyte in the environmental sample was greater than five times the concentration detected in an associated blank, the sample datum was with a "B" flag to indicate the analyte was detected in an associated blank.
- **Common Laboratory Contaminants.** If a target analyte was detected in a blank and in an associated sample, and the concentration of the analyte in the

environmental sample was less than ten times the concentration detected in the blank, the detection of the analyte in the sample was considered a false positive. The sample datum was qualified with a "UB" flag to indicate the datum is considered not detected at the reported concentration based on blank data. If the concentration of a target analyte in the environmental sample was greater than ten times the concentration detected in an associated blank, the sample datum was qualified with a "B" flag to indicate the analyte was detected in an associated blank.

- **Sample Concentration Substantially Greater than Blank Concentration.** If a target analyte was detected in a blank and in an associated sample, and the concentration of the analyte in the environmental sample was greater than fifty times the concentration detected in the blank, sample data were not qualified because it was determined that the associated blank concentration could have no affect on data quality.

B2.2.5 Method Blank Evaluation

The method blank contains all the reagents used in the processing of samples and is carried through the complete analytical procedure used for the samples. Sample data qualified due to method blank results were qualified as described previously and are listed in Table B.3 with "MB" as the QC type.

B2.2.6 Equipment Rinseate Blanks

Equipment rinseate blanks were collected by rinsing decontaminated sampling equipment with distilled water to assess possible target analyte carry-over between environmental sample locations. No analytes were detected in the equipment rinseate blanks.

B2.2.7 Initial and Continuing Calibration Blank Evaluation

Initial and continuing calibration blank samples were analyzed with each sample batch for methods SW-846 6010B and 6020 (inductively coupled plasma [ICP]) to determine whether the analytical instrument is stable throughout analysis. The same criteria that were used to evaluate the sample blanks described previously were used to evaluate the ICB/CCB and associated sample data. However, if the concentration in the ICB/CCB was less than the reporting limit, no action was taken. No sample data were qualified due to ICB/CCB data.

B2.2.8 Reporting Limits.

The RL is the lowest concentration that can be reliably achieved within limits of precision and accuracy during routine instrument operating conditions and is based on the method detection limit (MDL) for each analyte. For this project, all sample data were reported to the RL established in the QAPP, with the following exceptions:

- For samples that required a dilution due to either high analyte concentration or interference, the RL was multiplied by the dilution factor. It should be noted that all raised reporting limits were less that the preliminary remediation goal (PRG) listed in the QAPP.

- The SPLP radium-226 data was reported to 0.2 picocuries per liter (pCi/l) instead of 0.1 pCi/l.

- All soil samples for VOC analysis were prepared using the high concentration soil method. This resulted in the VOC RLs established in the QAPP to be multiplied by 100.

B2.2.9 Field Replicate Evaluation

Field replicate samples were collected and analyzed to evaluate sampling and analytical precision. Because precision is affected by several variables including sample heterogeneity, sample collection procedures, sample preparation and sample analysis, the results of field replicates were used as additional evidence to support data quality rather than as a basis for accepting, qualifying or rejecting the data. The relative percent difference (RPD) was calculated only for those analytes that were detected above the RL in both the environmental and field replicate samples. The RPDs were less than the guidance RPD of 30 percent established in the QAPP except for two radium-226 results, nine selenium results, and one bis-2-ethylhexyl phthalate result. The high RPD for these samples is most likely due to sample heterogeneity.

B2.3 ACCURACY EVALUATION

Accuracy is a measure of the bias of a method or the level of agreement between a measurement and a known true value. Accuracy is evaluated by percent recovery (%R), which is calculated using the following equation:

$$\%R = \frac{A - B}{C} \times 100$$

Where: A = the measured concentration of the spiked analyte in a spiked sample

B = the measured concentration of the spiked analyte in an unspiked sample

C = the concentration of the analyte used for spiking.

Laboratory data were evaluated for accuracy by assessing compliance with the following:

- Instrument tune results (GC/MS analyses only)
- ICAL, ICV, CVS results.
- ICS (metals analysis only)
- Surrogate spike recoveries (organic analyses only)
- MS/MSD sample results
- LCS and LCD results.
- IS results (GC/MS analyses only)

B2.3.1 Tune Standard Evaluation.

For gas chromatography/mass spectroscopy (GC/MS) methods the analytical instruments must be tuned to demonstrate that the instrument is functioning such that it will detect the compounds of interest during analysis. Sample analysis can not proceed unless the tune standard criteria are met; otherwise sample data are flagged with an “R” and are not usable. In addition sample must be analyzed within twelve hours of the instrument tune standard. Samples analyzed outside the twelve hour winder are flagged with an “R” and are not usable. All tune standards were within the acceptance criteria specified in the laboratories’ SOPs.

B2.3.2 Initial Calibration, Initial Calibration Verification, and Continuing Calibration Verification Standards Evaluation

The ICAL, ICV, and CVS were analyzed prior to and during sample analysis as specified by the analytical method. The ICAL is used to demonstrate linearity of instrument calibration, the ICV is used to verify the ICAL by using a second source standard, and the CVS is used to assess whether the ICAL remains valid. The ICAL, ICV, and CVS results were evaluated against the method specific QC criteria. If either the ICAL , ICV, or CVS QC criteria were not met the data for all samples associated with the ICAL , ICV, or CVS were qualified as follows:

- **ICAL Outside Acceptance Criteria.** If the relative standard deviation (RSD) or correlation coefficient (r^2) was outside acceptance criterion, the calibration curve was evaluated to determine which standard caused the non-conformance. If the lowest level of the calibration curve was not the cause of the non-conformance, and the laboratory demonstrated that the RL was met, no non-detect data were qualified. For detected compounds where the RSD or r^2 exceeded the acceptance criteria, the data were considered estimated with an unknown bias and were qualified with a “J” flag.

- **ICAL Average Relative Response Factor (RRF) Outside Acceptance Criteria (GC/MS Analysis Only).** If the RRF is outside acceptance criteria for system performance check compounds (SPCCs) (refer to the QAPP for method specific criteria) or the acceptance criteria of > 0.05 for non-SPCC compounds, the sample data were qualified as follows. If the analytes were not detected in the associated samples, the sample results were labeled with a “R” flag to indicate the data are not usable. If the corresponding analytes were detected in the associated samples, the sample results were qualified with a “J” flag to indicate the data are estimated.

- **ICV Percent Difference (%D) or Percent Drift (% Drift) Outside Acceptance Criteria.** If the ICV %D (RSD used) or the % Drift (r^2 used) was outside acceptance criteria bias was first determined. If the bias was high non-detected analytes, associated with the ICV, were not qualified; detected analytes associated with the ICV were qualified with a “J+” flag indicating the datum was estimated, potentially biased high. If the bias was determined to be low, non-detected analytes associated with the ICV were qualified with a “UJ” flag indicating the RL is estimated; detected analytes associated with the

ICV were qualified with a "J-" flag indicating the data are estimated, potentially biased low.

- **CVS Percent Difference (%D) or Percent Drift Outside Acceptance Criteria.** If the CVS %D or the % Drift was outside acceptance criteria the bias was determined. If the bias was high, non-detected analytes associated with the CVS, were not qualified; detected analytes associated with the CVS were qualified with a "J" flag indicating the datum was estimated, potentially biased high. If the bias was determined to be low non-detected analytes associated with the CVS were qualified with a "UJ" flag indicating the RL is estimated; detected analytes associated with the CVS were qualified with a "J" flag indicating the data are estimated, potentially biased low.

- **CVS Average RRF Below Acceptance Criteria.** If the CVS average RRF was outside the acceptance criterion of $\leq$0.05 (for VOCs and SVOCs only), the sample data were qualified as follows. Compounds below the acceptance criteria indicate a potential bias during sample analysis. If the analytes were not detected in the associated samples, the sample results were labeled with a "R" flag to indicate the data may not be usable. If the corresponding analytes were detected in the associated samples, the sample results were qualified with a "J" flag to indicate the data are estimated.

All ICAL and ICV result were within the acceptance criteria specified in QAPP. Sample data qualified due CVS results are listed in Table B.3 with "CVS" as the QC type.

B2.3.3 Interference Check Samples

The ICP ICS verifies the laboratory inter-element and background correction factors. The following criteria were used to assess the results of the ICS. No sample data were qualified if the percent recovery of the ICS for an analyte was greater than 120 percent and the sample results were less than the instrument detection limit (IDL). If the percent recovery of an ICS for an analyte was greater than 120 percent, or between 50-79 percent, and the sample results were greater than the IDL, the sample data were qualified with a "J" flag to indicate the data are estimated. If the percent recovery of the ICS for an analyte was between 50-79 percent, and the sample results were less than the IDL, the sample data were qualified with a "UJ" flag to indicate the RL is estimated. If the percent recovery of ICS for an analyte was greater than 50 percent, the sample data were flagged with an "R" flag to indicate that the data were unusable. All ICS data were within acceptance criteria.

B2.3.4 Surrogate Spike Evaluation

Surrogate spike recoveries were used to evaluate the accuracy of the analytical data and to monitor laboratory control procedures for organic analyses. Samples were spiked with surrogates according to the QAPP. The surrogate spike recovery data were evaluated using the acceptance criteria outlined in the QAPP. The following criteria were used to evaluate surrogate recoveries:

- **Surrogate Recoveries Below Acceptance Criteria**. Surrogate recoveries below the acceptance criteria indicate a potential low bias during sample analysis. Therefore, if the surrogate recovery was below the acceptance criteria and the surrogate recovery was greater than or equal to ten percent, non-detect compounds associated with the surrogate were qualified with a "UJ" flag indicating the RL is estimated. If the surrogate recovery was less than 10 percent, then the associated compounds were flagged with an "R" to indicate the data are not usable. If analytes associated with the surrogates were detected in the sample, the sample results were qualified with a "J-" flag to indicate the data are estimated and are potentially biased low.

- **Surrogate Recoveries Above Acceptance Criteria**. Surrogate recoveries above the acceptance criteria indicate a potential high bias during sample analysis. Therefore, if the surrogate recovery was above the acceptance criteria, non-detected compounds associated with the surrogate were not qualified because of the potentially high bias. If the compounds associated with the surrogate were detected in the sample, the sample results were qualified with a "J+" flag to indicate the data are estimated and potentially biased high.

- **Methods with Multiple Surrogates.** SVOC analyses require the use of multiple surrogate compounds. All SVOC compounds and surrogates are identified as either "acid compounds" or "base/neutral (B/N) compounds". There are three "acid surrogates" and three "B/N surrogates". If only one surrogate from each fraction was outside the acceptance criteria, no data were qualified, unless the surrogate recovery was less than ten percent. When more that one surrogate from each fraction was outside the acceptance criteria only the data associated with the specific fraction outside acceptance criteria were qualified. For example if two "acid surrogate compounds" were outside the acceptance criteria, then only the "acid compounds" were qualified.

- **High and Low Surrogate Exceedences for the Same Sample.** Bias cannot be determined if one recovery is above and another surrogate is below acceptance criteria. Therefore, if the number of surrogate failures exceeded the method allowable maximum, and analytes associated with the surrogates were not detected in the sample, the sample results were not qualified. If the analytes associated with the failed surrogate were detected in the sample, the sample results were qualified with a "J" flag to indicate the data are estimated.

All surrogate recoveries were within the acceptance criteria specified in the QAPP.

B2.3.5 Matrix Spike/Matrix Spike Duplicate Samples Evaluation

Site specific MS/MSD samples were analyzed to assess accuracy and to identify possible adverse matrix effects. These samples were spiked with target analytes according to the QAPP before extraction or analysis. The percent recoveries of the spiked compounds were compared to the QAPP established QC limits. The following criteria were used to evaluate the MS/MSD samples:

- **MS and/or MSD Recovery Below Acceptance Criteria**. Matrix spike compounds below the acceptance criteria indicate a potential low bias during sample analysis. Therefore, if corresponding analytes were not detected in the parent sample, the sample data were qualified with a "UJ" flag indicating a possible false negative. If corresponding analytes were detected in the parent sample, the sample data were qualified with a "J" flag indicating the data are estimated and potentially biased low.

- **MS and/or MSD Recovery Above Acceptance Criteria**. Matrix spike/matrix spike duplicate recoveries above the acceptance criteria indicate a potential high bias during sample analysis. Therefore, if corresponding analytes were not detected in the parent sample, the sample data were not qualified because high recoveries indicate a high bias and do not affect non-detected analytes. If corresponding analytes were detected in the parent sample, the sample data were qualified with a "J" flag indicating the data are estimated and potentially biased high.

- **High Analyte Concentration in Parent Sample.** If the concentration in the parent sample was more than four times the spiked analyte concentration, the overall change in the MS/MSD concentration is not significant enough for the instrument to detect the spiked compound. Therefore, if the MS/MSD recoveries were outside the acceptance criteria, and the analyte concentrations in the parent sample were more than four times the spiked analyte concentration, no data were qualified.

- **High and Low MS/MSD Exceedences.** Bias cannot be determined if a spike recovery is above the acceptance criterion in the MS and below the acceptance criterion in the MSD or vice versa. Therefore, the following procedures were used to verify parent sample data. Parent sample data were not qualified if the analytes were not detected in the parent sample for the MS/MSD analytes that were outside acceptance criteria. Parent sample data were qualified with a "J" flag indicating the data are estimated if the MS/MSD analytes that were outside acceptance criteria were detected in the parent sample.

It should be noted that, typically, MS/MSD results are not used as the sole basis for evaluating data usability and are used in conjunction with other available QC data. Based on the other acceptable QC data available (i.e. surrogate recoveries, internal standard recoveries, and LCS recoveries) the data qualified due to MS/MSD results should not affect the decision making process. Sample data qualified due to MS and MSD results are listed in Table B.3 with "MS" and "MSD" as the QC types.

B2.3.6 Laboratory Control Sample/Laboratory Control Sample Duplicate Evaluation

LCS/LCDs were analyzed to assess accuracy in the absence of matrix effects. Laboratory grade sand was spiked with target analytes according to the QAPP before analysis. The percent recoveries of the spiked compounds were compared to the QAPP established QC limits. The same criteria used to evaluate the MS/MSD samples described previously were used to evaluate the LCS/LCD, except that all sample batch data associated with the LCS/LCD were qualified. All LCD recoveries were with in the acceptance criteria specified in the QAPP. Sample data qualified due to LCS recoveries are listed in Table B.3 with "LCS" as the QC type.

B2.3.7 Internal Standard Recoveries Evaluation

Internal standards are used to assess accuracy and to determine the concentration of target analytes in samples for VOC analyses. Internal standards are spiked in the sample after sample preparation/extraction, but prior to analysis. Analyte concentration is determined using the following equation:

$$C_S = \frac{A_S \times C_{IS}}{A_{IS} \times RF}$$

Where: CS = Concentration of the analyte or surrogate.

AS = Peak area (or height) of the analyte or surrogate.

CIS = Concentration of the IS.

AIS = Area of the IS

RF = Average response factor of calibration curve.

Accuracy was assessed by comparing the IS recovery to the control limits established by the method. The following criteria were used to evaluate IS data:

- **IS Recovery Below Acceptance Criteria.** If the IS recovery was below 50 percent, non-detected analytes associated with the IS were qualified with a "UJ" flag indicating the RL is estimated. Detected analytes were qualified with a "J" flag indicating the data were estimated.

- **IS Recovery Above Acceptance Criteria.** If the IS recovery is above 200 percent, undetected compounds were not qualified. Detected compounds were qualified with a "J" flag indicating the data were estimated.

All internal standard recoveries were within the acceptance criteria specified in the analytical methods.

B2.4 PRECISION EVALUATION

Precision measures the reproducibility of measurements under a given set of conditions. Laboratory precision was evaluated using the RPD calculated between the MS and MSD samples and between parent and field duplicate samples.

Relative percent difference is calculated using the following equation:

$$RPD = \left(\frac{|A - B|}{[A + B]/2} \right) \text{ x } 100$$

Where: A and B are the reported concentrations for sample duplicate analyses.

B2.4.1 Matrix Spike/Matrix Spike Duplicate Sample Evaluation

The MS/MSD sample results were evaluated as follows. If the RPD exceeded the acceptance criteria, corresponding analytes detected in the parent sample were qualified with a "J" flag indicating the data are estimated. Because bias cannot be determined when target analytes are not detected in a sample, parent sample data for non-detected analytes were not qualified as long as all other accuracy components were met. Sample data qualified due to the MS/MSD RPDs are listed in Table B.3 with "RPD" as the QC type.

B2.4.2 Laboratory Replicate Sample Evaluation.

For metals and radium-226 analyses the laboratory prepared and analyzed a duplicate sample. The RPD was calculated between the parent and laboratory replicate sample. The same criteria described above for the MS/MSD was used to evaluate RPD results between the parent and laboratory duplicate samples. Sample data qualified due to laboratory replicate results are listed in Table B.3 with "LR" as the QC type.

B2.4.3 Field Replicate Evaluation

As discussed previously field replicate samples were collected and analyzed to evaluate sampling and analytical precision. Because precision is affected by several variables including sample heterogeneity, sample collection procedures, sample preparation and sample analysis, the results of field replicates were used as additional evidence to support data quality rather than as a basis for accepting, qualifying or rejecting the data. The RPD was calculated only for those analytes that were detected above the RL in both the environmental and field replicate samples. The RPDs were less than the guidance RPD of 30 established in the QAPP except for two radium-226 results, nine selenium results, and one bis-2-ethylhexyl phthalate result. The high RPD for these samples is most likely due to sample heterogeneity.

B2.5 Level IV Verfication

As discussed previously, a Level IV verification was conducted for 10 percent of the data in accordance with the QAPP. In addition to the QC parameters reviewed during the Level III verification process, the following data review was conducted as part of the Level IV verification:

- Review of raw data from the instrument (i.e. chromatograms, quantitation reports, spectra)
- Back check of all calculations
- Review of sample preparation and analytical logs.

A review of the parameter indicated that the samples were prepared, analyzed and calculated properly.

B2.6 Comparability Evaluation

Comparability is a qualitative parameter that expresses the confidence that one data set may be compared to another. For this project, sample collection and analysis followed standard methods and the data were reported using standard units of measure as specified in the QAPP. In addition, QC data for this project indicate the data are comparable. As a result, the data from this project should be comparable to other data collected at this site using similar sample collection and analytical methodology.

B3.0 DATA VERIFICATION SUMMARY

Precision. Based on the MS/MSD sample, laboratory replicate sample, and field replicate results, the data are precise as qualified.

Accuracy. Based on the tune, ICAL, ICV, CVS, IS, ICS, surrogate, MS/MSD, LCS, and internal standard results, the data are accurate as qualified.

Representativeness. Based on the results of the sample preservation and holding time evaluation; the method, equipment rinseate, and ICB/CCB blank sample results; the field replicate sample evaluation; and the RL evaluation the data are considered representative of the site as qualified.

Comparability. Standard methods of sample collection and standard units of measure were used during this project. The analysis performed by the laboratory was in accordance with current EPA methodology and the QAPP.

Completeness. Based on the results of the data verification, all data are considered valid as qualified.

Table B.3 Summary of Qualified Data										
Field Sample Identification	Sample Date	Analysis Code	Analyte	Sample Result	Units	QC Type	QC Result	QC Limit	Added Flag	Comment
NECR1-SB-131 [20]	11/16/06	E901.1	Radium-226	1.2	pCi/g	LR	40%	<30%	J	Datum is estimated, bias unknown. LR RPD outside acceptance criterion.
NECR1-SS-028	12/5/06	SW6020	Molybdenum	55.5	mg/kg	MS MSD	27% 33%	75-125	UJ	Reporting limit is estimated. MS and MSD recoveries below acceptance criterion, indicating a potential low bias.
NECR1-SS-281	11/28/06	SW6020	Selenium	53.1 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
NECR1-SS-289	11/28/06	SW6020	Selenium	1 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
NECR1-SS-293	11/28/06	SW6020	Selenium	3.2 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
NECR1-SS-307	11/28/06	SW6020	Selenium	1.1 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
NECR1-SS-307	11/28/06	SW6020	Uranium	0.0042	mg/l	MB	0.0001 mg/l	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
NECR2-SS-050	11/14/06	E901.1	Radium-226	1.2	pCi/g	LR	34%	<30%	J	Datum is estimated, bias unknown. LR RPD outside acceptance criterion.
NECR2-SS-096	12/1/06	SW6020	Uranium	0.0035	mg/l	MB	0.0001 mg/l	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
NECR2-SS-109	12/1/06	E903.0	Radium-226	0.9	pCi/L	LR	33%	<30%	J	Datum is estimated, bias unknown. LR RPD outside acceptance criterion.
NECR2-SS-109	12/1/06	SW6020	Uranium	0.0021	mg/l	MB	0.0001 mg/l	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
NECR-SS-238	11/28/06	SW6020	Selenium	1.4 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
NECR-SS-240	11/28/06	SW6020	Selenium	0.5 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
NECR-SS-240	11/28/06	SW6020	Uranium	0.0032	mg/l	MB	0.0001 mg/l	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
NECR-SS-240 DUP	11/28/06	SW6020	Selenium	1.1 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
NECR-SS-262	11/28/06	SW6020	Selenium	1.1 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
NECR-SS-265	11/28/06	SW6020	Selenium	0.4 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
NECR-SS-266	11/28/06	SW6020	Selenium	0.6 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
NEMSA-TP-001 [6-6.5]	11/14/06	E901.1	Radium-226	1.3	pCi/g	LR	60%	<30%	J	Datum is estimated, bias unknown. LR RPD outside acceptance criterion.

Table B.3
Summary of Qualified Data

Field Sample Identification	Sample Date	Analysis Code	Analyte	Sample Result	Units	QC Type	QC Result	QC Limit	Added Flag	Comment
NEMSA-TP-005 [4-4.5]	12/1/06	SW6020	Uranium	27.3	mg/kg	MS MSD MB	145% 140% 0.0008 mg/kg	75-125	J+	Datum is estimated, potentially biased high. MS and MSD recoveries above acceptance criterion. Analyte detected in associated method blank. Sample concentration greater than fifty times associated blank concentration and therefore has no affect on analyte concentration. Qualifier due MS and MSD recoveries only.
POND12-TP-030 [2-3]	12/2/06	SW6020	Selenium	13.2 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
POND12-TP-030 [4.5-5]	12/2/06	SW6020	Selenium	1.6 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
POND12-TP-035 [2-2.5]	12/2/06	SW6020	Selenium	11.2 D	mg/kg	LCS RPD	68% 23%	70-130% 20%	J-	Datum is estimated, potentially biased low. LCS recovery below and MS/MSD RPD outside acceptance criteria.
POND12-TP-035 [2-2.5]	12/2/06	SW6020	Uranium	38.9	mg/kg	MSD RPD MB	165% 26% 0.0010 mg/kg	75-125% 20% N/A	J+	Datum is estimated, potentially biased high. MSD recovery above and MS/MSD RPD outside acceptance criteria. Analyte detected in associated method blank. Sample concentration greater than fifty times associated blank concentration and therefore has no affect on analyte concentration. Qualifier due MSD recoveries and RPD only.
POND12-TP-035 [2-2.5]	12/2/06	SW6020	Vanadium	31.6	mg/kg	MSD RPD	136% 24%	75-125% 20%	J+	Datum is estimated, potentially biased high. MSD recovery above and MS/MSD RPD outside acceptance criteria.
POND12-TP-035) [1-1.5]	12/2/06	SW6020	Selenium	159 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
Sand1-SS-009	11/13/06	SW6020	Selenium	0.3 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand1-SS-011	11/13/06	SW6020	Selenium	0.9 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand1-SS-017	11/13/06	SW6020	Selenium	0.3 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand1-SS-021	11/13/06	SW6020	Selenium	0.7 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand1-SS-027	11/13/06	SW6020	Selenium	0.6 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand1-SS-028	11/13/06	SW6020	Selenium	0.2 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand1-SS-041	11/13/06	SW6020	Selenium	0.4 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand1-SS-043	11/13/06	SW6020	Selenium	1.7 D	mg/kg	LR MB	25% 0.02 mg/kg	<20%	J	Datum is estimated, bias unknown. LR RPD outside acceptance criterion. Analyte detected in associated method blank. Sample concentration greater than fifty times associated blank concentration and therefore has no affect on analyte concentration. Qualifier due LR results only.

Table B.3 Summary of Qualified Data										
Field Sample Identification	**Sample Date**	**Analysis Code**	**Analyte**	**Sample Result**	**Units**	**QC Type**	**QC Result**	**QC Limit**	**Added Flag**	**Comment**
Sand1-SS-051	11/13/06	SW6020	Selenium	0.5 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand1-SS-063	11/13/06	SW6020	Selenium	3.5 D	mg/kg	LR MB	24% 0.02 mg/kg	20%	J	Datum is estimated, bias unknown. LR RPD outside acceptance criterion. Analyte detected in associated method blank. Sample concentration greater than fifty times associated blank concentration and therefore has no affect on analyte concentration. Qualifier due LR results only.
SAND1-TP-030 [1-1.5]	12/2/06	SW6020	Uranium	0.0024	mg/l	MB	0.0001 mg/l	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
SAND1-TP-063 [0.5-1]	12/2/06	E903.0	Radium-226	17	pCi/L	LR	33%	<30%	J	Datum is estimated, bias unknown. LR RPD outside acceptance criterion.
Sand2-SS-003	11/13/06	SW6020	Selenium	0.9 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand2-SS-003	11/13/06	SW6020	Uranium	0.0012 D	mg/l	MB	0.0001 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand2-SS-004	11/13/06	SW6020	Selenium	0.8 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand2-SS-006	11/13/06	SW6020	Selenium	0.2 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand2-SS-010	11/13/06	SW6020	Selenium	0.3 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand2-SS-012	11/13/06	SW6020	Selenium	0.9 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand2-SS-015	11/13/06	SW6020	Selenium	0.8 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
Sand2-SS-212	11/13/06	SW6020	Selenium	0.9 D	mg/kg	MB	0.02 mg/kg	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
SAND3-SS-017	11/16/06	SW6020	Uranium	0.0015	mg/l	MB	0.0001 mg/l	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
SEDPAD-SS-011	11/17/06	SW6020	Uranium	0.0012	mg/l	MB	0.0001 mg/l	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
SEDPAD-SS-018	11/17/06	SW6020	Uranium	0.00096	mg/l	MB	0.0001 mg/l	N/A	B	Analyte detected in associated method blank. Sample concentration greater than five time method blank
TP-SS-001	12/1/06	SW6020	Selenium	6.6 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
TP-SS-009	12/1/06	SW6020	Selenium	39.8 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
TP-SS-013	12/1/06	SW6020	Selenium	101 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
TP-SS-024	12/1/06	SW6020	Selenium	1.7 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.

Table B.3 Summary of Qualified Data										
Field Sample Identification	**Sample Date**	**Analysis Code**	**Analyte**	**Sample Result**	**Units**	**QC Type**	**QC Result**	**QC Limit**	**Added Flag**	**Comment**
TP-SS-027	12/1/06	SW6020	Selenium	0.8 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
TP-SS-224	12/1/06	SW6020	Selenium	1.1 D	mg/kg	LCS	68%	70-130%	J-	Datum is estimated, potentially biased low. LCS recovery below acceptance criterion.
Yard-TP-001 (1-1.5)	11/30/06	SW8260B	Dichlorodifluoromethane	<0.2	mg/kg	CVS	23%	±20%	UJ	Reporting limit is estimated. CVS %D below acceptance criterion, indicating a potential low bias.
Yard-TP-002 (1.5-2.0)	11/30/06	SW8260B	Dichlorodifluoromethane	<0.2	mg/kg	CVS	23%	±20%	UJ	Reporting limit is estimated. CVS %D below acceptance criterion, indicating a potential low bias.
Yard-TP-002 (1.5-2.0)	11/30/06	SW8270C	2,4-Dinitrophenol	<1.7	mg/kg	MS MSD	19% 20%	31-135	UJ	Reporting limit is estimated. MS and MSD recoveries below acceptance criterion, indicating a potential low bias.
Yard-TP-002 (9.5-10.0)	12/1/06	SW8260B	Dichlorodifluoromethane	<0.2	mg/kg	CVS	23%	±20%	UJ	Reporting limit is estimated. CVS %D below acceptance criterion, indicating a potential low bias.
Yard-TP-003 (1-1.5)	12/1/06	SW8260B	Dichlorodifluoromethane	<0.2	mg/kg	CVS	23%	±20%	UJ	Reporting limit is estimated. CVS %D below acceptance criterion, indicating a potential low bias.
Yard-TP-004 (0.5-1.0)	11/30/06	SW8260B	Dichlorodifluoromethane	<0.2	mg/kg	CVS	23%	±20%	UJ	Reporting limit is estimated. CVS %D below acceptance criterion, indicating a potential low bias.
Yard-TP-004 (5.5-6.0)	11/30/06	SW8260B	Dichlorodifluoromethane	<0.2	mg/kg	CVS	23%	±20%	UJ	Reporting limit is estimated. CVS %D below acceptance criterion, indicating a potential low bias.
Yard-TP-004 (7.0-7.5)	12/1/06	SW8260B	Dichlorodifluoromethane	<0.2	mg/kg	CVS	23%	±20%	UJ	Reporting limit is estimated. CVS %D below acceptance criterion, indicating a potential low bias.
Yard-TP-004 (9.5-10.0)	12/1/06	SW8260B	Dichlorodifluoromethane	<0.2	mg/kg	CVS	23%	±20%	UJ	Reporting limit is estimated. CVS %D below acceptance criterion, indicating a potential low bias.
Yard-TP-005 (2.5-3.0)	11/30/06	SW8260B	Dichlorodifluoromethane	<0.2	mg/kg	CVS	23%	±20%	UJ	Reporting limit is estimated. CVS %D below acceptance criterion, indicating a potential low bias.
Yard-TP-005 (4.5-5.0)	12/1/06	SW8260B	Dichlorodifluoromethane	<0.2	mg/kg	CVS	23%	±20%	UJ	Reporting limit is estimated. CVS %D below acceptance criterion, indicating a potential low bias.
Yard-TP-005 (8.5-9.0)	12/1/06	SW8260B	Dichlorodifluoromethane	<0.2	mg/kg	CVS	23%	±20%	UJ	Reporting limit is estimated. CVS %D below acceptance criterion, indicating a potential low bias.
Yard-TP-204 (7.0-7.5)	12/1/06	SW8260B	Dichlorodifluoromethane	<0.2	mg/kg	CVS	23%	±20%	UJ	Reporting limit is estimated. CVS %D below acceptance criterion, indicating a potential low bias.

Notes:

mg/kg	milligrams per kilogram	LCS	Laboratory control sample
mg/l	milligrams per liter	LR	Laboratory replicate
pCi/g	picocuries per gram	MB	Method blank
pCi/l	picocuries per liter	MS	Matrix spike
D	Sample dilution required for analysis; reported values reflect the dilution.	MSD	Matrix spike duplicate
%D	Percent difference	RPD	Relative percent difference
CVS	Calibration verification standard		

DATA VALIDATION WORKSHEETS

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06081541
Field Duplicates:
MS/MSD Parent:
Validation Complete: (Signature and Date) 02/20/07 Craig Moore

Sample Collection Date(s): 08/17/06
MW Job Number:
Matrix: Groundwater : Solid
Page: 1 of 2

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
NECRBKG-01	C06081541-01	Y	B	U detected in method blank	1
NECRBKG-02	C06081541-02	Y	B	U detected in method blank	1
NECRBKG-03	C06081541-03	Y	B	U detected in method blank	1
NECRBKG-04	C06081541-04	Y	B	U detected in method blank	1
NECRBKG-05	C06081541-05	Y	B	U detected in method blank	1
NECRBKG-06	C06081541-06	Y	B	U detected in method blank	1
NECRBKG-07	C06081541-07	Y			
NECRBKG-08	C06081541-08	Y			
NECRBKG-09	C06081541-09	Y			
NECRBKG-10	C06081541-10	Y			
NECRBKG-11	C06081541-11	Y			
NECRBKG-12	C06081541-12	Y			
NECRBKG-13	C06081541-13	Y			
NECRBKG-14	C06081541-14	Y			
NECRBKG-15	C06081541-15	Y			
NECRBKG-16	C06081541-16	Y			
NECRBKG-17	C06081541-17	Y			
NECRBKG-18	C06081541-18	Y			
NECRBKG-19	C06081541-19	Y			
NECRBKG-20	C06081541-20	Y			
NECRBKG-21	C06081541-21	Y			
NECRBKG-22	C06081541-22	Y			
NECRBKG-23	C06081541-23	Y			
NECRBKG-24	C06081541-24	Y			
NECRBKG-25	C06081541-25	Y			
NECRBKG-42	C06081541-26	Y			
NECRBKG-45	C06081541-27	Y			

1 MB-12023 contains Mb @ 0.006 mg/kg, U @ 003 mg/kg and V @ 0.02 mg/kg. Mo not detected in any assoiciated sample. Qualify all U concentrations w/"B". V concentration > 50X MB cocentration, no qualification.

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06081541

Analysis	Total Metals																
Sample ID	-01	-02	-03	-04	-05	-06	-07	-08	-09	-10	-11	-12	-13	-14	-15	-16	-17
Laboratory ID	-01	-02	-03	-04	-05	-06	-07	-08	-09	-10	-11	-12	-13	-14	-15	-16	-17
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Interference Check Standard (ICP method)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
ICP Serial Dilution	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Post Digestion Spike	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch ID
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific requirement
N/A indicates criteria are not applicable for the specified analytical method

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06081541

Analysis										
Sample ID	-18	-19	-20	-21	-22	-23	-24	-25	-42	-45
Laboratory ID	-18	-19	-20	-21	-22	-23	-24	-25	-26	-27
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A
Interference Check Standard (ICP method)	A	A	A	A	A	A	A	A	A	A
ICP Serial Dilution	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Post Digestion Spike	A	A	A	A	A	A	A	A	A	A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

LDC Report# 15801A29

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	United Nuclear Corporation, NE Church Rock Site
Collection Date:	August 17 through August 18, 2006
LDC Report Date:	September 7, 2007
Matrix:	Soil
Parameters:	Radium 226
Validation Level:	EPA Level III & IV
Laboratory:	Energy Laboratories, Inc.
Sample Delivery Group (SDG):	C06081541

Sample Identification

NECR BKG-01**
NECR BKG-02
NECR BKG-03**
NECR BKG-04
NECR BKG-05**
NECR BKG-06
NECR BKG-07**
NECR BKG-08
NECR BKG-09**
NECR BKG-10
NECR BKG-11**
NECR BKG-12
NECR BKG-13**
NECR BKG-14
NECR BKG-15
NECR BKG-16
NECR BKG-17
NECR BKG-18
NECR BKG-19
NECR BKG-20
NECR BKG-21
NECR BKG-22
NECR BKG-23
NECR BKG-24
NECR BKG-25
NECR BKG-42
NECR BKG-45
NECR COR-A-19
NECR BKG-10DUP
NECR BKG-20DUP
NECR COR-A-19DUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 31 soil samples listed on the cover sheet. The analyses were per EPA Method 901.1 for Radium 226.

The review follows the Quality Assurance Project Plan for United Nuclear Corporation Northeast Church Rock Site (Appendix A, August 2006) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

B The compound or analyte was found in an associated blank as well as in the sample.

U Data are qualified as non-detected, because the analyte was observed in an associated laboratory or field blank.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined and a self-absorption curve was generated for each radionuclide of interest.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within laboratory control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06081541	Radium 226	More than twenty samples associated to a method blank.	No more than twenty samples to be associated to a method blank.	None	P

Blank results contained less than the minimum detectable activity (MDA).

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06081541	Radium 226	More than twenty samples associated to a laboratory control sample.	No more than twenty samples to be associated to laboratory control sample.	None	P

Percent recoveries (%R) were within QC limits.

c. Chemical Recovery

Chemical recovery analysis was not required by the method.

V. Sample Result Verification

All sample result verifications were acceptable for samples on which a EPA Level IV review was performed.

All sample result verifications met validation criteria with the following exceptions:

Sample	Isotope	Reported Concentration	Recalculated Concentration	Flag	A or P
NECR BKG-01**	Radium 226	0.8 pCi/g	-0.3 pCi/g	J (all detects)	P
NECR BKG-03**	Radium 226	1.1 pCi/g	-0.2 pCi/g	J (all detects)	P
NECR BKG-05**	Radium 226	1.1 pCi/g	-0.5 pCi/g	J (all detects)	P
NECR BKG-07**	Radium 226	1.1 pCi/g	-0.3 pCi/g	J (all detects)	P
NECR BKG-09**	Radium 226	1.2 pCi/g	-0.2 pCi/g	J (all detects)	P
NECR BKG-11**	Radium 226	1.0 pCi/g	-0.4 pCi/g	J (all detects)	P
NECR BKG-13**	Radium 226	1.0 pCi/g	-0.2 pCi/g	J (all detects)	P

Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

No field duplicates were identified in this SDG.

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Data Qualification Summary - SDG C06081541

SDG	Sample	Isotope	Flag	A or P	Reason
C06081541	NECR BKG-01** NECR BKG-02 NECR BKG-03** NECR BKG-04 NECR BKG-05** NECR BKG-06 NECR BKG-07** NECR BKG-08 NECR BKG-09** NECR BKG-10 NECR BKG-11** NECR BKG-12 NECR BKG-13** NECR BKG-14 NECR BKG-15 NECR BKG-16 NECR BKG-17 NECR BKG-18 NECR BKG-19 NECR BKG-20 NECR BKG-21 NECR BKG-22 NECR BKG-23 NECR BKG-24 NECR BKG-25 NECR BKG-42 NECR BKG-45 NECR COR-A-19	Radium 226	None	P	Method blank
C06081541	NECR BKG-01** NECR BKG-02 NECR BKG-03** NECR BKG-04 NECR BKG-05** NECR BKG-06 NECR BKG-07** NECR BKG-08 NECR BKG-09** NECR BKG-10 NECR BKG-11** NECR BKG-12 NECR BKG-13** NECR BKG-14 NECR BKG-15 NECR BKG-16 NECR BKG-17 NECR BKG-18 NECR BKG-19 NECR BKG-20 NECR BKG-21 NECR BKG-22 NECR BKG-23 NECR BKG-24 NECR BKG-25 NECR BKG-42 NECR BKG-45 NECR COR-A-19	Radium 226	None	P	Laboratory control samples

SDG	Sample	Isotope	Flag	A or P	Reason
C06081541	NECR BKG-01** NECR BKG-03** NECR BKG-05** NECR BKG-07** NECR BKG-09** NECR BKG-11** NECR BKG-13**	Radium 226	J (all detects)	P	Sample result verification (recalculation)

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Laboratory Blank Data Qualification Summary - SDG C06081541

No Sample Data Qualified in this SDG

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Field Blank Data Qualification Summary - SDG C06081541

No Sample Data Qualified in this SDG

LDC #: 15801A29 **VALIDATION COMPLETENESS WORKSHEET** Date: 11-22-06

SDG #: C06081541 Level III/IV Page: 1 of 1

Laboratory: Energy Laboratories, Inc. Reviewer: MG

2nd Reviewer: ✓

METHOD: Radium 226 (EPA Method 901.1)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 8-17-06 through 8-18-06
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IVa.	Matrix Spike/(Matrix Spike) Duplicates ~~MS~~	~~SW~~ A	DUP
IVb.	Laboratory control samples	SW	LCS
IVc.	Chemical recovery	N	Not required
V.	Sample result verification	SW	Not reviewed for Level III validation.
VI.	Minimum dectectable activity (MDA)	A	
VII.	Overall assessment of data	A	
VIII.	Field duplicates	N	
XIV	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: ** Indicates sample underwent Level IV validation

all soil

1	NECR BKG-01**	11	NECR BKG-11**	21	NECR BKG-21	31	NECR COR-A-19DUP
2	NECR BKG-02	12	NECR BKG-12	22	NECR BKG-22	32	PBS
3	NECR BKG-03**	13	NECR BKG-13**	23	NECR BKG-23	33	
4	NECR BKG-04	14	NECR BKG-14	24	NECR BKG-24	34	
5	NECR BKG-05**	15	NECR BKG-15	25	NECR BKG-25	35	
6	NECR BKG-06	16	NECR BKG-16	26	NECR BKG-42	36	
7	NECR BKG-07**	17	NECR BKG-17	27	NECR BKG-45	37	
8	NECR BKG-08	18	NECR BKG-18	28	NECR COR-A-19	38	
9	NECR BKG-09**	19	NECR BKG-19	29	NECR BKG-10DUP	39	
10	NECR BKG-10	20	NECR BKG-20	30	NECR BKG-20DUP	40	

Notes:

LDC #: 15801A29
SDG #: C06081541

VALIDATION FINDINGS CHECKLIST

Reviewer: MG
2nd Reviewer: ✓

Method: Radiochemistry(EPA Method 901.1)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments and detectors calibration as required?	✓			
Were NIST traceable standards used for all calibrations?	✓			
Was the check source identified by activity and radionuclide?	✓			
Were check sources including background counts analyzed at the requiried frequency and within laboratory control limits?	✓			
III. Blanks				
Were blank analyses performed as required?		✓		
Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spikes and Duplicates				
Were a matrix spike (MS) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.		✓		
Were the MS percent recoveries (%R) within the QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Was a duplicate sample anaylzed at the required frequency of 5% in this SDG?	✓			
Were all duplicate sample duplicate error rations (DER) ≤1.42?.	✓	~~✓~~		gm
V. Laboratory control samples				
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 75-125%	✓			
VI. Sample Chemical/Carrier Recovery				
Was a tracer/carrier added to each sample?		✓		
Were tracer/carrier recoveries within the QC limits?			✓	
VII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
VIII. Sample Result Verification				
Were activities adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were the Minimum Detectable Activities (MDA) < RL?	✓			

LDC #: 15801A29
SDG #: C06081541

VALIDATION FINDINGS CHECKLIST

Reviewer: MG
2nd Reviewer: ✓

Validation Area	Yes	No	NA	Findings/Comments
IX. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
X. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
XI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 15801A29
SDG #: C0608154|

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: MG
2nd Reviewer: ~

METHOD: Radiochemistry (Method: 901.1)

Y (N) N/A Were blank analyses performed as required? If no, please see qualifications below.
Y (N) N/A Were any activities detected in the blanks greater than the minimum detectable activity (MDA)? If yes, please see qualifications below.

Units: ______ Associated Samples: all

Isotope	Blank ID	Blank Action Level	Sample Identification									
finding:	65	samples	associated to		one	method	blank.					
criteria:	≤ 20	samples	per batch.									
Qual:	None/P											
	28 samples from		SDG: C0608154		}							
	17 samples from		SDG: C0608154?		}	all in	batch	# 12015				
	20 samples from		SDG: C0608154?		}							
total	65 samples											

Units: ______ Associated Samples: ______

Isotope	Blank ID	Blank Action Level	Sample Identification									

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
If there is activity in the blank above the MDA, sample results within 10x the blank activity will be qualified as not detected "U".

LDC #: 15801A29
SDG #: C0608154

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample (LCS)

Reviewer: MG
2nd Reviewer: [illegible]

METHOD: Radiochemistry (Method: 901.1)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Was a laboratory control sample (LCS) analyzed at the required frequency in this SDG?
(Y) N N/A Were all LCS percent recoveries (%R) within the control limits of 75-125%?

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	LCS ID	Matrix	Isotope	%R (limits)	Associated Samples	Qualifications
1	finding:	65	samples	associated to two	LCSs.	
	Criteria	: ≤ 20	samples	per LCS		
	Qual	all samples :		None / P		

Comments: 3 SDG in one batch (# 12015)

LDC #: 1580A29
SDG #: C06081541

VALIDATION FINDINGS WORKSHEET
Sample Result Verification

Page: 1 of 1
Reviewer: MG
2nd Reviewer: gr

METHOD: Radiochemistry (Method: 901.1)

#	Sample ID	Isotope	Reported Result (units)	Calculated Result (units)	Finding	Qualifications
1	1	Ra-226	0.8 (pCi/g)	-0.3 (pCi/g)	recalculated result > 10 % difference	J dets/P
2	3		1.1 ( )	-0.2 ( )		
3	5		1.1 ( )	-0.5 ( )		
4	7		1.1 ( )	-0.3 ( )		
5	9		1.2 ( )	-0.2 ( )		
6	11		1.0 ( )	-0.4 ( )		
7	13		1.0 ( )	-0.2 ( )		

Comments:

SMPLRSLT

Version 1.0 (3/2/2000)

LDC #: 15801A29
SDG #: C06081541

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: MG
2nd Reviewer: [illegible]

METHOD: Radiochemistry (Method: 901.1)

Percent recoveries (%R) for a laboratory control sample, a matrix spike and a matrix spike duplicate sample were recaluculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = activity of each analyte measured in the analysis of the sample.
True = activity of each analyte in the source.

A matrix spike and matrix spike duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample activity
D = Duplicate sample activity

Sample ID	Type of Analysis	Analyte	Found/S (units)	True/D (units)	Recalculated %R or RPD	Reported %R or RPD	Acceptable (Y/N)
LCS	Laboratory control sample	Ra-226	8.50 (pCi/g)	8.7 (pCi/g)	98	98	Y
—	Matrix spike sample	—	—	—	—	—	—
29	Duplicate RPD	Ra-226	1.00 (pCi/g)	0.9 (pCi/g)	11	11	Y
—	Chemical recovery	—	—	—	—	—	—

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 15801A29
SDG #: C06081541

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: MG
2nd reviewer: [signature]

METHOD: Radiochemistry (Method: 901.1)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A   Have results been reported and calculated correctly?
(Y) N N/A   Are results within the calibrated range of the instruments?

Analyte results for #1, Ra-226 (Bi-214) reported with a positive detect were recalculated and verified using the following equation:

Activity =

$$\frac{\text{(cpm - bckgrd cpm)}}{(2.22)(E)(Vol)(CF)}$$

Recalculation:

$$\frac{(63.8/60) - 1.8}{(2.22)(0.012)(0.4630)(179.9g)} = -0.33 \text{ pCi/g}$$

E = Efficiency
Vol = Volume
CF = %R, Self-absorbance, abundance, ect.

#	Sample ID	Analyte	Reported Concentration (pCi/g)	Calculated Concentration (pCi/g)	Acceptable (Y/N)
1	1	Ra-226	0.8	-0.33	N
2	3	Ra-226	1.1	-0.17	
3	5	Ra-226	1.1	-0.51	
4	7	Ra-226	1.1	-0.30	
5	9	Ra-226	1.2	-0.24	
6	11	Ra-226	1.0	-0.41	
7	13	Ra-226	1.0	-0.21	

Note:

LDC Report# 15801B29

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	United Nuclear Corporation, NE Church Rock Site
Collection Date:	August 17, 2006
LDC Report Date:	January 4, 2007
Matrix:	Soil
Parameters:	Radium 226
Validation Level:	EPA Level III
Laboratory:	Energy Laboratories, Inc.
Sample Delivery Group (SDG):	C06081542

Sample Identification

NECR COR-B-01
NECR COR-B-02
NECR COR-B-03
NECR COR-B-04
NECR COR-B-05
NECR COR-B-06
NECR COR-B-07
NECR COR-B-08
NECR COR-B-09
NECR COR-B-10
NECR COR-B-40
NECR COR-B-11
NECR COR-B-12
NECR COR-B-13
NECR COR-B-14
NECR COR-B-15
NECR COR-B-45
NECR COR-B-04DUP
NECR COR-B-45DUP

Introduction

This data review covers 19 soil samples listed on the cover sheet. The analyses were per EPA Method 901.1 for Radium 226.

The review follows the Quality Assurance Project Plan for United Nuclear Corporation Northeast Church Rock Site (Appendix A, August 2006) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

B The compound or analyte was found in an associated blank as well as in the sample.

U Data are qualified as non-detected, because the analyte was observed in an associated laboratory or field blank.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined and a self-absorption curve was generated for each radionuclide of interest.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within laboratory control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06081542	Radium 226	More than twenty samples associated to a method blank.	No more than twenty samples to be associated to a method blank.	None	P

Blank results contained less than the minimum detectable activity (MDA).

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06081542	Radium 226	More than twenty samples associated to a laboratory control sample.	No more than twenty samples to be associated to laboratory control sample.	None	P

Percent recoveries (%R) were within QC limits.

c. Chemical Recovery

Chemical recovery analysis was not required by the method.

V. Sample Result Verification

Raw data were not reviewed for this SDG.

VI. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

No field duplicates were identified in this SDG.

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Data Qualification Summary - SDG C06081542

SDG	Sample	Isotope	Flag	A or P	Reason
C06081542	NECR COR-B-01 NECR COR-B-02 NECR COR-B-03 NECR COR-B-04 NECR COR-B-05 NECR COR-B-06 NECR COR-B-07 NECR COR-B-08 NECR COR-B-09 NECR COR-B-10 NECR COR-B-40 NECR COR-B-11 NECR COR-B-12 NECR COR-B-13 NECR COR-B-14 NECR COR-B-15 NECR COR-B-45	Radium 226	None	P	Method blank
C06081542	NECR COR-B-01 NECR COR-B-02 NECR COR-B-03 NECR COR-B-04 NECR COR-B-05 NECR COR-B-06 NECR COR-B-07 NECR COR-B-08 NECR COR-B-09 NECR COR-B-10 NECR COR-B-40 NECR COR-B-11 NECR COR-B-12 NECR COR-B-13 NECR COR-B-14 NECR COR-B-15 NECR COR-B-45	Radium 226	None	P	Laboratory control samples

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Laboratory Blank Data Qualification Summary - SDG C06081542

No Sample Data Qualified in this SDG

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Field Blank Data Qualification Summary - SDG C06081542

No Sample Data Qualified in this SDG

LDC Report# 15801C29

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	United Nuclear Corporation, NE Church Rock Site
Collection Date:	August 17 through August 18, 2006
LDC Report Date:	January 4, 2007
Matrix:	Soil
Parameters:	Radium 226
Validation Level:	EPA Level III
Laboratory:	Energy Laboratories, Inc.
Sample Delivery Group (SDG):	C06081547

Sample Identification

NECR-COR-A-01
NECR-COR-A-02
NECR-COR-A-03
NECR-COR-A-04
NECR-COR-A-05
NECR-COR-A-06
NECR-COR-A-07
NECR-COR-A-08
NECR-COR-A-09
NECR-COR-A-10
NECR-COR-A-50
NECR-COR-A-11
NECR-COR-A-12
NECR-COR-A-13
NECR-COR-A-14
NECR-COR-A-15
NECR-COR-A-55
NECR-COR-A-16
NECR-COR-A-17
NECR-COR-A-18
NECR-COR-A-10DUP
NECR-COR-A-18DUP

Introduction

This data review covers 22 soil samples listed on the cover sheet. The analyses were per EPA Method 901.1 for Radium 226.

The review follows the Quality Assurance Project Plan for United Nuclear Corporation Northeast Church Rock Site (Appendix A, August 2006) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

B The compound or analyte was found in an associated blank as well as in the sample.

U Data are qualified as non-detected, because the analyte was observed in an associated laboratory or field blank.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined and a self-absorption curve was generated for each radionuclide of interest.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within laboratory control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06081547	Radium 226	More than twenty samples associated to a method blank.	No more than twenty samples to be associated to a method blank.	None	P

Blank results contained less than the minimum detectable activity (MDA).

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06081547	Radium 226	More than twenty samples associated to a laboratory control sample.	No more than twenty samples to be associated to laboratory control sample.	None	P

Percent recoveries (%R) were within QC limits.

c. Chemical Recovery

Chemical recovery analysis was not required by the method.

V. Sample Result Verification

Raw data were not reviewed for this SDG.

VI. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

No field duplicates were identified in this SDG.

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Data Qualification Summary - SDG C06081547

SDG	Sample	Isotope	Flag	A or P	Reason
C06081547	NECR-COR-A-01 NECR-COR-A-02 NECR-COR-A-03 NECR-COR-A-04 NECR-COR-A-05 NECR-COR-A-06 NECR-COR-A-07 NECR-COR-A-08 NECR-COR-A-09 NECR-COR-A-10 NECR-COR-A-50 NECR-COR-A-11 NECR-COR-A-12 NECR-COR-A-13 NECR-COR-A-14 NECR-COR-A-15 NECR-COR-A-55 NECR-COR-A-16 NECR-COR-A-17 NECR-COR-A-18	Radium 226	None	P	Method blank
C06081547	NECR-COR-A-01 NECR-COR-A-02 NECR-COR-A-03 NECR-COR-A-04 NECR-COR-A-05 NECR-COR-A-06 NECR-COR-A-07 NECR-COR-A-08 NECR-COR-A-09 NECR-COR-A-10 NECR-COR-A-50 NECR-COR-A-11 NECR-COR-A-12 NECR-COR-A-13 NECR-COR-A-14 NECR-COR-A-15 NECR-COR-A-55 NECR-COR-A-16 NECR-COR-A-17 NECR-COR-A-18	Radium 226	None	P	Laboratory control samples

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Laboratory Blank Data Qualification Summary - SDG C06081547

No Sample Data Qualified in this SDG

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Field Blank Data Qualification Summary - SDG C06081547

No Sample Data Qualified in this SDG

Analytical Method/Analytes: Metals

Laboratory: Energy Laboratories

Batch Identification: C06110737

Sample Collection Date(s): 11/13/06

MW Job Number:

Matrix: Groundwater : Solid

Field Duplicates: **Sand2-SS-012** **Sand1-SS-049**

MS/MSD Parent: **Sand2-SS-003** **Sand1-SS-028**

Sand1-SS-063 **Sand1-SS-043**

Validation Complete: (Signature and Date) 03/12/07 Craig Moore

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
Sand2-SS-003	C06110737-001	Y	B	Se in MB. Sample concentration > 5X but < 50X	1
	SPLP	Y	B	U in MB. Sample concentration > 5X but < 50X	5
Sand2-SS-004	C06110737-002	Y	B	Se in MB. Sample concentration > 5X but < 50X	1
Sand2-SS-006	C06110737-003	Y	B	Se in MB. Sample concentration > 5X but < 50X	1
Sand2-SS-007	C06110737-004	Y			1
Sand2-SS-010	C06110737-005	Y	B	Se in MB. Sample concentration > 5X but < 50X	1
	SPLP	Y			5
Sand2-SS-011	C06110737-006	Y			1
Sand2-SS-212	C06110737-007	Y	B	Se in MB. Sample concentration > 5X but < 50X	1
Sand2-SS-012	C06110737-008	Y	B	Se in MB. Sample concentration > 5X but < 50X	1
Sand2-SS-014	C06110737-009	Y			1
Sand2-SS-015	C06110737-010	Y	B	Se in MB. Sample concentration > 5X but < 50X	1
Sand2-SS-016	C06110737-011	Y			1
Sand2-SS-017	C06110737-012	Y			1
Sand2-SS-019	C06110737-013	Y			1
Sand2-SS-020	C06110737-014	Y			1
Sand1-SS-044	C06110737-015	Y			1
Sand1-SS-049	C06110737-016	Y			1
Sand1-SS-249	C06110737-017	Y			1
Sand1-SS-050	C06110737-018	Y			1
Sand1-SS-051	C06110737-019	Y	B	Se in MB. Sample concentration > 5X but < 50X	1
Sand1-SS-063	C06110737-020	Y	J	LR RPD ouside citeria	1 2
Sand1-SS-068	C06110737-021	Y			3
Sand1-SS-017	C06110737-022	Y	B	Se in MB. Sample concentration > 5X but < 50X	3
Sand1-SS-030	C06110737-023	Y	B	Se in MB. Sample concentration > 5X but < 50X	3
Sand1-SS-011	C06110737-024	Y	B	Se in MB. Sample concentration > 5X but < 50X	3
Sand1-SS-041	C06110737-025	Y	B	Se in MB. Sample concentration > 5X but < 50X	3
Sand1-SS-021	C06110737-026	Y	B	Se in MB. Sample concentration > 5X but < 50X	3
Sand1-SS-027	C06110737-027	Y	B	Se in MB. Sample concentration > 5X but < 50X	3
Sand1-SS-009	C06110737-028	Y	B	Se in MB. Sample concentration > 5X but < 50X	3
Sand1-SS-028	C06110737-029	Y	B	Se in MB. Sample concentration > 5X but < 50X	3
Sand1-SS-043	C06110737-030	Y	J	LR RPD ouside citeria	3 4

1 MB (MB12829) contains Se @ 0.02 mg/kg. No qualifcation for ND or for concentration > 50 MB concentration. Qualify w/"B" where sample cncnetration > 5X but < 50X MB concentration.

2 LR RPD outside acceptance criteria for Se (24% [20]). Qualify parent w/"J"

3 MB (MB12830) contains Mb @ 0.004 mg/kg, Se @ 0.02 mg/kg. All associated sample ND for Mb. For Se, No qualifcation for concentration > 50 MB concentration. Qualify w/"B" where sample cncnetration > 5X but < 50X MB concentration.

4 LR RPD outside acceptance criteria for Se (25% [20]). Qualify parent w/"J"

5 MB (MB13190) contains U @ 0.004 mg/kg. No qualifcation for concentration > 50 MB concentration. Qualify w/"B" where sample cncnetration > 5X but < 50X MB concentration

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06110737

Analysis	Total Metals											
Sample ID	**2-SS-003**	**SPLP**	**2-SS-004**	**2-SS-006**	**2-SS-007**	**2-SS-010**	**SPLP**	**2-SS-011**	**2-SS-212**	**2-SS-012**	**2-SS-014**	**2-SS-015**
Laboratory ID	**-01**		**-02**	**-03**	**-04**	**-05**		**-06**	**-07**	**-08**	**-09**	**-10**
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A
Interference Check Standard (ICP method)	A	A	A	A	A	A	A	A	A	A	A	A
ICP Serial Dilution	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A[1]	A[5]	A[1]	A[1]	A[1]	A[1]	A[5]	A[1]	A[1]	A[1]	A[1]	A[1]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Post Digestion Spike	A	A	A	A	A	A	A	A	A	A	A	A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch ID
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific requirement
N/A indicates criteria are not applicable for the specified analytical method

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06110737

Analysis	Total Metals											
Sample ID	2-SS-016	2-SS-017	2-SS-019	2-SS-020	1-SS-044	1-SS-049	1-SS-249	1-SS-050	1-SS-051	1-SS-063	1-SS-068	1-SS-017
Laboratory ID	-11	-12	-13	-14	-15	-16	-17	-18	-19	-20	-21	-22
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A
Interference Check Standard (ICP method)	A	A	A	A	A	A	A	A	A	A	A	A
ICP Serial Dilution	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[3]	A[3]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A[2]	N/A	N/A
Post Digestion Spike	A	A	A	A	A	A	A	A	A	A	A	A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	A	A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06110737

Analysis	Total Metals							
Sample ID	1-SS-030	1-SS-011	1-SS-041	1-SS-021	1-SS-027	1-SS-009	1-SS-028	1-SS-043
Laboratory ID	-23	-24	-25	-26	-27	-28	-29	-30
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A
Interference Check Standard (ICP method)	A	A	A	A	A	A	A	A
ICP Serial Dilution	A	A	A	A	A	A	A	A
Method Blank	A[3]	A[3]	A[3]	A[3]	A[3]	A[3]	A[3]	A[3]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A[4]
Post Digestion Spike	A	A	A	A	A	A	A	A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

LDC Report# 16435A29

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: United Nuclear Corporation, NE Church Rock Site

Collection Date: November 13, 2006

LDC Report Date: March 28, 2007

Matrix: Soil

Parameters: Radium 226

Validation Level: EPA Level III

Laboratory: Energy Laboratories, Inc.

Sample Delivery Group (SDG): C06110737

Sample Identification

Sand2-SS-003
Sand2-SS-004
Sand2-SS-006
Sand2-SS-007
Sand2-SS-010
Sand2-SS-011
Sand2-SS-212
Sand2-SS-012
Sand2-SS-014
Sand2-SS-015
Sand2-SS-016
Sand2-SS-017
Sand2-SS-019
Sand2-SS-020
Sand1-SS-044
Sand1-SS-049
Sand1-SS-249
Sand1-SS-050
Sand1-SS-051
Sand1-SS-063
Sand1-SS-068
Sand1-SS-017
Sand1-SS-030
Sand1-SS-011
Sand1-SS-041
Sand1-SS-021
Sand1-SS-027
Sand1-SS-009
Sand1-SS-028
Sand1-SS-043
Sand2-SS-003SPLP
Sand2-SS-010SPLP
Sand2-SS-015DUP
Sand1-SS-063DUP
Sand1-SS-043DUP

Introduction

This data review covers 35 soil samples listed on the cover sheet. The analyses were per EPA Method 901.1 and EPA Method 903.0 for Radium 226.

The review follows the Quality Assurance Project Plan for United Nuclear Corporation Northeast Church Rock Site (Appendix A, August 2006) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

B The compound or analyte was found in an associated blank as well as in the sample.

U Data are qualified as non-detected, because the analyte was observed in an associated laboratory or field blank.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding. therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within laboratory control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06110737	Radium 226	More than twenty samples associated to a method blank.	No more than twenty samples to be associated to a method blank.	None	P

Blank results contained less than the minimum detectable activity (MDA).

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Isotope	RPD (Limits)	Flag	A or P
SANDI-TP-063(0.5-1.0)SPLPDUP (Sand2-SS-003SPLP Sand2-SS-010SPLP)	Ra-226	33 (≤30)	J (all detects)	A

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06110737	Radium 226	More than twenty samples associated to a laboratory control sample.	No more than twenty samples to be associated to laboratory control sample.	None	P

Percent recoveries (%R) were within QC limits.

c. Chemical Recovery

Chemical recovery analysis were within QC limits for Method 903.0 .

V. Sample Result Verification

All sample result verifications met validation criteria with the following exceptions:

Sample	Isotope	Laboratory Reporting Limit	QAPP Reporting Limit	Flag	A or P
Sand2-SS-003SPLP Sand2-SS-010SPLP	Ra-226	0.2 pCi/L	0.1 pCi/L	None	P

Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

Samples Sand2-SS-212 and Sand2-SS-012 and samples Sand1-SS-049 and Sand1-SS-249 were identified as field duplicates. No Radium 226 was detected in any of the samples with the following exceptions:

Isotope	Activity (pCi/g)		RPD (Limits)
	Sand2-SS-212	Sand2-SS-012	
Radium 226	6.6	6.2	6 (≤30)

Isotope	Activity (pCi/g)		RPD (Limits)
	Sand1-SS-049	Sand1-SS-249	
Radium 226	16.8	19.1	13 (≤30)

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Data Qualification Summary - SDG C06110737

SDG	Sample	Isotope	Flag	A or P	Reason
C06110737	Sand2-SS-003 Sand2-SS-004 Sand2-SS-006 Sand2-SS-007 Sand2-SS-010 Sand2-SS-011 Sand2-SS-212 Sand2-SS-012 Sand2-SS-014 Sand2-SS-015 Sand2-SS-016 Sand2-SS-017 Sand2-SS-019 Sand2-SS-020 Sand1-SS-044 Sand1-SS-049 Sand1-SS-249 Sand1-SS-050 Sand1-SS-051 Sand1-SS-063 Sand1-SS-068 Sand1-SS-017 Sand1-SS-030 Sand1-SS-011 Sand1-SS-041 Sand1-SS-021 Sand1-SS-027 Sand1-SS-009 Sand1-SS-028 Sand1-SS-043 Sand2-SS-003SPLP Sand2-SS-010SPLP	Radium 226	None	P	Method blank
C06110737	Sand2-SS-003SPLP Sand2-SS-010SPLP	Radium 226	J (all detects)	A	Duplicate analysis (RPD)

SDG	Sample	Isotope	Flag	A or P	Reason
C06110737	Sand2-SS-003 Sand2-SS-004 Sand2-SS-006 Sand2-SS-007 Sand2-SS-010 Sand2-SS-011 Sand2-SS-212 Sand2-SS-012 Sand2-SS-014 Sand2-SS-015 Sand2-SS-016 Sand2-SS-017 Sand2-SS-019 Sand2-SS-020 Sand1-SS-044 Sand1-SS-049 Sand1-SS-249 Sand1-SS-050 Sand1-SS-051 Sand1-SS-063 Sand1-SS-068 Sand1-SS-017 Sand1-SS-030 Sand1-SS-011 Sand1-SS-041 Sand1-SS-021 Sand1-SS-027 Sand1-SS-009 Sand1-SS-028 Sand1-SS-043 Sand2-SS-003SPLP Sand2-SS-010SPLP	Radium 226	None	P	Laboratory control samples
C06110737	Sand2-SS-003SPLP Sand2-SS-010SPLP	Ra-226	None	P	Sample result verification

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Laboratory Blank Data Qualification Summary - SDG C06110737

No Sample Data Qualified in this SDG

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Field Blank Data Qualification Summary - SDG C06110737

No Sample Data Qualified in this SDG

Analytical Method/Analytes: Metals

Laboratory: Energy Laboratories

Batch Identification: C06110906

Sample Collection Date(s): 11/13,15,16/06

MW Job Number:

Matrix: Groundwater : Solid

Field Duplicates: SAND3-SS-014, HOME2-SS-004, NECR2-TP-039 [1-1.5], HOME4-SS-002, NECR2-SS-039

MS/MSD Parent: NECR2-TP-239 [1-1.5], HOME5-SS-003, NECR2-SS-050, HOME9-SS-005, HOME1-SS-003

Validation Complete: (Signature and Date) 03/12/07 Craig Moore

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
SAND3-SS-026	C06110906-001	Y			
SAND3-SS-025	C06110906-002	Y			
SAND3-SS-024	C06110906-003	Y			
SAND3-SS-022	C06110906-004	Y			
SAND3-SS-014	C06110906-005	Y			
SAND3-SS-214	C06110906-006	Y			
SAND3-SS-027	C06110906-007	Y			
SAND3-SS-09	C06110906-008	Y			
SAND3-SS-05	C06110906-009	Y			
SAND3-SS-010	C06110906-010	Y			
SAND3-SS-017	C06110906-011	Y			
SPLP		Y	B	U detected in MB. Sample cocentration > 5X	1
SAND3-SS-006	C06110906-012	Y			
SAND3-SS-002	C06110906-013	Y			
SAND3-SS-008	C06110906-014	Y			
NECR2-TP-035 [1-1.5]	C06110906-015	Y			
NECR2-TP-052 [1.5-2]	C06110906-016	Y			
NECR2-TP-052 [4-5]	C06110906-017	Y			
NECR2-TP-020 [1-1.5]	C06110906-018	Y			
NECR2-TP-039 [1-1.5]	C06110906-019	Y			
NECR2-TP-239 [1-1.5]	C06110906-020	Y			
NECR2-TP-015 [0.5-1]	C06110906-021	Y			
SAND2-TP-011 [0.5-1]	C06110906-022	Y			
SAND2-TP-012 [1.5-2]	C06110906-023	Y			
SAND2-TP-017 [1.5-2]	C06110906-024	Y			
SAND2-TP-019 [1-1.5]	C06110906-025	Y			
SAND2-TP-008 [0.5-1]	C06110906-026	Y			
NEMSA-TP-001 [0-0.5]	C06110906-027	Y			
NEMSA-TP-001 [1-1.5]	C06110906-028	Y			
NEMSA-TP-001 [4-5]	C06110906-029	Y			
NEMSA-TP-001 [6-6.5]	C06110906-030	Y			
YARD-TP-001 [0-0.5]	C06110906-031	Y			
NECR2-SS-015	C06110906-032	Y			
NECR2-SS-017	C06110906-033	Y			
NECR2-SS-018	C06110906-034	Y			

Analytical Method/Analytes: Metals **Sample Collection Date(s): 11/13,15,16/06**

Laboratory: Energy Laboratories **MW Job Number:**

Batch Identification: C06110906 **Matrix: Groundwater : Solid**

Field Duplicates: SAND3-SS-014 HOME2-SS-004
NECR2-TP-039 [1-1.5] HOME4-SS-002
NECR2-SS-039

MS/MSD Parent: NECR2-TP-239 [1-1.5] HOME5-SS-003
NECR2-SS-050 HOME9-SS-005
HOME1-SS-003

Validation Complete: (Signature and Date) 03/12/07 Craig Moore

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
NECR2-SS-033	C06110906-035	Y			
NECR2-SS-037	C06110906-036	Y			
NECR2-SS-035	C06110906-037	Y			
NECR2-SS-039	C06110906-038	Y			
NECR2-SS-239 (Rep)	C06110906-039	Y			
NECR2-SS-050	C06110906-040	Y			
NECR2-SS-056	C06110906-041	Y			
NECR2-SS-020	C06110906-042	Y			
NECR2-SS-069	C06110906-043	Y			
NECR2-SS-071	C06110906-044	Y			
NECR2-SS-052	C06110906-045	Y			
NECR2-SS-004	C06110906-046	Y			
NECR2-SS-027	C06110906-047	Y			
HOME1-SS-001	C06110906-048	Y			
HOME1-SS-002	C06110906-049	Y			
HOME1-SS-003	C06110906-050	Y			
HOME1-SS-004	C06110906-051	Y			
HOME1-SS-005	C06110906-052	Y			
HOME2-SS-001	C06110906-053	Y			
HOME2-SS-002	C06110906-054	Y			
HOME2-SS-003	C06110906-055	Y			
HOME2-SS-004	C06110906-056	Y			
HOME2-SS-204	C06110906-057	Y			
HOME2-SS-005	C06110906-058	Y			
HOME3-SS-001	C06110906-059	Y			
HOME3-SS-002	C06110906-060	Y			
HOME3-SS-003	C06110906-061	Y			
HOME3-SS-004	C06110906-062	Y			
HOME3-SS-005	C06110906-063	Y			
HOME4-SS-001	C06110906-064	Y			
HOME4-SS-002	C06110906-065	Y			
HOME4-SS-202	C06110906-066	Y			
HOME4-SS-003	C06110906-067	Y			
HOME4-SS-004	C06110906-068	Y			
HOME4-SS-005	C06110906-069	Y			

Analytical Method/Analytes: Metals

Sample Collection Date(s): 11/13,15,16/06

Laboratory: Energy Laboratories

MW Job Number:

Batch Identification: C06110906

Matrix: Groundwater : Solid

Field Duplicates: SAND3-SS-014, HOME2-SS-004, NECR2-TP-039 [1-1.5], HOME4-SS-002, NECR2-SS-039

MS/MSD Parent: NECR2-TP-239 [1-1.5], HOME5-SS-003, NECR2-SS-050, HOME9-SS-005, HOME1-SS-003

Validation Complete: (Signature and Date) 03/12/07 Craig Moore

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
HOME5-SS-001	C06110906-070	Y			
HOME5-SS-002	C06110906-071	Y			
HOME5-SS-003	C06110906-072	Y			
HOME5-SS-004	C06110906-073	Y			
HOME5-SS-005	C06110906-074	Y			
HOME6-SS-001	C06110906-075	Y			
HOME6-SS-002	C06110906-076	Y			
HOME6-SS-003	C06110906-077	Y			
HOME6-SS-004	C06110906-078	Y			
HOME6-SS-005	C06110906-079	Y			
HOME7-SS-001	C06110906-080	Y			
HOME7-SS-002	C06110906-081	Y			
HOME7-SS-003	C06110906-082	Y			
HOME7-SS-004	C06110906-083	Y			
HOME7-SS-005	C06110906-084	Y			
HOME8-SS-001	C06110906-085	Y			
HOME8-SS-002	C06110906-086	Y			
HOME8-SS-003	C06110906-087	Y			
HOME8-SS-004	C06110906-088	Y			
HOME8-SS-005	C06110906-089	Y			
HOME9-SS-001	C06110906-090	Y			
HOME9-SS-002	C06110906-091	Y			
HOME9-SS-003	C06110906-092	Y			
HOME9-SS-004	C06110906-093	Y			
HOME9-SS-005	C06110906-094	Y			

1 MB (MB-13190) contains U @ 0.0001 mg/l. Associated sample concentration > 5X MB concentration. Qualify w/ "B".

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06110906

Analysis	**Total Metals**													
Sample ID	**SAND3-SS-026**	**SAND3-SS-025**	**SAND3-SS-024**	**SAND3-SS-022**	**SAND3-SS-014**	**SAND3-SS-214**	**SAND3-SS-027**	**SAND3-SS-09**	**SAND3-SS-05**	**SAND3-SS-010**	**SAND3-SS-017**	**SPLP**	**SAND3-SS-006**	**SAND3-SS-002**
Laboratory ID	-01	-02	-03	-04	-05	-06	-07	-08	-09	-10	-11		-12	-13
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A[1]	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch ID
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific requirement
N/A indicates criteria are not applicable for the specified analytical method

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06110906

Analysis	Total Metals													
Sample ID	SAND3-SS-008	NECR2-TP-035 [1-1.5]	NECR2-TP-052 [1.5-2]	NECR2-TP-052 [4-5]	NECR2-TP-020 [1-1.5]	NECR2-TP-039 [1-1.5]	NECR2-TP-239 [1-1.5]	NECR2-TP-015 [0.5-1]	SAND2-TP-011 [0.5-1]	SAND2-TP-012 [1.5-2]	SAND2-TP-017 [1.5-2]	SAND2-TP-019 [1-1.5]	SAND2-TP-008 [0.5-1]	NEMSA-TP-001 [0-0.5]
Laboratory ID	-14	-15	-16	-17	-18	-19	-20	-21	-22	-23	-24	-25	-26	-27
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06110906

Analysis	Total Metals													
Sample ID	NEMSA-TP-001 [1-1.5]	NEMSA-TP-001 [4-5]	NEMSA-TP-001 [6-6.5]	YARD-TP-001 [0-0.5]	NECR2-SS-015	NECR2-SS-017	NECR2-SS-018	NECR2-SS-033	NECR2-SS-037	NECR2-SS-035	NECR2-SS-039	NECR2-SS-239 (Rep)	NECR2-SS-050	NECR2-SS-056
Laboratory ID	-28	-29	-30	-31	-32	-33	-34	-35	-36	-37	-38	-39	-40	-41
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06110906

Analysis	Total Metals												
Sample ID	NECR2-SS-020	NECR2-SS-069	NECR2-SS-071	NECR2-SS-052	NECR2-SS-004	NECR2-SS-027	HOME1-SS-001	HOME1-SS-002	HOME1-SS-003	HOME1-SS-004	HOME1-SS-005	HOME2-SS-001	HOME2-SS-002
Laboratory ID	-42	-43	-44	-45	-46	-47	-48	-49	-50	-51	-52	-53	-54
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
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Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06110906

Analysis	Total Metals												
Sample ID	HOME2-SS-003	HOME2-SS-004	HOME2-SS-204	HOME2-SS-005	HOME3-SS-001	HOME3-SS-002	HOME3-SS-003	HOME3-SS-004	HOME3-SS-005	HOME4-SS-001	HOME4-SS-002	HOME4-SS-202	HOME4-SS-003
Laboratory ID	-55	-56	-57	-58	-59	-60	-61	-62	-63	-64	-65	-66	-67
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
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Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06110906

Analysis	Total Metals												
Sample ID	HOME4-SS-004	HOME4-SS-005	HOME5-SS-001	HOME5-SS-002	HOME5-SS-003	HOME5-SS-004	HOME5-SS-005	HOME6-SS-001	HOME6-SS-002	HOME6-SS-003	HOME6-SS-004	HOME6-SS-005	HOME7-SS-001
Laboratory ID	-68	-69	-70	-71	-72	-73	-74	-75	-76	-77	-78	-79	-80
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
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N/A indicates criteria are not applicable for the specifi

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06110906

Analysis	**Total Metals**													
Sample ID	**HOME7-SS-002**	**HOME7-SS-003**	**HOME7-SS-004**	**HOME7-SS-005**	**HOME8-SS-001**	**HOME8-SS-002**	**HOME8-SS-003**	**HOME8-SS-004**	**HOME8-SS-005**	**HOME9-SS-001**	**HOME9-SS-002**	**HOME9-SS-003**	**HOME9-SS-004**	**HOME9-SS-005**
Laboratory ID	**-81**	**-82**	**-83**	**-84**	**-85**	**-86**	**-87**	**-88**	**-89**	**-90**	**-91**	**-92**	**-93**	**-94**
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
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N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

LDC Report# 16361B29

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	United Nuclear Corporation, NE Church Rock Site
Collection Date:	November 14 through November 16, 2006
LDC Report Date:	April 3, 2007
Matrix:	Soil
Parameters:	Radium 226
Validation Level:	EPA Level III and IV
Laboratory:	Energy Laboratories, Inc.
Sample Delivery Group (SDG):	C06110906

Sample Identification

SAND3-SS-026
SAND3-SS-025
SAND3-SS-024
SAND3-SS-022
SAND3-SS-014**
SAND3-SS-214
SAND3-SS-027
SAND3-SS-09
SAND3-SS-05
SAND3-SS-010**
SAND3-SS-017
SAND3-SS-006
SAND3-SS-002
SAND3-SS-008
NEC2-TP-035(1.0-1.5)**
NEC2-TP-052(1.5-2.0)
NEC2-TP-052(4.0-5.0)
NEC2-TP-020(1.0-1.5)
NEC2-TP-039(1.0-1.5)
NEC2-TP-239(1.0-1.5)**
NEC2-TP-015(0.5-1.0)
SAND2-TP-011(0.5-1.0)
SAND2-TP-012(1.5-2)
SAND2-TP-017(1.5-2)
SAND2-TP-019(1-1.5)**
SAND2-TP-008(0.5-1.0)
NEMSA-TP-001(0-0.5)
NEMSA-TP-001(1-1.5)
NEMSA-TP-001(4-5)
NEMSA-TP-001(6-6.5)**
YARD-TP-001(0-0.5)
NECR2-SS-015
NECR2-SS-017
NECR2-SS-018
NECR2-SS-033**
NECR2-SS-037
NECR2-SS-035
NECR2-SS-039
NECR2-SS-239(Rep)
NECR2-SS-050**
NECR2-SS-056
NECR2-SS-020
NECR2-SS-069
NECR2-SS-071
NECR2-SS-052**
NECR2-SS-004
NECR2-SS-027
HOME1-SS-001
HOME1-SS-002
HOME1-SS-003
HOME1-SS-004
HOME1-SS-005
HOME2-SS-001
HOME2-SS-002
HOME2-SS-003
HOME2-SS-004
HOME2-SS-204
HOME2-SS-005
HOME3-SS-001
HOME3-SS-002
HOME3-SS-003
HOME3-SS-004
HOME3-SS-005
HOME4-SS-001
HOME4-SS-002
HOME4-SS-202
HOME4-SS-003
HOME4-SS-004
HOME4-SS-005
HOME5-SS-001
HOME5-SS-002
HOME5-SS-003
HOME5-SS-004
HOME5-SS-005
HOME6-SS-001
HOME6-SS-002
HOME6-SS-003
HOME6-SS-004
HOME6-SS-005
HOME7-SS-001
HOME7-SS-002
HOME7-SS-003
HOME7-SS-004
HOME7-SS-005
HOME8-SS-001
HOME8-SS-002
HOME8-SS-003
HOME8-SS-004
HOME8-SS-005
HOME9-SS-001
HOME9-SS-002
HOME9-SS-003
HOME9-SS-004
HOME9-SS-005
SAND3-SS-010DUP
NEC2-TP-239(1.0-1.5)DUP
NEMSA-TP-001(6-6.5)DUP
NECR2-SS-050DUP
HOME1-SS-003DUP
HOME3-SS-002DUP
HOME5-SS-001DUP
HOME7-SS-001DUP
HOME9-SS-001DUP
SAND5-SS-017SPLP**

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 104 soil samples listed on the cover sheet. The analyses were per EPA Method 901.1 and EPA Method 903.0 for Radium 226.

The review follows the Quality Assurance Project Plan for United Nuclear Corporation Northeast Church Rock Site (Appendix A, August 2006) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

B The compound or analyte was found in an associated blank as well as in the sample.

U Data are qualified as non-detected, because the analyte was observed in an associated laboratory or field blank.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within laboratory control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06110906 except sample SAND3-SS-017SPLP**	Radium 226	More than twenty samples associated to a method blank.	No more than twenty samples to be associated to a method blank.	None	P

Blank results contained less than the minimum detectable activity (MDA).

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Isotope	RPD (Limits)	Flag	A or P
NEMSA-TP-001(6-6.5)DUP (NEC2-TP-035(1.0-1.5)** NEC2-TP-052(1.5-2.0) NEC2-TP-052(4.0-5.0) NEC2-TP-020(1.0-1.5) NEC2-TP-039(1.0-1.5) NEC2-TP-239(1.0-1.5)** NEC2-TP-015(0.5-1.0) SAND2-TP-011(0.5-1.0) SAND2-TP-012(1.5-2) SAND2-TP-017(1.5-2) SAND2-TP-019(1-1.5)** SAND2-TP-008(0.5-1.0) NEMSA-TP-001(0-0.5) NEMSA-TP-001(1-1.5) NEMSA-TP-001(4-5) NEMSA-TP-001(6-6.5)** YARD-TP-001(0-0.5) NECR2-SS-015 NECR2-SS-017 NECR2-SS-018 NECR2-SS-033** NECR2-SS-037 NECR2-SS-035 NECR2-SS-039 NECR2-SS-239(Rep) NECR2-SS-050** NECR2-SS-056 NECR2-SS-020 NECR2-SS-069 NECR2-SS-071 NECR2-SS-052** NECR2-SS-004)	Ra-226	60 (≤30)	J (all detects)	A

DUP ID (Associated Samples)	Isotope	RPD (Limits)	Flag	A or P
NECR2-SS-050DUP (NEC2-TP-035(1.0-1.5)** NEC2-TP-052(1.5-2.0) NEC2-TP-052(4.0-5.0) NEC2-TP-020(1.0-1.5) NEC2-TP-039(1.0-1.5) NEC2-TP-239(1.0-1.5)** NEC2-TP-015(0.5-1.0) SAND2-TP-011(0.5-1.0) SAND2-TP-012(1.5-2) SAND2-TP-017(1.5-2) SAND2-TP-019(1-1.5)** SAND2-TP-008(0.5-1.0) NEMSA-TP-001(0-0.5) NEMSA-TP-001(1-1.5) NEMSA-TP-001(4-5) NEMSA-TP-001(6-6.5)** YARD-TP-001(0-0.5) NECR2-SS-015 NECR2-SS-017 NECR2-SS-018 NECR2-SS-033** NECR2-SS-037 NECR2-SS-035 NECR2-SS-039 NECR2-SS-239(Rep) NECR2-SS-050** NECR2-SS-056 NECR2-SS-020 NECR2-SS-069 NECR2-SS-071 NECR2-SS-052** NECR2-SS-004)	Ra-226	34 (≤30)	J (all detects)	A

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06110906 except sample SAND3-SS-017SPLP**	Radium 226	More than twenty samples associated to a laboratory control sample.	No more than twenty samples to be associated to laboratory control sample.	None	P

Percent recoveries (%R) were within QC limits.

c. Chemical Recovery

Chemical recovery analysis were within QC limits for Method 903.0 .

V. Sample Result Verification

All sample result verifications were acceptable for samples on which a EPA Level IV review was performed.

All sample result verifications met validation criteria with the following exceptions:

Sample	Isotope	Laboratory Reporting Limit	QAPP Reporting Limit	Flag	A or P
SAND3-SS-017SPLP**	Ra-226	0.2 pCi/L	0.1 pCi/L	None	P

Results for Level IV gamma spectrometry samples could not be recalculated because the gamma spectrometry instruments use proprietary equations developed by both Ortec and Canberra. The laboratory has never been privy to the calculation factors used to generate the data output. Results are accepted based on the accuracy of an LCS sample.

Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

Samples SAND3-SS-014** and SAND3-SS-214, samples NEC2-TP-039(1.0-1.5) and NEC2-TP-239(1.0-1.5)**, samples NECR2-SS-039 and NECR2-SS-239(Rep), samples HOME2-SS-004 and HOME2-SS-204, and samples HOME4-SS-002 and HOME4-SS-202 were identified as field duplicates. No Radium 226 was detected in any of the samples with the following exceptions:

	Activity (pCi/g)		
Isotope	SAND3-SS-014**	SAND3-SS-214	RPD (Limits)
Radium 226	123	123	0 (≤30)

	Activity (pCi/g)		
Isotope	NEC2-TP-039(1.0-1.5)	NEC2-TP-239(1.0-1.5)**	RPD (Limits)
Radium 226	5.5	5.2	6 (≤30)

Isotope	Activity (pCi/g)		RPD (Limits)
	NECR2-SS-039	NECR2-SS-239(Rep)	
Radium 226	35.4	33.7	5 (≤30)

Isotope	Activity (pCi/g)		RPD (Limits)
	HOME2-SS-004	HOME2-SS-204	
Radium 226	0.9	1.0	11 (≤30)

Isotope	Activity (pCi/g)		RPD (Limits)
	HOME4-SS-002	HOME4-SS-202	
Radium 226	2.1	2.1	0 (≤30)

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Data Qualification Summary - SDG C06110906

SDG	Sample	Isotope	Flag	A or P	Reason
C06110906	SAND3-SS-026 SAND3-SS-025 SAND3-SS-024 SAND3-SS-022 SAND3-SS-014** SAND3-SS-214 SAND3-SS-027 SAND3-SS-09 SAND3-SS-05 SAND3-SS-010** SAND3-SS-017 SAND3-SS-006 SAND3-SS-002 SAND3-SS-008 NEC2-TP-035(1.0-1.5)** NEC2-TP-052(1.5-2.0) NEC2-TP-052(4.0-5.0) NEC2-TP-020(1.0-1.5) NEC2-TP-039(1.0-1.5) NEC2-TP-239(1.0-1.5)** NEC2-TP-015(0.5-1.0) SAND2-TP-011(0.5-1.0) SAND2-TP-012(1.5-2) SAND2-TP-017(1.5-2) SAND2-TP-019(1-1.5)** SAND2-TP-008(0.5-1.0) NEMSA-TP-001(0-0.5) NEMSA-TP-001(1-1.5) NEMSA-TP-001(4-5) NEMSA-TP-001(6-6.5)** YARD-TP-001(0-0.5) NECR2-SS-015 NECR2-SS-017 NECR2-SS-018 NECR2-SS-033** NECR2-SS-037 NECR2-SS-035 NECR2-SS-039 NECR2-SS-239(Rep) NECR2-SS-050** NECR2-SS-056 NECR2-SS-020 NECR2-SS-069 NECR2-SS-071 NECR2-SS-052** NECR2-SS-004 NECR2-SS-027 HOME1-SS-001 HOME1-SS-002 HOME1-SS-003 HOME1-SS-004 HOME1-SS-005 HOME2-SS-001 HOME2-SS-002 HOME2-SS-003 HOME2-SS-004 HOME2-SS-204 HOME2-SS-005	Radium 226	None	P	Method blank

SDG	Sample	Isotope	Flag	A or P	Reason
C06110906	HOME3-SS-001 HOME3-SS-002 HOME3-SS-003 HOME3-SS-004 HOME3-SS-005 HOME4-SS-001 HOME4-SS-002 HOME4-SS-202 HOME4-SS-003 HOME4-SS-004 HOME4-SS-005 HOME5-SS-001 HOME5-SS-002 HOME5-SS-003 HOME5-SS-004 HOME5-SS-005 HOME6-SS-001 HOME6-SS-002 HOME6-SS-003 HOME6-SS-004 HOME6-SS-005 HOME7-SS-001 HOME7-SS-002 HOME7-SS-003 HOME7-SS-004 HOME7-SS-005 HOME8-SS-001 HOME8-SS-002 HOME8-SS-003 HOME8-SS-004 HOME8-SS-005 HOME9-SS-001 HOME9-SS-002 HOME9-SS-003 HOME9-SS-004 HOME9-SS-005	Radium 226	None	P	Method blank

SDG	Sample	Isotope	Flag	A or P	Reason
C06110906	NEC2-TP-035(1.0-1.5)** NEC2-TP-052(1.5-2.0) NEC2-TP-052(4.0-5.0) NEC2-TP-020(1.0-1.5) NEC2-TP-039(1.0-1.5) NEC2-TP-239(1.0-1.5)** NEC2-TP-015(0.5-1.0) SAND2-TP-011(0.5-1.0) SAND2-TP-012(1.5-2) SAND2-TP-017(1.5-2) SAND2-TP-019(1-1.5)** SAND2-TP-008(0.5-1.0) NEMSA-TP-001(0-0.5) NEMSA-TP-001(1-1.5) NEMSA-TP-001(4-5) NEMSA-TP-001(6-6.5)** YARD-TP-001(0-0.5) NECR2-SS-015 NECR2-SS-017 NECR2-SS-018 NECR2-SS-033** NECR2-SS-037 NECR2-SS-035 NECR2-SS-039 NECR2-SS-239(Rep) NECR2-SS-050** NECR2-SS-056 NECR2-SS-020 NECR2-SS-069 NECR2-SS-071 NECR2-SS-052** NECR2-SS-004	Ra-226	J (all detects)	A	Duplicate analysis (RPD)

SDG	Sample	Isotope	Flag	A or P	Reason
C06110906	SAND3-SS-026 SAND3-SS-025 SAND3-SS-024 SAND3-SS-022 SAND3-SS-014** SAND3-SS-214 SAND3-SS-027 SAND3-SS-09 SAND3-SS-05 SAND3-SS-010** SAND3-SS-017 SAND3-SS-006 SAND3-SS-002 SAND3-SS-008 NEC2-TP-035(1.0-1.5)** NEC2-TP-052(1.5-2.0) NEC2-TP-052(4.0-5.0) NEC2-TP-020(1.0-1.5) NEC2-TP-039(1.0-1.5) NEC2-TP-239(1.0-1.5)** NEC2-TP-015(0.5-1.0) SAND2-TP-011(0.5-1.0) SAND2-TP-012(1.5-2) SAND2-TP-017(1.5-2) SAND2-TP-019(1-1.5)** SAND2-TP-008(0.5-1.0) NEMSA-TP-001(0-0.5) NEMSA-TP-001(1-1.5) NEMSA-TP-001(4-5) NEMSA-TP-001(6-6.5)** YARD-TP-001(0-0.5) NECR2-SS-015 NECR2-SS-017 NECR2-SS-018 NECR2-SS-033** NECR2-SS-037 NECR2-SS-035 NECR2-SS-039 NECR2-SS-239(Rep) NECR2-SS-050** NECR2-SS-056 NECR2-SS-020 NECR2-SS-069 NECR2-SS-071 NECR2-SS-052** NECR2-SS-004 NECR2-SS-027 HOME1-SS-001 HOME1-SS-002 HOME1-SS-003 HOME1-SS-004 HOME1-SS-005 HOME2-SS-001 HOME2-SS-002 HOME2-SS-003 HOME2-SS-004 HOME2-SS-204 HOME2-SS-005 HOME3-SS-001 HOME3-SS-002	Radium 226	None	P	Laboratory control samples

SDG	Sample	Isotope	Flag	A or P	Reason
C06110906	HOME3-SS-003 HOME3-SS-004 HOME3-SS-005 HOME4-SS-001 HOME4-SS-002 HOME4-SS-202 HOME4-SS-003 HOME4-SS-004 HOME4-SS-005 HOME5-SS-001 HOME5-SS-002 HOME5-SS-003 HOME5-SS-004 HOME5-SS-005 HOME6-SS-001 HOME6-SS-002 HOME6-SS-003 HOME6-SS-004 HOME6-SS-005 HOME7-SS-001 HOME7-SS-002 HOME7-SS-003 HOME7-SS-004 HOME7-SS-005 HOME8-SS-001 HOME8-SS-002 HOME8-SS-003 HOME8-SS-004 HOME8-SS-005 HOME9-SS-001 HOME9-SS-002 HOME9-SS-003 HOME9-SS-004 HOME9-SS-005	Radium 226	None	P	Laboratory control samples
C06110906	SAND3-SS-017SPLP**	Ra-226	None	P	Sample result verification

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Laboratory Blank Data Qualification Summary - SDG C06110906

No Sample Data Qualified in this SDG

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Field Blank Data Qualification Summary - SDG C06110906

No Sample Data Qualified in this SDG

Analytical Method/Analytes: Metals

Laboratory: Energy Laboratories

Batch Identification: C06111057

Sample Collection Date(s): 11/15,16,17,18,20/06

MW Job Number:

Matrix: Groundwater : Solid

Field Duplicates: NECR1-SS-030 — Pond12-SS-035; SEDPAD-SS-022 — NECR1-SS-103 (MWH DUP); Pond12-SS-019 — Pond3-SS-059

MS/MSD Parent: NECR1-SB-095 [14.0] — Pond3-SS-059; SEDPAD-SS-021 — 3/3a-SB-61 [20.0]; Pond12-SS-042 — Pond3-SS-014; NECR1-SS-138

Validation Complete: (Signature and Date) 03/19/07 Craig Moore

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
NECR1-SS-049	C06111057-001	Y			
NECR1-SS-047	C06111057-002	Y			
NECR1-SB-046 [0-0.5]	C06111057-003	Y			
NECR1-SS-044	C06111057-004	Y			
NECR1-SS-230	C06111057-005	Y			
NECR1-SS-030	C06111057-006	Y			
NECR1-SS-028	C06111057-007	Y			
NECR1-SS-026	C06111057-008	Y			
NECR1-SS-023	C06111057-009	Y			
NECR1-SS-020	C06111057-010	Y			
NECR1-SS-018	C06111057-011	Y			
NECR1-SB-016 [0-0.25]	C06111057-012	Y			
NECR1-SS-005	C06111057-013	Y			
NECR1-SB-016 [5.0]	C06111057-014	Y			
NECR1-SB-016 [10.0]	C06111057-015	Y			
NECR1-SB-016 [15.0]	C06111057-016	Y			
NECR1-SB-016 [20.0]	C06111057-017	Y			
NECR1-SB-095 [5.0]	C06111057-018	Y			
NECR1-SB-095 [10.0]	C06111057-019	Y			
NECR1-SB-095 [14.0]	C06111057-020	Y			
NECR1-SB-90 [5.0]	C06111057-021	Y			
NECR1-SB-90 [10.0]	C06111057-022	Y			
NECR1-SB-90 [15.0]	C06111057-023	Y			
NECR1-SB-90 [20]	C06111057-024	Y			
NECR1-SB-90 [25]	C06111057-025	Y			
NECR1-SB-90 [30.0]	C06111057-026	Y			
NECR1-SB-90 [35.5]	C06111057-027	Y			
NECR1-SB-90 [40]	C06111057-028	Y			
NECR1-SB-90 [45]	C06111057-029	Y			
SEDPAD-SS-005	C06111057-030	Y			
SEDPAD-SS-006	C06111057-031	Y			
SEDPAD-SS-07	C06111057-032	Y			
SEDPAD-SS-011	C06111057-033	Y			
	SPLP	Y	B	U detected in MB. Sample Concentration > 5X	2

Analytical Method/Analytes: Metals | **Sample Collection Date(s): 11/15,16,17,18,20/06**
Laboratory: Energy Laboratories | **MW Job Number:**
Batch Identification: C06111057 | **Matrix: Groundwater : Solid**

Field Duplicates: NECR1-SS-030, Pond12-SS-035, SEDPAD-SS-022, NECR1-SS-103 (MWH DUP), Pond12-SS-019, Pond3-SS-059

MS/MSD Parent: NECR1-SB-095 [14.0], Pond3-SS-059, SEDPAD-SS-021, 3/3a-SB-61 [20.0], Pond12-SS-042, Pond3-SS-014, NECR1-SS-138

Validation Complete: (Signature and Date) 03/19/07 Craig Moore

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
SEDPAD-SS-08	C06111057-034	Y			
SEDPAD-SS-12	C06111057-035	Y			
SEDPAD-SS-014	C06111057-036	Y			
SEDPAD-SS-015	C06111057-037	Y			
SEDPAD-SS-018	C06111057-038	Y			
	SPLP	Y	B	U detected in MB. Sample Concentration > 5X	2
SEDPAD-SS-020	C06111057-039	Y			
SEDPAD-SS-021	C06111057-040	Y			3
SEDPAD-SS-022	C06111057-041	Y			
SEDPAD-SS-025	C06111057-042	Y			
SEDPAD-SS-026	C06111057-043	Y			
NECR1-SB-046 [5.0]	C06111057-044	Y			
NECR1-SB-046 [10.0]	C06111057-045	Y			
NECR1-SB-046 [15.0]	C06111057-046	Y			
NECR1-SB-046 [20.0]	C06111057-047	Y			
NECR1-SB-046 [25.0]	C06111057-048	Y			
NECR1-SB-046 [30.0]	C06111057-049	Y			
Pond12-SS-011	C06111057-050	Y			
Pond12-SS-014	C06111057-051	Y			
Pond12-SS-019	C06111057-052	Y			
Pond12-SS-219	C06111057-053	Y			
Pond12-SS-020	C06111057-054	Y			
Pond12-SS-023	C06111057-055	Y			
Pond12-SS-024	C06111057-056	Y			
Pond12-SS-035	C06111057-057	Y			
	SPLP	Y			2
Pond12-SS-235	C06111057-058	Y			
Pond12-SS-041	C06111057-059	Y			
Pond12-SS-042	C06111057-060	Y			
Pond12-SS-047	C06111057-061	Y			
Pond12-SS-050	C06111057-062	Y			
Pond12-SS-056	C06111057-063	Y			
Pond12-SS-058	C06111057-064	Y			
	SPLP	Y			2

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06111057

Sample Collection Date(s): 11/15,16,17,18,20/06
MW Job Number:
Matrix: Groundwater : Solid

Field Duplicates:	NECR1-SS-030	Pond12-SS-035
	SEDPAD-SS-022	NECR1-SS-103 (MWH DUP)
	Pond12-SS-019	Pond3-SS-059
MS/MSD Parent:	NECR1-SB-095 [14.0]	Pond3-SS-059
	SEDPAD-SS-021	3/3a-SB-61 [20.0]
	Pond12-SS-042	Pond3-SS-014
	NECR1-SS-138	

Validation Complete: (Signature and Date) 03/19/07 Craig Moore

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
Pond12-SS-061	C06111057-065	Y			
Pond12-SS-069	C06111057-066	Y			
Pond12-SS-076	C06111057-067	Y			
Pond12-SS-077	C06111057-068	Y			
Pond12-SB-071 [0-0.5]	C06111057-069	Y			
Pond12-SB-71 [5.0]	C06111057-070	Y			
1/2-SB-71 [10.0]	C06111057-071	Y			
1/2-SB-71 [15.0]	C06111057-072	Y			
1/2-SB-82 [0-0.5]	C06111057-073	Y			
1/2-SB-82 [5.0]	C06111057-074	Y			
1/2-SB-82 [10.0]	C06111057-075	Y			
1/2-SB-82 [15]	C06111057-076	Y			
1/2-SB-82 [20]	C06111057-077	Y			
NECR1-SB-095 [0-0.5]	C06111057-078	Y			
NECR1-SS-140	C06111057-079	Y			
NECR1-SS-138	C06111057-080	Y			
NECR1-SS-137	C06111057-081	Y			
NECR1-SS-135	C06111057-082	Y			
NECR1-SS-133	C06111057-083	Y			
NECR1-SB-131 [0-0.5]	C06111057-084	Y			
NECR1-SS-129	C06111057-085	Y			
NECR1-SS-127	C06111057-086	Y			
NECR1-SS-126	C06111057-087	Y			
NECR1-SS-103 (MWH D	C06111057-088	Y			
NECR1-SS-103	C06111057-089	Y			
NECR1-SS-101	C06111057-090	Y			
NECR1-SS-93	C06111057-091	Y			
NECR1-SS-92	C06111057-092	Y			
NECR1-SB-090 [0-0.5]	C06111057-093	Y			
NECR1-SS-070	C06111057-094	Y			
NECR1-SS-068	C06111057-095	Y			
NECR1-SS-067	C06111057-096	Y			
NECR1-SS-065	C06111057-097	Y			
Pond3-SS-057	C06111057-098	Y			

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06111057

Sample Collection Date(s): 11/15,16,17,18,20/06
MW Job Number:
Matrix: Groundwater : Solid

Field Duplicates:	NECR1-SS-030	Pond12-SS-035
	SEDPAD-SS-022	NECR1-SS-103 (MWH DUP)
	Pond12-SS-019	Pond3-SS-059
MS/MSD Parent:	NECR1-SB-095 [14.0]	Pond3-SS-059
	SEDPAD-SS-021	3/3a-SB-61 [20.0]
	Pond12-SS-042	Pond3-SS-014
	NECR1-SS-138	

Validation Complete: (Signature and Date) 03/19/07 Craig Moore

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
	SPLP	Y			2
Pond3-SS-046	C06111057-099	Y			
Pond3-SS-059	C06111057-100	Y			
Pond3-SS-065	C06111057-101	Y			
Pond3-SS-063	C06111057-102	Y			
Pond3-SS-042	C06111057-103	Y			
Pond3-SS-259	C06111057-104	Y			
Pond3-SS-038	C06111057-105	Y			
Pond3-SS-29	C06111057-106	Y			
Pond3-SS-027	C06111057-107	Y			
Pond3-SS-015	C06111057-108	Y			
Pond3-SS-007	C06111057-109	Y			
Pond3-SS-001	C06111057-110	Y			
3/3a-SB-61 [0-0.5]	C06111057-111	Y			
3/3a-SB-61 [5.5]	C06111057-112	Y			
3/3a-SB-61 [10.0]	C06111057-113	Y			
3/3a-SB-61 [15.0]	C06111057-114	Y			
3/3a-SB-61 [20.0]	C06111057-115	Y			
3/3a-SB-61 [25.0]	C06111057-116	Y			1
NECR1-SB-131 [5.0]	C06111057-117	Y			1
NECR1-SB-131 [10.0]	C06111057-118	Y			1
NECR1-SB-131 [15.0]	C06111057-119	Y			1
NECR1-SB-131 [20]	C06111057-120	Y			1
NECR1-SB-131 [24]	C06111057-121	Y			1
Pond3-SS-014	C06111057-122	Y			1
	SPLP	Y			2

1 MB (MB-13190) contains U @0.008mg/kg. All sample concentration > 50X MB concentration.
2 MB (MB-13190) contains U @0.0001mg/l. Qualify w/"B" where sample concentration < 50x MB concentration. No qualfification where sample concentration > 50 MB cocentration.
3 MS/MSD recoveries outside acceptance criteria for U (234/234 [75-125]). Sample concentration > 4X spike concentration, no qualification.

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06111057

Analysis	Total Metals													
Sample ID	NECR1-SS-049	NECR1-SS-047	NECR1-SB-046 [0-0.5]	NECR1-SS-044	NECR1-SS-230	NECR1-SS-030	NECR1-SS-028	NECR1-SS-026	NECR1-SS-023	NECR1-SS-020	NECR1-SS-018	NECR1-SB-016 [0-0.25]	NECR1-SS-005	NECR1-SB-016 [5.0]
Laboratory ID	-01	-02	-03	-04	-05	-06	-07	-08	-09	-10	-11	-12	-13	-14
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch ID
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific requirement
N/A indicates criteria are not applicable for the specified analytical method

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06111057

Analysis	Total Metals													
Sample ID	NECR1-SB-016 [10.0]	NECR1-SB-016 [15.0]	NECR1-SB-016 [20.0]	NECR1-SB-095 [5.0]	NECR1-SB-095 [10.0]	NECR1-SB-095 [14.0]	NECR1-SB-90 [5.0]	NECR1-SB-90 [10.0]	NECR1-SB-90 [15.0]	NECR1-SB-90 [20]	NECR1-SB-90 [25]	NECR1-SB-90 [30.0]	NECR1-SB-90 [35.5]	NECR1-SB-90 [40]
Laboratory ID	-15	-16	-17	-18	-19	-20	-21	-22	-23	-24	-25	-26	-27	-28
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06111057

Analysis	Total Metals												
Sample ID	NECR1-SB-90 [45]	SEDPAD-SS-005	SEDPAD-SS-006	SEDPAD-SS-07	SEDPAD-SS-011	SPLP	SEDPAD-SS-08	SEDPAD-SS-12	SEDPAD-SS-014	SEDPAD-SS-015	SEDPAD-SS-018	SPLP	SEDPAD-SS-020
Laboratory ID	-29	-30	-31	-32	-33		-34	-35	-36	-37	-38		-39
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A[2]	A	A	A	A	A	A[2]	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
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N/A indicates criteria are not applicable for the specifi

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06111057

Analysis	Total Metals											
Sample ID	SEDPAD-SS-021	SEDPAD-SS-022	SEDPAD-SS-025	SEDPAD-SS-026	NECR1-SB-046 [5.0]	NECR1-SB-046 [10.0]	NECR1-SB-046 [15.0]	NECR1-SB-046 [20.0]	NECR1-SB-046 [25.0]	NECR1-SB-046 [30.0]	Pond12-SS-011	Pond12-SS-014
Laboratory ID	-40	-41	-42	-43	-44	-45	-46	-47	-48	-49	-50	-51
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	A[3]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
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Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06111057

Analysis	Total Metals												
Sample ID	Pond12-SS-019	Pond12-SS-219	Pond12-SS-020	Pond12-SS-023	Pond12-SS-024	Pond12-SS-035	SPLP	Pond12-SS-235	Pond12-SS-041	Pond12-SS-042	Pond12-SS-047	Pond12-SS-050	Pond12-SS-056
Laboratory ID	-52	-53	-54	-55	-56	-57		-58	-59	-60	-61	-62	-63
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A[2]	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	A	A	N/A	N/A	N/A	A	N/A	A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06111057

Analysis	Total Metals												
Sample ID	Pond12-SS-058	SPLP	Pond12-SS-061	Pond12-SS-069	Pond12-SS-076	Pond12-SS-077	Pond12-SB 071 [0-0.5]	Pond12-SB 71 [5.0]	1/2-SB-71 [10.0]	1/2-SB-71 [15.0]	1/2-SB-82 [0-0.5]	1/2-SB-82 [5.0]	1/2-SB-82 [10.0]
Laboratory ID	-64		-65	-66	-67	-68	-69	-70	-71	-72	-73	-74	-75
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A[2]	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
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Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06111057

Analysis	Total Metals												
Sample ID	1/2-SB-82 [15]	1/2-SB-82 [20]	NECR1-SB-095 [0-0.5]	NECR1-SS 140	NECR1-SS 138	NECR1-SS 137	NECR1-SS 135	NECR1-SS 133	NECR1-SB-131 [0-0.5]	NECR1-SS 129	NECR1-SS 127	NECR1-SS 126	NECR1-SS 103 (MWH DUP)
Laboratory ID	-76	-77	-78	-79	-80	-81	-82	-83	-84	-85	-86	-87	-88
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A

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Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06111057

Analysis	Total Metals												
Sample ID	NECR1-SS 103	NECR1-SS 101	NECR1-SS 93	NECR1-SS 92	NECR1-SB-090 [0-0.5]	NECR1-SS 070	NECR1-SS 068	NECR1-SS 067	NECR1-SS 065	Pond3-SS-057	SPLP	Pond3-SS-046	Pond3-SS-059
Laboratory ID	-89	-90	-91	-92	-93	-94	-95	-96	-97	-98		-99	-100
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A[2]	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A

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Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06111057

Analysis	Total Metals												
Sample ID	Pond3-SS-065	Pond3-SS-063	Pond3-SS-042	Pond3-SS-259	Pond3-SS-038	Pond3-SS-29	Pond3-SS-027	Pond3-SS-015	Pond3-SS-007	Pond3-SS-001	3/3a-SB-61 [0-0.5]	3/3a-SB-61 [5.5]	3/3a-SB-61 [10.0]
Laboratory ID	-101	-102	-103	-104	-105	-106	-107	-108	-109	-110	-111	-112	-113
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06111057

Analysis	Total Metals									
Sample ID	3/3a-SB-61 [15.0]	3/3a-SB-61 [20.0]	3/3a-SB-61 [25.0]	NECR1-SB-131 [5.0]	NECR1-SB-131 [10.0]	NECR1-SB-131 [15.0]	NECR1-SB-131 [20]	NECR1-SB-131 [24]	Pond3-SS-014	SPLP
Laboratory ID	-114	-115	-116	-117	-118	-119	-120	-121	-122	
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[2]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

MWH Americas, Inc.
10619 South Jordan Gateway, Suite 100
Salt Lake City, UT 84095
ATTN: Mr. Craig Moore

April 3, 2007

SUBJECT: United Nuclear Corporation, NE Church Rock Site, Data Validation

Dear Mr. Moore,

Enclosed are the final verification reports for the fraction listed below. This SDG was received on February 20, 2007. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 16324:

SDG #	**Fraction**
C06111057	Radium-226

The data verification was performed under EPA Level III and IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004

Please feel free to contact us if you have any questions.

Sincerely,

ERauto

Erlinda T. Rauto
Operations Manager/Senior Chemist

Attachment 1

LDC #16324 (MWH Americas, Inc.-Salt Lake City, UT / United Nuclear Corporation, NE Church Rock Site)

LDC	SDG#	DATE REC'D	(3) DATE DUE	Ra-226 (901.1)		SPLP Ra-226 (903.0)																															
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	C06111057	02/20/07	03/13/07	0	108	0	6																														
A	C06111057	02/20/07	03/13/07	0	13	0	0																														
Total	B/LR			0	121	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	127

Shaded cells indicate Level IV validation (all other cells are Level III validation). These sample counts do not include MS/MSD, and DUPs

United Nuclear Corporation, NE Church Rock Site
Data Validation Reports
LDC# 16324

Radium 226

LDC Report# 16324A29

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	United Nuclear Corporation, NE Church Rock Site
Collection Date:	November 15 through November 20, 2006
LDC Report Date:	April 3, 2007
Matrix:	Soil
Parameters:	Radium 226
Validation Level:	EPA Level III and IV
Laboratory:	Energy Laboratories, Inc.
Sample Delivery Group (SDG):	C06111057

Sample Identification

NECR1-SS-049
NECR1-SS-047
NECR1-SB-046(0-0.5)
NECR1-SS-044
NECR1-SS-230**
NECR1SS-030
NECR1-SS-028
NECR1-SS-026
NECR1-SS-023
NECR1-SS-020**
NECR1-SS-018
NECR1-SB-016(0-0.25)
NECR1-SS-005
NECR1-SB-016(5.0)
NECR1-SB-016(10.0)**
NECR1-SB-016(15.0)
NECR1-SB-016(20.0)
NECR1-SB-095(5.0)
NECR1-SB-095(10.0)
NECR1-SB-095(14.0)**
NECR1-SB-90(5.0)
NECR1-SB-90(10.0)
NECR1-SB-90(15.0)
NECR1-SB-90(20)
NECR1-SB-90(25)**
NECR1-SB-90(30.0)
NECR1-SB-90(35.5)
NECR1-SB-90(40)
NECR1-SB-90(45)
SEPAD-SS-005**
SEPAD-SS-006
SEPAD-SS-07
SEPAD-SS-011
SEPAD-SS-08
SEPAD-SS-12**
SEPAD-SS-014
SEPAD-SS-015
SEPAD-SS-018
SEPAD-SS-020
SEPAD-SS-021**
SEPAD-SS-022
SEPAD-SS-025
SEPAD-SS-026
NECR1-SB-046(5.0)
NECR1-SB-046(10.0)**
NECR1-SB-046(15.0)
NECR1-SB-046(20.0)
NECR1-SB-046(25.0)
NECR1-SB-046(30.0)
Pond12-SS-011**
Pond12-SS-014
Pond12-SS-019
Pond12-SS-219
Pond12-SS-020
Pond12-SS-023**
Pond12-SS-024
Pond12-SS-035
Pond12-SS-235
Pond12-SS-041
Pond12-SS-042**
Pond12-SS-047
Pond12-SS-050
Pond12-SS-056
Pond12-SS-058
Pond12-SS-061
Pond12-SS-069
Pond12-SS-076
Pond12-SS-077
Pond12-SB-071(0-0.5)
Pond12-SB-71(5.0)
1/2-SB-71(10.0)
1/2-SB-71(15.0)
1/2-SB-82(0-0.5)
1/2-SB-82(5.0)
1/2-SB-82(10.0)
1/2-SB-82(15)
1/2-SB-82(20)
NECR1-SB-095(0-0.5)
NECR1-SS-140
NECR1-SS-138
NECR1-SS-137
NECR1-SS-135
NECR1-SS-133
NECR1-SS-131(0-0.5)
NECR1-SS-129
NECR1-SS-127
NECR1-SS-126
NECR1-SS-103(MWHDUP)
NECR1-SS-103
NECR1-SS-101
NECR1-SS-93
NECR1-SS-92
NECR1-SB-090(0-0.5)
NECR1-SS-070
NECR1-SS-068
NECR1-SS-067
NECR1-SS-065
Pond3-SS-046
Pond3-SS-059
Pond3-SS-065
Pond3-SS-063
Pond3-SS-042
Pond3-SS-259
Pond3-SS-038
Pond3-SS-29
Pond3-SS-027
Pond3-SS-015
Pond3-SS-007
Pond3-SS-001
3/3a-SB-61(0-0.5)
3/3a-SB-61(5.5)
3/3a-SB-61(10.0)
3/3a-SB-61(15.0)
3/3a-SB-61(20.0)
3/3a-SB-61(25.0)
NECR1-SB-131(5.0)
NECR1-SB-131(10.0)
NECR1-SB-131(15.0)
NECR1-SB-131(20)
NECR1-SB-131(24)
Pond3-SS-014
SEPAD-SS-011SPLP
SEPAD-SS-018SPLP
Pond12-SS-035SPLP
Pond12-SS-058SPLP
Pond3-SS-014SPLP**
NECR1-SS-020DUP
NECR1-SB-095(14.0)DUP
SEPAD-SS-005DUP
SEPAD-SS-021DUP
Pond12-SS-011DUP
Pond12-SS-042DUP
Pond12-SB-71(5.0)DUP
NECR1-SS-138DUP
NECR1-SS-101DUP
Pond3-SS-057
Pond3-SS-057SPLP
Pond3-SS-059DUP
Pond3-SS-001DUP
NECR1-SB-131(20)DUP
SEDPAD-SS-011SPLPMS
Pond12-SS-058DUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 142 soil samples listed on the cover sheet. The analyses were per EPA Method 901.1 and EPA Method 903.0 for Radium 226.

The review follows the Quality Assurance Project Plan for United Nuclear Corporation Northeast Church Rock Site (Appendix A, August 2006) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

B The compound or analyte was found in an associated blank as well as in the sample.

U Data are qualified as non-detected, because the analyte was observed in an associated laboratory or field blank.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within laboratory control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06111057	Radium 226	More than twenty samples associated to a method blank.	No more than twenty samples to be associated to a method blank.	None	P

Blank results contained less than the minimum detectable activity (MDA).

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID [Associated Samples]	Isotope	RPD (Limits)	Flag	A or P
NECR1-SB-131(20)DUP [NECR1-SB-046(0-0.5) NECR1-SB-016(0-0.25) NECR1-SB-016(5.0) NECR1-SB-016(10.0)** NECR1-SB-016(15.0) NECR1-SB-016(20.0) NECR1-SB-095(5.0) NECR1-SB-095(10.0) NECR1-SB-095(14.0)** NECR1-SB-046(5.0) NECR1-SB-046(10.0)** NECR1-SB-046(15.0) NECR1-SB-046(20.0) NECR1-SB-046(25.0) NECR1-SB-046(30.0) NECR1-SB-095(0-0.5) NECR1-SS-131(0-0.5) 3/3a-SB-61(0-0.5) 3/3a-SB-61(5.5) 3/3a-SB-61(10.0) 3/3a-SB-61(15.0) 3/3a-SB-61(20.0) 3/3a-SB-61(25.0) NECR1-SB-131(5.0) NECR1-SB-131(10.0) NECR1-SB-131(15.0) NECR1-SB-131(20) NECR1-SB-131(24)]	Ra-226	40 (≤30)	J (all detects)	A

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06111057	Radium 226	More than twenty samples associated to a laboratory control sample.	No more than twenty samples to be associated to laboratory control sample.	None	P

Percent recoveries (%R) were within QC limits.

c. Chemical Recovery

Chemical recovery analysis were within QC limits for Method 903.0 .

V. Sample Result Verification

All sample result verifications were acceptable for samples on which a EPA Level IV review was performed.

All sample result verifications met validation criteria with the following exceptions:

Sample	Isotope	Laboratory Reporting Limit	QAPP Reporting Limit	Flag	A or P
SEPAD-SS-011SPLP SEPAD-SS-018SPLP Pond12-SS-035SPLP Pond12-SS-058SPLP Pond3-SS-014SPLP**	Ra-226	0.2 pCi/L	0.1 pCi/L	None	P

Results for Level IV gamma spectrometry samples could not be recalculated because the gamma spectrometry instruments use proprietary equations developed by both Ortec and Canberra. The laboratory has never been privy to the calculation factors used to generate the data output. Results are accepted based on the accuracy of an LCS sample.

Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

Samples NECR1-SS-230** and NECR1SS-030, samples SEPAD-SS-07 and SEPAD-SS-022, samples Pond12-SS-019 and Pond12-SS-219, samples Pond12-SS-035 and Pond12-SS-235, samples NECR1-SS-103(MWHDUP) and NECR1-SS-103, and samples Pond3-SS-059 and Pond3-SS-259 were identified as field duplicates. No Radium 226 was detected in any of the samples with the following exceptions:

	Activity (pCi/g)		
Isotope	NECR1-SS-230**	NECR1SS-030	RPD (Limits)
Radium 226	6.9	6.5	6 (≤30)

	Activity (pCi/g)		
Isotope	SEPAD-SS-07	SEPAD-SS-022	RPD (Limits)
Radium 226	106	104	2 (≤30)

Isotope	Activity (pCi/g)		RPD (Limits)
	Pond12-SS-019	Pond12-SS-219	
Radium 226	4.7	5.5	16 (≤30)

Isotope	Activity (pCi/g)		RPD (Limits)
	Pond12-SS-035	Pond12-SS-235	
Radium 226	78.5	82.1	4 (≤30)

Isotope	Activity (pCi/g)		RPD (Limits)
	NECR1-SS-103(MWHDUP)	NECR1-SS-103	
Radium 226	20.9	17.7	17 (≤30)

Isotope	Activity (pCi/g)		RPD (Limits)
	Pond3-SS-059	Pond3-SS-259	
Radium 226	26.9	39.3	37 (≤30)

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Data Qualification Summary - SDG C06111057

SDG	Sample	Isotope	Flag	A or P	Reason
C06111057	NECR1-SS-049 NECR1-SS-047 NECR1-SB-046(0-0.5) NECR1-SS-044 NECR1-SS-230** NECR1SS-030 NECR1-SS-028 NECR1-SS-026 NECR1-SS-023 NECR1-SS-020** NECR1-SS-018 NECR1-SB-016(0-0.25) NECR1-SS-005 NECR1-SB-016(5.0) NECR1-SB-016(10.0)** NECR1-SB-016(15.0) NECR1-SB-016(20.0) NECR1-SB-095(5.0) NECR1-SB-095(10.0) NECR1-SB-095(14.0)** NECR1-SB-90(5.0) NECR1-SB-90(10.0) NECR1-SB-90(15.0) NECR1-SB-90(20) NECR1-SB-90(25)** NECR1-SB-90(30.0) NECR1-SB-90(35.5) NECR1-SB-90(40) NECR1-SB-90(45) SEPAD-SS-005** SEPAD-SS-006 SEPAD-SS-07 SEPAD-SS-011 SEPAD-SS-08 SEPAD-SS-12** SEPAD-SS-014 SEPAD-SS-015 SEPAD-SS-018 SEPAD-SS-020 SEPAD-SS-021** SEPAD-SS-022 SEPAD-SS-025 SEPAD-SS-026 NECR1-SB-046(5.0) NECR1-SB-046(10.0)** NECR1-SB-046(15.0) NECR1-SB-046(20.0) NECR1-SB-046(25.0) NECR1-SB-046(30.0) Pond12-SS-011** Pond12-SS-014 Pond12-SS-019 Pond12-SS-219 Pond12-SS-020 Pond12-SS-023** Pond12-SS-024 Pond12-SS-035 Pond12-SS-235	Radium 226	None	P	Method blank

SDG	Sample	Isotope	Flag	A or P	Reason
C06111057	Pond12-SS-041 Pond12-SS-042** Pond12-SS-047 Pond12-SS-050 Pond12-SS-056 Pond12-SS-058 Pond12-SS-061 Pond12-SS-069 Pond12-SS-076 Pond12-SS-077 Pond12-SB-071(0-0.5) Pond12-SB-71(5.0) 1/2-SB-71(10.0) 1/2-SB-71(15.0) 1/2-SB-82(0-0.5) 1/2-SB-82(5.0) 1/2-SB-82(10.0) 1/2-SB-82(15) 1/2-SB-82(20) NECR1-SB-095(0-0.5) NECR1-SS-140 NECR1-SS-138 Pond12-SS-047 Pond12-SS-050 Pond12-SS-056 Pond12-SS-058 Pond12-SS-061 Pond12-SS-069 Pond12-SS-076 Pond12-SS-077 Pond12-SB-071(0-0.5) Pond12-SB-71(5.0) 1/2-SB-71(10.0) 1/2-SB-71(15.0) 1/2-SB-82(0-0.5) 1/2-SB-82(5.0) 1/2-SB-82(10.0) 1/2-SB-82(15) 1/2-SB-82(20) NECR1-SB-095(0-0.5) NECR1-SS-140 NECR1-SS-138 NECR1-SS-137 NECR1-SS-135 NECR1-SS-133 NECR1-SS-131(0-0.5) NECR1-SS-129 NECR1-SS-127 NECR1-SS-126 NECR1-SS-103(MWHDUP) NECR1-SS-103 NECR1-SS-101 NECR1-SS-93 NECR1-SS-92 NECR1-SB-090(0-0.5) NECR1-SS-070 NECR1-SS-068 NECR1-SS-067 NECR1-SS-065 Pond3-SS-046 Pond3-SS-059 Pond3-SS-065	Radium 226	None	P	Method blank

SDG	Sample	Isotope	Flag	A or P	Reason
C06111057	Pond3-SS-063 Pond3-SS-042 Pond3-SS-259 Pond3-SS-038 Pond3-SS-29 Pond3-SS-027 Pond3-SS-015 Pond3-SS-007 Pond3-SS-001 3/3a-SB-61(0-0.5) 3/3a-SB-61(5.5) 3/3a-SB-61(10.0) 3/3a-SB-61(15.0) 3/3a-SB-61(20.0) 3/3a-SB-61(25.0) NECR1-SB-131(5.0) NECR1-SB-131(10.0) NECR1-SB-131(15.0) NECR1-SB-131(20) NECR1-SB-131(24) Pond3-SS-014 SEPAD-SS-011SPLP SEPAD-SS-018SPLP Pond12-SS-035SPLP Pond12-SS-058SPLP Pond3-SS-014SPLP**	Radium 226	None	P	Method blank
C06111057	NECR1-SB-046(0-0.5) NECR1-SB-016(0-0.25) NECR1-SB-016(5.0) NECR1-SB-016(10.0)** NECR1-SB-016(15.0) NECR1-SB-016(20.0) NECR1-SB-095(5.0) NECR1-SB-095(10.0) NECR1-SB-095(14.0)** NECR1-SB-046(5.0) NECR1-SB-046(10.0)** NECR1-SB-046(15.0) NECR1-SB-046(20.0) NECR1-SB-046(25.0) NECR1-SB-046(30.0) NECR1-SB-095(0-0.5) NECR1-SS-131(0-0.5) 3/3a-SB-61(0-0.5) 3/3a-SB-61(5.5) 3/3a-SB-61(10.0) 3/3a-SB-61(15.0) 3/3a-SB-61(20.0) 3/3a-SB-61(25.0) NECR1-SB-131(5.0) NECR1-SB-131(10.0) NECR1-SB-131(15.0) NECR1-SB-131(20) NECR1-SB-131(24	Radium 226	J (all detects)	A	Duplicate analysis (RPD)

SDG	Sample	Isotope	Flag	A or P	Reason
C06111057	NECR1-SS-049 NECR1-SS-047 NECR1-SB-046(0-0.5) NECR1-SS-044 NECR1-SS-230** NECR1SS-030 NECR1-SS-028 NECR1-SS-026 NECR1-SS-023 NECR1-SS-020** NECR1-SS-018 NECR1-SB-016(0-0.25) NECR1-SS-005 NECR1-SB-016(5.0) NECR1-SB-016(10.0)** NECR1-SB-016(15.0) NECR1-SB-016(20.0) NECR1-SB-095(5.0) NECR1-SB-095(10.0) NECR1-SB-095(14.0)** NECR1-SB-90(5.0) NECR1-SB-90(10.0) NECR1-SB-90(15.0) NECR1-SB-90(20) NECR1-SB-90(25)** NECR1-SB-90(30.0) NECR1-SB-90(35.5) NECR1-SB-90(40) NECR1-SB-90(45) SEPAD-SS-005** SEPAD-SS-006 SEPAD-SS-07 SEPAD-SS-011 SEPAD-SS-08 SEPAD-SS-12** SEPAD-SS-014 SEPAD-SS-015 SEPAD-SS-018 SEPAD-SS-020 SEPAD-SS-021** SEPAD-SS-022 SEPAD-SS-025 SEPAD-SS-026 NECR1-SB-046(5.0) NECR1-SB-046(10.0)** NECR1-SB-046(15.0) NECR1-SB-046(20.0) NECR1-SB-046(25.0) NECR1-SB-046(30.0) Pond12-SS-011** Pond12-SS-014 Pond12-SS-019 Pond12-SS-219 Pond12-SS-020 Pond12-SS-023** Pond12-SS-024 Pond12-SS-035 Pond12-SS-235 Pond12-SS-041 Pond12-SS-042** Pond12-SS-047 Pond12-SS-050	Radium 226	None	P	Laboratory control samples

SDG	Sample	Isotope	Flag	A or P	Reason
C06111057	Pond12-SS-056 Pond12-SS-058 Pond12-SS-061 Pond12-SS-069 Pond12-SS-076 Pond12-SS-077 Pond12-SB-071(0-0.5) Pond12-SB-71(5.0) 1/2-SB-71(10.0) 1/2-SB-71(15.0) 1/2-SB-82(0-0.5) 1/2-SB-82(5.0) 1/2-SB-82(10.0) 1/2-SB-82(15) 1/2-SB-82(20) NECR1-SB-095(0-0.5) NECR1-SS-140 NECR1-SS-138 Pond12-SS-047 Pond12-SS-050 Pond12-SS-056 Pond12-SS-058 Pond12-SS-061 Pond12-SS-069 Pond12-SS-076 Pond12-SS-077 Pond12-SB-071(0-0.5) Pond12-SB-71(5.0) 1/2-SB-71(10.0) 1/2-SB-71(15.0) 1/2-SB-82(0-0.5) 1/2-SB-82(5.0) 1/2-SB-82(10.0) 1/2-SB-82(15) 1/2-SB-82(20) NECR1-SB-095(0-0.5) NECR1-SS-140 NECR1-SS-138 NECR1-SS-137 NECR1-SS-135 NECR1-SS-133 NECR1-SS-131(0-0.5) NECR1-SS-129 NECR1-SS-127 NECR1-SS-126 NECR1-SS-103(MWHDUP) NECR1-SS-103 NECR1-SS-101 NECR1-SS-93 NECR1-SS-92 NECR1-SB-090(0-0.5) NECR1-SS-070 NECR1-SS-068 NECR1-SS-067 NECR1-SS-065 Pond3-SS-046 Pond3-SS-059 Pond3-SS-065 Pond3-SS-063 Pond3-SS-042 Pond3-SS-259 Pond3-SS-038	Radium 226	None	P	Laboratory control samples

SDG	Sample	Isotope	Flag	A or P	Reason
C06111057	Pond3-SS-29 Pond3-SS-027 Pond3-SS-015 Pond3-SS-007 Pond3-SS-001 3/3a-SB-61(0-0.5) 3/3a-SB-61(5.5) 3/3a-SB-61(10.0) 3/3a-SB-61(15.0) 3/3a-SB-61(20.0) 3/3a-SB-61(25.0) NECR1-SB-131(5.0) NECR1-SB-131(10.0) NECR1-SB-131(15.0) NECR1-SB-131(20) NECR1-SB-131(24) Pond3-SS-014 SEPAD-SS-011SPLP SEPAD-SS-018SPLP Pond12-SS-035SPLP Pond12-SS-058SPLP Pond3-SS-014SPLP**	Radium 226	None	P	Laboratory control samples
C06111057	SEPAD-SS-011SPLP SEPAD-SS-018SPLP Pond12-SS-035SPLP Pond12-SS-058SPLP Pond3-SS-014SPLP**	Ra-226	None	P	Sample result verification

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Laboratory Blank Data Qualification Summary - SDG C06111057

No Sample Data Qualified in this SDG

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Field Blank Data Qualification Summary - SDG C06111057

No Sample Data Qualified in this SDG

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120227

Sample Collection Date(s): 11/30-12/01,03/06
MW Job Number:
Matrix: Groundwater : Solid

Field Duplicates: Yard-TP-004 (7.0-7.5)
MS/MSD Parent: Yard-TP-001 (1-1.5)
Yard-TP-004 (9.5-10.0)
Yard-TP-204 (7.0-7.5)

Validation Complete: (Signature and Date) 03/12/07 Craig Moore

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
Yard-TP-001 (1-1.5)	C06120227-001	Y			
Yard-TP-002 (1.5-2.0)	C06120227-002	Y			
Yard-TP-004 (0.5-1.0)	C06120227-003	Y			
Yard-TP-004 (5.5-6.0)	C06120227-004	Y			2
Yard-TP-005 (2.5-3.0)	C06120227-005	Y			2
Yard-TP-004 (9.5-10.0)	C06120227-006	Y			2
Yard-TP-004 (7.0-7.5)	C06120227-007	Y			
Yard-TP-005 (4.5-5.0)	C06120227-008	Y			2
Yard-TP-005 (8.5-9.0)	C06120227-009	Y			
Yard-TP-003 (1-1.5)	C06120227-010	Y			
Yard-TP-002 (9.5-10.0)	C06120227-011	Y			
Yard-TP-204 (7.0-7.5)	C06120227-012	Y			
ARROYO-RB-001	C06120227-013	N			1

1 MB (MB-12952) contains Mo @ 0.0003 mg/l and U @ 0.0001 mg/l. Associated sample ND, no qualfication.
2 MB (MB-12987) contains Pb @ 0.004 mg/l. Associated samples ND, no qualifcation.

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120227

Analysis	Total Metals												
Sample ID	Yard-TP-001 (1-1.5)	Yard- TP-002 (1.5-2.0)	Yard- TP-004 (0.5-1.0)	Yard- TP-004 (5.5-6.0)	Yard- TP-005 (2.5-3.0)	Yard- TP-004 (9.5-10.0)	Yard- TP-004 (7.0-7.5)	Yard- TP-005 (4.5-5.0)	Yard- TP-005 (8.5-9.0)	Yard- TP-003 (1-1.5)	Yard- TP-002 (9.5-10.0)	Yard- TP-204 (7.0-7.5)	ARROYO-RB-001
Laboratory ID	-01	-02	-03	-04	-05	-06	-07	-08	-09	-10	-11	-12	-13
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Interference Check Standard (ICP method)	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A[2]	A[2]	A[2]	A	A[2]	A	A	A	A	A[1]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Matrix Spike/Matrix Spike Duplicate	A	NA	NA	NA	NA	A	NA	NA	NA	NA	NA	A	NA
Field Duplicate/Replicate	NA	NA	NA	NA	NA	NA	A	NA	NA	NA	NA	A	NA
Equipment Rinseate Blanks	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

(a) List QC batch identification if different than Batch ID
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific requirement
N/A indicates criteria are not applicable for the specified analytical method

Analytical Method/Analytes: Organics
Laboratory: Energy Laboratories
Batch Identification: C06120227
Field Duplicates: Yard-TP-004 (7.0-7.5)
MS/MSD Parent: Yard-TP-002 (1.5-2.0)
Yard-TP-004 (5.5-6.0)
Validation Complete: (Signature and Date) 03/21/07

Sample Collection Date(s): 11/30-12/01,03/06
MW Project: GE-NECR
Matrix: Soil

Craig Moore

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
VOCs					
Yard-TP-001 (1-1.5)	C06120227-001	N	UJ	CVS %D low for dichlorodifluoromethane	1
Yard-TP-002 (1.5-2.0)	C06120227-002	N	UJ	CVS %D low for dichlorodifluoromethane	1
Yard-TP-004 (0.5-1.0)	C06120227-003	N	UJ	CVS %D low for dichlorodifluoromethane	1
Yard-TP-004 (5.5-6.0)	C06120227-004	N	UJ	CVS %D low for dichlorodifluoromethane	1
Yard-TP-005 (2.5-3.0)	C06120227-005	N	UJ	CVS %D low for dichlorodifluoromethane	1
Yard-TP-004 (9.5-10.0)	C06120227-006	N	UJ	CVS %D low for dichlorodifluoromethane	1
Yard-TP-004 (7.0-7.5)	C06120227-007	N	UJ	CVS %D low for dichlorodifluoromethane	1
Yard-TP-005 (4.5-5.0)	C06120227-008	N	UJ	CVS %D low for dichlorodifluoromethane	1
Yard-TP-005 (8.5-9.0)	C06120227-009	N	UJ	CVS %D low for dichlorodifluoromethane	1
Yard-TP-003 (1-1.5)	C06120227-010	N	UJ	CVS %D low for dichlorodifluoromethane	1
Yard-TP-002 (9.5-10.0)	C06120227-011	N	UJ	CVS %D low for dichlorodifluoromethane	1
Yard-TP-204 (7.0-7.5)	C06120227-012	N	UJ	CVS %D low for dichlorodifluoromethane	1
SVOCs					
Yard-TP-001 (1-1.5)	C06120227-001	N			
Yard-TP-002 (1.5-2.0)	C06120227-002	N	UJ	MS and MSD recoveries low for 2,4-dinitrophenol	2
Yard-TP-004 (0.5-1.0)	C06120227-003	N			
Yard-TP-004 (5.5-6.0)	C06120227-004	N			
Yard-TP-005 (2.5-3.0)	C06120227-005	N			
Yard-TP-004 (9.5-10.0)	C06120227-006	N			
Yard-TP-004 (7.0-7.5)	C06120227-007	Y			
Yard-TP-005 (4.5-5.0)	C06120227-008	N			
Yard-TP-005 (8.5-9.0)	C06120227-009	N			
Yard-TP-003 (1-1.5)	C06120227-010	N			
Yard-TP-002 (9.5-10.0)	C06120227-011	N			
Yard-TP-204 (7.0-7.5)	C06120227-012	Y			

VOCs

1 CVS (13-Dec-06_CCV_4) %D below acceptance criteria for dichlorodifluoromethane (23% [20]). All associated samples ND, qualify w/ "UJ".

SVOCs

2 MS and MSD recoveries below criteria for 2,4-dinitrophenol (19/20%[31-135]). Parent sample ND, qualify w/"UJ"

Analytical Method/Analytes: Organics
Laboratory: Energy Laboratories
Batch Identification: C06120227

Analysis	VOCs											
Sample ID	Yard-TP-001 (1-1.5)	Yard-TP-002 (1.5-2.0)	Yard-TP-004 (0.5-1.0)	Yard-TP-004 (5.5-6.0)	Yard-TP-005 (2.5-3.0)	Yard-TP-004 (9.5-10.0)	Yard-TP-004 (7.0-7.5)	Yard-TP-005 (4.5-5.0)	Yard-TP-005 (8.5-9.0)	Yard-TP-003 (1-1.5)	Yard-TP-002 (9.5-10.0)	Yard-TP-204 (7.0-7.5)
Laboratory ID	-01	-02	-03	-04	-05	-06	-07	-08	-09	-10	-11	-12
Holding Time/Sample Preservation	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A
Tuning Standard (BFB)	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration Verification	A	A	A	A	A	A	A	A	A	A	A	A
Calibration Verification	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]
Injection Time	A	A	A	A	A	A	A	A	A	A	A	A
Internal Standard EICP Area (GC/MS)	A	A	A	A	A	A	A	A	A	A	A	A
Internal Standard Retention Time Window (GC/MS)	A	A	A	A	A	A	A	A	A	A	A	A
Retention Time Windows (GC)	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A
Surrogate Spike Recovery	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate	A	A	A	A	A	A	A	A	A	A	A	A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Trip Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate blank	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	A	N/A	N/A	N/A	N/A	A

(a) List QC batch identification if different than Batch ID
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific requirement
N/A indicates criteria are not applicable for the specified analytical method

Analytical Method/Analytes: Organic
Laboratory: Energy Laboratories
Batch Identification: C06120227

Analysis	SVOCs											
Sample ID	Yard-TP-001 (1-1.5)	Yard-TP-002 (1.5-2.0)	Yard-TP-004 (0.5-1.0)	Yard-TP-004 (5.5-6.0)	Yard-TP-005 (2.5-3.0)	Yard-TP-004 (9.5-10.0)	Yard-TP-004 (7.0-7.5)	Yard-TP-005 (4.5-5.0)	Yard-TP-005 (8.5-9.0)	Yard-TP-003 (1-1.5)	Yard-TP-002 (9.5-10.0)	Yard-TP-204 (7.0-7.5)
Laboratory ID	-01	-02	-03	-04	-05	-06	-07	-08	-09	-10	-11	-12
Holding Time/Sample Preservation	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A
Tuning Standard (BFB)	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration Verification	A	A	A	A	A	A	A	A	A	A	A	A
Calibration Verification	A	A	A	A	A	A	A	A	A	A	A	A
Injection Time	A	A	A	A	A	A	A	A	A	A	A	A
Internal Standard EICP Area (GC/MS)	A	A	A	A	A	A	A	A	A	A	A	A
Internal Standard Retention Time Window (GC/MS)	A	A	A	A	A	A	A	A	A	A	A	A
Retention Time Windows (GC)	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A	A	A	A	A	A	A	A	A	A	A	A
Surrogate Spike Recovery	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate	A	A	A	A	A	A	A	A	A	A	A	A
Matrix Spike/Matrix Spike Duplicate	N/A	A[2]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Trip Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate blank	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	A	N/A	N/A	N/A	N/A	A

(a) List QC batch identification if differe
A indicates validation criteria were met
X indicates validation criteria were not n
N indicates data review were not a proje
N/A indicates criteria are not applicable

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

MWH Americas, Inc.
10619 South Jordan Gateway, Suite 100
Salt Lake City, UT 84095
ATTN: Mr. Craig Moore

April 3, 2007

SUBJECT: United Nuclear Corporation, NE Church Rock Site, Data Validation

Dear Mr. Moore,

Enclosed are the final verification reports for the fraction listed below. These SDGs were received on February 28, 2007. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 16361:

SDG #	**Fraction**
C06120227, C06110906	Radium-226

The data verification was performed under EPA Level III and IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004

Please feel free to contact us if you have any questions.

Sincerely,

E Rauto

Erlinda T. Rauto
Operations Manager/Senior Chemist

LDC #16361 (MWH Americas, Inc.-Salt Lake City, UT / United Nuclear Corporation, NE Church Rock Site)

LDC	SDG#	DATE REC'D	(3) DATE DUE	Ra-226 (901.1 903.0)																																	
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	C06120227	02/28/07	03/21/07	1	0																																
B	C06110906	03/02/07	03/21/07	0	84																																
B	C06110906	03/02/07	03/21/07	0	10																																
Total	B/LR			1	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	95

Shaded cells indicate Level IV validation (all other cells are Level III validation). These sample counts do not include MS/MSD, and DUPs

United Nuclear Corporation, NE Church Rock Site
Data Validation Reports
LDC# 16361

Radium 226

LDC Report# 16361A29

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: United Nuclear Corporation, NE Church Rock Site

Collection Date: December 3, 2006

LDC Report Date: March 13, 2007

Matrix: Water

Parameters: Radium 226

Validation Level: EPA Level III

Laboratory: Energy Laboratories, Inc.

Sample Delivery Group (SDG): C06120227

Sample Identification

ARROYO-RB-001
ARROYO-RB-001MS
ARROYO-RB-001MSD

Introduction

This data review covers 3 water samples listed on the cover sheet. The analyses were per EPA Method 903.0 for Radium 226.

The review follows the Quality Assurance Project Plan for United Nuclear Corporation Northeast Church Rock Site (Appendix A, August 2006) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

B The compound or analyte was found in an associated blank as well as in the sample.

U Data are qualified as non-detected, because the analyte was observed in an associated laboratory or field blank.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within laboratory control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. Blank results contained less than the minimum detectable activity (MDA).

Sample ARROYO-RB-001 was identified as a rinse blank. No radium-226 contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

c. Chemical Recovery

Chemical recovery analysis were within QC limits for Method 903.0 .

V. Sample Result Verification

Raw data were not reviewed for this SDG.

VI. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

No field duplicates were identified in this SDG.

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Data Qualification Summary - SDG C06120227

No Sample Data Qualified in this SDG

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Laboratory Blank Data Qualification Summary - SDG C06120227

No Sample Data Qualified in this SDG

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Field Blank Data Qualification Summary - SDG C06120227

No Sample Data Qualified in this SDG

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120235
Field Duplicates: VENT8-SS-002
NECR-SS-240
TP-SS-024
MS/MSD Parent: NECR2-SS-109
NECR-SS-207
POND12-TP-035 [2-2.5]
SAND3-TP-014 [0.5-1]
Validation Complete: (Signature and Date)_03/12/07__ Craig Moore

Sample Collection Date(s): 11/28,30-12/01.02.03/06
MW Job Number:
Matrix: Groundwater : Solid

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
VENT8-SS-002	C06120235-001	Y			1
VENT8-SS-202	C06120235-002	Y			1
VENT8-SS-006	C06120235-003	Y			1
VENT8-SS-031	C06120235-004	Y			1
VENT3-SS-034	C06120235-005	Y			1
VENT8-SS-019	C06120235-006	Y			1
NECR1-SS-323	C06120235-007	Y			1
NECR1-SS-326	C06120235-008	Y			1
NECR1-SS-316	C06120235-009	Y			1
POND12-SS-009	C06120235-010	Y			1
POND12-SS-012	C06120235-011	Y			1
POND12-SS-032	C06120235-012	Y			1
POND12-SS-063	C06120235-013	Y			1
SAND1-SS-032	C06120235-014	Y			1
SAND1-SS-053	C06120235-015	Y			1
SAND1-SS-065	C06120235-016	Y			1
NECR2-SS-083	C06120235-017	Y			1
NECR2-SS-096	C06120235-018	Y			1
	SPLP	Y	B	U detected in MB. Sample concentration < 50X	8
NECR2-SS-103	C06120235-019	Y			1
NECR2-SS-109	C06120235-020	Y			1
	SPLP	Y	B	U detected in MB. Sample concentration < 50X	8
YARD-TP-001 [1-1.5]	C06120235-021	Y			2
YARD-TP-001 [0-0.5]	C06120235-022	Y			2
YARD-TP-002 [0-0.5]	C06120235-023	Y			2
YARD-TP-002 [1.5-2]	C06120235-024	Y			2
YARD-TP-002 [9.5-10]	C06120235-025	Y			2
YARD-TP-003 [0-0.5]	C06120235-026	Y			2
YARD-TP-003 [1-1.5]	C06120235-027	Y			2
YARD-TP-004) [0.5-1]	C06120235-028	Y			2
YARD-TP-004 [5.5-6]	C06120235-029	Y			2
YARD-TP-004 [7-7.5]	C06120235-030	Y			2
YARD-TP-004 [9.5-10]	C06120235-031	Y			2
YARD-TP-204 [7-7.5]	C06120235-032	Y			2
YARD-TP-005 [0-0.5]	C06120235-033	Y			2
YARD-TP-005 [2.5-3]	C06120235-034	Y			2

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120235
Field Duplicates: VENT8-SS-002
NECR-SS-240
TP-SS-024
MS/MSD Parent: NECR2-SS-109
NECR-SS-207
POND12-TP-035 [2-2.5]
SAND3-TP-014 [0.5-1]
Validation Complete: (Signature and Date)_03/12/07__ Craig Moore

Sample Collection Date(s): 11/28,30-12/01.02.03/06
MW Job Number:
Matrix: Groundwater : Solid

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
YARD-TP-005 [4.5-5]	C06120235-035	Y			2
YARD-TP-005 [8.5-9]	C06120235-036	Y			2
NECR1-SS-164	C06120235-037	Y			2
NECR1-SS-173	C06120235-038	Y			2
NECR1-SS-184	C06120235-039	Y			2
NECR-SS-207	C06120235-040	Y			2
NECR-SS-238	C06120235-041	Y	J-	LCS recovery low for Se	3 2
NECR-SS-240	C06120235-042	Y	J-	LCS recovery low for Se	3 2
	SPLP	Y	B	U detected in MB. Sample concentration < 50X	8
NECR-SS-240 DUP	C06120235-043	Y	J-	LCS recovery low for Se	3 2
NECR-SS-262	C06120235-044	Y	J-	LCS recovery low for Se	3 2
NECR-SS-265	C06120235-045	Y	J-	LCS recovery low for Se	3 2
NECR-SS-266	C06120235-046	Y	J-	LCS recovery low for Se	3 2
NECR1-SS-281	C06120235-047	Y	J-	LCS recovery low for Se	3 2
NECR1-SS-289	C06120235-048	Y	J-	LCS recovery low for Se	3 2
NECR1-SS-293	C06120235-049	Y	J-	LCS recovery low for Se	3 2
NECR1-SS-307	C06120235-050	Y	J-	LCS recovery low for Se	3 2
	SPLP	Y	B	U detected in MB. Sample concentration < 50X	8
TP-SS-001	C06120235-051	Y	J-	LCS recovery low for Se	3 2
TP-SS-013	C06120235-052	Y	J-	LCS recovery low for Se	3 2
TP-SS-009	C06120235-053	Y	J-	LCS recovery low for Se	3 2
TP-SS-024	C06120235-054	Y	J-	LCS recovery low for Se	3 2
TP-SS-224	C06120235-055	Y	J-	LCS recovery low for Se	3 2
TP-SS-027	C06120235-056	Y	J-	LCS recovery low for Se	3 2
POND12-TP-030 [2-3]	C06120235-057	Y	J-	LCS recovery low for Se	3 2
POND12-TP-030 [4.5-5]	C06120235-058	Y	J-	LCS recovery low for Se	3 2
POND12-TP-035) [1-1.5]	C06120235-059	Y	J-	LCS recovery low for Se	3 2

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120235
Field Duplicates: VENT8-SS-002
NECR-SS-240
TP-SS-024
MS/MSD Parent: NECR2-SS-109
NECR-SS-207
POND12-TP-035 [2-2.5]
SAND3-TP-014 [0.5-1]
Validation Complete: (Signature and Date) 03/12/07__

Sample Collection Date(s): 11/28,30-12/01.02.03/06
MW Job Number:
Matrix: Groundwater : Solid

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
POND12-TP-035 [2-2.5]	C06120235-060	Y	J- J+	LCS recovery low and RPD high for for Se MSD recovery and RPD high for U and V	3 2,5 5
POND12-TP-035 [9-9.5]	C06120235-061	Y			6
POND12-TP-058 [4.5-5]	C06120235-062	Y			6
POND12-TP-058 [8.5-9]	C06120235-063	Y			6
SAND3-SS-004	C06120235-064	Y			6
SAND3-SS-012	C06120235-065	Y			6
SAND3-TP-005 [0.5-1]	C06120235-066	Y			6
SAND3-TP-005 [1.5-2]	C06120235-067	Y			6
SAND3-TP-006 [0.5-1]	C06120235-068	Y			6
SAND3-TP-009 [0.5-1]	C06120235-069	Y			6
	SPLP	Y			8
SAND3-TP-014 [1-1.5]	C06120235-070	Y			6
SAND3-TP-025 [0.5-1]	C06120235-071	Y			6
ARROYO-SB-001 [0-1]	C06120235-072	Y			6
ARROYO-SB-001 [1-2]	C06120235-073	Y			6
ARROYO-SB-001 [2-3]	C06120235-074	Y			6
SAND3-TP-014 [0.5-1]	C06120235-075	Y			6,7

1 MB (MB-12963) contains U @ 0.00009 mg/kg. All sample concentration > 50X MB concentration, no qualification
2 MB (MB-12967) contains Se @ 0.0010 mg/kg and U @ 0.00007 mg/kg. For Se, no qualification for NDs; all detected concentration > 50X MB concentration, no qualfication. For U, all concentration > 50X MB concentration, no qualfication.
3 MB (MB-12983) contains Mo @ 0.00006 mg/kg and U @ 0.0010 mg/kg. For Mo, all associated sample ND, no qualfication. For U, all concentration > 50X MB concentration, no qualfication.
4 LCS (LCS1-12983) recovery low for Se (68% [70-130]. Qualify all sample w/ "J-".
5 MSD recovery high for U (165% [75-125}) and V (136 [75-125]). RPD high for Se (23% [20]), U (26% [20]), V (24% [20]). Se data already qualified "J-" due to LCS reocvoery. Qualfiy U and V data w/ "J+"
6 MB (MB-12983) contains Mo @ 0.0001 mg/kg and U @ 0.0005 mg/kg. For Mo, all associated sample ND, no qualfication. For U, all concentration > 50X MB concentration, no qualfication.
7 MS and MSD recoveries outside criteria for U (217%/-32% [75-125]). Sample cocentration > 4X spike concentration, no qualfication.
8 MB (MB-13190) contains U @0.0001mg/l. Qualify w/"B" where sample concentration < 50x MB concentration. No qualfification where sample concentration > 50 MB cocentration.

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120235

Analysis	Total Metals													
Sample ID	VENT8-SS-002	VENT8-SS-202	VENT8-SS-006	VENT8-SS-031	VENT3-SS-034	VENT8-SS-019	NECR1-SS-323	NECR1-SS-326	NECR1-SS-316	POND12-SS-009	POND12-SS-012	POND12-SS-032	POND12-SS-063	SAND1-SS-032
Laboratory ID	-001	-002	-003	-004	-005	-006	-007	-008	-009	-010	-011	-012	-013	-014
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch ID
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific requirement
N/A indicates criteria are not applicable for the specified analytical method

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120235

Analysis															
Sample ID	**SAND1-SS-053**	**SAND1-SS-065**	**NECR2-SS-083**	**NECR2-SS-096**	**SPLP**	**NECR2-SS-103**	**NECR2-SS-109**	**SPLP**	**YARD-TP-001 [1-1.5]**	**YARD-TP-001 [0-0.5]**	**YARD-TP-002 [0-0.5]**	**YARD-TP-002 [1.5-2]**	**YARD-TP-002 [9.5-10]**	**YARD-TP-003 [0-0.5]**	**YARD-TP-003 [1-1.5]**
Laboratory ID	**-015**	**-016**	**-017**	**-018**		**-019**	**-020**		**-021**	**-022**	**-023**	**-024**	**-025**	**-026**	**-027**
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A[1]	A[1]	A[1]	A[1]	A[8]	A[1]	A[1]	A[8]	A[2]	A[2]	A[2]	A[2]	A[2]	A[2]	A[2]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
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N/A indicates criteria are not applicable for the specifi

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120235

Analysis															
Sample ID	**YARD-TP-004) [0.5-1]**	**YARD-TP-004 [5.5-6]**	**YARD-TP-004 [7-7.5]**	**YARD-TP-004 [9.5-10]**	**YARD-TP-204 [7-7.5]**	**YARD-TP-005 [0-0.5]**	**YARD-TP-005 [2.5-3]**	**YARD-TP-005 [4.5-5]**	**YARD-TP-005 [8.5-9]**	**NECR1-SS-164**	**NECR1-SS-173**	**NECR1-SS-184**	**NECR-SS-207**	**NECR-SS-238**	**NECR-SS-240**
Laboratory ID	**-028**	**-029**	**-030**	**-031**	**-032**	**-033**	**-034**	**-035**	**-036**	**-037**	**-038**	**-039**	**-040**	**-041**	**-042**
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A[2]	A[2]	A[2]	A[2]	A[2]	A[2]	A[2]	A[2]	A[2]	A[2]	A[2]	A[2]	A[2]	A[3]	A[3]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A[4]	A[4]
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
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Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120235

Analysis **Sample ID**	**SPLP**	**NECR-SS-240 DUP**	**NECR-SS-262**	**NECR-SS-265**	**NECR-SS-266**	**NECR1-SS-281**	**NECR1-SS-289**	**NECR1-SS-293**	**NECR1-SS-307**	**SPLP**	**TP-SS-001**	**TP-SS-013**	**TP-SS-009**	**TP-SS-024**	**TP-SS-224**
Laboratory ID		**-043**	**-044**	**-045**	**-046**	**-047**	**-048**	**-049**	**-050**		**-051**	**-052**	**-053**	**-054**	**-055**
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A[8]	A[3]	A[3]	A[3]	A[3]	A[3]	A[3]	A[3]	A[3]	A[8]	A[3]	A[3]	A[3]	A[3]	A[3]
Laboratory Control Sample (all methods)	A	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A	A[4]	A[4]	A[4]	A[4]	A[4]
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
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N/A indicates criteria are not applicable for the specifi

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120235

Analysis / Sample ID	TP-SS-027	POND12-TP-030 [2-3]	POND12-TP-030 [4.5-5]	POND12-TP-035) [1-1.5]	POND12-TP-035 [2-2.5]	POND12-TP-035 [9-9.5]	POND12-TP-058 [4.5-5]	POND12-TP-058 [8.5-9]	SAND3-SS-004	SAND3-SS-012	SAND3-TP-005 [0.5-1]	SAND3-TP-005 [1.5-2]	SAND3-TP-006 [0.5-1]
Laboratory ID	-056	-057	-058	-059	-060	-061	-062	-063	-064	-065	-066	-067	-068
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A[3]	A[3]	A[3]	A[3]	A[3]	A[6]	A[6]	A[6]	A[6]	A[6]	A[6]	A[6]	A[6]
Laboratory Control Sample (all methods)	A[4]	A[4]	A[4]	A[4]	A[4]	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	A[5]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
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Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120235

Analysis								
Sample ID	SAND3-TP-009 [0.5-1]	SPLP	SAND3-TP-014 [1-1.5]	SAND3-TP-025 [0.5-1]	ARROYO-SB-001 [0-1]	ARROYO-SB-001 [1-2]	ARROYO-SB-001 [2-3]	SAND3-TP-014 [0.5-1]
Laboratory ID	-069		-070	-071	-072	-073	-074	-075
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A
Method Blank	A[6]	A[8]	A[6]	A[6]	A[6]	A[6]	A[6]	A[6]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A[7]
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
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N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

LDC Report# 16435B29

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: United Nuclear Corporation. NE Church Rock Site

Collection Date: November 28 through December 2, 2006

LDC Report Date: April 3, 2007

Matrix: Soil

Parameters: Radium 226

Validation Level: EPA Level III and IV

Laboratory: Energy Laboratories, Inc.

Sample Delivery Group (SDG): C06120235

Sample Identification

VENT8-SS-002	YARD-TP-004(9.5-10.0)	POND12-TP-035(9.0-9.5)
VENT8-SS-202	YARD-TP-204(7.0-7.5)	POND12-TP-058(4.5-5.0)
VENT8-SS-006	YARD-TP-005(0.0-0.5)	POND12-TP-058(8.5-9.0)
VENT8-SS-031	YARD-TP-005(2.5-3.0)	SAND3-SS-004
VENT3-SS-034**	YARD-TP-005(4.5-5.0)**	SAND3-SS-012**
VENT8-SS-019	YARD-TP-005(8.5-9.0)	SAND3-TP-005(0.5-1.0)
NECR1-SS-323	NECR1-SS-164	SAND3-TP-005(1.5-2.0)
NECR1-SS-326	NECR1-SS-173	SAND3-TP-006(0.5-1.0)
NECR1-SS-316	NECR1-SS-184	SAND3-TP-009(0.5-1.0)
POND12-SS-009**	NECR-SS-207**	SAND3-TP-014(1.0-1.5)
POND12-SS-012	NECR-SS-238	SAND3-TP-025(0.5-1.0)
POND12-SS-032	NECR-SS-240	ARROYO-SB-001(0.0-1.0)
POND12-SS-063	NECR-SS-240-DUP	ARROYO-SB-001(1.0-2.0)
SAND1-SS-032	NECR-SS-262	ARROYO-SB-001(2.0-3.0)
SAND1-SS-053**	NECR-SS-265**	SAND3-TP-014(0.5-1.0)
SAND1-SS-065	NECR-SS-266	NECR2-SS-096SPLP
NECR2-SS-083	NECR1-SS-281	NECR2-SS-109SPLP**
NECR2-SS-096	NECR1-SS-289	NECR-SS-240SPLP
NECR2-SS-103	NECR1-SS-293**	NECR1-SS-307SPLP
NECR2-SS-109**	NECR1-SS-307	SAND3-TP-009(0.5-1.0)SPLP
YARD-TP-001(1.0-1.5)	TP-SS-001	POND12-SS-009DUP
YARD-TP-001(0.0-0.5)	TP-SS-013	NECR2-SS-109DUP
YARD-TP-002(0.0-0.5)	TP-SS-009	YARD-TP-004(7.0-7.5)DUP
YARD-TP-002(1.5-2.0	TP-SS-024	NECR-SS-207DUP
YARD-TP-002(9.5-10.0)**	TP-SS-224**	NECR1-SS-307DUP
YARD-TP-003(0.0-0.5)	TP-SS-027	POND12-TP-035(2.0-2.5)DUP
YARD-TP-003(1.0-1.5)	POND12-TP-030(2.0-3.0)	SAND3-TP-014(1.0-1.5)DUP
YARD-TP-004(0.5-1.0)	POND12-TP-030(4.5-5.0)	SAND3-TP-014(0.5-1.0)DUP
YARD-TP-004(5.5-6.0)	POND12-TP-035(1.0-1.5)	NECR2-SS-109SPLPDUP
YARD-TP-004(7.0-7.5)**	POND12-TP-035(2.0-2.5)**	SAND3-TP-009(0.5-1.0)SPLPDUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 90 soil samples listed on the cover sheet. The analyses were per EPA Method 901.1 and EPA Method 903.0 for Radium 226.

The review follows the Quality Assurance Project Plan for United Nuclear Corporation Northeast Church Rock Site (Appendix A, August 2006) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

B The compound or analyte was found in an associated blank as well as in the sample.

U Data are qualified as non-detected, because the analyte was observed in an associated laboratory or field blank.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within laboratory control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06120235	Radium 226	More than twenty samples associated to a method blank.	No more than twenty samples to be associated to a method blank.	None	P

Blank results contained less than the minimum detectable activity (MDA).

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID [Associated Samples]	Isotope	RPD (Limits)	Flag	A or P
SANDI-TP-063(0.5-1.0)SPLPDUP (NECR2-SS-096SPLP NECR2-SS-109SPLP** NECR-SS-240SPLP NECR1-SS-307SPLP SAND3-TP-009(0.5-1.0)SPLP)	Ra-226	33 (≤30)	J (all detects)	A

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All samples in SDG C06120235	Radium 226	More than twenty samples associated to a laboratory control sample.	No more than twenty samples to be associated to laboratory control sample.	None	P

Percent recoveries (%R) were within QC limits.

c. Chemical Recovery

Chemical recovery analysis were within QC limits for Method 903.0 .

V. Sample Result Verification

All sample result verifications were acceptable for samples on which a EPA Level IV review was performed.

All sample result verifications met validation criteria with the following exceptions:

Sample	Isotope	Laboratory Reporting Limit	QAPP Reporting Limit	Flag	A or P
NECR2-SS-096SPLP NECR2-SS-109SPLP** NECR-SS-240SPLP NECR1-SS-307SPLP SAND3-TP-009(0.5-1.0)SPLP	Ra-226	0.2 pCi/L	0.1 pCi/L	None	P

Results for Level IV gamma spectrometry samples could not be recalculated because the gamma spectrometry instruments use proprietary equations developed by both Ortec and Canberra. The laboratory has never been privy to the calculation factors used to generate the data output. Results are accepted based on the accuracy of an LCS sample.

Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

Samples VENT8-SS-002 and VENT8-SS-202, samples YARD-TP-004(7.0-7.5)** and YARD-TP-204(7.0-7.5), samples NECR-SS-240 and NECR-SS-240-DUP, and samples TP-SS-024 and TP-SS-224** were identified as field duplicates. No Radium 226 was detected in any of the samples with the following exceptions:

Isotope	Activity (pCi/g)		RPD (Limits)
	VENT8-SS-002	VENT8-SS-202	
Radium 226	3.6	3.9	8 (≤30)

Isotope	Activity (pCi/g)		RPD (Limits)
	YARD-TP-004(7.0-7.5)**	YARD-TP-204(7.0-7.5)	
Radium 226	10.1	13.0	25 (≤30)

Isotope	Activity (pCi/g)		RPD (Limits)
	NECR-SS-240	NECR-SS-240-DUP	
Radium 226	1.5	1.2	22 (≤30)

Isotope	Activity (pCi/g)		RPD (Limits)
	TP-SS-024	TP-SS-224**	
Radium 226	2.1	1.8	15 (≤30)

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Data Qualification Summary - SDG C06120235

SDG	Sample	Isotope	Flag	A or P	Reason
C06120235	VENT8-SS-002 VENT8-SS-202 VENT8-SS-006 VENT8-SS-031 VENT3-SS-034** VENT8-SS-019 NECR1-SS-323 NECR1-SS-326 NECR1-SS-316 POND12-SS-009** POND12-SS-012 POND12-SS-032 POND12-SS-063 SAND1-SS-032 SAND1-SS-053** SAND1-SS-065 NECR2-SS-083 NECR2-SS-096 NECR2-SS-103 NECR2-SS-109** YARD-TP-001(1.0-1.5) YARD-TP-001(0.0-0.5) YARD-TP-002(0.0-0.5) YARD-TP-002(1.5-2.0 YARD-TP-002(9.5-10.0)** YARD-TP-003(0.0-0.5) YARD-TP-003(1.0-1.5) YARD-TP-004(0.5-1.0) YARD-TP-004(5.5-6.0) YARD-TP-004(7.0-7.5)** YARD-TP-004(9.5-10.0) YARD-TP-204(7.0-7.5) YARD-TP-005(0.0-0.5) YARD-TP-005(2.5-3.0) YARD-TP-005(4.5-5.0)** YARD-TP-005(8.5-9.0) NECR1-SS-164 NECR1-SS-173 NECR1-SS-184 NECR-SS-207** NECR-SS-238 NECR-SS-240 NECR-SS-240-DUP NECR-SS-262 NECR-SS-265** NECR-SS-266 NECR1-SS-281 NECR1-SS-289 NECR1-SS-293** NECR1-SS-307 TP-SS-001 TP-SS-013 TP-SS-009 TP-SS-024 TP-SS-224** TP-SS-027 POND12-TP-030(2.0-3.0) POND12-TP-030(4.5-5.0)	Radium 226	None	P	Method blank

SDG	Sample	Isotope	Flag	A or P	Reason
C06120235	POND12-TP-035(1.0-1.5) POND12-TP-035(2.0-2.5)** POND12-TP-035(9.0-9.5) POND12-TP-058(4.5-5.0) POND12-TP-058(8.5-9.0) SAND3-SS-004 SAND3-SS-012** SAND3-TP-005(0.5-1.0) SAND3-TP-005(1.5-2.0) SAND3-TP-006(0.5-1.0) SAND3-TP-009(0.5-1.0) SAND3-TP-014(1.0-1.5) SAND3-TP-025(0.5-1.0) ARROYO-SB-001(0.0-1.0) ARROYO-SB-001(1.0-2.0) ARROYO-SB-001(2.0-3.0) SAND3-TP-014(0.5-1.0) NECR2-SS-096SPLP NECR2-SS-109SPLP** NECR-SS-240SPLP NECR1-SS-307SPLP SAND3-TP-009(0.5-1.0)SPLP	Radium 226	None	P	Method blank
C06120235	NECR2-SS-096SPLP NECR2-SS-109SPLP** NECR-SS-240SPLP NECR1-SS-307SPLP SAND3-TP-009(0.5-1.0)SPLP	Radium 226	J (all detects)	A	Duplicate analysis (RPD)

SDG	Sample	Isotope	Flag	A or P	Reason
C06120235	VENT8-SS-002 VENT8-SS-202 VENT8-SS-006 VENT8-SS-031 VENT3-SS-034** VENT8-SS-019 NECR1-SS-323 NECR1-SS-326 NECR1-SS-316 POND12-SS-009** POND12-SS-012 POND12-SS-032 POND12-SS-063 SAND1-SS-032 SAND1-SS-053** SAND1-SS-065 NECR2-SS-083 NECR2-SS-096 NECR2-SS-103 NECR2-SS-109** YARD-TP-001(1.0-1.5) YARD-TP-001(0.0-0.5) YARD-TP-002(0.0-0.5) YARD-TP-002(1.5-2.0 YARD-TP-002(9.5-10.0)** YARD-TP-003(0.0-0.5) YARD-TP-003(1.0-1.5) YARD-TP-004(0.5-1.0) YARD-TP-004(5.5-6.0) YARD-TP-004(7.0-7.5)** YARD-TP-004(9.5-10.0) YARD-TP-204(7.0-7.5) YARD-TP-005(0.0-0.5) YARD-TP-005(2.5-3.0) YARD-TP-005(4.5-5.0)** YARD-TP-005(8.5-9.0) NECR1-SS-164 NECR1-SS-173 NECR1-SS-184 NECR-SS-207** NECR-SS-238 NECR-SS-240 NECR-SS-240-DUP NECR-SS-262 NECR-SS-265** NECR-SS-266 NECR1-SS-281 NECR1-SS-289 NECR1-SS-293** NECR1-SS-307 TP-SS-001 TP-SS-013 TP-SS-009 TP-SS-024 TP-SS-224** TP-SS-027 POND12-TP-030(2.0-3.0) POND12-TP-030(4.5-5.0)	Radium 226	None	P	Laboratory control samples

SDG	Sample	Isotope	Flag	A or P	Reason
C06120235	POND12-TP-035(1.0-1.5) POND12-TP-035(2.0-2.5)** POND12-TP-035(9.0-9.5) POND12-TP-058(4.5-5.0) POND12-TP-058(8.5-9.0) SAND3-SS-004 SAND3-SS-012** SAND3-TP-005(0.5-1.0) SAND3-TP-005(1.5-2.0) SAND3-TP-006(0.5-1.0) SAND3-TP-009(0.5-1.0) SAND3-TP-014(1.0-1.5) SAND3-TP-025(0.5-1.0) ARROYO-SB-001(0.0-1.0) ARROYO-SB-001(1.0-2.0) ARROYO-SB-001(2.0-3.0) SAND3-TP-014(0.5-1.0) NECR2-SS-096SPLP NECR2-SS-109SPLP** NECR-SS-240SPLP NECR1-SS-307SPLP SAND3-TP-009(0.5-1.0)SPLP	Radium 226	None	P	Laboratory control samples
C06120235	NECR2-SS-096SPLP NECR2-SS-109SPLP** NECR-SS-240SPLP NECR1-SS-307SPLP SAND3-TP-009(0.5-1.0)SPLP	Ra-226	None	P	Sample result verification

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Laboratory Blank Data Qualification Summary - SDG C06120235

No Sample Data Qualified in this SDG

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Field Blank Data Qualification Summary - SDG C06120235

No Sample Data Qualified in this SDG

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

MWH Americas, Inc.
10619 South Jordan Gateway, Suite 100
Salt Lake City, UT 84095
ATTN: Mr. Craig Moore

April 3, 2007

SUBJECT: United Nuclear Corporation, NE Church Rock Site, Data Validation

Dear Mr. Moore,

Enclosed are the final verification reports for the fraction listed below. This SDG was received on March 23, 2007. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 16469:

SDG #	**Fraction**
C06120336	Radium-226

The data verification was performed under EPA Level III and IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004

Please feel free to contact us if you have any questions.

Sincerely,

E Rauto

Erlinda T. Rauto
Operations Manager/Senior Chemist

LDC #16469 (MWH Americas, Inc.-Salt Lake City, UT / United Nuclear Corporation, NE Church Rock Site)

LDC	SDG#	DATE REC'D	(3) DATE DUE	Ra-226 (901.1 903.0)																																	
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	C06120336	03/23/07	04/13/07	1	48																																
A	C06120336	03/23/07	04/13/07	0	6																																
Total	B/LR			1	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55

Shaded cells indicate Level IV validation (all other cells are Level III validation). These sample counts do not include MS/MSD, and DUPs

United Nuclear Corporation, NE Church Rock Site
Data Validation Reports
LDC# 16469

Radium-226

LDC Report# 16469A29

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: United Nuclear Corporation, NE Church Rock Site

Collection Date: November 30 through December 5, 2006

LDC Report Date: April 3, 2007

Matrix: Soil/Water

Parameters: Radium 226

Validation Level: EPA Level III and IV

Laboratory: Energy Laboratories, Inc.

Sample Delivery Group (SDG): C06120336

Sample Identification

ARROYO-SB-002(0-1)
ARROYO-SB-002(1-2)
ARROYO-SB-002(2-3)
ARROYO-SB-003(0-1)
ARROYO-SB-003(1-2)**
ARROYO-SB-003(2-3)
ARROYO-SB-004(0-1)
ARROYO-SB-004(1-2)
ARROYO-SB-004(2-3)
ARROYO-SB-005(0-1)**
ARROYO-SB-005(1-2)
ARROYO-SB-005(2-3)
ARROYO-SB-006(0-1)
ARROYO-SB-006(1-2)
ARROYO-SB-006(2-3)**
ARROYO-SB-007(0-1)
ARROYO-SB-007(1-2)
ARROYO-SB-007(2-3)
ARROYO-SB-008(0-1)
ARROYO-SB-008(1-2)**
ARROYO-SB-008(2-3)
ARROYO-SB-208(1-2)
ARROYO-SB-208(2-3)
ARROYO-SB-009(0-1)
ARROYO-SB-009(1-2)**
ARROYO-SB-009(2-3)
ARROYO-SB-010(0-1)
ARROYO-SB-010(1-2)
ARROYO-SB-010(2-3)
NEMSA-TP-002(0.0-0.25)**
NEMSA-TP-002(0.25-0.75)
NEMSA-TP-002(5.5-6.0)
NEMSA-TP-002(7.0-7.5)
NEMSA-TP-003(0.0-0.5)
NEMSA-TP-003(1.5-2.0)
NEMSA-TP-003(4.0-4.5)
NEMSA-TP-004(0.0-0.5)
NEMSA-TP-004(8.5-9.0)
NEMSA-TP-005(0.0-0.5)
NEMSA-TP-005(4.0-4.5)
NEMSA-TP-005(8.0-8.5)
POND3-TP-007(5-5.5)
POND3-TP-007(9-9.5)
POND3-TP-014(6.5-7.0)
POND3-TP-014(8.5-9.0)
POND3-TP-029(3-3.5)
POND3-TP-029(6-6.5)
POND3-TP-029(9-9.5)
POND3-TP-037(0-0.5)
POND3-TP-037(5-5.5)
POND3-TP-037(8.5-9.0)
NEMSA-TP-004(1-1.5)
NEMSA-TP-004(6-6.5)
NECR1-SS-0.28
ARROYO-RB-002
ARROYO-SB-005(0-1)DUP
ARROYO-SB-008(1-2)DUP
NEMSA-TP-002(0.0-0.25)DUP
NEMSA-TP-005(4.0-4.5)DUP
POND3-TP-037(5-5.5)DUP
ARROYO-RB-002MS
ARROYO-RB-002MSD

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 59 soil samples and 3 water samples listed on the cover sheet. The analyses were per EPA Method 901.1 and EPA Method 903.0 for Radium 226.

The review follows the Quality Assurance Project Plan for United Nuclear Corporation Northeast Church Rock Site (Appendix A, August 2006) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

B The compound or analyte was found in an associated blank as well as in the sample.

U Data are qualified as non-detected, because the analyte was observed in an associated laboratory or field blank.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within laboratory control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All soil samples in SDG C06120336	Radium 226	More than twenty samples associated to a method blank.	No more than twenty samples to be associated to a method blank.	None	P

Blank results contained less than the minimum detectable activity (MDA).

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Isotope	Finding	Criteria	Flag	A or P
All soil samples in SDG C06120336	Radium 226	More than twenty samples associated to a laboratory control sample.	No more than twenty samples to be associated to laboratory control sample.	None	P

Percent recoveries (%R) were within QC limits.

c. Chemical Recovery

Chemical recovery analysis were within QC limits for Method 903.0 .

V. Sample Result Verification

All sample result verifications were acceptable for samples on which a EPA Level IV review was performed.

All sample result verifications met validation criteria with the following exceptions:

Sample	Isotope	Laboratory Reporting Limit	QAPP Reporting Limit	Flag	A or P
All water samples in SDG C06120336	Ra-226	0.2 pCi/L	0.1 pCi/L	None	P

Results for Level IV gamma spectrometry samples could not be recalculated because the gamma spectrometry instruments use proprietary equations developed by both Ortec and Canberra. The laboratory has never been privy to the calculation factors used to generate the data output. Results are accepted based on the accuracy of an LCS sample.

Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

Samples ARROYO-SB-008(1-2)** and ARROYO-SB-208(1-2) and samples ARROYO-SB-008(2-3) and ARROYO-SB-208(2-3) were identified as field duplicates. No Radium 226 was detected in any of the samples with the following exceptions:

Isotope	Activity (pCi/g)		RPD (Limits)
	ARROYO-SB-008(1-2)**	ARROYO-SB-208(1-2)	
Radium 226	21.5	20.2	6 (≤30)

Isotope	Activity (pCi/g)		RPD (Limits)
	ARROYO-SB-008(2-3)	ARROYO-SB-208(2-3)	
Radium 226	24.5	23.0	6 (≤30)

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Data Qualification Summary - SDG C06120336

SDG	Sample	Isotope	Flag	A or P	Reason
C06120336	ARROYO-SB-002(0-1) ARROYO-SB-002(1-2) ARROYO-SB-002(2-3) ARROYO-SB-003(0-1) ARROYO-SB-003(1-2)** ARROYO-SB-003(2-3) ARROYO-SB-004(0-1) ARROYO-SB-004(1-2) ARROYO-SB-004(2-3) ARROYO-SB-005(0-1)** ARROYO-SB-005(1-2) ARROYO-SB-005(2-3) ARROYO-SB-006(0-1) ARROYO-SB-006(1-2) ARROYO-SB-006(2-3)** ARROYO-SB-007(0-1) ARROYO-SB-007(1-2) ARROYO-SB-007(2-3) ARROYO-SB-008(0-1) ARROYO-SB-008(1-2)** ARROYO-SB-008(2-3) ARROYO-SB-208(1-2) ARROYO-SB-208(2-3) ARROYO-SB-009(0-1) ARROYO-SB-009(1-2)** ARROYO-SB-009(2-3) ARROYO-SB-010(0-1) ARROYO-SB-010(1-2) ARROYO-SB-010(2-3) NEMSA-TP-002(0.0-0.25)** NEMSA-TP-002(0.25-0.75) NEMSA-TP-002(5.5-6.0) NEMSA-TP-002(7.0-7.5) NEMSA-TP-003(0.0-0.5) NEMSA-TP-003(1.5-2.0) NEMSA-TP-003(4.0-4.5) NEMSA-TP-004(0.0-0.5) NEMSA-TP-004(8.5-9.0) NEMSA-TP-005(0.0-0.5) NEMSA-TP-005(4.0-4.5) NEMSA-TP-005(8.0-8.5) POND3-TP-007(5-5.5) POND3-TP-007(9-9.5) POND3-TP-014(6.5-7.0) POND3-TP-014(8.5-9.0) POND3-TP-029(3-3.5) POND3-TP-029(6-6.5) POND3-TP-029(9-9.5) POND3-TP-037(0-0.5) POND3-TP-037(5-5.5) POND3-TP-037(8.5-9.0) NEMSA-TP-004(1-1.5) NEMSA-TP-004(6-6.5) NECR1-SS-0.28	Radium 226	None	P	Method blank

SDG	Sample	Isotope	Flag	A or P	Reason
C06120336	ARROYO-SB-002(0-1) ARROYO-SB-002(1-2) ARROYO-SB-002(2-3) ARROYO-SB-003(0-1) ARROYO-SB-003(1-2)** ARROYO-SB-003(2-3) ARROYO-SB-004(0-1) ARROYO-SB-004(1-2) ARROYO-SB-004(2-3) ARROYO-SB-005(0-1)** ARROYO-SB-005(1-2) ARROYO-SB-005(2-3) ARROYO-SB-006(0-1) ARROYO-SB-006(1-2) ARROYO-SB-006(2-3)** ARROYO-SB-007(0-1) ARROYO-SB-007(1-2) ARROYO-SB-007(2-3) ARROYO-SB-008(0-1) ARROYO-SB-008(1-2)** ARROYO-SB-008(2-3) ARROYO-SB-208(1-2) ARROYO-SB-208(2-3) ARROYO-SB-009(0-1) ARROYO-SB-009(1-2)** ARROYO-SB-009(2-3) ARROYO-SB-010(0-1) ARROYO-SB-010(1-2) ARROYO-SB-010(2-3) NEMSA-TP-002(0.0-0.25)** NEMSA-TP-002(0.25-0.75) NEMSA-TP-002(5.5-6.0) NEMSA-TP-002(7.0-7.5) NEMSA-TP-003(0.0-0.5) NEMSA-TP-003(1.5-2.0) NEMSA-TP-003(4.0-4.5) NEMSA-TP-004(0.0-0.5) NEMSA-TP-004(8.5-9.0) NEMSA-TP-005(0.0-0.5) NEMSA-TP-005(4.0-4.5) NEMSA-TP-005(8.0-8.5) POND3-TP-007(5-5.5) POND3-TP-007(9-9.5) POND3-TP-014(6.5-7.0) POND3-TP-014(8.5-9.0) POND3-TP-029(3-3.5) POND3-TP-029(6-6.5) POND3-TP-029(9-9.5) POND3-TP-037(0-0.5) POND3-TP-037(5-5.5) POND3-TP-037(8.5-9.0) NEMSA-TP-004(1-1.5) NEMSA-TP-004(6-6.5) NECR1-SS-0.28	Radium 226	None	P	Laboratory control samples
C06120336	ARROYO-RB-002	Ra-226	None	P	Sample result verification

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Laboratory Blank Data Qualification Summary - SDG C06120336

No Sample Data Qualified in this SDG

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Field Blank Data Qualification Summary - SDG C06120336

No Sample Data Qualified in this SDG

LDC Report# 16435C29

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	United Nuclear Corporation, NE Church Rock Site
Collection Date:	November 28 through December 2, 2006
LDC Report Date:	April 3, 2007
Matrix:	Soil
Parameters:	Radium 226
Validation Level:	EPA Level III
Laboratory:	Energy Laboratories, Inc.
Sample Delivery Group (SDG):	C06120405

Sample Identification

SEDPAD-TP-006(1.5-2.0)
SEDPAD-TP-006(3.0-3.5)
SEDPAD-TP-012(1.0-1.5)
SEDPAD-TP-012(1.5-2.0)
SEDPAD-TP-014(0.5-1.0)
SEDPAD-TP-014(1.0-1.5)
SEDPAD-TP-021(5.0-5.5)
SEDPAD-TP-021(10.0-10.5)
SEDPAD-TP-026(0.5-1.0)
NECR1-TP-138(3.5-4.0)
SAND1-TP-030(1.0-1.5)
SAND1-TP-043(1.0-1.5)
SAND1-TP-049(1.0-1.5)
SAND1-TP-049(3.5-4.0)
SAND1-TP-249(3.5-4.0)
SAND1-TP-063(0.5-1.0)
SAND1-TP-063(1.5-2.0)
SAND1-TP-068(0.5-1.0)
SAND1-TP-068(1.5-2.0)
SAND1-TP-030(3.5-4.0)
SAND1-TP-030(1.0-1.5)SPLP
SAND1-TP-063(0.5-1.0)SPLP
NECR1-TP-138(3.5-4.0)DUP
SAND1-TP-030(3.5-4.0)DUP
SAND1-TP-063(0.5-1.0)SPLPDUP

Introduction

This data review covers 25 soil samples listed on the cover sheet. The analyses were per EPA Method 901.1 and EPA Method 903.0 for Radium 226.

The review follows the Quality Assurance Project Plan for United Nuclear Corporation Northeast Church Rock Site (Appendix A, August 2006) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section VIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

B The compound or analyte was found in an associated blank as well as in the sample.

U Data are qualified as non-detected, because the analyte was observed in an associated laboratory or field blank.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

Detector efficiency was determined.

b. Continuing Calibration

Calibration verification and background determination were performed at the required frequencies. Results were within laboratory control limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. Blank results contained less than the minimum detectable activity (MDA).

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Matrix Spike/(Matrix Spike) Duplicate

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID [Associated Samples]	Isotope	RPD (Limits)	Flag	A or P
SANDI-TP-063(0.5-1.0)SPLPDUP (SAND1-TP-030(1.0-1.5)SPLP SAND1-TP-063(0.5-1.0)SPLP)	Ra-226	33 (≤30)	J (all detects)	A

b. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

c. Chemical Recovery

Chemical recovery analysis were within QC limits for Method 903.0 .

V. Sample Result Verification

All sample result verifications met validation criteria with the following exceptions:

Sample	Isotope	Laboratory Reporting Limit	QAPP Reporting Limit	Flag	A or P
SAND1-TP-030(1.0-1.5)SPLP SAND1-TP-063(0.5-1.0)SPLP	Ra-226	0.2 pCi/L	0.1 pCi/L	None	P

Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Minimum Detectable Activity (MDA)

All minimum detectable activities met required detection limits.

VII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

VIII. Field Duplicates

Samples SAND1-TP-049(3.5-4.0) and SAND1-TP-249(3.5-4.0) were identified as field duplicates. No Radium 226 was detected in any of the samples with the following exceptions:

	Activity (pCi/g)		
Isotope	SAND1-TP-049(3.5-4.0)	SAND1-TP-249(3.5-4.0)	RPD (Limits)
Radium 226	6.4	9.0	34 (≤30)

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Data Qualification Summary - SDG C06120405

SDG	Sample	Isotope	Flag	A or P	Reason
C06120405	SAND1-TP-030(1.0-1.5)SPLP SAND1-TP-063(0.5-1.0)SPLP	Radium 226	J (all detects)	A	Duplicate analysis (RPD)
C06120405	SAND1-TP-030(1.0-1.5)SPLP SAND1-TP-063(0.5-1.0)SPLP	Ra-226	None	P	Sample result verification

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Laboratory Blank Data Qualification Summary - SDG C06120405

No Sample Data Qualified in this SDG

United Nuclear Corporation, NE Church Rock Site
Radium 226 - Field Blank Data Qualification Summary - SDG C06120405

No Sample Data Qualified in this SDG

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120405
Field Duplicates: SAND1-TP-049 [3.5-4]
MS/MSD Parent: SAND1-TP-030 [3.5-4]
Validation Complete: (Signature and Date) 03/12/07

Sample Collection Date(s): 11/28,12/02/06
MW Job Number:
Matrix: Groundwater : Solid

Craig Moore

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
SEDPAD-TP-006 [1.5-2]	C06120405-001	Y			1
SEDPAD-TP-006 [3-3.5]	C06120405-002	Y			1
SEDPAD-TP-012 [1-1.5]	C06120405-003	Y			1
SEDPAD-TP-012 [1.5-2]	C06120405-004	Y			1
SEDPAD-TP-014 [0.5-1]	C06120405-005	Y			1
SEDPAD-TP-014 [1-1.5]	C06120405-006	Y			1
SEDPAD-TP-021 [5-5.5]	C06120405-007	Y			1
SEDPAD-TP-021 [10-10.5]	C06120405-008	Y			1
SEDPAD-TP-026 [0.5-1]	C06120405-009	Y			1
NECR1-TP-138 [3.5-4]	C06120405-010	Y			1
SAND1-TP-030 [1-1.5]	C06120405-011	Y			1
	SPLP	Y	B	U detected in MB. Sample concentration < 50X	2
SAND1-TP-043 [1-1.5]	C06120405-012	Y			1
SAND1-TP-049 [1-1.5]	C06120405-013	Y			1
SAND1-TP-049 [3.5-4]	C06120405-014	Y			1
SAND1-TP-249 [3.5-4]	C06120405-015	Y			1
SAND1-TP-063 [0.5-1]	C06120405-016	Y			1
	SPLP	Y			2
SAND1-TP-063 [1.5-2]	C06120405-017	Y			1
SAND1-TP-068 [0.5-1]	C06120405-018	Y			1
SAND1-TP-068 [1.5-2]	C06120405-019	Y			1
SAND1-TP-030 [3.5-4]	C06120405-020	Y			1

1 MB (MB-13013) contains Se @ 0.001 mg/kg, U @ 0.002 mg/kg, and V @ 0.0008 mg/kg. Sample concentrations > 50X MB concentrations for all elements, No qualfication.

2 MB (MB-13190) contains U @0.0001mg/l. Qualify w/"B" where sample concentration < 50x MB concentration. No qualfification where sample concentration > 50 MB cocentration.

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120405

Analysis	Total Metals												
Sample ID	SEDPAD-TP-006 [1.5-2]	SEDPAD-TP-006 [3-3.5]	SEDPAD-TP-012 [1-1.5]	SEDPAD-TP-012 [1.5-2]	SEDPAD-TP-014 [0.5-1]	SEDPAD-TP-014 [1-1.5]	SEDPAD-TP-021 [5-5.5]	SEDPAD-TP-021 [10-10.5]	SEDPAD-TP-026 [0.5-1]	NECR1-TP138 [3.5-4]	SAND1-TP-030 [1-1.5]	SAND1-TP-043 [1-1.5]	SAND1-TP049 [1-1.5]
Laboratory ID	-01	-02	-03	-04	-05	-06	-07	-08	-09	-10	-11	-12	-13
Hardcopy vs. Chain of Custody													
Holding Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A	A	A	A
Method Blank	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch ID
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific requirement
N/A indicates criteria are not applicable for the specified analytical method

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120405

Analysis	Total Metals						
Sample ID	SAND1-TP-049 [3.5-4]	SAND1-TP-249 [3.5-4]	SAND1-TP-063 [0.5-1]	SAND1-TP-063 [1.5-2]	SAND1-TP-068 [0.5-1]	SAND1-TP-068 [1.5-2]	SAND1-TP-030 [3.5-4]
Laboratory ID	-14	-15	-16	-17	-18	-19	-20
Hardcopy vs. Chain of Custody							
Holding Time	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A
Method Blank	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	A	A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120336
Field Duplicates: ARROYO-SB-008 [0-1]
ARROYO-SB-008 [1-2]
MS/MSD Parent: ARROYO-SB-008 [1-2]
NEMSA-TP-005 [4-4.5]
NECR1-SS-028

Sample Collection Date(s): 12/01,03,04,05/06
MW Job Number:
Matrix: Groundwater : Solid

Validation Complete: (Signature and Date)_______ 3/12/2007 Craig Moore

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
ARROYO-SB-002 [0-1]	C06120336-001	Y			1
ARROYO-SB-002 [1-2]	C06120336-002	Y			1
ARROYO-SB-002 [2-3]	C06120336-003	Y			1
ARROYO-SB-003 [0-1]	C06120336-004	Y			1
ARROYO-SB-003 [1-2]	C06120336-005	Y			1
ARROYO-SB-003 [2-3]	C06120336-006	Y			1
ARROYO-SB-004 [0-1]	C06120336-007	Y			1
ARROYO-SB-004 [1-2]	C06120336-008	Y			1
ARROYO-SB-004 [2-3]	C06120336-009	Y			1
ARROYO-SB-005 [0-1]	C06120336-010	Y			1
ARROYO-SB-005 [1-2]	C06120336-011	Y			1
ARROYO-SB-005 [2-3]	C06120336-012	Y			1
ARROYO-SB-006 [0-1]	C06120336-013	Y			1
ARROYO-SB-006 [1-2]	C06120336-014	Y			1
ARROYO-SB-006 [2-3]	C06120336-015	Y			1
ARROYO-SB-007 [0-1]	C06120336-016	Y			1
ARROYO-SB-007 [1-2]	C06120336-017	Y			1
ARROYO-SB-007 [2-3]	C06120336-018	Y			1
ARROYO-SB-008 [0-1]	C06120336-019	Y			1
ARROYO-SB-008 [1-2]	C06120336-020	Y			1
ARROYO-SB-008 [2-3]	C06120336-021	Y			2
ARROYO-SB-208 [1-2]	C06120336-022	Y			2
ARROYO-SB-208 [2-3]	C06120336-023	Y			2
ARROYO-SB-009 [0-1]	C06120336-024	Y			2
ARROYO-SB-009 [1-2]	C06120336-025	Y			2
ARROYO-SB-009 [2-3]	C06120336-026	Y			2
ARROYO-SB-010 [0-1]	C06120336-027	Y			2
ARROYO-SB-010 [1-2]	C06120336-028	Y			2
ARROYO-SB-010 [2-3]	C06120336-029	Y			2
NEMSA-TP-002 [0-0.25]	C06120336-030	Y			2
NEMSA-TP-002 [0.25-0.7	C06120336-031	Y			2
NEMSA-TP-002 [5.5-6]	C06120336-032	Y			2
NEMSA-TP-002 [7-7.5]	C06120336-033	Y			2
NEMSA-TP-003 [0-0.5]	C06120336-034	Y			2
NEMSA-TP-003 [1.5-2]	C06120336-035	Y			2
NEMSA-TP-003 [4-4.5]	C06120336-036	Y			2

Analytical Method/Analytes: Metals

Laboratory: Energy Laboratories

Batch Identification: C06120336

Field Duplicates: ARROYO-SB-008 [0-1]
ARROYO-SB-008 [1-2]

MS/MSD Parent: ARROYO-SB-008 [1-2]
NEMSA-TP-005 [4-4.5]
NECR1-SS-028

Sample Collection Date(s): 12/01,03,04,05/06

MW Job Number:

Matrix: Groundwater : Solid

Validation Complete: (Signature and Date) ______ **3/12/2007** Craig Moore

Sample Identification	Lab Identification	Hits (Y/N)	Quals	Comments	Foot Notes
NEMSA-TP-004 [0-0.5]	C06120336-037	Y			2
NEMSA-TP-004 [8.5-9]	C06120336-038	Y			2
NEMSA-TP-005 [0-0.5]	C06120336-039	Y			2
NEMSA-TP-005 [4-4.5]	C06120336-040	Y	J+	MS and MSD recoveries high for U	2 3
NEMSA-TP-005 [8-8.5]	C06120336-041	Y			4
POND3-TP-007 [5-5.5]	C06120336-042	Y			4
POND3-TP-007 [9-9.5]	C06120336-043	Y			4
POND3-TP-014 [6.5-7]	C06120336-044	Y			4
POND3-TP-014 [8.5-9]	C06120336-045	Y			4
POND3-TP-029 [3-3.5]	C06120336-046	Y			4
POND3-TP-029 [6-6.5]	C06120336-047	Y			4
POND3-TP-029 [9-9.5]	C06120336-048	Y			4
POND3-TP-037 [0-0.5]	C06120336-049	Y			4
POND3-TP-037 [5-5.5]	C06120336-050	Y			4
POND3-TP-037 [8.5-9]	C06120336-051	Y			4
NEMSA-TP-004 [1-1.5]	C06120336-052	Y			4
NEMSA-TP-004 [6-6.5]	C06120336-053	Y			4
NECR1-SS-028	C06120336-054	Y	UJ	MS and MSD recoveries low for Mo	4 5
ARROYO-RB-002	C06120336-055	Y			

1 MB (MB-13007) contains Mo @ 0.0004 mg/kg, U @ 0.0002 mg/kg, and V @ 0.00005 mg/kg. For Mo, associated samples ND, no qualfication. For U and V assoicated sample concentration > 50X MB concentration, no qualfication.

2 MB (MB-13009) contains Mo @ 0.0003 mg/kg, U @ 0.0008 mg/kg, and V @ 0.0003 mg/kg. For Mo, associated samples ND, no qualfication. For U and V assoicated sample concentration > 50X MB concentration, no qualfication.

3 MS and MSD recoveries high for U (145/140% [75-125]). Qualify parent w/ "J+"

4 MB (MB-13012) contains U @ 0.0004 mg/kg, and V @ 0.0001 mg/kg. For Mo, associated samples ND, no qualfication. For U and V assoicated sample concentration > 50X MB concentration, no qualfication.

5 MS and MSD recoveries below acceptance criteria for Mo (27/33% [75-125]). Parent sample ND, qualify w/ "UJ"

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120336

Sample ID	ARROYO-SB-002 [0-1]	ARROYO-SB-002 [1-2]	ARROYO-SB-002 [2-3]	ARROYO-SB-003 [0-1]	ARROYO-SB-003 [1-2]	ARROYO-SB-003 [2-3]	ARROYO-SB-004 [0-1]	ARROYO-SB-004 [1-2]	ARROYO-SB-004 [2-3]
Laboratory ID	-001	-002	-003	-004	-005	-006	-007	-008	-009
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A
Method Blank	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch ID
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific requirement
N/A indicates criteria are not applicable for the specified analytical method

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120336

Sample ID	ARROYO-SB-005 [0-1]	ARROYO-SB-005 [1-2]	ARROYO-SB-005 [2-3]	ARROYO-SB-006 [0-1]	ARROYO-SB-006 [1-2]	ARROYO-SB-006 [2-3]	ARROYO-SB-007 [0-1]	ARROYO-SB-007 [1-2]	ARROYO-SB-007 [2-3]
Laboratory ID	-010	-011	-012	-013	-014	-015	-016	-017	-018
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A
Method Blank	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]	A[1]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120336

Sample ID	ARROYO-SB-008 [0-1]	ARROYO-SB-008 [1-2]	ARROYO-SB-008 [2-3]	ARROYO-SB-208 [1-2]	ARROYO-SB-208 [2-3]	ARROYO-SB-009 [0-1]	ARROYO-SB-009 [1-2]	ARROYO-SB-009 [2-3]	ARROYO-SB-010 [0-1]
Laboratory ID	-019	-020	-021	-022	-023	-024	-025	-026	-027
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A
Method Blank	A[1]	A[1]	A[2]	A[2]	A[2]	A[2]	A[2]	A[2]	A[2]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120336

Sample ID	ARROYO-SB-010 [1-2]	ARROYO-SB-010 [2-3]	NEMSA-TP-002 [0-0.25]	NEMSA-TP-002 [0.25-0.75]	NEMSA-TP-002 [5.5-6]	NEMSA-TP-002 [7-7.5]	NEMSA-TP-003 [0-0.5]	NEMSA-TP-003 [1.5-2]	NEMSA-TP-003 [4-4.5]	NEMSA-TP-004 [0-0.5]
Laboratory ID	-028	-029	-030	-031	-032	-033	-034	-035	-036	-037
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A
Method Blank	A^2	A^2	A^2	A^2	A^2	A^2	A^2	A^2	A^2	A^2
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120336

Sample ID	NEMSA-TP-004 [8.5-9]	NEMSA-TP-005 [0-0.5]	NEMSA-TP-005 [4-4.5]	NEMSA-TP-005 [8-8.5]	POND3-TP-007 [5-5.5]	POND3-TP-007 [9-9.5]	POND3-TP-014 [6.5-7]	POND3-TP-014 [8.5-9]	POND3-TP-029 [3-3.5]	POND3-TP-029 [6-6.5]
Laboratory ID	-038	-039	-040	-041	-042	-043	-044	-045	-046	-047
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A	A	A
Method Blank	A[2]	A[2]	A[2]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	A[3]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

Analytical Method/Analytes: Metals
Laboratory: Energy Laboratories
Batch Identification: C06120336

Sample ID	POND3-TP-029 [9-9.5]	POND3-TP-037 [0-0.5]	POND3-TP-037 [5-5.5]	POND3-TP-037 [8.5-9]	NEMSA-TP-004 [1-1.5]	NEMSA-TP-004 [6-6.5]	NECR1-SS-028	ARROYO-RB-002
Laboratory ID	-048	-049	-050	-051	-052	-053	-054	-055
Hardcopy vs. Chain of Custody	A	A	A	A	A	A	A	A
Holding Time	A	A	A	A	A	A	A	A
Analyte List	A	A	A	A	A	A	A	A
Reporting Limits	A	A	A	A	A	A	A	A
Initial Calibration (All Methods)	A	A	A	A	A	A	A	A
Initial Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A
Continuing Calibration (All Methods)	A	A	A	A	A	A	A	A
Continuing Check Blank (ICP & AA methods)	A	A	A	A	A	A	A	A
Analysis Time	A	A	A	A	A	A	A	A
Method Blank	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A[4]	A
Laboratory Control Sample (all methods)	A	A	A	A	A	A	A	A
Laboratory Control Sample Duplicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Matrix Spike/Matrix Spike Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	A[5]	A
Laboratory Replicate (lab specific)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Field Duplicate/Replicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment Rinseate Blanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) List QC batch identification if different than Batch
A indicates validation criteria were met
X indicates validation criteria were not met
N indicates data review were not a project-specific req
N/A indicates criteria are not applicable for the specifi

CHAIN-OF-CUSTODY FORMS

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: [illegible] Road Ste [illegible] PO Box [illegible] 774018 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-[illegible] (office) 970-879-[illegible] (Fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn: Accounts Payable PO Box [illegible] Broomfield, CO 8002[illegible]	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☐

Other ____

EDD/EDT ☐ Format ____

ANALYSIS REQUESTED: Number of Containers; Sample Type: A W S V B O — Air Water Soils/Solids Vegetation Bioassay Other; Ra-226; Metals*; SEE ATTACHED; Normal Turnaround (TAT); RUSH Turnaround (TAT)

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: * Metals - Arsenic, Molybdenum, Selenium, Vanadium, Uranium

Shipped by: FedEx
Cooler ID(s): 1433
Receipt Temp: 2.8 °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	Metals*	Normal TAT	Lab ID
1 NECRBKG-01	8-17-06	940	Soils	X	X	X	C06081541
2 NECRBKG-02	8-17-06	946	Soils	X	X	X	
3 NECRBKG-03	8-17-06	954	Soils	X	X	X	
4 NECRBKG-04	8-17-06	1002	Soils	X	X	X	
5 NECRBKG-05	8-17-06	1011	Soils	X	X	X	
6 NECRBKG-06	8-17-06	1020	Soils	X	X	X	
7 NECRBKG-07	8-17-06	1034	Soils	X	X	X	
8 NECRBKG-08	8-17-06	1035	Soils	X	X	X	
9 NECRBKG-09	8-17-06	1040	Soils	X	X	X	
10 NECRBKG-10	8-17-06	1047	Soils	X	X	X	

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Leah Wolf Martin	8/18/06 1305	[signature]	Narven Patel	8/18/06 1325	[signature]
Narven Patel	8/23/06 @ 1009	[signature]	[illegible]	8/25/06 1015	[signature]

Sample Disposal: Return to client: ____ Lab Disposal: X

LABORATORY USE ONLY — Sample Type: ____ # of fractions ____

[In c]ertain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis re[quest]ed. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Road, Ste 109; PO Box 774018; Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (phone) 970-879-9048 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas - Attn: Accounts Payable; PO Box 6610; Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other ______
EDD/EDT ☐ Format ______

ANALYSIS REQUESTED — Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other; SEE ATTACHED; Normal Turnaround (TAT); RUSH Turnaround (TAT)

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: * Metals - Arsenic, Molybdenum, Selenium, Vanadium, Uranium

Shipped by: ______
Cooler ID(s): ______
Receipt Temp ______ °C
Custody Seal Y N
Intact Y N
Signature Match Y N

#	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	Metals*	Normal TAT	RUSH TAT	Lab ID
1	NECRBKG-11	8-17-06	10:51	Soil	X	X	X		C06081541
2	NECRBKG-12	8-17-06	10:58	Soil	X	X	X		
3	NECRBKG-13	8-17-06	11:07	Soil	X	X	X		
4	NECRBKG-14	8-17-06	11:1[illegible]	Soil	X	X	X		
5	NECRBKG-15	8-17-06	11:[illegible]	Soil	X	X	X		
6	NECRBKG-16	8-17-06	11:17	Soil	X	X	X		
7	NECRBKG-17	8-17-06	11:22	Soil	X	X	X		
8	NECRBKG-18	8-17-06	11:28	Soil	X	X	X		
9	NECRBKG-19	8-17-06	11:33	Soil	X	X	X		
10	NECRBKG-20	8-17-06	11:35	Soil	X	X	X		

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Leah Wolf Martin	8-18-06/1325	Leah Wolf Martin	Natver Patel	8/18/06 13:25	[signature]
Natver Patel	8/21/06 10:09				

Sample Disposal: Return to client: ______ Lab Disposal: X

LABORATORY USE ONLY — Sample Type: ______ # of fractions ______

[C]ertain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis re[quest]ed. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste109, PO Box ~~84~~ 774018, Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (office) 970-879-9048 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas, Attn: Accounts Payable, PO Box 6610, Broomfield CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other ______
EDD/EDT ☐ Format ______

ANALYSIS REQUESTED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Metals*: Arsenic, Molybdenum, Selenium, Vanadium, Uranium

Shipped by: ______
Cooler ID(s) ______
Receipt Temp ______ °C
Custody Seal Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other)	Ra-226	Metals*								SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID (LABORATORY USE ONLY)
1	NECRBKG-21	8-17-06	11:40	Soils	X	X									X			C06081541
2	NECRBKG-22	8-17-06	11:43	Soils	X	X									X			
3	NECRBKG-23	8-17-06	11:47	Soils	X	X									X			
4	NECRBKG-24	8-17-06	11:50	Soils	X	X									X			
5	NECRBKG-25	8-17-06	11:55	Soils	X	X									X			
6	NECRBKG-42	8-17-06	10:45	Soils	X	X									X			
7	NECRBKG-45	8-17-06	11:48	Soils	X	X									X			
8	NECR-COP A-19	8-18-06	12:00	Soils	X										X		Ra-226 only	
9																		
10																		

Custody Record MUST be Signed

Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
Leah Wolf Martin	8-18-06 / 1326	Leah Wolf Martin	Natver Patel	8/18/06 13:26	[signature]
Natver Patel	8/18/06 @ 10:09				

Sample Disposal: Return to client: ______ Lab Disposal: ✓

LABORATORY USE ONLY — Sample Type: ______ # of fractions ______

ertain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis re ted.
This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC-NECR
Report Mail Address: 1475 Pine Grove Road, STE 109 PO BOX 774018 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin 970-879-6260 (office) 970-879-9048 (Fax) — Sampler Name if other than Contact: Natver Patel AVM Environmental Services, Inc. 505-787-4593
Invoice Address: MWH Americas PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other ______
EDD/EDT ☐ Format ______

ANALYSIS REQUESTED: Ra-226, 90th

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:

Shipped by: FedEx
Cooler ID(s):
Receipt Temp: °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O)	Ra-226, 90th	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1 NECR-COR-B-01	8/17/06	0947	S	✓		✓		LABORATORY USE ONLY
2 NECR-COR-B-02	8/17/06	1015	S	✓		✓		
3 NECR-COR-B-03	8/17/06	10:22	S	✓		✓		
4 NECR-COR-B-04	8/17/06	10:39	S	✓		✓		
5 NECR-COR-B-05	8/17/06	10:47	S	✓		✓		
6 NECR-COR-B-06	8/17/06	11:05	S	✓		✓		
7 NECR-COR-B-07	8/17/06	11:15	S	✓		✓		
8 NECR-COR-B-08	8/17/06	11:27	S	✓		✓		
9 NECR-COR-B-09	8/17/06	11:38	S	✓		✓		
10 NECR-COR-B-10	8/17/06	11:55	S	✓		✓		

Custody Record MUST be Signed

Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
Natver Patel	8/28/06 @1000	[signature]	Tom Boatman	8/30/06	[signature]

Sample Disposal: Return to client: ______ Lab Disposal: X

LABORATORY USE ONLY
Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, & links.

ENERGY LABORATORIES, INC. · 2393 Salt Creek Highway (82601) · P.O. Box 3258 · Casper, WY 82602
Toll Free 888.235.0515 · 307.235.0515 · Fax 307.234.1639 · casper@energylab.com · www.energylab.com

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC-NECR
Report Mail Address: 1475 Pine Grove Road, Ste 109 PO Box 774018 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin 970-879-6260 (office) 970-879-9048 (Fax) — Sampler Name if other than Contact: Natver Patel AVM Environmental Services, Inc. 505-287-4593
Invoice Address: MWH Americas, Acct Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following: NELAC ☐ A2LA ☐ Level IV ☐ Other ____ EDD/EDT ☐ Format ____

ANALYSIS REQUESTED: Ra-226, 901.1

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:

Shipped by: FedEx
Cooler ID(s): [illegible]
Receipt Temp [illegible] °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers / Sample Type: A W S V B O / Air Water Soils/Solids Vegetation Bioassay Other / MATRIX	Ra-226, 901.1	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID (LABORATORY USE ONLY)
1 NECR-COR-B-40	8/17/06	12:00	S	✓		✓		
2 NECR-COR-B-11	8/17/06	12:10	S	✓		✓		
3 NECR-COR-B-12	8/17/06	12:16	S	✓		✓		
4 NECR-COR-B-13	8/17/06	12:27	S	✓		✓		
5 NECR-COR-B-14	8/17/06	12:36	S	✓		✓		
6 NECR-COR-B-15	8/17/06	12:55	S	✓		✓		
7 NECR-COR-B-45	8/17/06	13:00	S	✓		✓		
8								
9								
10								

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Natver Patel	8/28/06 @ 1000	[signature]	Tom Bernard	8/31/06 [illegible]	[signature]

Sample Disposal: Return to client: ____ Lab Disposal: ____

LABORATORY USE ONLY — Sample Type: ____ # of fractions ____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, & links.

ENERGY LABORATORIES, INC. · 2393 Salt Creek Highway (82601) · P.O. Box 3258 · Casper, WY 82602 Toll Free 888.235.0515 · 307.235.0515 · Fax 307.234.1639 · casper@energylab.com · www.energylab.com

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 1 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Road, Ste 109 PO Box 774018 Steamboat Springs CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin 970-879-6260 (office) 970-879-9048 (fax) — Sampler Name if other than Contact: Nataver Patel AVM Environmental Services, Inc 505-287-4593
Invoice Address: MWH Americas, Attn: Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☐

Other ______

EDD/EDT ☐ Format ______

ANALYSIS REQUESTED: Ra-226, Soil

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:

Shipped by: fedex

Cooler ID(s): 627

Receipt Temp: 22.8 °C

Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers / Sample Type: A W S V B O / MATRIX	Ra-226, Soil	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID
1 NECR-COR-A-01	8/17/06	14:28	S	✓		✓			
2 NECR-COR-A-02	8/17/06	14:40	S	✓		✓			
3 NECR-COR-A-03	8/17/06	14:50	S	✓		✓			
4 NECR-COR-A-04	8/17/06	15:00	S	✓		✓			
5 NECR-COR-A-05	8/17/06	15:14	S	✓		✓			
6 NECR-COR-A-06	8/17/06	15:27	S	✓		✓			C06081554
7 NECR-COR-A-07	8/17/06	15:40	S	✓		✓			
8 NECR-COR-A-08	8/17/06	16:04	S	✓		✓			
9 NECR-COR-A-09	8/17/06	16:15	S	✓		✓			
10 NECR-COR-A-10	8/17/06	16:35	S	✓		✓			

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Nataver Patel	8/28/06 @ 12:05	[signature]	Tom Bartman	8/30/06 10:15	[signature]
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:

Sample Disposal: Return to client: ______ Lab Disposal: X

LABORATORY USE ONLY Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

Page 2 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH

Project Name, PWS #, Permit #, Etc.:

Report Mail Address: 1475 Pine Grove Road, Ste 109, PO Box 774018, Steamboat Springs, CO 80487

Contact Name, Phone, Fax, E-mail: Leah Wolf Martin, 970-879-6260 (office), 970-879-9048 (Fax)

Sampler Name if other than Contact: Natver Patel, AVM Environmental Services, Inc. 505-287-4593

Invoice Address: MWH Americas, Acct Payable, PO Box 6610, Broomfield, CO 80021

Invoice Contact & Phone #: as above

Purchase Order #:

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other ______
EDD/EDT ☐ Format ______

ANALYSIS REQUESTED: Ra-226, 901.1

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:

Shipped by: FedEx
Cooler ID(s): 627
Receipt Temp: 22.8 °C
Custody Seal Y N
Intact Y N
Signature Match Y N

#	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226, 901.1	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1	NECR-COR-A-50	8/17/06	14:40	S	✓		✓		
2	NECR-COR-A-11	8/18/06	08:48	S	✓		✓		
3	NECR-COR-A-12	8/18/06	09:14	S	✓		✓		
4	NECR-COR-A-13	8/18/06	09:22	S	✓		✓		
5	NECR-COR-A-14	8/18/06	09:30	S	✓		✓		
6	NECR-COR-A-15	8/18/06	09:45	S	✓		✓		
7	NECR-COR-A-55	8/18/06	09:50	S	✓		✓		C06081547
8	NECR-COR-A-16	8/18/06	10:14	S	✓		✓		
9	NECR-COR-A-17	8/18/06	10:37	S	✓		✓		
10	NECR-COR-A-18 Clean Trailer	8/18/06	11:03	S	✓		✓		

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
Natver Patel	8/28/06 @ 10:05	[signature]	Tom Bertram	8/30/06 10:15	[signature]

Sample Disposal: Return to client: ______ Lab Disposal: X

LABORATORY USE ONLY: Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 1 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (office) 970-879-9048 (fax) Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above Purchase Order #: ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other ____

EDD/EDT ☑ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: [illegible]

Cooler ID(s): [illegible]

Receipt Temp [illegible] °C

Custody Seal Y N

Intact Y N

Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, U, V	Agronomic	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID (LABORATORY USE ONLY)
1	Sand2-SS-003	11/13/06	14:50	Soil	X	X			X		Hold Samples	
2	Sand2-SS-004	11/13/06	15:05	Soil	X	X			X		after analysis	
3	Sand2-SS-006	11/13/06	14:40	Soil	X	X			X			
4	Sand2-SS-007	11/13/06	15:16	Soil	X	X			X			
5	Sand2-SS-010	11/13/06	1435	Soil	X	X			X			
6	Sand2-SS-011	11/12/06	15:15	Soil	X	X			X			
7	Sand2-SS-212	11/13/06	15:25	Soil	X	X			X			
8	Sand2-SS-012	11/13/06	15:25	Soil	X	X			X			
9	Sand2-SS-014	11/13/06	14:55	Soil	X	X	X		X			
10	Sand2-SS-015	11/13/06	15:30	Soil	X	X			X			

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Hans Hoffman	11/14/06 0800	[illegible]	B Ketchum	11/16/06 1030	[illegible]

Sample Disposal: Return to client: ____ Lab Disposal: ____

LABORATORY USE ONLY: Sample Type: ____ # of fractions ____

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Chain of Custody and Analytical Request Record

Page 2 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH

Project Name, PWS #, Permit #, Etc.: UNC NECR

Report Mail Address: 1475 Pine Grove Rd Ste 109, PO Box 774018, Steamboat Springs, Co 80487

Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (office) 970-879-9048 (fax)

Sampler Name if other than Contact:

Invoice Address: MWH Americas Attn: Accounts Payable, PO Box 6610, Broomfield, Co 80021

Invoice Contact & Phone #: as above

Purchase Order #:

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ________

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☒
Other ________
EDD/EDT ☒ Format ________

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: [illegible]
Cooler ID(s): [illegible]
Receipt Temp: [illegible] °C
Custody Seal Y N
Intact Y N
Signature Match Y N

ANALYSIS REQUESTED

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers, Sample Type: A W S V B O, Air Water Soils/Solids Vegetation Bioassay Other)	Ra-226	As, Mo, Se, U, V	Agronomic							SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments:	Lab ID (LABORATORY USE ONLY)
1 Sand2-SS-016	11/13/06	15:45	Soil	X	X									X		Hold samples	
2 Sand2-SS-017	11/13/06	15:30	Soil	X	X									X		after analysis	
3 Sand2-SS-019	11/13/06	15:40	Soil	X	X									X			
4 Sand2-SS-022	11/13/06	15:50	Soil	X	X									X			
5																	
6																	
7																	
8																	
9																	
10																	

Custody Record MUST be Signed

Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
Hans Hoffman	11/14/06 0800	Hans Hoffman	B. Ketcham	[illegible]	B. Ketcham

Sample Disposal: Return to client: ________ Lab Disposal: ________

LABORATORY USE ONLY
Sample Type: ________ # of fractions ________

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Chain of Custody and Analytical Request Record

Page 1 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (office) 970-879-9048 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn: Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ________

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other ________

EDD/EDT ☑ Format ________

ANALYSIS REQUESTED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: [illegible]
Cooler ID(s): [illegible]
Receipt Temp [illegible] °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers, Sample Type: A W S V B O, Air Water Soils/Solids Vegetation Bioassay Other)	Ra-226	As, Mo, Se, V, U	Agronomic	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID
1 Sand1-SS-0161	11-13-06	11:25	Soil	X	X			X		Hold Samples after analysis	LABORATORY USE ONLY
2 Sand1-SS-0119		12:25		X	X			X			
3 Sand1-SS-Z419		12:25		X	X			X			
4 Sand1-SS-050		11:45		X	X			X			
5 Sand1-SS-057		11:40		X	X			X			
6 Sand1-SS-063		12:10		X	X			X			
7 Sand1-SS-068		12:05		X	X			X			
8 Sand1-SS-077		11:00		X	X	X		X			
9 Sand1-SS-080		12:15		X	X			X			
10 Sand1-SS-011		10:55		X	X			X			

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Hans Hoffman	11/14/06 0900	Hans Hoffman	Tabitha Edwards	[illegible]	Tabitha Edwards

Sample Disposal: Return to client: ________ Lab Disposal: ________

LABORATORY USE ONLY — Sample Type: ________ # of fractions ________

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

Page 2 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109 Steamboat Springs, Co 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (office) 970-879-9048 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other ______

EDD/EDT ☑ Format ______

ANALYSIS REQUESTED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: 2nd day air

Cooler ID(s): 497

Receipt Temp: 8.1 °C

Custody Seal Y N

Intact Y N

Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other)	Ra-226	As, Mo, Se, V, U	Agronomic							SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments:	Lab ID (LABORATORY USE ONLY)
1 ~~sand1-ss-011~~ error 11/13/06	11/13/06	10:55	soil	X	X									X		Hold Samples after analysis	
2 sand1-ss-041	↓	11:10	↓	X	X									X			
3 sand1-ss-021		10:28		X	X									X			
4 sand1-ss-027		10:35		X	X									X			
5 sand1-ss-009		11:05		X	X									X			
6 sand1-ss-028		10:45		X	X	X								X			
7 sand1-ss-043		11:30		X	X									X			
8																	
9																	
10																	

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Hans McCloskey	11/14/06 0800	Hans McCl—	Tabitha Edwards	11-16-06 1000	Tabitha Edwards

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY — Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

Page 1 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH

Project Name, PWS #, Permit #, Etc.: UNC NECR

Report Mail Address: [illegible]

Contact Name, Phone, Fax, E-mail: [illegible]

Sampler Name if other than Contact:

Invoice Address: MWH Americas Attn: Account Payable [illegible]

Invoice Contact & Phone #: As above

Purchase Order #:

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other ______

EDD/EDT ☑ Format ______

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: UPS 2nd Day

Cooler ID(s): 1059

Receipt Temp: n/a °C

Custody Seal Ⓨ N

Intact Ⓨ N

Signature Match Ⓨ N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other)	Ra-226	As, Mo, Se, U, V	Ag [illegible]	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID
1 SAND3-SS-026	11/16/06	1420	Soil	X	X			X		Hold Samples	C06110960
2 SAND3-SS-025	11/16/06	1425	Soil	X	X			X		after analysis	
3 SAND3-SS-024	11/16/06	1440	Soil	X	X			X			
4 SAND3-SS-022	11/16/06	1435	Soil	X	X			X			
5 SAND3-SS-014	11/16/06	1445	Soil	X	X			X			
6 SAND3-SS-214	11/16/06	1445	Soil	X	X			X			
7 SAND3-SS-027	11/16/06	1450	Soil	X	X	X		X			
8 SAND3-SS-09	11/16/06	1500	Soil	X	X			X			
9 SAND3-SS-05	11/16/06	1510	Soil	X	X			X			
10 SAND3-SS-010	11/16/06	1455	Soil	X	X			X			

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
[illegible]	11/17/06 [illegible]	[illegible]	Tabitha Edwards	11/21/06 0950	Tabitha Edwards

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY

Sample Type: ______ # of fractions ______

Chain of Custody and Analytical Request Record

Page 2 of 3

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109, Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (office) 970-879-2048 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn Accounts Payable P.O. Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ______
EDD/EDT ☑ Format ______

ANALYSIS REQUESTED: Number of Containers; Sample Type: A W S V B O (Air Water Soils/Solids Vegetation Bioassay Other); Ra-226; As, Mo, Se, U, V; Radionuclide (?)

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by:
Cooler ID(s): 1759
Receipt Temp ____ °C
Custody Seal Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, U, V	Radionuclide	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID
1	SAND3-SS-017	11/16/06	1505	Soil	X	X	X		X		Hold Samples	C06110906
2	SAND3-SS-006	11/16/06	1515	Soil	X	X			X		after analysis	C06110906
3	SAND3-SS-002	11/16/06	1520	Soil	X	X			X			
4	SAND3-SS-008	11/16/06	1525	Soil	X	X			X			
5												
6												
7												
8												
9												
10												

LABORATORY USE ONLY

LW 11/16/06

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Leah Wolf Martin	11/16/06 1745	Leah Wolf Martin	Tabitha Edwards	11/21/06 09:30	Tabitha Edwards

Sample Disposal: Return to client: ______ Lab Disposal: ______
LABORATORY USE ONLY — Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

Page 1 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (office) 970-879-9048 fax — Sampler Name if other than Contact:
Invoice Address: MWH Americas, Attn Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following: NELAC ☐ A2LA ☐ Level IV ☐ ✓ Other ____ EDD/EDT ☐ Format ____

ANALYSIS REQUESTED: Ra-226; Metals - As, Mo, Se, U, V; Archive other Hold

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: UPS 2nd Day Air — Cooler ID(s): 13066 — Receipt Temp: 1.0 °C — Custody Seal (Y) N — Intact (Y) N — Signature Match (Y) N

#	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	Metals	Archive	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID
1	NECR2-TP-035 (1.0-1.5ft)	11/14/06	15:10	Soil	X	X			X		Hold Samples after analysis	C06110926
2	NECR2-TP-052 (1.5-2.0ft)	11/14/06	15:25	Soil	X	X			X			
3	NECR2-TP-022 (4.0-5.0ft)	11/14/06	15:20	Soil	X	X			X			
4	NECR2-TP-020 (1.0-1.5ft)	11/14/06	16:30	Soil	X	X			X			
5	NECR2-TP-039 (1.0-1.5ft)	11/14/06	1630	Soil	X	X			X			
6	NECR2-TP-239 (1.0-1.5ft)	11/14/06	1635	Soil	X	X			X			
7	NECR2-TP-015 (0.5-1.0ft)	11/14/06	1640	Soil	X	X			X			
8	SAND2-TP-011 (0.5-1.0)	11/14/06	1425	Soil	X	X			X			
9	SAND2-TP-012 (1.5-2)	11/14/06	1440	Soil	X	X			X			
10	SAND2-TP-017 (1.5-2)	11/14/06	1455	Soil	X	X			X			

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
Leah Wolf Martin	11/16/06 1740	Leah Wolf Martin	Tabitha Edwards	11/21/06 09:30	Tabitha Edwards

Sample Disposal: Return to client: ____ Lab Disposal: ____

LABORATORY USE ONLY — Sample Type: ____ # of fractions ____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 2 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd, Ste 109 Steamboat Springs, CO 80477	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin (970) 879-6260 (970) 879-9045 fax. Sampler Name if other than Contact: Leah.wolf.martin@mwhglobal.com
Invoice Address: MWH Americas Attn: Accounts Payable P.O. 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above. Purchase Order #: ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ______
EDD/EDT ☐ Format ______

ANALYSIS REQUESTED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: ______
Cooler ID(s): 1806
Receipt Temp ______ °C
Custody Seal Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other)	Ra-226	Metals-As, Mo, Se, U, V	Agronomic							SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments:	LABORATORY USE ONLY Lab ID
1	SAN02-TP-002 (1-1.5)	11/14/06	1535	Soil	X	X									X		Hold Samples	C06110926
2	SAN02-TP-002 (0.5-1.0)	11/14/06	1600	Soil	X	X									X		After Analysis	
3	NEMSA-TP-001 (0-0.5)	11/14/06	1050	Soil	X	X	X								X			
4	NEMSA-TP-001 (1-1.5)	11/14/06	1100	Soil	X	X									X			
5	NEMSA-TP-001 (4-5)	11/14/06	1115	Soil	X	X									X			
6	NEMSA-TP 001 (6-6.5	11/14/06	1120	Soil	X	X									X			
7	YARD-TP-001 (0-0.5)	11/14/06	1150	Soil	X	X	X								X			
8											LWM 11/14/06							
9																		
10																		

Custody Record MUST be Signed	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
	Leah Wolf Martin	11/14/06 1741	Leah Wolf Martin	Tabitha Edwards	11/21/06 09:50	Tabitha Edwards
	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY
Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 1 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Suite 109, Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 office 970-879-9048 (fax) Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn: Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above / Purchase Order #: / ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ______
EDD/EDT ☑ Format ______

ANALYSIS REQUESTED: Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other; Ra-226; As, Mo, Se, U, V; Archive ; SEE ATTACHED; Normal Turnaround (TAT); RUSH Turnaround (TAT)

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: ODA
Cooler ID(s): 1758 various
Receipt Temp: 10.1/4 °C
Custody Seal Ⓨ N
Intact Ⓨ N
Signature Match Ⓨ N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, U, V	Archive	Normal TAT	Comments	Lab ID
1 NECR2-SS-015	11/14/06	11:15	Soil	X	X	X	X	Hold Samples	C06110906
2 NECR2-SS-017	11/14/06	11:35	Soil	X	X		X	after analysis	
3 NECR2-SS-019	11/14/06	11:25	Soil	X	X		X		
4 NECR2-SS-033	11/14/06	10:20	Soil	X	X		X		
5 NECR2-SS-037	11/14/06	10:30	Soil	X	X		X		
6 NECR2-SS-035	11/14/06	12:10	Soil	X	X		X		
7 NECR2-SS-039	11/14/06	11:10	Soil	X	X		X		
8 NECR2-SS-239 (cap)	11/14/06	11:10	Soil	X	X		X		
9 NECR2-SS-050	11/14/06	10:45	Soil	X	X		X		
10 NECR2-SS-056	11/14/06	10:35	Soil	X	X	X	X		

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Leah Wolf Martin	11/16/06 1801	Leah Wolf Martin	Tabitha Edwards	11/21/06 950	Tabitha Edwards

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY: Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Suite 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Woolf Martin leah.woolf.martin@mwhglobal.com 970-879-6260 (office) 970-879-9048 (fax) Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn. Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above; Purchase Order #: ; ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ______
EDD/EDT ☑ Format ______

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: ______
Cooler ID(s): 1058
Receipt Temp ______ °C
Custody Seal Y N
Intact Y N
Signature Match Y N

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O Air Water Soils/Solids Vegetation Bioassay Other)	Ra-226	As Mo Se V U	Agronomic	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments:	LABORATORY USE ONLY Lab ID
1	~~NECRZ-PP-022~~	~~11-14-06~~	~~16:20~~	~~Soil~~	~~X~~	~~X~~			~~X~~		Hold Samples	C06110966
2	NECRZ-SS-020	11-14-06	11:30	soil	X	X			X		after analysis	
3	NECRZ-SS-069	11-14-06	10:40	soil	X	X			X			
4	NECRZ-SS-071	11-14-06	11:05	Soil	X	X			X			
5	NECRZ-SS-092	11-14-06	12:05	soil	X	X			X			
6	NECRZ-SS-094	11-14-06	12:05	soil	X	X			X			
7	NECRZ-SS-027	11-14-06	15:45	Soil	X	X			X			
8												
9					lwm 11/14/06							
10												

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Leah Woolf Martin	11/14/06 1500	Leah Woolf Martin	Tabitha Edwards	11/21/06 950	Tabitha Edwards

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY
Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

Page 1 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109, Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin; 970-879-6260 (office); 970-879-[illegible] (fax); Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn: Accounts Payable, PO [illegible], Broomfield, CO 80021	Invoice Contact & Phone #: as above; Purchase Order #: ; ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ____
EDD/EDT ☑ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: UPS 2nd Day
Cooler ID(s): 11697
Receipt Temp: n/a °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	U, Mo, Se, V	[illegible]	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID
1 HOME1-SS-001	11/15/06	1622	Soil	X	X			X		Hold Samples	C06110900
2 HOME1-SS-002	11/15/06	1625	Soil	X	X			X		after Analysis	
3 HOME1-SS-003	11/15/06	1630	Soil	X	X			X			
4 HOME1-SS-004	11/15/06	1630	Soil	X	X			X			
5 HOME1-SS-005	11/15/06	1627	Soil	X	X			X			
6 HOME2-SS-001	11/15/06	1650	Soil	X	X			X			
7 HOME2-SS-002	11/15/06	1555	Soil	X	X			X			
8 HOME2-SS-003	11/15/06	1615	Soil	X	X			X			
9 HOME2-SS-004	11/15/06	1600	Soil	X	X			X			
10 HOME2-SS-204	11/15/06	1602	Soil	X	X			X			

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Leah Wolf Martin	11/16/06	Leah Wolf Martin	Tabitha Edwards	11/21/06 09:55	Tabitha Edwards

Sample Disposal: Return to client: ____ Lab Disposal: ____

LABORATORY USE ONLY
Sample Type: ____ # of fractions ____

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ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 2 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH

Project Name, PWS #, Permit #, Etc.: UNC NECR

Report Mail Address: 1475 Pine Grove Rd Ste 109, Steamboat Springs, CO 80487

Contact Name, Phone, Fax, E-mail: Leah Wolf Martin [illegible] 970-879-6260 (office) 970-879-[illegible] (fax)

Sampler Name if other than Contact:

Invoice Address: MWH Americas Attn: Accounts Payable P.O. Box [illegible] Broomfield, CO [illegible]

Invoice Contact & Phone #: as above

Purchase Order #:

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ____
EDD/EDT ☑ Format ____

Number of Containers / Sample Type: A W S V B O / Air Water Soils/Solids Vegetation Bioassay Other

ANALYSIS REQUESTED: Ra-226; As, Mo, Se, U, V

SEE ATTACHED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by:

Cooler ID(s): 1697

Receipt Temp ____ °C

Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, U, V	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID
1 HOME2-SS-005	11/15/06	1620	Soil	X	X	X		Hold samples	C06110966
2 HOME3-SS-001	11/15/06	1558	Soil	X	X	X		after analysis	
3 HOME3-SS-002	11/15/06	1603	Soil	X	X	X			
4 HOME3-SS-003	11/15/06	1605	Soil	X	X	X			
5 HOME3-SS-004	11/15/06	1600	Soil	X	X	X			
6 HOME3-SS-005	11/15/06	1555	Soil	X	X	X			
7									
8									
9				LWM 11/16/06					
10									

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Leah Wolf Martin	11/16/06	Leah Wolf Martin	[illegible] Edwards	11/21/06 0950	[illegible]

Sample Disposal: Return to client: ____ Lab Disposal: ____

LABORATORY USE ONLY
Sample Type: ____ # of fractions ____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

Page 1 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109, Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin, 970 879-6260 (office), 970-879-9049 (fax); Sampler Name if other than Contact: [illegible]
Invoice Address: MWH Americas Attn: Accounts Payable [illegible]	Invoice Contact & Phone #: as above; Purchase Order #:; ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following: NELAC ☐ A2LA ☐ Level IV ☒ Other ______ EDD/EDT ☒ Format ______

ANALYSIS REQUESTED: Ra-226; Isotopic U

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: UPS 2nd Day; Cooler ID(s): 1700; Receipt Temp n/a °C; Custody Seal Y N; Intact Y N; Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	Isotopic U	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID
1 HOME4-SS-001	11/15/06	1545	Soil	X	X		X		Hold samples	C06110906
2 HOME4-SS-002	11/15/06	1510	Soil	X	X		X		after analysis	
3 HOME4-SS-002	11/15/06	1510	Soil	X	X		X			
4 HOME4-SS-003	11/15/06	1520	Soil	X	X		X			
5 HOME4-SS-004	11/15/06	1535	Soil	X	X		X			
6 HOME4-SS-005	11/15/06	1530	Soil	X	X		X			
7 HOME5-SS-001	11/15/06	1425	Soil	X	X		X			
8 HOME5-SS-002	11/15/06	1430	Soil	X	X		X			
9 HOME5-SS-003	11/15/06	1440	Soil	X	X		X			
10 HOME5-SS-004	11/15/06	1450	Soil	X	X		X			

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
Leah Wolf Martin	11/16/06 1737	Leah Wolf Martin	Tabitha Edwards	11/21/06 09:50	Tabitha Edwards

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY: Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 1 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf@mwhglobal.com 970-879-6260 (office) 970-879-9049 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn. Accounts Payable P.O. Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ____
EDD/EDT ☑ Format ____

ANALYSIS REQUESTED: Ra-226; As, Mo, Se, U, V — SEE ATTACHED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: UPS 2nd Day Air
Cooler ID(s): 1700
Receipt Temp: n/a °C
Custody Seal: Y N
Intact: Y N
Signature Match: Y N

#	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, U, V	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID (LABORATORY USE ONLY)
1	HOMES-SS-005	11/15/06	1500	Soil	X	X	X		Hold Samples	C06110906
2	HOMEG-SS-001	11/15/06	1345	Soil	X	X	X		after analysis	
3	HOMEG-SS-002	11/15/06	1350	Soil	X	X	X			
4	HOMEG-SS-003	11/15/06	1355	Soil	X	X	X			
5	HOMEG-SS-004	11/15/06	1400	Soil	X	X	X			
6	HOMEG-SS-005	11/15/06	1405	Soil	X	X	X			
7										
8										
9										
10										

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Leah Wolf-Martin	11/16/06 1730	Leah Wolf-Martin	Tabitha Edwards	11/21/06 0950	Tabitha Edwards

Sample Disposal: Return to client: ____ Lab Disposal: ____

LABORATORY USE ONLY — Sample Type: ____ # of fractions ____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

Page 1 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Witt Martin / 970-879-6260 (office) 970 879-9048 (Fax)
Invoice Address: MWH Americas Attn Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above / Purchase Order #: / ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ______
EDD/EDT ☑ Format ______

ANALYSIS REQUESTED: Ra-226; As, Mo, Se, U, V

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: UPS 2nd Day Air
Cooler ID(s): 1760
Receipt Temp: n/a °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, U, V	Normal Turnaround (TAT)	Comments	Lab ID
1 HOME7-SS-001	11/15/06	1140	Soil	X	X	X	Hold Samples after analysis	C06110906
2 HOME7-SS-002	11/15/06	1145	Soil	X	X	X		
3 HOME7-SS-003	11/15/06	1150	Soil	X	X	X		
4 HOME7-SS-004	11/15/06	1200	Soil	X	X	X		
5 HOME7-SS-005	11/15/06	1205	Soil	X	X	X		
6 HOME8-SS-001	11/15/06	1120	Soil	X	X	X		
7 HOME8-SS-002	11/15/06	1115	Soil	X	X	X		
8 HOME8-SS-003	11/15/06	1110	Soil	X	X	X		
9 HOME8-SS-004	11/15/06	1100	Soil	X	X	X		
10 HOME8-SS-005	11/15/06	1105	Soil	X	X	X		

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Leah Witt Martin	11/16/06/1730	[signature]	Tabitha Edwards	11/21/06 09:50	[signature]

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY: Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

Page 2 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH

Project Name, PWS #, Permit #, Etc.: UNC NECR

Report Mail Address: 1475 Pine Grove Rd Ste 109, Steamboat Springs, CO 80487

Contact Name, Phone, Fax, E-mail: Leah Wolf Martin, 970-879-6260 (Office), 970-879-9048 (Fax)

Sampler Name if other than Contact:

Invoice Address: MWH Americas Attn: Accounts Payable, P.O. Box 6610, Broomfield, CO 80021

Invoice Contact & Phone #: as above

Purchase Order #:

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ________

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other ________

EDD/EDT ☑ Format ________

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by:

Cooler ID(s): 1766

Receipt Temp ____ °C

Custody Seal Y N

Intact Y N

Signature Match Y N

ANALYSIS REQUESTED: Ra-226; As, Mo, Se, U, V; SEE ATTACHED

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, U, V	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID
1 HOME9-SS-001	11/15/06	1025	Soil	X	X		X		Hold Samples	C06110926
2 HOME9-SS-002	11/15/06	1030	Soil	X	X		X		other analysis	
3 HOME9-SS-003	11/15/06	1035	Soil	X	X		X			
4 HOME9-SS-004	11/15/06	1040	Soil	X	X		X			
5 HOME9-SS-005	11/15/06	1045	Soil	X	X		X			
6										
7 LWM										
8										
9										
10										

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
Leah Wolf Martin	11/16/06 1735	Leah Wolf Martin	Tabitha Edwards	11/21/06 0950	Tabitha Edwards

Sample Disposal: Return to client: ________ Lab Disposal: ________

LABORATORY USE ONLY

Sample Type: ________ # of fractions ________

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 1 of 1

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd. Steamboat Springs, CO 80477	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin (303) 475-1135 — Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn. Accounts Payable POB 6610 Broomfield CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ________

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other ________
EDD/EDT ☐ Format ________

Number of Containers / Sample Type: A W S V B O / Air Water Soils/Solids Vegetation Bioassay Other

ANALYSIS REQUESTED: VOCs, Fuel Scan; SEE ATTACHED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: LDM
Cooler ID(s): 2131
Receipt Temp 6.1 °C
Custody Seal Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	VOCs	Fuel Scan	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments:	Lab ID
1	NECR1-SB-131 (24)	11/16/06	1100	Soil	X			X		Call MWH	C06110941
2	NECR1-SB-131 (24)	11/16/06	1100	Soil		X		X		before running.	
3											
4											
5											
6											
7											
8											
9											
10											

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
R. Sassarf	11/17/06	R. Sassarf	Tabitha Edwards	11/21/06 950	Tabitha Edwards

Sample Disposal: Return to client: ________ Lab Disposal: ________

LABORATORY USE ONLY
Sample Type: ________ # of fractions ________

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: [illegible]	Contact Name, Phone, Fax, E-mail: [illegible] 970-879-6260 (office) 970-879-[illegible] (fax) — Sampler Name if other than Contact:
Invoice Address: [illegible] Attn: Accounts Payable [illegible]	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ______
EDD/EDT ☑ Format ______

ANALYSIS REQUESTED — Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: [illegible]
Cooler ID(s): [illegible]
Receipt Temp [illegible] °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	[illegible]	[illegible]	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1 NECR1-SS-049	11-20-06	9:30	Soil	X	X			X		
2 NECR1-SS-047	11-20-06	9:35	Soil	X	X			X		
3 NECR1-SB-046 (0-0.5)	11-16-06	13:45	Soil	X	X			X		
4 NECR1-SS-044	11-20-06	9:50	Soil	X	X	X		X		
5 NECR1-SS-230	11-20-06	9:15	Soil	X	X			X		
6 NECR1-SS-030	11-20-06	9:15	Soil	X	X			X		
7 NECR1-SS-028	11-20-06	9:10	Soil	X	X			X		
8 NECR1-SS-020	11-20-06	9:55	Soil	X	X			X		
9 NECR1-SS-025	11-20-06	2:50	Soil	X	X			X		
10 NECR1-SS-020	11-20-06	9:05	Soil	X	X			X		

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
[illegible]	11-21-06 / 10:05	[illegible]	[illegible]	[illegible]	

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY — Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH

Project Name, PWS #, Permit #, Etc.: UNC NECR

Report Mail Address: 1475 Pine Grove Rd Suite 109 Steamboat Springs, CO 80487

Contact Name, Phone, Fax, E-mail: Leah Wolff Martin 970-879-6260 (office) 970-879-9048 (fax)

Sampler Name if other than Contact: leah.wolff.martin@mwhglobal.com

Invoice Address: MWH Americas Attn: Accounts Payable PO Box 6610 Broomfield CO 80021

Invoice Contact & Phone #: as above

Purchase Order #:

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ________

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ________
EDD/EDT ☑ Format ________

ANALYSIS REQUESTED: Ra-226; Metals (As, Mo, Se, U, V); [illegible]

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: ________
Cooler ID(s): [illegible]
Receipt Temp [illegible] °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, U, V	[illegible]	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1 ~~NECR1-SS-020~~	~~11-20-06~~	~~9:05~~	~~Soil~~	~~X~~	~~X~~			~~X~~		
2 NECR1-SS-018	11-20-06	9:00	Soil	X	X			X		
3 NECR1-SB-016 (0-0.5')	11-16-06	3:05	Soil	X	X			X		
4 NECR1-SS-005	11-20-06	5:45	Soil	X	X			X		
5 NECR1-SB-016 (5.0)	11-16-06	15:22	Soil	X	X			X		
6 NECR1-SB-016 (10.0)	11-16-06	15:30	Soil	X	X			X		
7 NECR1-SB-016 (15.0)	11-16-06	15:40	Soil	X	X			X		
8 NECR1-SB-016 (20.0)	11-16-06	15:48	Soil	X	X			X		
9 NECR1-SB-095 (5.0)	11-16-06	9:45	Soil	X	X			X		
10 NECR1-SB-095 (10.0)	11-16-06	9:30	Soil	X	X			X		

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Anne Hoffman	11-21-06 / 10:05	[signature]	[illegible]	[illegible]	[signature]

Sample Disposal: Return to client: ________ Lab Disposal: ________

LABORATORY USE ONLY
Sample Type: ________ # of fractions ________

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Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Suite 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin 970-879-6260 (office) 970-879-9048 (fax) Sampler Name if other than Contact: leah.wolf.martin@mwhglobal.com
Invoice Address: MWH Americas, Attn: Accounts Payable PO Box 6610 Broomfield CO 80021	Invoice Contact & Phone #: as above / Purchase Order #: / ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other______
EDD/EDT ☑ Format______

ANALYSIS REQUESTED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by:
Cooler ID(s): C2098
Receipt Temp: N/A °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other)	Ra 226	Ar, Mo, Se, V, U	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments: Hold Sample After Analysis	Lab ID (LABORATORY USE ONLY)
1 NECR1-SB-095 (14.0)	11/16/06	0915	soil	X	X		X			C06110931
2										
3										
4										
5										
6										
7										
8										
9										
10										

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Travis Hoffman	11-21-06/10:05	T. Hoffman	[illegible]	11/27/06 1410	

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY
Sample Type: ______ # of fractions ______

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH

Project Name, PWS #, Permit #, Etc.: UNC NECR

Report Mail Address: 1475 Pine Grove Rd Suite 109 Steamboat Springs, CO 80487

Contact Name, Phone, Fax, E-mail: Leah Wolf Martin 970-879-6260 (office)

Sampler Name if other than Contact: leah.wolf.martin@mwhglobal.com 970-879-9048 (fax)

Invoice Address: MWH Americas Attn: Accounts Payable PO Box 6610 Broomfield, CO 80021

Invoice Contact & Phone #: as above

Purchase Order #:

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other ______

EDD/EDT ☑ Format ______

ANALYSIS REQUESTED: Ra-226; As, Mo, Se, V, U; Agronomic

Number of Containers / Sample Type: A W S V B O / Air Water Soils/Solids Vegetation Bioassay Other

SEE ATTACHED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: ______

Cooler ID(s) ______

Receipt Temp ______ °C

Custody Seal Y N

Intact Y N

Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, V, U	Agronomic	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1	NECR1-SB-90(5.0)	11-15-06	14:35	soil	X	X			X		
2	NECR1-SB-90(10.0)	11-15-06	14:45	soil	X	X			X		
3	NECR1-SB-90(15.0)	11-15-06	14:55	soil	X	X			X		
4	NECR1-SB-90(20)	11-15-06	15:15	soil	X	X			X		
5	NECR1-SB-90(25)	11-15-06	15:25	soil	X	X			X		
6	NECR1-SB-90(30.0)	11-15-06	15:30	soil	X	X			X		
7	NECR1-SB-90(35.5)	11-15-06	15:50	soil	X	X			X		C06111105
8	NECR1-SB-90(40)	11-15-06	16:00	soil	X	X			X		
9	NECR1-SB-90(45)	11-15-06	16:15	soil	X	X			X		
10											

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print): Hans Hellman Date/Time: 11/21/06 / 12:20 Signature: [signature]

Received by (print): A Wagner Date/Time: 11/27/06 940 Signature:

Relinquished by (print): Date/Time: Signature:

Received by (print): Date/Time: Signature:

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY

Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: [illegible] Rd Suite 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: [illegible] 970 879 6260 (office) 970 879-9048 (fax) / Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn: Accounts Payable [illegible] Broomfield, CO 80021	Invoice Contact & Phone #: as above / Purchase Order #: / ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other____
EDD/EDT ☑ Format____

Number of Containers / Sample Type: A W S V B O / Air Water Soils/Solids Vegetation Bioassay Other

ANALYSIS REQUESTED: Ra 226 | Ar, Mo, Se, V, U | [illegible] | SEE ATTACHED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: [illegible]
Cooler ID(s): [illegible]
Receipt Temp [illegible] °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra 226	Ar, Mo, Se, V, U	[illegible]	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1 SCDPAD SS-005	11-17-06	15:34	Soil	X	X			X		LABORATORY USE ONLY
2 SCDPAD SS-006	11-17-06	15:42	Soil	X	X			X		
3 SCDPAD SS-007	11-17-06	15:06	Soil	X	X			X		
4 SCDPAD SS-[illegible]	11-17-06	15:53	Soil	X	X			X		
5 SCDPAD SS-[illegible]	11-17-06	15:28	Soil	X	X			X		
6 SCDPAD SS-012	11-17-06	15:55	Soil	X	X			X		
7 SCDPAD SS-014	11-17-06	16:04	Soil	X	X			X		
8 SCDPAD SS-015	11-17-06	15:17	Soil	X	X			X		
9 SCDPAD SS-018	11-17-06	15:30	Soil	X	X			X		
10 SCDPAD SS-020	11-17-06	15:22	Soil	X	X			X		

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
[illegible]	11-21-06 / 1000	[illegible]	[illegible]	11/22/06	[illegible]

Sample Disposal: Return to client: ____ Lab Disposal: ____

LABORATORY USE ONLY Sample Type: ____ # of fractions ____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Suite 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com; Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn: Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above; Purchase Order #:; ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ______
EDD/EDT ☑ Format ______

ANALYSIS REQUESTED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: ______
Cooler ID(s): C737
Receipt Temp: 11.8 °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, V, U	Asbestos	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1 SEDPAD-SS-021	11-17-06	15:55	soil	X	X	X		X		
2 SEDPAD-SS-022	11-17-06	15:00	soil	X	X			X		
3 SEDPAD-SS-025	11-17-06	15:10	soil	X	X			X		
4 SEDPAD-SS-026	11-17-06	15:10	soil	X	X			X		
5 NECR1-SB-046 (5.0)	11-16-06	13:55	soil	X	X					
6 NECR1-SB-046 (10.0)	11-16-06	14:05	soil	X	X					
7 NECR1-SB-046 (15.0)	11-16-06	14:15	soil	X	X					
8 NECR1-SB-046 (20.0)	11-16-06	14:22	soil	X	X					
9 NECR1-SB-046 (25.0)	11-16-06	14:35	soil	X	X					
10 NECR1-SB-046 (30.0)	11-16-06	14:45	soil	X	X					

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Hans Hellmann	11-21-06/1000	[signature]	[illegible]	11-22-06 [illegible]	

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY

Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

Page ____ of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: [illegible] Springs, CO [illegible]	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970 879-6260 (office) 970-879-9045 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn: Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ________

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other________

EDD/EDT ☑ Format________

Number of Containers / Sample Type: A W S V B O / Air Water Soils/Solids Vegetation Bioassay Other

ANALYSIS REQUESTED: Ra-226 | As, Mo, Se, U | [illegible] | SEE ATTACHED | Normal Turnaround (TAT) | RUSH Turnaround (TAT)

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples ADAC Analysis

Shipped by: [illegible]

Cooler ID(s): [illegible]

Receipt Temp n/a °C

Custody Seal Y N

Intact Y N

Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, U	[illegible]	SEE ATTACHED	Normal TAT	RUSH TAT	Lab ID
1 PGWD12-SS-011	11-8-06	10:35	Soil	X	X			X		
2 PGWD12-SS-014	11-8-06	10:00	Soil	X	X			X		
3 PGWD12-SS-019	11-8-06	10:25	Soil	X	X			X		
4 PGWD12-SS-219	11-8-06	10:25	Soil	X	X			X		
5 PGWD12-SS-020	11-8-06	10:47	Soil	X	X	X		X		
6 PGWD12-SS-023	11-8-06	9:56	Soil	X	X			X		
7 PGWD12-SS-024	11-8-06	10:09	Soil	X	X			X		
8 PGWD12-SS-035	11-8-06	9:35	Soil	X	X			X		
9 PGWD12-SS-235	11-8-06	9:35	Soil	X	X			X		
10 PGWD12-SS-[illegible]	11-8-06	[illegible]	Soil	X	X			X		

Analysis on per Leah Martin 11/20/06 [illegible]

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
[illegible] Hoffman	11/21/2006 10:00	[signature]	[illegible]	11/21/06 09:40	

Sample Disposal: Return to client: ________ Lab Disposal: ________

LABORATORY USE ONLY

Sample Type:________ # of fractions ________

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Suite 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (office) 970-879-9048 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn: Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ______
EDD/EDT ☑ Format ______

Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other

ANALYSIS REQUESTED: Ra-226; As, Mo, Se, V, U; Asbestos(?)

SEE ATTACHED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples after analysis

Shipped by: ______
Cooler ID(s): Client
Receipt Temp 11.8 °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, V, U	Asbestos	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1 POND12-SS-042	11-18-06	10:45	Soil	X	X		X		
2 POND12-SS-047	11-18-06	9:40	Soil	X	X	X	X		
3 POND12-SS-050	11-18-06	9:30	Soil	X	X		X		
4 POND12-SS-056	11-18-06	10:15	Soil	X	X		X		
5 POND12-SS-059	11-18-06	9:50	Soil	X	X		X		
6 POND12-SS-061	11-18-06	9:28	Soil	X	X		X		
7 POND12-SS-064	11-18-06	9:25	Soil	X	X		X		
8 POND12-SS-076	11-18-06	9:20	Soil	X	X		X		
9 POND12-SS-077	11-18-06	9:15	Soil	X	X		X		
10 POND12-SB-071 (0-0.5)	11-17-06	10:30	Soil	X	X	As per Leah Martin 11/29/06 TAT	X		

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Hans Hoffman	11/21/06 14:00	Hans Hoffman	[illegible]	[illegible]	[illegible]

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY — Sample Type: ______ # of fractions ______

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ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH

Project Name, PWS #, Permit #, Etc.: UNC NECR

Report Mail Address: 1475 Pine Grove Rd Suite 109 Steamboat Springs, CO 80487

Contact Name, Phone, Fax, E-mail: Leah Walk Martin leah.walk.martin@mwhglobal.com 970-879-6260 (office) 970-879-9048 (fax)

Sampler Name if other than Contact:

Invoice Address: MWH Americas Attn: Accounts Payable PO Box 6610 Broomfield, CO 80021

Invoice Contact & Phone #: as above

Purchase Order #:

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other

Special Report Formats - ELI must be notified prior to sample submittal for the following: NELAC ☐ A2LA ☐ Level IV ☑

Other

EDD/EDT ☑ Format

ANALYSIS REQUESTED: Ra-226, Ar, Mo, Se, V, U, Appendix IX

SEE ATTACHED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by:

Cooler ID(s): Client

Receipt Temp: NA °C

Custody Seal Y N

Intact Y N

Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	Ar, Mo, Se, V, U	Appendix IX	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1 YCNN12-SB-71 (5.0)	11-17-06	10:40	Soil	X	X		X		
2 1/2-SB-71 (10.0)	11-17-06	10:50	Soil	X	X		X		
3 1/2-SB-71 (15.0)	11-17-06	11:00	Soil	X	X		X		
4 1/2-SB-82 (0-0.5)	11-17-06	9:00	Soil	X	X		X		
5 1/2-SB-82 (5.0)	11-17-06	9:15	Soil	X	X		X		
6 1/2-SB-82 (10.0)	11-17-06	9:25	Soil	X	X		X		C06111057
7 1/2-SB-82 (15)	11-17-06	9:35	Soil	X	X		X		
8 1/2-SB-82 (20)	11-17-06	9:50	Soil	X	X		X		
9									
10									

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
Hans Hoffman	11/21/06 10:00	[signature]	[signature]	11/27/06 9:10	

Sample Disposal: Return to client: Lab Disposal:

LABORATORY USE ONLY Sample Type: # of fractions

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Suite 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (office) 970-879-9048 (fax) Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn: Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above Purchase Order #: ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☒
Other ______
EDD/EDT ☒ Format ______

ANALYSIS REQUESTED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: ______
Cooler ID(s): ______
Receipt Temp ______ °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O Air Water Soils/Solids Vegetation Bioassay Other)	Ra-226	As, Mo, Se, V, U	Radionuclide	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID (LABORATORY USE ONLY)
1 NECR1-SB-045 (0-0.5)	11/16/06	0900	Soil	X	X			X		
2 NECR1-SS-140	11-2006	2:30	Soil	X	X			X		
3 NECR1-SS-138	11-2006	2:25	Soil	X	X			X		
4 NECR1-SS-137	11-2006	11:50	Soil	X	X			X		
5 NECR1-SS-135	11-2006	11:40	Soil	X	X			X		
6 NECR1-SS-133	11-2006	11:35	Soil	X	X			X		C06110557
7 NECR1-SB-131 (0-0.5)	11-16-06	10:05	Soil	X	X			X		
8 NECR1-SS-129	11-2006	11:20	Soil	X	X			X		
9 NECR1-SS-127	11-2006	11:00	Soil	X	X	X		X		
10 NECR1-SS-126	11-2006	11:05	Soil	X	X			X		

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Hans Hoffman	11-21-06 / 10:05	[signature]	[signature]	11/27/06 940	

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY
Sample Type: ______ # of fractions ______

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

Page 2 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Suite 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Woolf Martin lwoolf martin@mwhglobal.com 970-879-6260 (office) 970-879-9048 (fax) Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn: Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above Purchase Order #: ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ______
EDD/EDT ☑ Format ______

ANALYSIS REQUESTED: Ra 226; Metals Se, V, U; Agronomic

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: ______
Cooler ID(s): [illegible]
Receipt Temp [illegible] °C
Custody Seal Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra 226	Metals Se, V, U	Agronomic	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1	NECR1-SS-103 (duplicate)	11-20-06	2:15	Soil	X	X			X		
2	NECR1-SS-103	11-20-06	2:15	Soil	X	X			X		
3	NECR1-SS-101	11-20-06	12:00	Soil	X	X			X		
4	NECR1-SS-93	11-18-06	8:50	Soil	X	X			X		
5	NECR1-SS-92	11-18-06	9:00	Soil	X	X			X		
6	NECR1-SS-090 (0-0.5)	11-15-06	14:25	Soil	X	X			X		C06111057
7	NECR1-SS-070	11-20-06	10:40	Soil	X	X			X		
8	NECR1-SS-068	11-20-06	10:35	Soil	X	X			X		
9	NECR1-SS-067	11-20-06	10:30	Soil	X	X			X		
10	NECR1-SS-065	11-20-06	10:25	Soil	X	X			X		

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Hans Hoffman	11/21/06 / 10:00	Hans Hoffman	C Wagner	11/27/06 940	

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY
Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.
This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

Page 1 of 3

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

ENERGY LABORATORIES

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Suite 109 Steamboat Springs CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin 970-879-6260 (office) 970-879-9048 (fax) Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above. Purchase Order #: ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☒
Other ______
EDD/EDT ☒ Format ______

ANALYSIS REQUESTED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: Conf'd
Cooler ID(s): C1520
Receipt Temp: N/A °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Number of Containers / Sample Type: A W S V B O	Ra-226	As, Mo, Se, V, U	Agronomic	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID (LABORATORY USE ONLY)
1 POND3-SS-057	11-17-06	13:40	soil		X	X	X		X		
2 POND3-SS-046	11-17-06	13:55	soil		X	X	X		X		
3 POND3-SS-059	11-17-06	13:45	soil		X	X			X		
4 POND3-SS-065	11-17-06	13:30	soil		X	X			X		
5 POND3-SS-063	11-17-06	13:35	soil		X	X			X		
6 POND3-SS-042	11-17-06	14:15	soil		X	X			X		C06111057
7 POND3-SS-259	11-17-06	13:45	soil		X	X			X		
8 POND3-SS-038	11-17-06	14:00	soil		X	X			X		
9 POND3-SS-29	11-17-06	14:10	soil		X	X			X		
10 POND3-SS-027	11-17-06	14:25	soil		X	X			X		

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Hans Hoffman	11-21-06 / 10:10	Hans Hoffman		11/27/06 9:00	

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY
Sample Type: ______ # of fractions ______

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ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH

Project Name, PWS #, Permit #, Etc.: UNC NECR

Report Mail Address: 1475 Pine Grove Rd Suite 109, Steamboat Springs, CO 80487

Contact Name, Phone, Fax, E-mail: Leah Woolf Morth — [illegible]@mwhglobal.com — 970-879-6260 (office) 970-879-9045 (fax)

Sampler Name if other than Contact:

Invoice Address: MWH Americas Attn: Accounts Payable, PO Box 6610, Broomfield, CO 80021

Invoice Contact & Phone #: as above

Purchase Order #:

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ______
EDD/EDT ☑ Format ______

ANALYSIS REQUESTED: Ra-226; As, Mo, Se, V, U; Agronomic

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by:

Cooler ID(s): CB2C

Receipt Temp: [illegible] °C

Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, V, U	Agronomic	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1 POND3-SS-015	11-17-06	14:35	soil	X	X			X		
2 POND3-SS-007	11-17-06	14:42	soil	X	X			X		
3 POND3-SS-001	11-17-06	14:45	soil	X	X			X		
4 3/3c-SB-61 (0-0.5)	11-16-06	16:07	soil	X	X			X		
5 3/3c-SB-61 (5.5)	11-16-06	16:20	soil	X	X			X		
6 3/3c-SB-61 (10.0)	11-16-06	16:28	soil	X	X			X		C06110S[illegible]
7 3/3c-SB-61 (15.0)	11-16-06	16:35	soil	X	X			X		
8 3/3c-SB-61 (20.0)	11-16-06	16:44	soil	X	X			X		
9 3/3c-SB-61 (25.0)	11-16-06	16:55	soil	X	X			X		
10 NECR1-SB-131 (5.0)	11-16-06	10:15	soil	X	X			X		

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
Harry Holloway	11-21-06/10:10	[signature]	[signature]	11/22/06 9:10	

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY
Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Suite 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (office) 970 879-9048 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn: Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☒
Other ______
EDD/EDT ☒ Format ______

ANALYSIS REQUESTED: Ra-226; Ar, Mo, Se, U, V; Hg (Mercury); SEE ATTACHED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: ______
Cooler ID(s): CTS20
Receipt Temp: 11.4 °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O — Air Water Soils/Solids Vegetation Bioassay Other)	Ra-226	Ar, Mo, Se, U, V	Hg							SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)		LABORATORY USE ONLY — Lab ID
1 NECR1-SB-131 (10.0)	11-16-06	10:25	soil	X	X									X			
2 NECR1-SB-131 (15.0)	11-16-06	10:36	soil	X	X									X			
3 NECR1-SB-131 (20)	11-16-06	10:48	soil	X	X									X			
4 NECR1-SB-131 (24)	11-16-06	11:06	soil	X	X									X			
5 POND3-SS-014	11-17-06	14:30	soil	X	X									X			
6																	C06111265
7																	
8																	
9																	
10																	

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Hans Hoffman	11-21-06/1010	Hans Hoff	C Wagner	11/27/06 940	
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY
Sample Type: ______ # of fractions ______

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ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Suite 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Linda Wolf Mueller linda.wolf.mueller@mwhglobal.com 970 879 6260 (office) 970-879-9048 (fax)
Invoice Address: MWH Americas Attn: Accounts Payable PO Box 6610 Broomfield CO 80021	Invoice Contact & Phone #: see above

Purchase Order #:

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other ____

EDD/EDT ☑ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: ____

Cooler ID(s): ____

Receipt Temp ____ °C

Custody Seal Y N

Intact Y N

Signature Match Y N

Lab ID

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers, Sample Type: A W S V B O)	ANALYSIS REQUESTED: TCLP - 8 RCRA metals	VOCs	SVOCs	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID
1	YARD-TP-001 (1.0-1.5)	11/30/06	1415	soil	1	1	1		X			
2	YARD TP-002 (1.5-2.0)	11/30/06	1440	soil	1	1	1		X			
3	YARD-TP-004 (0.5-1.0)	11/30/06	1505	soil	1	1	1		X			
4	YARD-TP-004 (5.5-6.0)	11/30/06	1530	soil	1	2	1		X		possibly elevated organics	
5	YARD-TP-005 (2.5-3.0)	11/30/06	1625	soil	1	1	1		X			
6	YARD-TP-004 (9.5-10)	~~11/30/06~~	1110	soil	1	1	1					
7	YARD TP-004 (7.0-7.5)	12-1-06	1125	soil	1	2	1					
8	YARD TP-005 (4.5-5.0)	12-1-06	1205	soil	1	1	1					
9	YARD-TP-005 (8.5-9.0)	12-1-06	1235	soil	1	1	1					
10	YARD-TP-003 (1.0-1.5)	12-1-06	1010	soil	1	1	1				C06120227	

LABORATORY USE ONLY

Custody Record MUST be Signed	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
	Chris Bowman	12-1-06 / 9:00	[signature]	[signature]	12/2/06 9:40	
	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:

Sample Disposal: Return to client: ____ Lab Disposal: ____

LABORATORY USE ONLY

Sample Type: ____ # of fractions ____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Suite 109, Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: [illegible] 970 879-6260 (office) 970 879-9048 (fax) — Sampler Name if other than Contact: [illegible]
Invoice Address: MWH Americas Attn: Accounts Payable [illegible] Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☐

Other______

EDD/EDT ☐ Format______

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: [illegible]

Cooler ID(s): [illegible]

Receipt Temp 2 °C

Custody Seal Y N

Intact Y N

Signature Match Y N

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Number of Containers / Sample Type: A W S V B O / Air Water Soils/Solids Vegetation Bioassay Other	TCLP 8 RCRA metals	VOCs	SVOCs	Ra-226	As [illegible]					SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID (LABORATORY USE ONLY)
1	YARD-TP-002 (4.5-7.0)	12-1-06	1510	soil		1	1	1								X		
2	YARD-TP-204 (7.0-7.5)	12-1-06	1125	soil		1	1	1								X		
3	[illegible]-RB-001	12-3-06	1525	H2O					X	X						X		
4																		
5																		
6																		
7																		
8																		
9																		
10																		C06120227

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
[illegible]	12-4-06/9:20	[illegible]	[illegible]	12-5-06 9:50	

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY — Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 1 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109, PO Box 774018, Steamboat Springs, CO 80477	Contact Name, Phone, Fax, E-mail: Leah Martin leah.wolf.martin@mwhglobal.com 970-879-6260 970-879-9048 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Inc Attn Accounts Payable, PO Box 6610, Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☒
Other ______
EDD/EDT ☐ Format ______

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: [illegible]
Cooler ID(s): [illegible]
Receipt Temp ____ °C
Custody Seal Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other)	Ra-226	As, Mo, Se, U, V	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments:	Lab ID (LABORATORY USE ONLY)
1	VENT8-SS-002	12-01-06	1015	Soil	X	X		X		Hold ~~for~~ after analysis	
2	VENT8-SS-202	12-01-06	1015	Soil	X	X		X		(dwn) 12/5/06	
3	VENT8-SS-006	12-01-06	1000	Soil	X	X		X			
4	VENT8-SS-031	12-01-06	1005	Soil	X	X		X			
5	VENT8-SS-034	12-01-06	1022	Soil	X	X		X			
6	VENT8-SS-019	12-01-06	0950	Soil	X	X		X			
7	NECR1-SS-323	12-01-06	1100	Soil	X	X		X			
8	NECR1-SS-326	12-01-06	1109	Soil	X	X		X			
9	NECR1-SS-316	12-01-06	1119	Soil	X	X		X			
10	POND12-SS-009	12-01-06	1211	Soil	X	X		X			C06120235

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
[illegible]	12-4-06 835	[illegible]	[illegible]	12/5/06 900	

Sample Disposal: Return to client: ______ Lab Disposal: ✓

LABORATORY USE ONLY
Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.
This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109 Steamboat Springs, CO 80477 PO 758 77448	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf-martin@mwhglobal.com 970-879-6260 (o) 970-879-9048 (f) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Inc Attn: Accts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☒
Other ______
EDD/EDT ☐ Format ______

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: ______
Cooler ID(s): ______
Receipt Temp ______ °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers / Sample Type: A W S V B O / MATRIX	Ra-226	As, Mo, Se, U, V	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID
1 POND12-SS-012	12-01-06	1202	SOIL	X	X		X		~~Hot~~ Hold after analysis	LABORATORY USE ONLY
2 POND12-SS-032	12-01-06	1158	SOIL	X	X		X			
3 POND12-SS-063	12-01-06	1134	SOIL	X	X		X			
4 SAND1-SS-032	12-01-06	1542	SOIL	X	X		X			
5 SAND1-SS-053	12-01-06	1537	SOIL	X	X		X			
6 SAND1-SS-065	12-01-06	1552	SOIL	X	X		X			
7 NECR2-SS-083	12-01-06	1623	SOIL	X	X		X			
8 NECR2-SS-096	12-01-06	1630	SOIL	X	X		X			
9 NECR2-SS-103	12-01-06	1615	SOIL	X	X		X			
10 NECR2-SS-109	12-01-06	1606	SOIL	X	X		X			C06120235

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
[illegible]	12-4-06/8:55	[illegible]		12/6/06 9:00	

Sample Disposal: Return to client: ______ Lab Disposal: X

LABORATORY USE ONLY — Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

Page 1 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH Americas Inc

Project Name, PWS #, Permit #, Etc.: UNC NECR

Report Mail Address: 1475 Pine Grove Rd Ste 109 PO Box 774018 Steamboat Springs CO 80487

Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (off) 970-879-6260 (cell)

Sampler Name if other than Contact:

Invoice Address: MWH Americas Inc. Attn Accts Payable PO Box 6610 Broomfield, CO 80021

Invoice Contact & Phone #: as above

Purchase Order #:

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other ______

EDD/EDT ☐ Format ______

ANALYSIS REQUESTED: Ra-226; As, Mo, Se, U, V; Ag, Zn, Hg, C

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: Cooler ID(s): Receipt Temp __ °C Custody Seal Y N Intact Y N Signature Match Y N Lab ID

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, U, V	Ag, Zn, Hg, C	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments
1 YARD-TP-001 (1.0-1.5)	11/30/06	1415	Soil	X	X			X		Hold after analysis
2 YARD-TP-001 (0-0.5)	11/30/06	1400	Soil	X	X	X		X		
3 YARD-TP-002 (0-0.5)	11/30/06	1430	Soil	X	X			X		
4 YARD-TP-002 (1.5-2.0)	11/30/06	1440	Soil	X	X			X		
5 YARD-TP-002 (9.5-10.0)	~~12/1/06~~ 11/30/06	1510	Soil	X	X			X		
6 YARD-TP-003 (0.0-0.5)	12/1/06	1000	Soil	X	X			X		
7 YARD-TP-003 (1.0-1.5)	12/1/06	1010	Soil	X	X			X		
8 YARD-TP-004 (0.5-1.0)	~~12/1~~ 11/30/06	1505	Soil	X	X			X		
9 YARD-TP-004 (5.5-6.0)	11/30/06	1530	Soil	X	X			X		
10 YARD-TP-004 (7.0-7.5)	12/1/06	1125	Soil	X	X			X		

LABORATORY USE ONLY C06120235

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Hans Hoffman	12-1-06 / 8:43	[signature]	Tim Holler	12/5/06 930	[signature]

Sample Disposal: Return to client: ______ Lab Disposal: X

LABORATORY USE ONLY Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

Page 2 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: [illegible] Pine Grove Rd Ste 107, PO Box 774018, Steamboat Springs, CO 80477	Contact Name, Phone, Fax, E-mail: [illegible] 970-879-[illegible] 970-879-[illegible] — Sampler Name if other than Contact:
Invoice Address: MWH Americas Inc, Attn: Accts Payable, [illegible], [illegible], CO [illegible]	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ____
EDD/EDT ☐ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: [illegible]
Cooler ID(s): [illegible]
Receipt Temp [illegible] °C
Custody Seal Y N
Intact Y N
Signature Match Y N

ANALYSIS REQUESTED: Ra-226, As Mo Se U V, Ammonia; SEE ATTACHED; Normal Turnaround (TAT); RUSH Turnaround (TAT)

Number of Containers / Sample Type: A W S V B O / Air Water Soils/Solids Vegetation Bioassay Other

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As Mo Se U V	Ammonia	SEE ATTACHED	Normal TAT	RUSH TAT	Comments	Lab ID (LABORATORY USE ONLY)
1	YARD-TP-004 (9.5-10.0)	12/01/06	1110	SOIL	X	X			X		Hold after analysis	
2	YARD-TP-004 (7.0-7.5)	12/01/06	1125	SOIL	X	X			X		↓	
3	YARD-TP-005 (0.0-0.5)	11/30/06	1605	SOIL	X	X	X		X			
4	YARD-TP-005 (2.5-3.0)	11/30/06	1625	SOIL	X	X			X			
5	YARD-TP-005 (4.5-5.0)	12/01/06	1205	SOIL	X	X			X			
6	YARD-TP-005 (8.5-9.0)	12/01/06	1235	SOIL	X	X			X			
7												
8												
9												
10												

AWK 12/5/06

C06120235

Custody Record MUST be Signed						
Relinquished by (print): Hans Hoffman	Date/Time: 12-4-06/8:43	Signature: Hans Hoffman	Received by (print): [illegible]	Date/Time: [illegible]	Signature: [illegible]
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:

Sample Disposal: Return to client: ____ Lab Disposal: X

LABORATORY USE ONLY — Sample Type: ____ # of fractions ____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 1 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109, PO Box 774018, Steamboat Springs, CO 80477	Contact Name, Phone, Fax, E-mail: Leah Wolf, Nadia 970-879-6260 (o) 970-879-6260 (f) Sampler Name if other than Contact:
Invoice Address: MWH Americas Inc Attn Accts Payable PO Box 6610 Broomfield CO 80021	Invoice Contact & Phone #: as above / Purchase Order #: / ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ____
EDD/EDT ☐ Format ____

ANALYSIS REQUESTED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: [illegible]
Cooler ID(s): [illegible]
Receipt Temp [illegible] °C
Custody Seal Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O Air Water Soils/Solids Vegetation Bioassay Other)	Ra-226	As, Mo, Se, U, V	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments:	LABORATORY USE ONLY Lab ID
1	NECR1-SS-164	11-28-06	1430	SOIL	X	X		X		Hold for reanalysis	
2	NECR1-SS-173	11-28-06	1425	SOIL	X	X		X			
3	NECR1-SS-184	11-28-06	1150	SOIL	X	X		X			
4	NECR-SS-207	11-28-06	1415	SOIL	X	X		X			
5	NECR-SS-235	11-28-06	1125	SOIL	X	X		X			
6	NECR-SS-240	11-28-06	1120	SOIL	X	X		X			
7	NECR-SS-240 dup	11-28-06	1120	SOIL	X	X		X			
8	NECR-SS-263	11-28-06	1130	SOIL	X	X		X			
9	NECR-SS-265	11-28-06	1130	SOIL	X	X		X			C06120235
10	NECR-SS-266	11-28-06	1212	SOIL	X	X		X			

Custody Record MUST be Signed						
Relinquished by (print): [illegible]	Date/Time: 12-4-06/835	Signature: [signature]	Received by (print): [illegible]	Date/Time: 12/5/06 0940	Signature: [signature]
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Sample Disposal: Return to client: ____ Lab Disposal: ✓			LABORATORY USE ONLY Sample Type: ____ # of fractions ____		

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Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH

Project Name, PWS #, Permit #, Etc.: UNC NECR

Report Mail Address: 1475 Pine Grove Rd Ste 109 Steamboat Springs CO 80477 PO Box 774018

Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (o) 970-879-9048 (F)

Sampler Name if other than Contact:

Invoice Address: MWH Americas Inc Attn: Accts Payable PO Box 6610 Broomfield, CO 80021

Invoice Contact & Phone #: as above

Purchase Order #:

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other ______

EDD/EDT ☐ Format ______

ANALYSIS REQUESTED: Ra-226; As, Mo, Se, U, V

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: [illegible]
Cooler ID(s): [illegible]
Receipt Temp: 1.2 °C
Custody Seal Y N
Intact Y N
Signature Match Y N

#	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, U, V	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID (LABORATORY USE ONLY)
1	NECRI-SS-281	11-28-06	1140	Soil	X	X		X		Hold after analysis	
2	NECRI-SS-289	11-28-06	1105	Soil	X	X		X			
3	NECRI-SS-293	11-28-06	1110	Soil	X	X		X			
4	NECRI-SS-307	11-28-06	1200	Soil	X	X		X			
5	TP-SS-001	12-1-06	1441	Soil	X	X		X			
6	TP-SS-013	12-1-06	1510	Soil	X	X		X			
7	TP-SS-009	12-1-06	1448	Soil	X	X		X			
8	TP-SS-024	12-01-06	1503	Soil	X	X		X			
9	TP-SS-224	12-01-06	1503	Soil	X	X		X			
10	TP-SS-027	12-01-06	1455	Soil	X	X		X			C06120355

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
[illegible]	12-1-06/837	[signature]	[signature]	12/6/06 9:15	

Sample Disposal: Return to client: ______ Lab Disposal: X

LABORATORY USE ONLY

Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

Page 1 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109, PO Box 774018, Steamboat Springs, CO 80477	Contact Name, Phone, Fax, E-mail: Lenhardt Martin lenhardt.martin@mwhglobal.com 970-879-6260(o) 970-879-9048(F) / Sampler Name if other than Contact:
Invoice Address: MWH Americas Inc, Box 6610, Broomfield, CO 80021	Invoice Contact & Phone #: as above / Purchase Order #: / ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐ ✓
Other ______
EDD/EDT ☐ Format ______

ANALYSIS REQUESTED: Ra-226; U, Mo, Se, V, As

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: / Cooler ID(s) / Receipt Temp ___ °C / Custody Seal Y N / Intact Y N / Signature Match Y N

#	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	U, Mo, Se, V, As	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID (LABORATORY USE ONLY)
1	POND 12-TP-036 (2.0-3.5)	12-02-06	1140	Soil	X	X		X		Hold for analysis	
2	POND 12-TP-036 (4.5-5.0)	12-02-06	1125	Soil	X	X		X		↓	
3	POND 12-TP-035 (1.0-1.5)	12-02-06	0940	Soil	X	X		X			
4	POND 12-TP-035 (2.0-2.5)	12-02-06	0943	Soil	X	X		X			
5	POND 12-TP-035 (9.0-9.5)	12-02-06	1005	Soil	X	X		X			
6	POND 12-TP-038 (4.5-5.0)	12-02-06	1050	Soil	X	X		X			
7	POND 12-TP-038 (8.5-9.0)	12-02-06	1040	Soil	X	X		X			
8	SAND 3-SS-004	11-30-06	1010	Soil	X	X		X			
9	SAND 3-SS-012	11-30-06	1020	Soil	X	X		X			C06120235
10	SAND 3-TP-005 (0.5-1.0)	11-30-06	1020	Soil	X	X		X			

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
[illegible]	12-4-06 0835	[illegible]	Tim Heller	[illegible]	[signature]

Sample Disposal: Return to client: ______ Lab Disposal: X

LABORATORY USE ONLY
Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

Page 2 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC / ECR
Report Mail Address: 1475 Pine Grove Rd Ste 109, PO Box 774018, Steamboat Springs, CO 80477	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (o) 970-879-9048 (f)
	Sampler Name if other than Contact:
Invoice Address: MWH Americas Inc Attn Accts Payable, PO Box 6610, Broomfield, CO 80021	Invoice Contact & Phone #: as above
Purchase Order #:	ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____________

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other ____________

EDD/EDT ☐ Format ____________

ANALYSIS REQUESTED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: [illegible]

Cooler ID(s): [illegible]

Receipt Temp [illegible] °C

Custody Seal Y N

Intact Y N

Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other)	Ra-226	As, Mo, Se, U, V	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID (LABORATORY USE ONLY)
1 SAN03-TP-005 (1.5-2.0)	11-30-06	1025	SOIL	X	X	X	X		Hold after analysis	
2 SAN03-TP-006 (0.5-1.0)	11-30-06	1010	SOIL	X	X	X	X			
3 SAN03-TP-007 (0.5-1.0)	11-30-06	1005	SOIL	X	X		X			
4 SAN03-TP-014 (0.5-1.0)	11-30-06	[illegible]	SOIL	X	X		X			
5 SAN03-TP-014 (1.0-1.5)	11-30-06	0950	SOIL	X	X		X			
6 SAN03-TP-025 (0.5-1.0)	11-30-06	0940	SOIL	X	X		X			
7 ARROYO-SB-001 (0.0-1.0)	12-03-06	1205	SOIL	X	X		X			
8 ARROYO-SB-001 (1.0-2.0)	12-03-06	1220	SOIL	X	X		X			
9 ARROYO-SB-001 (2.0-3.0)	12-03-06	1232	SOIL	X	X		X			C06120235
10										

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
[illegible]	12-4-06/0835	[illegible]	Tim Hallen	[illegible]	[illegible]

Sample Disposal: Return to client: ________ Lab Disposal: X

LABORATORY USE ONLY

Sample Type: ____________ # of fractions ____________

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

Page 1 of 3

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

ENERGY LABORATORIES

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC Rock
Report Mail Address: [illegible] Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin, leah.wolf.martin@mwhglobal.com, 970 879-6260 (office), 970-879-9048 (fax)
Invoice Address: MWH Americas, Attn: Accounts Payable, PO Box 6610, Broomfield, CO 80021	Invoice Contact & Phone #: as above
	Purchase Order #:
	ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☒
Other ____
EDD/EDT ☒ Format ____

ANALYSIS REQUESTED: COPC - Ra-226; As, Mo, Se, U, V

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: GRND
Cooler ID(s): C-837
Receipt Temp: 2.6 °C
Custody Seal Y / N
Intact Y / N
Signature Match Y / N

#	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	COPC - Ra-226	As, Mo, Se, U, V	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1	ARROYO-SB-002(0-1)	12-3-06	1245	Soil	X	X	X		
2	ARROYO-SB-002(1-2)	12-3-06	1252	Soil	X	X	X		
3	ARROYO-SB-002(2-3)	12-3-06	1259	Soil	X	X	X		
4	ARROYO-SB-003(0-1)	12-3-06	1311	Soil	X	X	X		
5	ARROYO-SB-003(1-2)	12-3-06	1318	Soil	X	X	X		
6	ARROYO-SB-003(2-3)	12-3-06	1325	Soil	X	X	X		
7	ARROYO-SB-004(0-1)	12-3-06	1340	Soil	X	X	X		
8	ARROYO-SB-004(1-2)	12-3-06	1348	Soil	X	X	X		
9	ARROYO-SB-004(2-3)	12-3-06	1355	Soil	X	X	X		
10	ARROYO-SB-005(0-1)	12-3-06	1408	Soil	X	X	X		C06120386

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
[illegible]	12-5-06/8:30	[signature]	[illegible]	[illegible]	[signature]

Sample Disposal: Return to client: ____ Lab Disposal: ____

LABORATORY USE ONLY: Sample Type: ____ # of fractions ____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: CNL NECR
Report Mail Address: 1475 Pine Grove Rd, Steamboat Springs CO 80487	Contact Name, Phone, Fax, E-mail: [illegible] Sampler Name if other than Contact: [illegible] 970-879-6260 (office) 970-879-9048 (fax)
Invoice Address: MWH Americas Attn: Accounts Payable, PO Box 6610, Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ____
EDD/EDT ☑ Format ____

ANALYSIS REQUESTED: Ra-226; U nat [illegible] — SEE ATTACHED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples All Analysis

Shipped by: [illegible]
Cooler ID(s): [illegible]
Receipt Temp: [illegible] °C
Custody Seal Y N
Intact Y N
Signature Match Y N

#	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	U nat	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1	ARROYO SB-005 (1-2)	12-3-06	1414	Soil	X	X	X		
2	ARROYO SB-005 (2-3)	12-3-06	1429	Soil	X	X	X		
3	ARROYO SB-006 (0-1)	12-3-06	1439	Soil	X	X	X		
4	ARROYO SB-006 (1-2)	12-3-06	1447	Soil	X	X	X		
5	ARROYO SB-006 (2-3)	12-3-06	1450	Soil	X	X	X		
6	ARROYO SB-007 (0-1)	12-4-06	1041	Soil	X	X	X		
7	ARROYO SB-007 (1-2)	12-4-06	1051	Soil	X	X	X		
8	ARROYO SB-007 (2-3)	12-4-06	1056	Soil	X	X	X		
9	ARROYO SB-008 (0-1)	12-4-06	1112	Soil	X	X	X		
10	ARROYO SB-008 (1-2)	12-4-06	1125	Soil	X	X	X		C06120836

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
[illegible]	12-5-06 / 8:30	[signature]			
			[illegible]	[illegible]	

Sample Disposal: Return to client: ____ Lab Disposal: ____

LABORATORY USE ONLY — Sample Type: ____ # of fractions ____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

Page 3 of 5

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: CNC NECOR
Report Mail Address: 1475 Pine Grove Rd Suite 109, Steamboat Springs CO 80487	Contact Name, Phone, Fax, E-mail: Jack Wolf Martin jack.wolf martin@mwhglobal.com 970-879-6260 (Cell) 970-879-9048 (Fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn: Accounts Payable PO Box 6610 Broomfield CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other ______

EDD/EDT ☑ Format ______

ANALYSIS REQUESTED: Ra-226; Alpha Spec U

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: Client

Cooler ID(s): C-857

Receipt Temp 4.6 °C

Custody Seal Y N

Intact Y N

Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	Alpha Spec U	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID (LABORATORY USE ONLY)
1	ARROYO-SB-006 (2-3)	12-4-06	11:35	Soil	X	X		X		
2	ARROYO-SB-008 (1-2)	12-4-06	11:25	Soil	X	X		X		
3	ARROYO-SB-008 (2-3)	12-4-06	11:35	Soil	X	X		X		
4	ARROYO-SB-009 (0-1)	12-4-06	11:42	Soil	X	X		X		
5	ARROYO-SB-009 (1-2)	12-4-06	11:47	Soil	X	X		X		
6	ARROYO-SB-009 (2-3)	12-4-06	12:00	Soil	X	X		X		
7	ARROYO-SB-010 (0-1)	12-4-06	12:05	Soil	X	X		X		
8	ARROYO-SB-010 (1-2)	12-4-06	12:12	Soil	X	X		X		
9	ARROYO-SB-010 (2-3)	12-4-06	12:19	Soil	X	X		X		C06120336
10										

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Hans Hoffmann	12-5-06 / 8:30	[signature]	R. Carter	12/7/06 10:02	[signature]

Sample Disposal: Return to client: ______ Lab Disposal: ______

LABORATORY USE ONLY — Sample Type: ______ # of fractions ______

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Chain of Custody and Analytical Request Record

Page 1 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

ENERGY LABORATORIES

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: MWH PO Box 774018 1475 Pine Grove Rd Ste 109 Steamboat Springs CO 80487	Contact Name, Phone, Fax, E-mail: Leah Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (off) 970-879-9048 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Inc Attn Acct Payable PO Box [illegible] [illegible], CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ______
EDD/EDT ☐ Format ______

ANALYSIS REQUESTED: Ra-226; As, Mo, Se, U, V; Asbestos — SEE ATTACHED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: [illegible]
Cooler ID(s): C-2118
Receipt Temp: 7 °C
Custody Seal Y N
Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, U, V	Asbestos	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments	Lab ID
1 NEMSA-TP-002(0.0-0.5)	11/30/06	1040	Soil	X	X		X		Hold after analysis	
2 NEMSA-TP-002(2.0-2.5)	11/30/06	1045	Soil	X	X		X			
3 NEMSA-TP-002(5.5-6.0)	11/30/06	1100	Soil	X	X		X			
4 NEMSA-TP-002(7.0-7.5)	11/30/06	1115	Soil	X	X		X			
5 NEMSA-TP-003(0.0-0.5)	11/30/06	1120	Soil	X	X	X	X			
6 NEMSA-TP-003(1.5-2.0)	11-30-06	1125	Soil	X	X		X			
7 NEMSA-TP-003(4.0-4.5)	11-30-06	1130	Soil	X	X		X			
8 NEMSA-TP-004(0.0-0.5	12-01-06	1620	Soil	X	X		X			
9 NEMSA-TP-004(8.5-9.0)	12-01-06	1545	Soil	X	X		X			
10 NEMSA-TP-005(0.0-0.5	12-01-06	1600	Soil	X	X		X			C06120336

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Hans Hoffman	12-4-06 / 18:45	[signature]	[signature]	12/5/06	[illegible]
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:

Sample Disposal: Return to client: ______ Lab Disposal: X

LABORATORY USE ONLY
Sample Type: ______ # of fractions ______

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Chain of Custody and Analytical Request Record

Page 2 of 2

ENERGY LABORATORIES

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: [illegible] P Box 774018 [illegible], CO 80477	Contact Name, Phone, Fax, E-mail: [illegible] 970-879-6260 [illegible] 970-879-9048 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Inc Attn Accts Payable [illegible] [illegible], CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☐

Other ____

EDD/EDT ☐ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: Grnd

Cooler ID(s): C-318

Receipt Temp 7 °C

Custody Seal Y N

Intact Y N

Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other)	ANALYSIS REQUESTED: Ra-226	As, Mo, Se, U, V							SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments:	Lab ID
1	NEMBA-TP-005(4.0-4.5)	12-0-06	1625	SOIL	X	X							X			Hold after analysis	
2	NEMBA-TP-005(8.0-8.5)	12-0-06	1635	SOIL	X	X							X			↓	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	C06120356

LABORATORY USE ONLY

Custody Record MUST be Signed						
Relinquished by (print): [illegible]	Date/Time: 12-16-06/8:15	Signature: [illegible]	Received by (print): [illegible]	Date/Time: 12/17/06 10:00	Signature:
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Sample Disposal: Return to client: ____	Lab Disposal: X		Sample Type: ____	LABORATORY USE ONLY # of fractions ____	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 1 of 4

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Suite 109, Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: [illegible] 970-879-6260 (office) 970-879-4048 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn: Accounts Payable PO Box [illegible] [illegible] CO [illegible]	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ________

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other ________

EDD/EDT ☑ Format ________

Number of Containers / Sample Type: A W S V B O / Air Water Soils/Solids Vegetation / Bioassay Other

ANALYSIS REQUESTED: Ra-226; As Mo Se V U; Arsenic [illegible]

SEE ATTACHED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: FedEx [illegible]

Cooler ID(s): [illegible]

Receipt Temp [illegible] °C

Custody Seal Y N

Intact Y N

Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As Mo Se V U	Arsenic	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1 POND3 TP-007(5-5.5)	120506	1145	soil	X	X		X		LABORATORY USE ONLY
2 POND3 TP-007(9-9.5)	120506	1150	soil	X	X		X		
3 POND3-TP-014(6.5-7.0)	120506	1050	soil	X	X		X		
4 POND3 TP-014(8.5-9.0)	120506	1105	soil	X	X		X		
5 POND3 TP-021(7-7.5)	120506	1025	soil	X	X		X		
6 POND3 TP-021(6-6.5)	120506	1000	soil	X	X		X		
7 POND3 TP-021(9-9.5)	120506	1015	soil	X	X		X		
8 POND3 TP-037(0-0.5)	120506	930	soil	X	X		X		
9 POND3-TP-037(5-5.5)	120506	935	soil	X	X		X		
10 POND3 TP-037(8.5-9.0)	120506	940	soil	X	X		X		C06120536

Custody Record MUST be Signed

Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
Hans Hoffman	12-5-06 / 4:20 pm	[signature]	[signature]	12/7/06 10:20	
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:

Sample Disposal: Return to client: ________ Lab Disposal: ________

LABORATORY USE ONLY

Sample Type: ________ # of fractions ________

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 2 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd. Suite 109 Steamboat Springs, CO 80487	Contact Name, Phone, Fax, E-mail: Leech Wolf Martin lechwolf.martin@mwhglobal.com 970 879-6260 (office) 970 879-9048 (fax) — Sampler Name if other than Contact:
Invoice Address: MWH Americas Attn. Accounts Payable PO Box 6610 Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ________

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☑
Other ________
EDD/EDT ☑ Format ________

ANALYSIS REQUESTED

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Hold Samples After Analysis

Shipped by: [illegible]
Cooler ID(s): 1155
Receipt Temp: 4.0 °C
Custody Seal: Y N
Intact: Y N
Signature Match: Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Number of Containers / Sample Type: A W S V B O / Air Water Soils/Solids Vegetation Bioassay Other	Ra-226	As, Mo, Se, V, U	Radionuclides	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Lab ID
1	NEMSA-TP-004 (1-1.5)	12-5-06	1207	soil		X	X			X		
2	NEMSA-TP-004 (6-6.5)	12-5-06	1215	soil		X	X			X		
3	NECR1-SS-028	12-5-06	1440	soil				X		X		
4	ARROYO-RB-002	12-4-06	1630	water		X	X					
5												
6												
7												
8												
9												
10												

LABORATORY USE ONLY
C06120336

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Aaron Hoffman	12-5-06/16:20	[signature]	[signature]	12/7/06 10:00	

Sample Disposal: Return to client: ________ Lab Disposal: ________

LABORATORY USE ONLY
Sample Type: ________ # of fractions ________

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 1 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNCNECR
Report Mail Address: 1475 Pine Grove Rd Ste 109, PO Box 774018, Steamboat Springs, CO 80477	Contact Name, Phone, Fax, E-mail: [illegible] martin, [illegible]@mwhglobal.com, 970-879-6260 (o) 970-879-9048 (F); Sampler Name if other than Contact:
Invoice Address: MWH Americas Inc Attn Accts Payable, Broomfield CO 80021	Invoice Contact & Phone #: as above; Purchase Order #: ; ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ________

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☑

Other ________

EDD/EDT ☐ Format ________

ANALYSIS REQUESTED

Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: UPS-G

Cooler ID(s): 2132

Receipt Temp: N/A °C

Custody Seal Y (N)

Intact (Y) N

Signature Match (Y) N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Ra-226	As, Mo, Se, U, V	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	Comments:	Lab ID (LABORATORY USE ONLY)
1 SEDPAD-TP-006 (1.5-2.0)	11-28-06	1600	SOIL	X	X		X		Hold for analysis	
2 SEDPAD-TP-006 (3.0-3.5)	11-28-06	1605	SOIL	X	X		X			
3 SEDPAD-TP-012 (1.0-1.5)	11-28-06	1545	SOIL	X	X		X			
4 SEDPAD-TP-012 (1.5-2.0)	11-28-06	1548	SOIL	X	X		X			
5 SEDPAD-TP-014 (0.5-1.0)	11-28-06	1530	SOIL	X	X		X			
6 SEDPAD-TP-014 (1.0-1.5)	11-28-06	1535	SOIL	X	X		X			
7 SEDPAD-TP-021 (5.0-5.5)	11-28-06	1600	SOIL	X	X		X			
8 SEDPAD-TP-021 (10-10.5)	11-28-06	1505	SOIL	X	X		X			
9 SEDPAD-TP-026 (0.5-1.0)	11-28-06	1620	SOIL	X	X		X			
10 NECRI-TP-136 (3.5-4.0)	12-2-06	1600	SOIL	X	X		X			C06120405

Custody Record MUST be Signed						
Relinquished by (print): Hans [illegible]	Date/Time: 12-1-06 / 8 55	Signature: [illegible]	Received by (print): [illegible]	Date/Time: 12/8/06 09:50	Signature:
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Sample Disposal:	Return to client: ________	Lab Disposal: ________	Sample Type: ________	LABORATORY USE ONLY # of fractions ________	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

Page 2 of 2

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MWH	Project Name, PWS #, Permit #, Etc.: UNC NECR
Report Mail Address: 1475 Pine Grove Rd Ste 109, PO Box 774018, Steamboat Springs, CO 80477	Contact Name, Phone, Fax, E-mail: Leah Wolf Martin leah.wolf.martin@mwhglobal.com 970-879-6260 (o) 970-879-9048 (F) — Sampler Name if other than Contact:
Invoice Address: MWH Americas, Inc. Attn: Accounts Payable, PO Box 6610, Broomfield, CO 80021	Invoice Contact & Phone #: as above — Purchase Order #: — ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ______

Special Report Formats - ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other ______
EDD/EDT ☐ Format ______

ANALYSIS REQUESTED: Ra-226; As, Mo, Se, U, V — SEE ATTACHED — Normal Turnaround (TAT) — RUSH Turnaround (TAT)

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Shipped by: Court
Cooler ID(s): 2183
Receipt Temp ___ °C
Custody Seal Y N
Intact Y N
Signature Match Y N

#	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other)	Ra-226	As, Mo, Se, U, V	Normal TAT	RUSH TAT	Comments	Lab ID (LABORATORY USE ONLY)
1	SANDI-TP-030 (1.0-1.5)	12-02-06	1505	SOIL	X	X	X		Hold after analysis	
2	SANDI-TP-043 (1.0-1.5)	12-02-06	1410	SOIL	X	X	X			
3	SANDI-TP-049 (1.0-1.5)	12-02-06	1340	SOIL	X	X	X			
4	SANDI-TP-049 (3.5-4.0)	12-02-06	1350	SOIL	X	X	X			
5	SANDI-TP-249 (3.5-4.0)	12-02-06	1350	SOIL	X	X	X			
6	SANDI-TP-063 (0.5-1.0)	12-02-06	1425	SOIL	X	X	X			
7	SANDI-TP-063 (1.5-2.0)	12-02-06	1427	SOIL	X	X	X			
8	SANDI-TP-068 (0.5-1.0)	12-02-06	1438	SOIL	X	X	X			
9	SANDI-TP-068 (1.5-2.0)	12-02-06	1440	SOIL	X	X	X			
10	SANDI-TP-070 (3.5-4.0)	12-02-06	1455	SOIL	X	X	X			C06120405

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Hans Hoffman	12-4-06 / 8:55	[signature]	[signature]	12/6/06 9:30	

Sample Disposal: Return to client: ______ Lab Disposal: X

LABORATORY USE ONLY — Sample Type: ______ # of fractions ______

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

APPENDIX C

FIELD NOTES, BORING LOGS AND TEST PIT LOGS

FIELD NOTES

[illegible] Sunny, 70°, calm

0800 Arrive at UNC Church Rock Mill, Site office

Meet AVM - Narrator Peter

0830 Roy arrives

Bruce (Navajo) arrives (NNEPA)

0845 AVM performs function check on Ludlum Micro-R-meter Model 19

Ruler and function checks on NaI detector in AVM Grants office

Conduct shielded + unshielded background reading in UNC Mill office

Compare to background readings in AVM Grants office

Ludlum 2221 Scaler/Ratemeter w/ an Eberline 2x2" NaI detector

0900 Teddie (Navajo resident) checks out Red Road Radio

0915 Head to background locations w/ Bruce, Ted, Roy, [illegible], Victor

BKG1 - 15/16 uR/hr

BKG2 15 uR/hr in arroyo

BKG 3 16/17 uR/hr

BKG 4 16/17 uR/hr

BKG 5 16 uR/hr

Navajo

Marking background locations for [illegible]

A 84-7 or A84-7 exploration hole outside of background grid in Section 34

BKG6 17 uR/hr

BKG-7 17 uR/hr

BKG-8 16/17 uR/hr [illegible]

BKG-9 16/17 uR/hr [illegible]

Jerry + Stanley NNEPA join us in background [illegible]

.?? E - Teddie Nez

505-879-2410 - cell phone

BKG-10 15/14 uR/hr

BKG 11 15/16 uR/hr

BKG-12 14 uR/hr

BKG-13 17 uR/hr

BKG-14 15/16 uR/hr

BKG 15 16 uR/hr

BKG-16 16/16.5 uR/hr

BKG-17 13 uR/hr edge of arroyo

BKG-18 15/16 uR/hr

BKG-19 15 uR/hr

BKG-20 14 uR/hr

BKG 21 ~~15 uR/hr~~ 13/14 uR/hr

BKG 22 13 uR/hr

3/11/06

background marking GPS Cont.

BCK6 - 23 - 15 uR/hr

BCK5 - 24 - 16 uR/hr

BCK6 - 25 - 16/17 uR/hr

exposure ranged for 14 - 17 uR/hr

1115 Finish marking background locations

go back to the Mill office for lunch

1230 Head to the mine site to survey areas to determine correlation sample locations w/ Dave, Stanley, Jerry, + AVM

1 pt NECR1 - CORA orange flag

~ 200 uR/hr

2 pt pond [illegible] CORA orange flag location

3 pt sediment pond CORA [illegible] [illegible]

~ 50 uR/hr

4 pt [illegible] [illegible] 7 orange flag - 40 uR/hr

1400 Pick up Earl w/ Palladino company @ front gate go back to group to continue identifying areas for correlation samples, have identified [illegible] in the 15 - 40 uR/hr range. Continue w/ orange correlation survey

3/11/06

Discharge pt. NECR1 -

pipe out [illegible] [illegible] [illegible] to [illegible] place [illegible], [illegible] [illegible]

at [illegible]

1630 Finish for the day, take equipment to the Mill office

1730 leave site for the day

[illegible]

3/11/06

8/17/06 [illegible] 80°F [illegible]

0800 Arrive at [illegible] building

Perform function checks on [illegible] or [illegible] analyzers. Andy [illegible]

[illegible] perform oversight on function check of [illegible] equipment. [illegible]

[illegible] to finish function checks

0905 Have discussed plan [illegible] to go [illegible] - start arroyo correlation [illegible] EPA to background area to collect background soil locations

0930 Arrive @ background locations [illegible]

NECRBKG1 8-17-06 0914 0-6"

BKG2 8-17-06 0944 0-6" [illegible]

BKG 3 8-17-06 0954 0-6"

BKG 4 8-17-06 1002 0-6"

BKG 5 8-17-06 1007 0-6"

BKG6 8-17-06 1020 0-6"

BKG 7 8-17-06 1029 0-6"

BKG 8 8-17-06 1035 0-6"

BKG 9 8-17-06 1041 0-6"

BKG10 8-17-06 1047 0-6"

BKG11 8-17-06 1051 0-6"

BKG12 8-17-06 1056 0-6"

BKG 13 8-17-06 1107 0-6"

8/17/06

Background sampling cont-

NECRBKG14 8-17-06 11:[illegible] 0-6"

NECRBKG15 8-17-06 11:14

NECRBKG16 8-17-06 11:17 0-6"

NECRBKG17 8-17-06 11:22 0-6"

NECRBKG18 8-17-06 11:28 0-6"

NECRBKG19 8-17-06 11:33 0-6"

NECRBKG20 8-17-06 11:35 0-6"

NECRBKG21 8-17-06 11:4[illegible] 0-6"

NECRBKG22 8-17-06 11:4[illegible] 0-6"

NECRBKG23 8-17-06 11:47 0-6"

NECRBKG24 8-17-06 11:48 0-6"

NECRBKG25 8-17-06 11:[illegible] 0-6"

1200 Finish background location sampling

12:30 Head back to [illegible]

[illegible]

12:40 [illegible]

[illegible]

[illegible] finishing 15 correlation sampling [illegible] in the arroyo [illegible] NNEPA

1300 [illegible] NNEPA, EPA [illegible] lunch

14:00 Go [illegible] to begin correlation sampling on site

8/17/06 ~~Clear~~ Cloudy, 75° calm

1410 On-site correlation is A

Argyle correlation is B

1425 CORA-01 [illegible] micro R meter = [illegible] µR/hr

collect 3 one-minute readings w/ [illegible] columns + w/out columns on 2 different Ebonite SPA-3 NaI crystals

Collect 5pt composite in a 5ft diameter around the measurement point

CORA-02

1450 CORA-03 all the same as above

CORA-04

in the area between the sediment pad + boneyard

1500 [illegible] Ray, Keith, Andy + [illegible] go [illegible] the [illegible], NESHA, [illegible] Pond [illegible] 2 [illegible] samples [illegible] [illegible] boneyard [illegible]

[illegible] [illegible] Pond [illegible] 2 [illegible] [illegible]

1100 [illegible] [illegible] Friday [illegible] [illegible]

[illegible]

1130 [illegible]

8/18/06 [illegible] [illegible]

0700 [illegible] [illegible] [illegible] [illegible]

0705 [illegible] [illegible] landfill area [illegible]

[illegible] landfill area [illegible] [illegible] area

0830 Go back to [illegible] [illegible] Cecil Ray [illegible] to airport

0835 Arrive on site [illegible] [illegible] continue [illegible] sampling on [illegible] [illegible] [illegible] to [illegible] ~ 15 [illegible] correlation locations on 8/17/06

Have ~3-7 more left today

0900 Andy [illegible] [illegible] Energy [illegible] [illegible] Andy will get back to us on Monday on [illegible] [illegible] [illegible] will be required

0945 [illegible] [illegible] to meet [illegible] + NMED [illegible] on correlation sampling

1030 [illegible] [illegible] [illegible] near water [illegible]

1100 Finish on-site correlation, head to background area to take measurements

6/18/06 cloudy 70's calm cont.
Collect calibration measurement + Sample next to BKG 20 in background
12:00 Head back to Mill site office and pack up fieldgear + samples

dwh
6/18/06

11/7/06 mostly sunny, low 40's calm
08:00 Hans + Leah arrive on-site
Meet AVM, start discussing field plan
08:15 AVM calibrate detectors + unload field gear, MWH organize field gear
09:15 NNEPA Reps - Jerry Begay, Stanley Edison, Eugene Esplain onsite
Coast ~~Guard~~ strike team member Butch onsite, Leah-MWH holds H+S briefing, Larry Bush, Max NNEPA, AVM, MWH in attendance.
0925 All members on site today scan hands, clothing, bottom of shoes as part of Health+Safety daily protocol in Mill office building - Model 2241-Ludlum alpha survey meter
10:00 AVM locate + collect 1 minute static readings @ NECR-1, Leah gives Butch from Coast Guard + Hans a tour of the site + each survey area
1105 NECR-1 113 check handheld vs. backpack
3949040Nm 725558Em-handheld
394903.38Nm 72558m - backpack
AVM continue to locate + measure static p

11/7/06 con't mostly sunny, 50s, light breeze
11:30 NNEPA representative, Eugene, Jerry + Stanley leave site, perform exit scan with alpha probe, scans of hands + probes below ~~570~~ 71 dwm 11/7/06 counts per minute (cpm), background 0 cpm Max calibrated alpha probe, determined efficiency, + exceedance level this morning Hans begin marking Pond 3/3a static pts with pin flags. Butch leaves site to read RSEWP
12:00 Leah back on minesite after letting NNEPA out of gate and witnessing exit scan
12:10 AVM + Max locating + measuring static on NECR-1, Leah meet up with Hans on Pond 3/3a flagging
13:00 AVM + MWH break for lunch
13:50 AVM continue @ NECR-1, MWH flags Pond 3/3a, Max assists AVM
15:30 AVM's GPS batter dies, AVM begins static measurements at flagged locations at Pond 3/3a
16:30 MWH + AVM finish onsite work
64 pts GPS + static 1min cnts @ NECR-1
69 pt GPS @ Pond 3/3a
pts 1min. static measurements @ Pond 3/3a
16:45 Go to UNC office bldg, scan hands + clothes, leave site
LWM 11/7/06

11/8/06 Sunny, calm, upper 30°
0745 Arrive on site - Leah + Hans
AVM on site, calibrate detectors.
0805 H+S tailgate meeting, attendees
NNEPA - Eugene Esplain, Jerry Begay, Stanley Edison
EPA rep - Butch Willoube - Coastal Guard
AVM - Nate Victor Patel
MWH - Leah + Hans
0815 AVM continue on NECR1 locating + take static measurement
0830 MWH continue flagging Pond 3/3a
0850 MWH finish flagging pts at Pond 3/3a
A total of 73 grid pts, 4 not located due to standing water in eastern side of ponds
15 blue flags located to indicate a dual surface soil + static gamma measurements
Pond locations # 44, 45, 52, 53 not located due to the water
Surface soil samples # 1, 7, 11, ~~13~~ 14 lwm 11/12/06, 15
27, 29, 38, 42, 46, 57, 59, 61, 63, 65
0900 Flag locations @ Sediment Pad
13 blue flags, total of 29 pts, blues - 5, 6, 7
11, 12, 14, 15, 18, 20, 21, 22, 25, 26
1025 Finish flagging sed pad
1045 Begin flagging sandfill no. 3

[illegible]

4/23, [illegible] sunny, [illegible]

11:30 [illegible] finish flagging Sand [illegible] Eugene explain NNEPA collecting micro-[illegible] reading around [illegible] & NECR-2 while [illegible] flagging. [illegible] flagged [illegible] 13 [illegible] flags 2, 3, 4, 7, 9, 10, 14, 17, 17, 24, 25, 26, 27

12:00 Break for lunch

12:30 Discuss [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] patient [illegible] at [illegible] or consent prior to going to the hospital [illegible] [illegible] a [illegible] letter to the hospital explaining the [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] would [illegible] [illegible] [illegible] [illegible]

13:00 [illegible] [illegible], [illegible], Stanley, [illegible] [illegible] at NECR-1

13:30 [illegible], [illegible] [illegible] [illegible] flagging [illegible], [illegible] approx 45 pts done

15:30 [illegible] finishes scanning + selecting [illegible] collecting [illegible] static measurements at NECR-1, [illegible] static measurements, start selecting measurements at Pond 3, 3a

16:40 [illegible] + [illegible] end for the day, [illegible] [illegible]

[illegible]

4/25/[illegible] [illegible], [illegible], [illegible]

07:30 [illegible] [illegible] [illegible] [illegible], [illegible] field supplies, [illegible] [illegible]

07:40 [illegible] [illegible], [illegible] [illegible] [illegible]

07:50 NNEPA [illegible], [illegible], [illegible], [illegible] [illegible] [illegible] [illegible]

08:05 All [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] EPA

08:15 [illegible] [illegible]

08:25 [illegible] [illegible] [illegible] [illegible] [illegible] discuss todays plan of [illegible] + static [illegible] [illegible] [illegible], [illegible] + [illegible], [illegible] [illegible], [illegible] [illegible] [illegible]

08:45 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] + [illegible] continue flagging [illegible] [illegible] + Stanley [illegible] [illegible] [illegible] [illegible] [illegible] + [illegible] [illegible] [illegible] at SED PAD

09:45 [illegible] + [illegible] [illegible] [illegible] [illegible]

09:30 [illegible] + [illegible] collect [illegible] [illegible] [illegible] the sediment pad, [illegible] [illegible] [illegible] [illegible] + NNEPA on NECR-2

10:50 [illegible] + [illegible] start [illegible] [illegible] [illegible]

11:00 [illegible] + [illegible] finish [illegible] [illegible]

10

11/09/06 con't sunny, windy gusty, 60°s F
11:30 Hans + Butch finish flagging pts at Pond 1/2 and then go locate a driveable road to Sandfill No. 1, good road is past NECR-2
11:45 Victor + NNEPA finish pts at Pond 3/3a w/ #33 detector
12:30 Break for lunch - Leah + Hans, Butch
12:45 AVM, NNEPA, EPA Break for lunch
13:25 Head back to site, UNC-Max provides generator and set up to collect an air sample w/ an Eberline
Regulate Air Pump Sampler DEL RAS-1
13:48 Begin pump sampler, flow between 40-60 l/min [illegible] Leave air sampler to run off generator, go back to continue locating pts + taking 1 min static measurements on NECR-2, Hans + Butch flagging locations on Sandfill No. 2, Victor, Stanley + Jerry on NECR-2, Leah, Nat + Max head to Pond 1/2
14:15 Leah, Nat, Max start 1 min static gamma measurements at Pond 1/2
15:30 Leah, Nat, Max break after collecting [illegible] pts at Pond 1/2, bring water [illegible]. Jerry + Stanley @ NECR-2, they have [illegible] [illegible] [illegible] GPS [illegible] 1 min static counts

11

11/09/06 con't windy, gusty, 60°s F
15:30 con't [illegible], Butch, [illegible] [illegible] moved to flag Sandfill No. 1 to get better GPS reception than at Sandfill No. 2 [illegible] [illegible] to flagging [illegible] Hans + Butch at Sandfill No. [illegible], [illegible] air sample
16:45 Hans + Butch [illegible] [illegible] few more pts [illegible] [illegible] Sandfill No. 1 Victor [illegible] [illegible] [illegible] NECR-2
17:00 [illegible], AVM, EPA, NNEPA leave site for the day

[illegible]
11/09/06

11/10/06 sunny, clear, calm, upper 20s
0745 AJM, Butch + Max arrive at site
[illegible] Scan
0800 H&S tailgate meeting, [illegible]
[illegible] Butch, AJM, Nat, Victor [illegible]
Leah + Hans
0820 Andy, Nat + Victor go to site + finish
locating pts + static readings @ NECR-2, Hans +
Butch finish flagging @ Sandfill No. 1, Leah
[illegible] hospital memo to Bill, [illegible]
[illegible], [illegible]
0905 Leah to site, meet AJM + Andy @ NECR-2
drum pieces near NECR-9, before [illegible]
10:30 Hans + Butch have finish flagging
Sandfill [illegible], go collect gps measurements
@ [illegible] 3/29
11:00 Nat + Andy continue taking static
measurements at Sandfill No 2, Leah, Victor
+ Max head to Pond 1/2 to continue taking
measurements
11:40 Andy + Nat finish Sandfill 2, [illegible]
static 1 minute counts
12:00 Leah, Victor, + Max finish primary pts
around Pond 1, break for lunch
13:20 Head back to Site, Nat + Andy go to Sandfill
No. 1, Victor + Max back to Pond 1, Butch + Hans to
Pond 1/2

11/10/06 con't sunny, clear, light breeze, low 50s
14:00 Leah meet up w/ Victor + Max @ Pond 1/2
15:15 Leah, Max + Victor finish 85 static
measurements @ Pond 1/2, head up to meet
Andy, Nat + Hans @ Sandfill No. 1
16:50 Complete static measurements
at Sandfill No. 1
17:00 Head back to Office, scan.
17:25 Leave for the day

dwm
11/10/06

20

11/11/06
0900 Arrive on site, Leah, Butch, Andy + Butch, scan hold H+S briefing, Took at aerial photos in mill office building Identify action items to discuss with Roy
1) Operational History of IX Plant, where did stripping occur 2) static measurements at on-site homesites 3) vent hole areas North of NEMSA, 4) change sampling depth of homesites from 0-6" to 0-3"
4) FCR for arroyo
1000 AVM arrive on site, work w/ Max to count air filter, Butch + Hans go to site w/ micro r-meter + drive up to vent hole North of Boneyard + NEMSA to look at disturbed area around vent hole as indicated on aerial photo, Leah + Andy mark six subsurface locations @ NECR-1 based on static gamma readings and spatial coverage on NECR-1, talk to UNC re: a 6th location, remove Pt 95 if only 5
11:00 Andy, Leah, AVM head to Boneyard + NEMSA Mark 5 loc in Boneyard, need to GPS + GPS new boundary 2 up West canyon, 3 along current boundary AVM take readings along NEMSA w/ micro r meter, readings will equate to above 2.2 pci/g field level, soil cover not blocking all gamma below soil cover AVM need to discuss this Harry Allen + Carl Paladino next week + possibly ... scan method for NEMSA + Boneyard

11/11/06 con't ~~cloudy~~, breezy, 50's F
1230 Discuss locations for subsurface @ Pond 1/2, 1 in bottom of pond 2, 2 in bottom of Pond 1, 1 in berm, 1 near correlation sample on NE corner of Pond 1
1245 Head back to office for lunch, AVM leaves for the day, Andy Bain leave Site to fly out, Butch, Leah + Hans break for lunch
1340 Butch, Leah + Hans go back to site to GPS and mark subsurface locations, go GPS 5 locations in Boneyard for surface + subsurface samples - judgemental, BYSub#1 in southern end, BYSub#2 south of NS center BYSub#3 in NW corner, dwm 11/11/06 ~~may~~ need to revise Boneyard + NEMSA joint boundary to cover buried material in SW corner of NEMSA, BYSub#4 in west canyon arm of boneyard BYSub#5 in far west of west canyon arm of boneyard, need to GPS west canyon arm
1400 Head to NECR-2 to mark locations for subsurface samples, Mark the following flagg locations for subsurface NECR2-20, NECR2-39, NECR2-15, NECR2-35 + NECR2-52
14:45 Mark 5 subsurface locations @ Sandfill No SF2-7, SF2-11, SF2-12, SF2-17, SF2-19
Choosing subsurface pts @ blue surface sample flags that have greater static gamma readings + are spatially distributed

11/11/06 con't ~~cloudy~~, breezy, 50°-60°F
15:30 Butch, Leah + Hans head to Sandfill No 1 to marke 5 subsurface locations, locate w/ follow blue flagged surface soil locations SF1-43, SF1-63, SF1-68, SF1-30 + SF1-49 Make SF1-48 a red flag + SF1-49 a blue flag (switch them around) so that there is a surface + subsurface sample at SF1-49 near center of Sandfill No 1 + the most elevated static gamma measurement @ Sandfill No. 1, choose subsur locations based on spatial distribution + elevated gamma
1600 Butch, Leah + Hans mark subsurface locations @ SEDPAD, 5 locations co-locate w/ blue surface flag use green pin flag to denote, SEDPAD-26, SEDPAD-21, SEDPAD-12, SEDPAD-14, SEDPAD-06.
1625 Mark 5 subsurface locations at Sandfill No. 3 co-locate w/ blue surface locations, SF3-25, SF3-14, SF3-09, SF3-05, SF3-06
1645 Leave mine site, go to mill office bldg to scan + leave
1700 Scan, unload field supplies + leave site - Leah, Hans + Butch

dWM 11/11/06

11/12/06 partly sunny, light breeze
12:00 Leah + Hans arrive on site, see Larry Bush who informs us that a powerline is out + no phone/power is available at the mill site office, Leah + Hans scan, sign in + head to mine site to finish flagging subsurface locations @ Ponds
1220 Arrive @ Pond 1/2 to mark subsurface areas, due to discussion w/ Andy Bain - EPA will co-located green subsurface flags w/ red (static only) flags vs. w/ blue (static surface) flags. Flag following locations Pond 1/2 (red) - 82, Pond 1/2 (blue) - 35, Pon 1/2 (blue) - 58

Switch flags #49 + 35 so that #35 which has a elevated gamma reading will have a surface + subsurface sample
1305 Mark 5 subsurface pts @ Pond 3/3a marke following blue surface locations Pond 3-38, Pond 3-61, Pond 3-7, Pond 3-1[illegible] Pond 3-29, switch ~~Pts~~ 13 + 14 so that there is a surface sample + subsurf sample at 14, making for easier acess
1350 Head back to mill office, scan + leave site for the day

dWM 11/12/06

11/13/06 cloudy, calm, 30°F
0730 Leah + Hans arrive on-site, organize field gear, scan
0745 Harry Allen + Butch - EPA + Coast Guard onsite, Roy Blickwedel - UNC on-site
0755 AVM - Nat + Arvind on-site
0800 Group scan, function check equipment
0815 Discuss plan for step-out borings for NECR-1 north boundary
0825 Start H+S briefing, discuss getting scanning procedure documented
0840 Discuss step-out plan - start step-out on North end of NECR-1 determine triangular grid coordinates find location w/ GPS, flag, + take 1-minute static gamma measurement
Discuss field change request - remove 20% judgemental scan for Boneyard NEMSA, discuss FCR for arroyo, scan banks vs centerline for soil samples @ each transect take 1 centerline subsurface sample 0-1, 1-2, 2-3 ft bgs vs. 3 0-1 ft bgs along transect
0915 AVM + Butch head to step-outs
0930 Leah, Hans + Harry head onsite to collect surface soil samples

11/13/06 con't cloudy, windy, 30°F
10:15 Leah, Hans + Harry start collecting surface soils at Sandfill No. 1
Need to collect 15 soil samples, 2 ag collect extra bag for SPLP
✓1025 Collect SAND1-SS-021 for prelim COCs, take photo #3
✓1035 Collect SAND1-SS-027 for prelim COCs, take photo # 4
✓1045 Collect SAND1-SS-028 for prelim COCs + Ag, EPA collect split for ~~SPLP~~ LM 11/13/06 prelim COCs, take photo 5
✓1055 Collect SAND1-SS-011 for prelim COCs, take photo 6
✓1100 Collect SAND1-SS-017 for prelim COCs + Ag, take photo 7
✓1105 Collect SAND1-SS-009 for prelim COCs, take photo 8, EPA collect split
✓1110 Collect SAND1-SS-041 for prelim COCs, take photo 9
✓1125 Collect SAND1-SS-044 for prelim COCs, take photo 11 - Hans collect
✓1130 Collect SAND1-SS-043
for prelim COCs, take photo 10 - Hans collecting 044 + while Harry
[illegible]

11/13/06 con't
✓1140 Collect Sand1-SS-51 for prelim COCs take photo 12
✓1145 Collect SAND1-SS-50 for prelim COCs take photo 13
✓1210 Collect SAND1-SS-63 for prelim COCs take photo 14, EPA split
✓1215 Collect SAND1-SS-68 for prelim COCs, EPA split, photo 15
✓1225 Collect SAND1-SS-49 for prelim COCs, MWH duplicate, photo 16
✓1215 Collect SAND1-SS-30 for prelim COCs, no photo, collected by HANS
1230 Break for lunch, Call Toby confirm he is coming out w/ drillers (WDC) on Wednesday
Talk w/ EI confirm that we can collect one fuller 1 gallon Ziplock for both SPLP + prelim COCs
1340 Butch + Harry back from lunch, AVM goes out to step-outs @ NECR-1, north side
1400 Jerry Begay + Stanley Edison - NNEPA arrive on-site, Jerry goes with Leah, Harry + Hans. Stanley heads out w/ AVM + Butch
AVM collected 1-min static gamma readings on ~30 locations this morning
1405 Leah, Hans, Harry + Jerry head to Sandfill No. 2 to collect grided surface soil samples 0-6" w/ dedicated stainless teaspoons

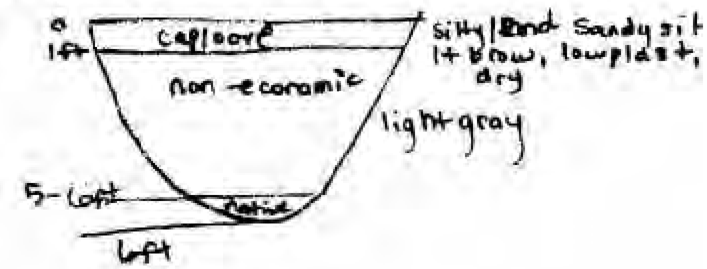
11/13/06 con't partly sunny, windy, 40°F
Sandfill No. 2

Sample ID	Time	Analytes	Photo
✓ Sand 2-SS-010	14:35	COPCs	17
✓ Sand 2-SS-006 EPA split	14:40	COPCs	18
✓ Sand 2-SS-014	14:55	COPCs + Ag	19
✓ Sand 2-SS-004	15:05	COPCs	20
✓ Sand 2-SS-003	14:50	COPCs	21
✓ Sand 2-SS-007	1510	COPCs	22
✓ Sand 2-SS-011 EPA split	1515	COPCs	23
✓✓ Sand 2-SS-012 NNEPA split	1525	COPCs	24
✓ Sand 2-SS-017	1530	COPCs	25
✓ Sand 2-SS-015 EPA split	1530	COPCs	26
✓ Sand 2-SS-019 EPA split	1540	COPCs	27
✓ Sand 2-SS-016	1545	COPCs	28
✓ Sand 2-SS-020	1550	COPCs	na

16:00 Finish soil sampling @ Sandfill No. 2
EPA collect 5 splits, MWH collect 13 + 1 rep + 1 for ag + PCOCs
1615 AVM finish 64 step out north of NECR-1 - Louis - EPA comm stop by site
1645 Back at mill office, scan, all but Leah + Hans leave site, Leah + Hans double bag samples + fill out COCs
1730 Leah + Hans leave site
LMN 11/13/06

11/14/06 partlycloudy, 30°F, windy
0735 Arrive on-site Leah+Hans, AVM arrive on-Site, Larry Bush opens office AVM performs functioncheck, Leah+Hans prepare coolers for shipment - will ship 2 coolers w/ SANDFILL NO1 + SANDFILL NO.2 soil samples to ELI, Casper, WY via UPS 2day
0755 EPA - Harry Allen, Jeff Woodley + Butch Willobey on site, everyone scans in
0830 H+S tailgate meeting in conference room - Harry Allen - EPA, Butch Willoughby Coast Gaurd, Jeff Woodlee - EPA, Luis Garcia - EPA, Lily Lane - NNEPA, Roy Blickwedel - UNC, Nat + Arvind Patel - AVM, Leah+Hans - MWH discuss testpit + backhoe H+S, discuss brushing off visible particles at gate, wiping w/ wet wipes, Louis + Lily talking w/ homesite residents, AVM performing step-out measurements @ NECR-1 + 2, Butch + Jeff set-up data ram air monitor, 4 folks have personal air monitors -
1000 Start surface soil sampling NECR-2
1045 Leah leaves Harry + Hans to soil sample @ NECR-2 + goes + meets Roy + Ronald w/ backhoe @ NEMSA to start testpits

11/14/06
1050 NEMSA - TP - 001 (0-0.5ft)
Sample of cover soil @ TP1
1100 NEMSA - TP - 001 (1-1.5ft)
Sample of precap surface @ TP1
1115 NEMSA - TP - 001 (4-5ft)
Sample of noneconomic material
1120 NEMSA - TP - 001 (~~5-6.5ft~~ 5-6ft) LWM 11/14/06
Sample of native



* found discrepancy of COCs 1-24-07 HH
YARD-TP-004 (0.0-0.5)
1145 Move to testpit @ Boneyard
1150 Collect ~~NEMSA-TP-00~~ HH 1/24/07 → (0.0-0.5ft)
sample of cover soil, stop since Leah does not have containers out in field for Van Lowe

11/14/06 con't sunny, windy, 50°F
12:00 Leah head back to NECR-2
to help Hans + Harry finish surface
Soil @ NECR-2, Collect 15 primary, 1 rep,
2 of primay for ag also, EPA collect 5 splits
12:30 MWH head back to office for
lunch, AVM come to office for lunch
30 step-out north + east of NECR-1
finish NECR-1 step-out for now
1320 Leah, Hans + Ronald go get backhoe
from Boneyard + head to Sandfill No. 2
1340 Set up on subsurface location
SF2#17, Hit native @ 1.5 ft bgs, ledge
that SF2#17 is on appears to be native
backfill location, move to SF2#12 +
attempt a 2nd pit, hit rock @ 3 @ 12 +
@ 1 ft fos SF2#1, collect a subsurface
Sample of what appears to be native
at all 3 locations, unable to collect a
rock sample
1350 Diane Malone, Arlene Luther, Jerry Begay
Stanley Edison - NNEPA arrive on site
1600 Move a subsurface pt from SAND2 7
to SAND2 8 since SAND2 7 on rock
1645 Finish 5 test pits at SAND2 + NECR2

11/14/06 con't sunny, windy, 40-50°F
Test Pits @ SAND2 - 8, 11, 12, 17, 19
Test Pits @ NECR2 - 35, 39, 20, 52, 15
1700 Hans + Leah go back to office,
EPA, NNEPA + AVM left for day, Hans
+ Leah scan + leave for day

dwm
11/14/06

11/15/06 sunny, calm, 18°F
0735 Leah + Hans arrive onsite
0740 AVM + Butch arrive onsite
0745 Roy arrive on-site
0800 Luis, Carl, Jeff, Harry, - EPA at office
Dave Taylor, Lillie Lane - NNEPA onsite
Stanley + Jerry Begay + Diane Malone
0830 Hold H+S brief discuss
home site sample strategy + drilling
0930 Head to and mark corners,
start scan + sample @ Homesite 9
1120 Finish scan + collection of
5 surface soil samples on each
Home 9 + Home 8
1210 Finish scan on Home 6 +
Home 7, Collect 5 samples on
Home 7, need to collect 5 on
Home 6 after lunch, break for
lunch
1250 WDC - Tom + + Toby
arrive at Site, go through H+S briefing +
scan
1330 Leah + Toby + WDC head to Site,
Max, Hans, AVM, EPA head back to
homesites, WDC drop decon trailer

11/15/06 con't sunny, light breeze, 50°
1400 WDC setting up on NECRI-90
north edge of NECR-1, will sample
w/ split spoon every five ft
Leah collect SS sample ~~NECR-1~~ dwm 11/15
NECR1-SB-090 (0-0.5 ft) for
COPCs - (Ra-226 + As, Mo, Se, U, V)
1430 Start drilling NECR1-90 - Toby
on rig, NNEPA - Jerry, Diane, Stanley
+ Lillie watching drilling
1445 head goes to homesites to allow
Hans to go w/ Toby on the rig
1640 EPA, AVM, Leah + Max finish
judgemental scan + collect 5 surface
soil samples from each of the nine
homesites
1650 Toby, Hans + WDC finish up drilling
NECR-90 - drill 45 ft, native esoft
1700 EPA, NNEPA, AVM Scan + check out
MWH double bag sample + organizes
samples
1725 MWH scan + leave site

dwm
11/15/06

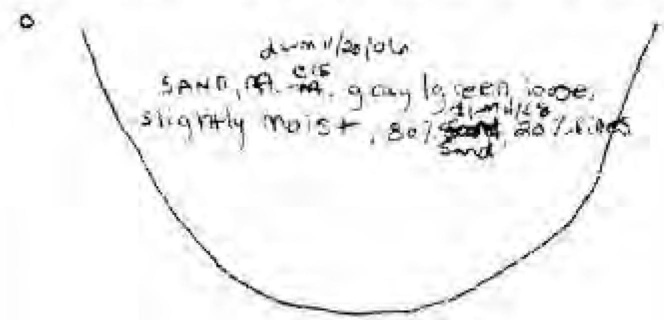
11/16/06 Sunny, clear, 25°F
0745 MWH, AVM + Butch arrive on site
0825 H+S Briefing @ mill site office
AVM - Nat + Arvind, MWH - Leah, Toby, Hans,
EPA - Harry, Butch, Carl, Jeff, Robin +
Stanley Edison - NNEPA, WDC
0845 Toby, Hans + WDC (Tommy + Jesse)
head to drill locations on NECR1
0900 AVM, MWH, + EPA discuss field
changes - step-out + sampling, new survey
areas, arroyo, scanning + boneyard, Carl,
Harry, Robin, Stanley, Leah, Nat, Arvind discuss
field changes, especially, step-out
NECR-1 areas, NECR2 stepouts, between SEPPAD
+ NEMSA, other fill in's, collect soil sample
at boundary limits at 4-6k range + cliffs
to confirm that boundary cliff pts are not
elevated, trailer park, ventholes
1000 AVM + Stanley head out to finish
step-out locations in NECR-1 + NECR-2
areas, Carl, Robin, Harry go drive to
ventholes, Leah + Butch go test hand
auger @ ponds
1215 Go + fill out COCs + bag samples
1245 Break for lunch
1300 AVM head back to site to continue

11/16/06 con't sunny, calm, clear, 60°F
1400 Head out SAND 3 w/ Harry, Butch
+ Jeff to collect 13 surface soil

SAMPLE ID	Date	Time	Comment	Phot
SAND 3-SS-025	11/16/06	1425		59
SAND 3-SS-026	11/16/06	1430		60
SAND 3-SS-022	11/16/06	1435	EPA SPLIT	61
SAND 3-SS-024	11/16/06	1440		62
SAND3-SS-014	11/16/06	1445	[illegible] SPLIT EPA SPLIT	63
SAND3-SS-027	11/16/06	1450	AGRO	64
SAND3-SS-010	11/16/06	1455	EPA SPLIT	67
SAND 3-SS-009	11/16/06	1500		66
SAND 3-SS-017	11/16/06	1505	AGRO	65
SAND3-SS-005	11/16/06	1510		68
SAND3-SS-006	11/16/06	1515		69
SAND3-SS-002	11/16/06	1520	EPA SPLIT	70
SAND3-SS-008	11/16/06	1525	EPA SPLIT	71
NECR2-SS-027	11/16/06	1545		72

when sorting NECR-2 samples realize
1 ss location is missing, Leah colla
15 ss sample from NECR-027
1550 Leah checks in on drilling
Toby + Hans on last hole in NECR-1
1600 Leah + EPA fill out COCs, fill put samples
in coolers, get 6 coolers ready to ship
1800 MWH scant leave the office

11/28/06 35, cloudy, snowy, windy
0745 Leah + Hans arrived onsite
0800 Bill + Robin - E+E, Colleen - EPA + Butch - Coast ~~Guard~~ arrive onsite
Discuss road step out areas east of Pond 1/2, road to SEDPAD/NECR2, scan of vent hole 8, H+S tailgate
0930 Robin, Leah + Hans head to Sedpad for test pits, waiting for Ronald w/ backhoe, Nat, Victor, Max head to vent hole 8 for transect scan
Butch gives tour to Bill - E+E + Colleen
0955 Start test pit 21 at SEDPAD



10:00 SEDPAD - TP - 021 (5.0 - 5.5 ft)
Photo 71

10:20 Backhoe arm bows/bends, head back to office, Larry calls RCS, will get a backhoe rented + delivered this afternoon

11/28/06
1030 Hans + Leah look @ NECR-1 map + pick out 13 surface soil samples
1100 Hans, Leah, Butch + Robin head to NECR-1 to collect SS.

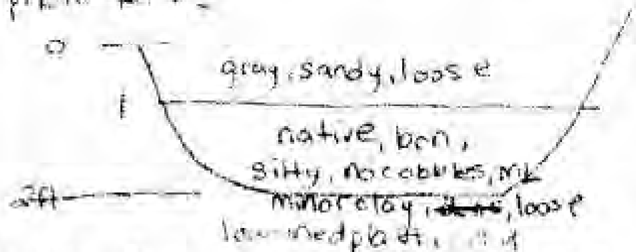
ID	Date	Time	Photo	Comment
NECR1-SS-289	11/28/06	1105	72	EPA split
NECR1-SS-293	11/28/06	1110	73	
NECR1-SS-240	11/28/06	1120	74	Navajo split
NECR1-SS-278	11/28/06	1125	75	
NECR1-SS-262	11/28/06	1130	76	EPA split
NECR1-SS-265	11/28/06	1136	77	
NECR1-SS-281	11/28/06	1146	78	
NECR1-SS-184	11/28/06	1150	79	
NECR1-SS-307	11/28/06	1200	80	
NECR1-SS-266	11/28/06	1212	81	

1220 break for lunch, go look at shift

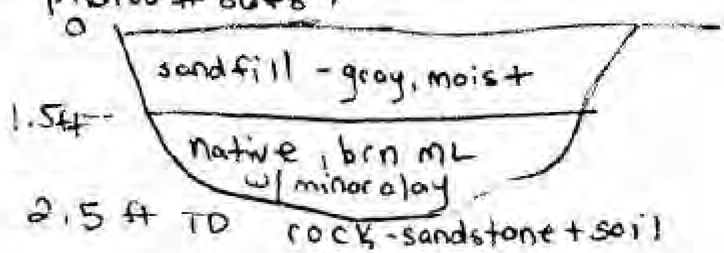
NECR-SS-207	11/28/06	1415	82
NECR-SS-164	11/28/06	1430	83
NECR-SS-173	11/28/06	1425	84

15.00 Rental backhoe on site, continue digging TP-021
1505 SEDPAD-TP-021 (10-10.5)
AVM leaves after scan @ vent hole, water tanks + step out near Sedpad

11/28/06 con't cold - 35°F, snow, windy
Reached limit of backhoe @ TP-024 - SED PAD, Total depth = 11 ft bgs
sandy, gray/green fill sediments entire depth, unable to collect native soil sample
1520 SEDPAD-TP-014 (0.5-1.0) 1530
start TP SEDPAD-TP-014 (1.0-1.5) 1535
photo # 85

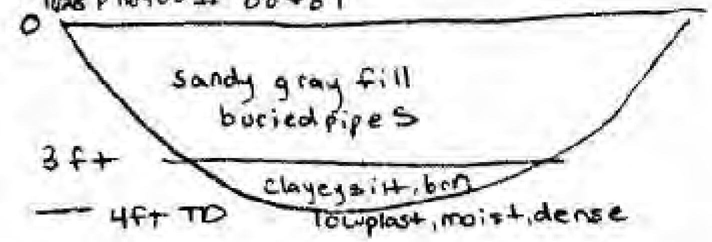


1540 End TP-014, head to TP-012 + start TP-012 @ 1542
1545 ~~TP~~ SEDPAD-TP-012 (1.0-1.5)
1548 SEDPAD-TP-012 (1.5-2.0)
photos #86+87



1600 Finish TP-012 at SEDPAD
160[illegible] Start TP-006 at SEDPAD

11/28/06 con't, snowing 33°, windy
SEDPAD-TP-006
1600 SEDPAD-TP-006 (1.5-2.0)
1605 SEDPAD-TP-006 (3.0-3.5)
dwm 11/28
Photos # 88+89



1615 Finish TP-006 @ SEDPAD
1620 SEDPAD-TP-026 (0.5-1.0)

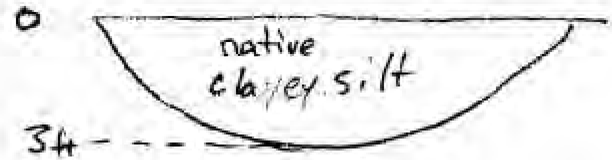


photo #90
1625 Stop testpits for the day
head back to office, meet harry + Robin @ gate, they are waiting for AAA to unlock Bill car, locked w/ engine running
1715 Hans + Leah leave site for day

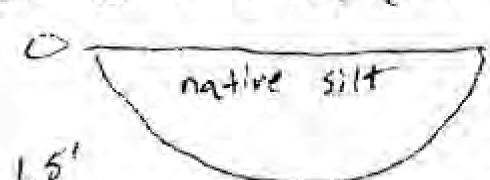
dwm 11/28/06

11/29/06 snow, windy, 20°F
0820 Leah + Hans arrive on site
Robin + Bill - E+E, Butch - USCG, JoAnn - EPA arrive on-site, due to 3in snow on site, cold weather, high winds + no backhoe operator (Ronald - UNC called in today) UNC EPA encourages MWH to delay field activities today. Robin calls Andy to discuss whether EPA remains onsite to wait for potential tour of uranium conference folks from Window Rock. Andy Bain advices not to wait on site due to weather
1000 Robin E+E heads to ABQ, Butch, Bill, JoAnn leave site for day
1030 Leah + Hans leave site for day, MWH will catch up on photo log paperwork rest of day

HWM
11/29/06

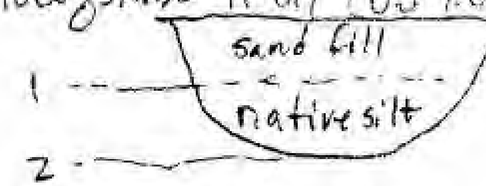
11/30/06 clear, sunny, -7°F
0800 Leah + Hans arrive on site, Butch - USCG, Colleen - EPA, Carl - Palladino, Bill - E+E, go over plan for day, let it warm up a few degrees before heading out to site, plan for site - test pits at SAND3, try to move to NEMSA next. Hans work on test pits, Leah go and surface soil sample

0940 SAND3-TP-025 (0.5-1.0) Photo #



1

0950 SAND3-TP-014 (1.0-1.5) (native)
1000 SAND3-TP-014 (0.5-1.0) (fill)



2

1005 SAND3-TP-009 (0.5-1.0)

3

11/30

Photo #

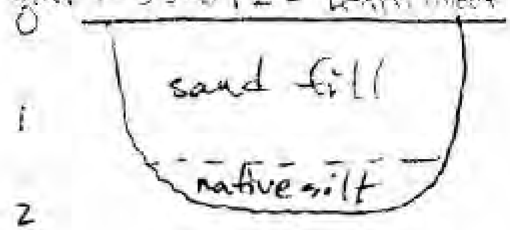
1010 SAND3-TP-006 (~~0-0.5~~) (0.5-1.0) 4

1010 SAND3-SS-004 - Leachcollect boundary confirmation

1020 SAND3-TP-005 (0.5-1.0) 5

1025 SAND3-TP-005 (1.5-2.0)

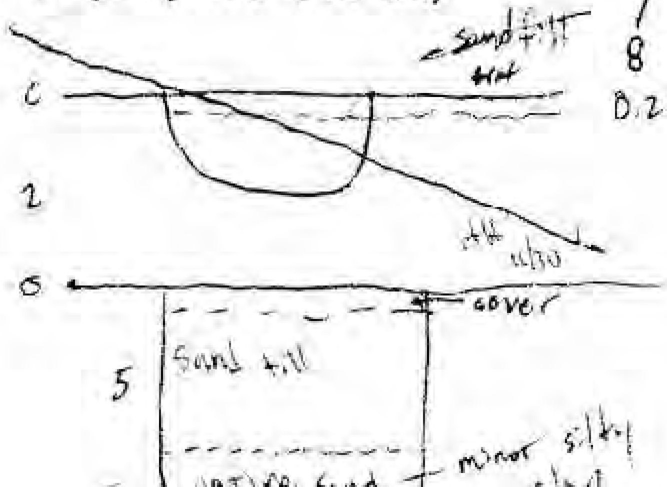
1030 SAND3-SS-012 - Leachcollect boundary confirmation



1040 NEMSA-TP-002 (0-0.25) 6

1045 NEMSA-TP-002 (0.25-0.75) 7

8



11/30

Photo #

1100 NEMSA-TP-002 (5.5-6.0) 9

1115 NEMSA-TP-002 (7.0-7.5) 10

1120 Start NEMSA-TP-003

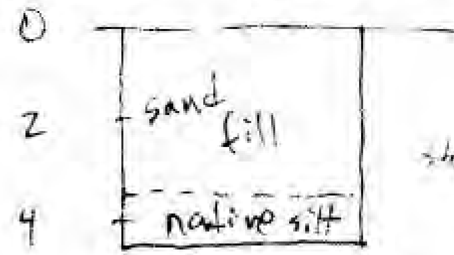
1120 NEMSA-TP-003 (0-0.5) 11

- COPC + Ag

1125 NEMSA-TP-003 (1.5-2)

- pre-cap

1130 NEMSA-TP-003 (4.0-4.5) 12



stop @ 1140

1145 NEMSA-TP-006 (no sample) 13

- for delineation purposes
- native soil @ 2.0'

1150 boneyard test

- all native

1200 NEMSA-TP-007 (no sample)

1230 Break for lunch

11/30

2:00 head to Boneyard w/ Bill, Carl, Leah, Ron

~~1400~~ HH 11/30/06 1400 ~~BY-SO-1~~ (0-0.5) COPC + Ag ; ~~SVOC moisture, TCLP~~ HH

YARD-TP-001

0
2
all native soil

205 YARD-TP-001 SVOC + moisture
215 YARD-TP-001 (1-1.5) VOC
215 YARD-TP-001 (1-1.5) CPOC
215 YARD-TP-001 (1-1.5) TCLP
- photo #15
1430 YARD-TP-002 (0-0.5) CPOC
1440 YARD-TP-002 (1.5-2.0) SVOC + moist
1440 YARD-TP-002 (1.5-2.0) VOC
1440 YARD-TP-002 (1.5-2.0) CPOC
1440 YARD-TP-002 (1.5-2.0) TCLP

0
1
2
3
HH 3.5

reworked native sand

no visible pre-cap

refusal @ rock

HH

HH 11/30/06

1500 move to YARD-TP-0034
1505 YARD-TP-004 (0.5-1.0) VOC
1505 YARD-TP-004 (0.5-1.0) SVOC + moist
1505 YARD-TP-004 (0.5-1.0) CPOC
1505 YARD-TP-004 (0.5-1.0) TCLP
Photo #19 - 26
1530 YARD-TP-004 (5.5-6.0) VOC X2
1530 YARD-TP-004 (5.5-6.0) SVOC
1530 YARD-TP-004 (5.5-6.0) CPOC
1530 YARD-TP-004 (5.5-6.0) TCLP

sandy soil

0
1
2
3
4
5
6

sand fill + debris

- buried cable, rubber, misc. metal
- could not reach native due to debris

End YARD-TP-004 @ 1550
Start YARD-TP-005 @ 4:05
1605 YARD-TP-005 (0-0.5) COPC + Ag
1625 YARD-TP-005 (2.5-3) VOC
1625 YARD-TP-005 (2.5-3) SVOC
1625 YARD-TP-005 (2.5-3) COPC
1625 YARD-TP-005 (2.5-3) TCLP

sand + debris

40

12/1/06 Sunny, clear, cold, 10°F

0820 Bill-E+E, Colleen, Butch, Carl, AVM (Nat + Victor) + Hans + Leah onsite, Hold H+S briefing + daily planning meeting

TP + Vent 3/8 - isolated areas/localized hotspots, MWH proposing 5 samples at each area confirmation sampling at each of these areas to confirm both low spots + elevated areas

0940 JoAnn, Butch, Carl + Leah collecting 5 SS samples @ Venthole 3/8

Bill + Hans @ Boneyard for test pits

Sample ID	Date	Time	Photo	Notes
VENT8-SS-019	12/1	0950	34	EPA SPLIT
VENT8-SS-020	12/1	1000	35	
VENT8-SS-031	12/1	1005	36	
VENT8-SS-002	12/1	1015	37	MWH DUP
VENT3-SS-034	12/1	1022	38	EPA SPLIT

Bill + Hans confirmative at Boneyard
323, 326, 316

Sample ID	Date	Time	Photo	Notes
NECR1-SS-323	12/1	1100	39	EPA SPLIT
NECR1-SS-324	12/1	1109	40	
NECR1-SS-316	12/1	1119	41	
PONDI2-SS-003	12/1	1134	42	
PONDI2-SS-032	12/1/06	1158	43	
PONDI2-SS-017	12/1	1202	44	

12/1/06

1440 Carl + Leah at Trailer Park to collect surface soil samples

Sample ID	Date	Time	Photo	Notes
TP-SS-001	12/1/06	1441	46	EPA Split
TP-SS-004	12/1/06	1448	47	
TP-SS-024	12/1/06	1455	48	EPA Split
TP-SS-024	12/1/06	1503	49	MWH Split
TP-SS-013	12/1/06	1510	50	
SANDI-SS-053	12/1/06	1527	51	
SANDI-SS-032	12/1/06	1542	52	
SANDI-SS-065	12/1/06	1552	53	
NECR2-SS-109	12/1/06	1606	54	EPA Split
NECR2-SS-102	12/1/06	1615	55	
NECR2-SS-082	12/1/06	1622	56	
NECR2-SS-096	12/1/06	1630	57	

1645 Finish surface soil [illegible] confirmation samples, Hans, Bill + [illegible] finish 4 test pits @ Boneyard [illegible] confirmative + 2 test pits @ NECR-1 [illegible]

1740 Leave site for day

JAM 12/1/06

12/?/06 Sunny, [illegible], cold, 50°F
0830 MWH representatives [illegible]
[illegible] arrive on site. Conduct H&S
complete briefing + discuss sampling plans for [illegible]
[illegible] notes in Hand field book

12/7/06

12/4/06 Sunny, light breeze, 60°F
1105 B.B. [illegible]
1145 Head out to arroyo to handauger
Start @ downstream transect,
next to culvert and road
1205 ARROYO - SB - ~~010~~ 001 (0-1)
1220 ARROYO - SB - ~~010~~ 001 (1-2)
1232 ARROYO - SB - ~~010~~ 001 (2-3)
decon 1 3/4" hand auger w/ alconox,
DI rinse, 10% HNO_3 rinse in between
each 1 foot sample, change ID from
010 too 001 for furthest downstream
sample due to figure generated by MWH
that has transect # from 1 downstream
to 10 upstream (near NECR-1)
1240 start arroyo #2
1245 ARROYO - SB - 002 (0-1)
1252 ARROYO - SB - 002 (1-2)
1259 ARROYO - SB - 002 (2-3)
1305 start arroyo #3
1311 ARROYO - SB - 003 (0-1)
1318 ARROYO - SB - 003 (1-2)
1325 ARROYO - SB - 003 (2-3)
1340 start arroyo #4
1340 ARROYO - SB - 004 (0-1)
1348 ARROYO - SB - 004 (1-2)
1355 ARROYO - SB - [illegible]

12/03/06 con't sunny, calm, 35°F
1406 Start Arroyo #5
1408 ARROYO-SS-005 (0-1)
1414 ARROYO-SS-005 (1-2) wire in sample
1429 ARROYO-SS-005 (2-3)
1435 Start Arroyo #6
1439 ARROYO-SS-006 (0-1)
1447 ARROYO-SS-006 (1-2)
grayer material in 1-2
1450 ARROYO-SS-006 (2-3)
stop hand augering after last decon
head back to office to get rinsate
blank + organize samples, bill leaves
1535 pour lab grade DI over hand
auger into ½ gallon w/ HNO3 preservative
to collect rinsate blank
ARROYO-RB-001 @1535
1550 Start organizing samples
1845 Hans + Leah clean out, lock up
office + leave for day

12-03-06

12-04-06 Sunny, calm 10°F
0819 Leah + Hans arrive onsite after
picking up DI water + ice, Bill Ert.
waiting @ office bldg
0840 Leah + Hans make copies of COCs
after signing, fill out UPS labels, tape
up 7 coolers - 7 coolers picked by
UPS for delivery to Energy labs
0950 Leah, Hans, H+S tailgate
get supplies to finish arroyo
sampling
1035 Arrive @ arroyo #7 photos
1041 Arroyo-SB-007 (0-1) #1-3
1050 Arroyo-SB-007 (1-2)
1050 Arroyo-SB-007 (2-3)
1111 Start arroyo #8
1112 ARROYO-SB-008 (0-1)
1125 ARROYO-SB-008 (1-2)
1125 ARROYO-SB-208 (1-2)
auger a 2nd hole next to 1st to
1-2' level collect sample + from each
hole mix total sample in a bag w/
a spoon + split
1135 ARROYO-SB-008 (2-3) photos
1135 ARROYO-SB-208 (2-3) 9,10,11
1140 Arrive @ ARROYO #9

12-04-2007

1142 ARROYO-SB-009 (0-1) photos
1147 ARROYO-SB-009 (1-2) 12,13,14,15
1200 ARROYO-SB-009 (2-3)
1203 Arrive @ ARROYO10 next to NECR1
1205 ARROYO SB-010 (0-1)
1212 ARROYO-SB-010 (1-2) photos
1213 ARROYO-SB 010 (2-3) 16,17
gray green sandy material every depth, rest of arroyo samples were lt brown to brown, moist 70%-80% [illegible], 30% fines, 10% fines, loose, no cement, no strat
1225 Finish 10 arroyo handauger soil borings, collect 3 intervals down to 3 ft for each boring
1235 Head back to office for lunch
1340 Clean out rental, organize [illegible] supply room, check pH of HNO_3 rinse bucket after neutralizing w/ pH 10.1 & 10.2 on each bucket, dispose of water into tailings ponds w/ Larry Bush
1445 Go onto site, look @ Pond 3, access [illegible] corner, Larry believes backhoe can get in with 3-4 scoops of dirt to cross erosional features

12-04-06 cont. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] approval from Andy Bain EPA to excavate [illegible] fill erosional features. Muri identifies a pile of disturbed material [illegible] near SW corner of Pond 3, [illegible] readings @ PT 3 of Pond 3 [illegible] that would be the pile to use as fill
1520 Leah speaks w/ Andy & get approval to perform limited excavation in order to access Pond 3 test pit locations, Andy asks Muri to photo document & Muri agrees
1530 Hans & Bill GPS boundary of [illegible] try to get other boundaries, but have poor satellite geometry on GPS
1630 Collect [illegible] blank of hand-auger ARROYO-RB-002, collected in 2L poly w/ pre-measured by lab [illegible] of HNO_3, Bill collects photo # 5 13-25
1645 Fill out COCs & double bag [illegible] soil samples, arrange [illegible], [illegible] for [illegible]
1750 Leah & Hans leave for day

[illegible] 12-04-06

12-05-06 Sunny, clear, calm, 5°F

0800 Leah + Hans arrive on site, meet Bill from E + L, hold H+S briefing, clean out car, organize equipment

0850 Bill + Hans head out w/ Ronald to Pond 3 to work on excavating road into Pond 3, take approx. 12 scoops of soil

0905 Complete access into Pond 3 start TP-037

Complete 5 sampling test pits in Pond 3, perform TP @ 030 for depth info only

1205 Digest adjacent to NENGA-004 to obtain 2 missed sample intervals

1230 Break for lunch

1330 Dump extra samples from SAN01 SPLP bag in Pond 1, lab did not require extra volume lab will hold all samples until SPLP samples chosen

1400 GPS boundaries + features + collect missed Ag sample @ NECR1-028

1500 Head back to office bldg, demob equip + supplies

1600 Leah scan backhoe w/ Ludlum m-meter + alpha probe after Pond decon, backhoe did not show levels above background, no visible dirt

1715 Finish decon + leave site

2 Location NECR Date 11-14-06

Project / Client

10:00 Arrive @ NECR2 w/ Leah Martin (MWH) and Harry Allen (EPA) to continue soil sampling. Cloudy, breezy, cold...
1 dup, 2 Ags (borrow area)

Sample ID	Time	Analysis	Photo #	Sampler/Misc
NECR2-SS-050	10:10	PCOC	29, 30	Harry
NECR2-SS-033	10:20	PCOC	31	Harry
NECR2-SS-057	10:30	PCOC	32	Harry EPA split
NECR2-SS-056	10:35	PCOC + Ag	33	Harry/Harry
NECR2-SS-069	10:40	PCOC	34	
NECR2-SS-076	11:05	PCOC	35	EPA split
NECR2-SS-039	11:10	PCOC	36	Mwh split
NECR2-SS-015	11:15	PCOC + Ag	37	EPA split
NECR2-SS-017	11:35	PCOC	38	EPA split
NECR2-SS-018	11:25	PCOC	39	EPA dup
NECR2-SS-020	11:30	PCOC	40	
NECR2-SS-004	12:05	PCOC	41	
NECR2-SS-035	12:10	PCOC	42	EPA split
NECR2-SS-052	12:15	PCOC	43	

12:30 Break for lunch
1:00 Test Pitting w/ LWM in afternoon at NECR2 and SAND2

HH 11-14-06

Location Date 11-15-06

Project / Client

10:00 Head to homesites w/ Nat + Arvind Patel (AVM), Leah Martin (MWH), Carl P, Louis, Jerry, Stan, Butch, Lillian, Diane, ...
10:15 Begin surveying + sampling @ homesite 9

SAMPLE ID	Time	Analysis	Photo #	Misc.
HOME9-SS-001	10:25	PCOC	5	
HOME9-SS-002	10:30	PCOC	6	
HOME9-SS-003	10:35	PCOC	7	
HOME9-SS-004	10:40	PCOC	8	
HOME9-SS-005	10:45	PCOC	9	
HOME8-SS-001	11:20	PCOC	14	
HOME8-SS-002	11:15	PCOC	13	
HOME8-SS-003	11:10	PCOC	12	
HOME8-SS-004	11:00	PCOC	10	
HOME8-SS-005	11:05	PCOC	11	
HOME7-SS-001	11:40	PCOC	15	
HOME7-SS-002	11:45	PCOC	16	
HOME7-SS-003	11:50	PCOC	17	
HOME7-SS-004	12:00	PCOC	18	
HOME7-SS-005	12:05	PCOC	19	

Break for lunch at 12:10

KHH 11/15

Location:

Date: 11-15-06

Project / Client:

→ Back to homesites w/ Max after lunch

SAMPLE ID	Time	Analysis	Photo#	Misc
HOME6-SS-001	1:45	COPC	20	
HOME6-SS-002	1:50	COPC	21	
HOME6-SS-003	1:55	COPC	22	
HOME6-SS-004	2:00	COPC	23	
HOME6-SS-005	2:05	COPC	24	
HOME5-SS-001	2:25	COPC	25	
HOME5-SS-002	2:30	COPC	26	
HOME5-SS-003	2:40	COPC	29	
HOME5-SS-004	2:50	COPC	30	
HOME5-SS-005	3:00	COPC	31	
HOME4-SS-001	3:45	COPC	36	
HOME4-SS-002	3:10	COPC	32	DUP. TAKEN
HOME4-SS-003	3:20	COPC	33	charcoal present
HOME4-SS-004	3:35	COPC	35	
HOME4-SS-005	3:30	COPC	34	

DWM 11/15

Location: Homesite

Date: 11-15-06

Project / Client: UNC NER

SAMPLE ID	TIME	ANALYSIS	PHOTO #	MISC.
HOME2-SS-001	1650	COPC	~~37~~	
HOME2-SS-002	~~1655~~ 5 dwm 11/16/06	COPC	~~38~~ 57	
HOME2-SS-~~004~~ 204	~~1600~~ 1602	COPC	~~39~~	duplicate taken
HOME3-SS-005	1555	COPC	40	
HOME3-SS-004	1600	COPC	41	
HOME3-SS-003	1605	COPC	42	
HOME3-SS-001	1558	COPC	43	
HOME3-SS-002	1603	COPC	4~~4~~3	PHOTO SKIP TO 43
HOME2-SS-003	1613	COPC	~~45~~ 44	
HOME2-SS-005	1620	COPC	~~47~~ 46	
HOME-1-SS-001	1622	COPC	~~48~~ 47	
HOME1-SS-003	1620	COPC	~~49~~ 48	
HOME1-SS-002	1625	COPC	~~50~~ 49	
HOME1-SS-004	1630	COPC	50	
HOME1-SS-005	1627	COPC	51	

DWM 11/15

NECR Date 11-17-06

0745 Arrive on site w/ Tleeson. Leah leaves for home after briefing in am. Butch, Carl, Robin, Jesse + Tom (Drillers), Nat, and Arvind arrive.
0815 Safety meeting, stressing concerns for slips, trips, falls, arsenic, and dehydration
0830 Toby heads out to rig to drill two holes by Ponds 1+2. I prepare samples (7 coolers) to be shipped out today.
0930 Meet up w/ Nat and Arvind to help with stepouts on Sed Pad, Pond 3/3a, and NECR1 (Arroyo Bank; AB1). Toby finished both holes by noon, and met with AVM crew along w/ Carl + Robin.
12:30 Break for lunch
1:30 Head back to site with Toby and Robin to sample Pond 3/3a and Sed Pad.
3:00 Carl and Butch meet up with us to help collect the samples.
4:00 Finished sampling Sed Pad and Pond 3/3a. Head back to office to sort samples

AL

Date 11/17/06

Project Name POND 3

SAMPLE ID	TIME	ANALYSIS	PHOTO #	COMMENTS
✓ POND3/3A-SS-[illegible]	1330	CCPC	1	
✓ POND3/3A-SS-[illegible]	1335	CCPC	2	
✓ POND3/3A-SS-[illegible]57	1340	CCPC+[illegible]	3	
✓ POND3-SS-[illegible]	1345	CCPC	4	[illegible]
✓ POND3-SS-[illegible]	1344	CCPC+[illegible]	5	
✓ POND3-SS-[illegible]	1400	CCPC	6	[illegible]
✓ POND3-SS-[illegible]42	1410	CCPC	7	
✓ POND3-SS-[illegible]	1416	CCPC	8	[illegible]
POND3-SS-[illegible]	1424	CCPC	9	[illegible]
✓ POND3-SS-[illegible]14	14[illegible]	CCPC	10-11	
✓ POND3-SS-[illegible]	1433	CCPC	12	
✓ POND3-SS-[illegible]	1440	CCPC	13	[illegible]
✓ POND3-SS-[illegible]	1445	CCPC	14	

SED PAD

SAMPLE ID	TIME	ANALYSIS	PHOTO #	COMMENTS
✓ SEDPAD-SS-[illegible]	15[illegible]	CCPC	15	[illegible]
✓ SEDPAD-SS-#26	1510	CCPC	16	[illegible]
✓ SEDPAD-SS-#25	1510	CCPC	17	
✓ SEDPAD-SS-#21	1515	CCPC+[illegible]	18	[illegible]
✓ SEDPAD-SS-#15	1517	CCPC	19	
✓ SEDPAD-SS-#22	1522	CCPC	20/21	
✓ SEDPAD-SS-#14	1524	CCPC	22	[illegible]
SEDPAD-SS-#16	1526	CCPC	23	
✓ SEDPAD-SS-#18	1530	CCPC	24	

Location ____ Date ____
Project / Client ____

Sample ID	Time	Analysis	Photo #	Comment
[illegible]-SS-012	1535	COPC	25	
[illegible]-SS-045	1534	COPC	26	EPA SPLIT
[illegible]-SS-[illegible]	1542	COPC	27	
[illegible]-SS-011	1545	COPC	28	

HH 11-17-06

Location NECR Date 11-18-06
Project / Client ____

7:50 arrive on site, and do usual check in scan, ~~[illegible]~~ sorting more samples, and safety meeting. Prepare to Sample NECR1 w/ Robin, Carl, Butch[HH] and Toby
8:40 Leave for site w/ Toby while Carl + Robin prepare COCs and Butch and Jack test Jack's rad-meter @ Pond!

Sample ID	Time	Analysis	Photo	Comments
NECR1-SS-098	8:50	COPC	29	
~~NECR1-SS-092~~	~~9:00~~	~~COPC~~	~~30~~	~~EPA D[illegible]~~ HH 11-1[illegible]
POND12-SS-077	9:15	COPC	31	
POND12-SS-069	9:25	COPC	33	
POND12-SS-076	9:20	COPC	32	
POND12-SS-061	9:28	COPC	34	EPA DUP
POND12-SS-050	9:30	COPC	35	
POND12-SS-035	9:35	COPC	36	EPA DU[illegible] MWH DU[illegible]
POND12-SS-097	9:40	COPC + Ag	37	Ag
POND12-SS-058	9:50	COPC	38	EPA DU[illegible]
POND12-SS-023	9:54	COPC	39	EPA DU[illegible]
POND12-SS-014	10:00	COPC	40	
POND12-SS-0[illegible]	10:08	COPC	41	EPA DU[illegible]
POND12-056	10:15	COPC	42	

Location _______ Date _______

Project / Client _______

	Time	Anal	Photo	Misc
✓POND1-2-SS-019	10:25	COPC	43	MWH DUP
✓PONDI2-SS-042	10:25	COPC	44	
✓PONDI2-SS-011	10:35	COPC	45	
✓, PO NDI2-SS-041	10:45	COPC	47	EPA Split
✓PONDI2-SS-020	10:47	COPC + Ag	46	

Started sampling NECR1 w/ Toby, but moved to POND12 after taking 2 samples b/c Not had NECR1 map + coords. Sampled POND12 w/ Toby. Took samples at seventeen locations, but did not sample PONDI2-SS-040, because only 17 samples were required. Returned to NECR office to organize samples and give EPA their 5 splits from POND12. P477 was recorded (initially) as an EPA DUP, but the sample was not found, and split PONDI2-SS-041 instead. Butch + Jack finished w/ their gamma readings - the purpose of which was to give Jack a little on-site experience/training. Probably not necessary, but HH

HH

Location NECR-1 Date 11/20/(?)

Project / Client

SAMPLE ID	TIME	ANALYSIS	PHOTO #	MISC
✓NECR/1-SS-ØØ5	ØS45	COPC	43	
✓NECR1-SS-Ø18	Ø9ØØ	COPC	49	
✓NECR1-SS-Ø2Ø	Ø9Ø5	COPC	5Ø	EPA SPLIT
✓NECR1-SS-Ø28	Ø91Ø	COPC	51	AG
✓NECR1-SS-Ø3Ø	Ø915	COPC	52	ZB (MWH) DUP
✓NECR1-SS-Ø49	Ø93Ø	COPC	53	
✓NECR1-SS-Ø47	Ø935	COPC	54	EPA SPLIT
✓NECR-1-SS-Ø44	Ø955	COPC	55	AG
✓NECR-1-SS-Ø26	Ø955	COPC	56	
✓NECR-1-SS-Ø65	1ØØ5	COPC	57	EPA SPLIT
✓NECR-1-SS-Ø61	1Ø3Ø	COPC	58	
✓NECR-1-SS-Ø68	1Ø35	COPC	59	
✓NECR-1-SS-Ø7Ø	1Ø4Ø	COPC	60	
✓NECR1-SS-Ø127	11ØØ	COPC	61	AG
✓NECR1-SS-126	11Ø5	COPC	62	EPA SPLIT
✓NECR1-SS-129	112Ø	COPC	63	
✓NECR1-SS-133	1135	COPC	64	EPA SPLIT
✓NECR-1-SS-135	114Ø	COPC	65	
✓NECR1-SS-137	115Ø	COPC	66	
✓NECR-1-SS-101	~~1155~~ 1220 HH	COPC	67	
✓NECR1-SS-143	1415	COPC	68	MWH DUP
✓NECR1-SS-138	1425	COPC	69	
✓NECR1-SS-14Ø	143Ø	COPC	70	
✓NECR1-SS-Ø23	1454	COPC	71	

Location NGCR   Date 11-21-06

Project / Client

→ More COCs, shipping coolers:
C-1701, C-1757, C-2098, blue igloo,
green coleman (C-1520), and another blue igloo
~~for storing sample POND3 SS csf~~ HH 11/21
→ 6 coolers to be shipped.
QA/QC
NGCR1 → 53 samples w/ 2 dups
POND5/Sn → 15 samples, 059 marked
as dup, but could not find
POND2 → 19 w/ 2 dups, but
surface samples at subsurface locations
not counted
SEDPAD → 141 w/ 1 dup
? Is the dup for 022 07?
Getting ready for break, I'm the
only one here, so didn't have anyone
to conduct safety meeting with.

HH 11/21/06

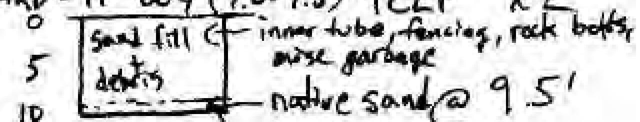
702-682-3277

Location UNC NGCR   Date 12/1/06

Project / Client

9:50 Head to boneyard w/ Ron + Bill
1000 YARD-TP-003 (0-0.5) COPC
1010 YARD-TP-003 (1.0-1.5) VOC
1010 YARD-TP-003 (1.0-1.5) SVOC + moist
1010 YARD-TP-003 (1.0-1.5) COPC
1010 YARD-TP-003 (1.0-1.5) TCLP

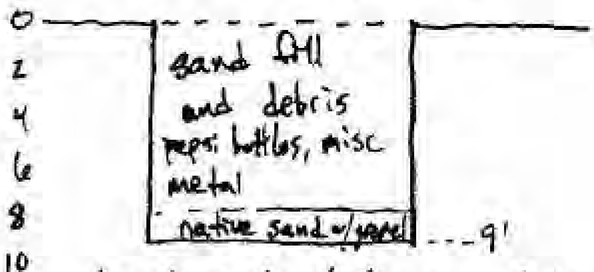
1030 Move to YARD-TP-004 to try
and dig deeper by going wider
1110 YARD-TP-004 (9.5-10) VOC
1110 YARD-TP-004 (9.5-10) SVOC + moist
1110 YARD-TP-004 (9.5-10) TCLP
1110 YARD-TP-004 (9.5-10) COPC
1125 YARD-TP-004 (7.0-7.5) VOC x 2
1125 YARD-TP-004 (7.0-7.5) SVOC + moisture x 2
1125 YARD-TP-004 (7.0-7.5) COPC x 2
1125 YARD-TP-004 (7.0-7.5) TCLP x 2



1150 move to YARD-TP-005 to go deeper

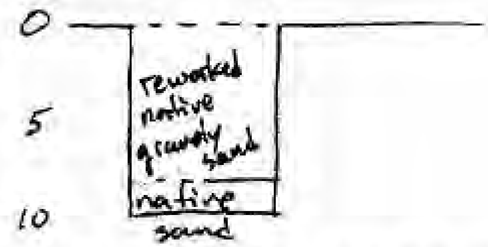
Date 12/1/06

1205 YARD-TP-005 (4.5-5.0) VOC
1205 YARD-TP-005 (4.5-5.0) SVOC + moisture
1205 YARD-TP-005 (4.5-5.0) CPOC
1205 YARD-TP-005 (4.5-5.0) TCLP
1235 YARD-TP-005 (8.5-9.0) VOC
1235 YARD-TP-005 (8.5-9.0) SVOC + moisture
1235 YARD-TP-005 (8.5-9.0) CPOC
1235 YARD-TP-005 (8.5-9.0) TCLP



- native hard to distinguish, but did have more cobbles w/ no garbage
1255 Leave site for lunch, w/ backhoe @ Boneyard/NEMSA
1450 Arrive to Boneyard w/ Ron + Bill to sample YARD-TP-002
1510 YARD-TP-002 (9.5-10.0) VOC
1510 YARD-TP-002 (9.5-10.0) SVOC + moisture
1510 YARD-TP-002 (9.5-10.0) COPC
1510 YARD-TP-002 (9.5-10.0) TCLP

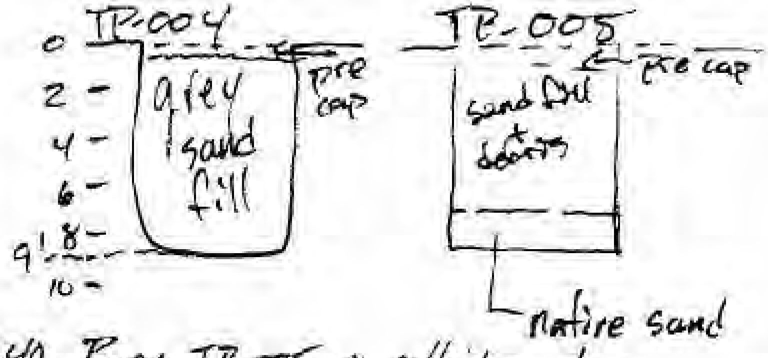
Date 12-1-06



1535 Begin test pit @ ~~NE~~ NEMSA-TP-~~DL1~~ 004 12/1 HH
1545 NEMSA-TP-~~DL1~~ 004 (8.5-9.0) COPC ?
1550 Move to NEMSA-TP-DL2 005
→ NEED TO GPS both pits ASAP HH 12/1
- presently marked w/ glove + spoon
1605 Move NEMSA-TP-005 b/c too much debris
1620 NEMSA-TP-004 (0-0.5) COPC
→ Forgot to collect initially
1600 NEMSA-TP-005 (0-0.5) COPC
→ close to final TP
1625 NEMSA-TP-005 (4.0-4.5) COPC
→ could not advance further due to rock bolts and cables

HH 12-1-06

1635 NEMSA-TP-005(8.0-8.5) COPC
→ able to dig past rock bolts, cable, etc... w/ some extra effort

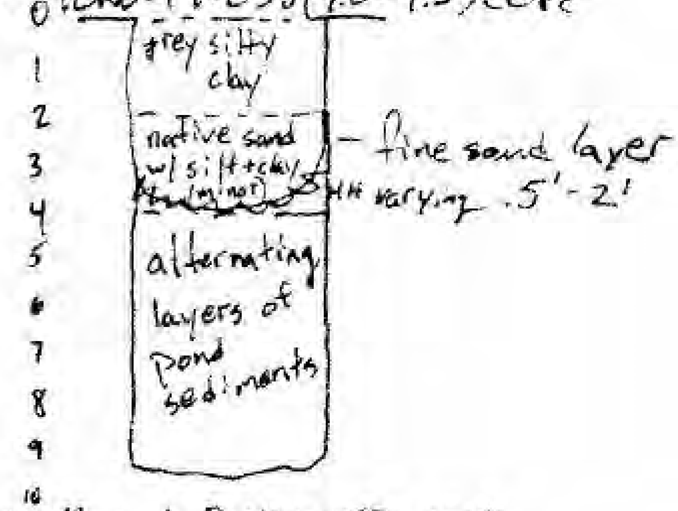


1640 Bury TP-005 + call it a day, still need to GPS 004 + 005 tomorrow

HH 12/2

Head to POND1 w/ Carl, Bill, Leah, and Ron. Leah dons Tyvek, bootees, + gloves due to elevated risk in the POND Photo

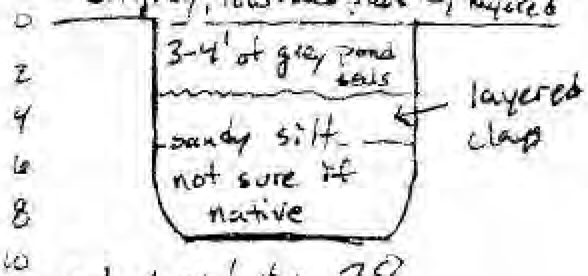
0940 POND-TP-035(1.0-1.5) COPC #6
0943 POND-TP-035(2.0-2.5) COPC #7
1005 POND-TP-035(9.0-9.5) COPC



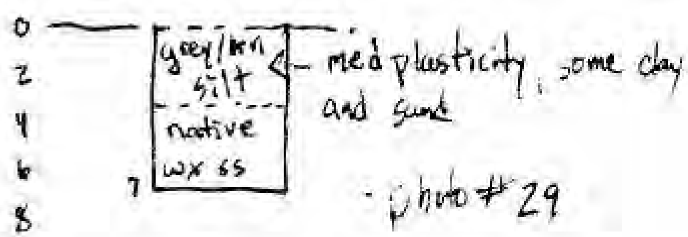
1015 Move to POND1-TP-058

HH 12/2/06

1040 POND1-TP-058 (8.5-9.0) COPC
1050 POND1-TP-058 (4.5-5.0) COPC
- dk grey, low-med plastic, layered



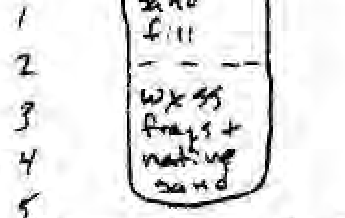
→ Last photo # is 28
1120 Move to POND2, test entry w/ Jeep, and Ron thinks the backhoe will make it
1125 Start POND2-TP-030
~~1130~~ 1125 POND2-TP-030 (4.5-5.0) COPC
-purpleish grey platey pliable soft laminated sediments, weathered sandstone
1140 POND2-TP-030 (~~1.5~~ 2.0-3.0) COPC



- photo # 29

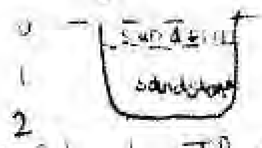
1200 Break for lunch, Carl leaves for home, Leah, Ron, ~~Carl~~ Bill, + Hans stay

1320 Head back to site, drive up backside SF1 w/ backhoe, decon buckets on backhoe b/c ponds 1+2 were very hot
1340 SAND1-TP-049 (1.0-1.5)
1350 SAND1-TP-049 (3.5-4.0) duplicate
- 0-2' sand fill
- 2-5' native weathered sandstone
- 0.5" - >6" ss frags



Photos # 31, 32, 33

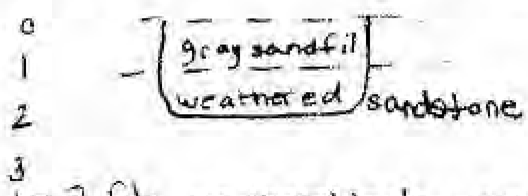
1400 Start TP-043 @ SAND1
1410 SAND1-TP-043 (1.0-1.5)
0 - 0.5' light brown sand fill
1 - 1.5 gray + tan sand stone, crumbly platy, bedded, weathered to sandy soil



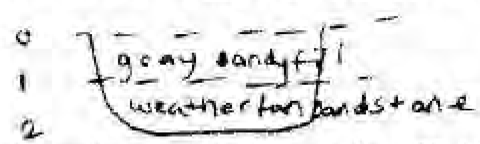
Photos # 34, 35, 36, 37

1415 Start TP-063 @ SAND1

cont SANDI-TP-063 test pit
1425 SANDI-TP-063 (0.5-1.0)
1427 SANDI-TP-063 (1.5-2.0)

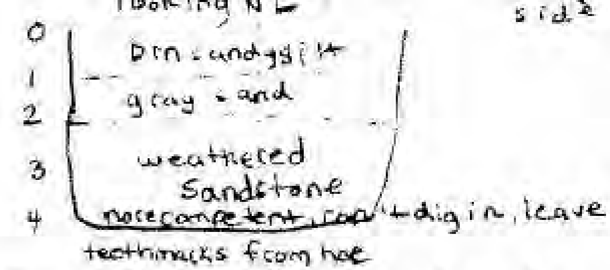


1-2 ft weathered tan/gray sandstone + sandy soil
0-1 ft gray sand fill, m-crs sand, moist
photo # 38, 39, 40
1435 SANDI-TP-068
1438 SANDI-TP-068 (0.5-1.0)
1440 SANDI-TP-068 (1.5-2.0)
0-1 ft gray sand fill, m-crs
1-2 ft tan sandstone, weathered

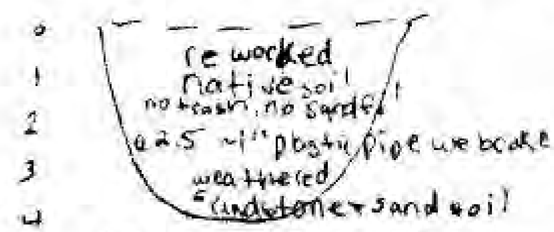


~~photo # 38, 39, 40~~ dwm 12/02/06
1450 Start TP-030
1455 SAND-TP-030 (3.5-4.0)
dig - widen pit to confirm ~~sand~~ bedrock @ 4.0 ft
hit rock @ 4.0, fill assymetrical
in pit 1505 SAND-TP-030 (1.0-1.5)

Cont 030 test pit photo # 41, 42, 43, 44
looking NE rocks is from N side



1515 Finish all 5 testpits @ SANDI
Go eval access into Pond 3 with some excavation work, think we can get in SE corner
1555 NECR1-TP-138 - sub location for NECR-1
1600 NECR1-TP-138 (3.5-4.0 ft)



photos 45, 46, 47, 48, 49, 50
1615 Head back to office bldg
1645 Scanout, Leah, Hans, Bill + Ronald leave site
dwm 12/02/06

Location Date 12-5-06

Project / Client

900 → Head to Pond 3 w/ Bill Sass + meet Ron there to ~~fix~~ build entrance road

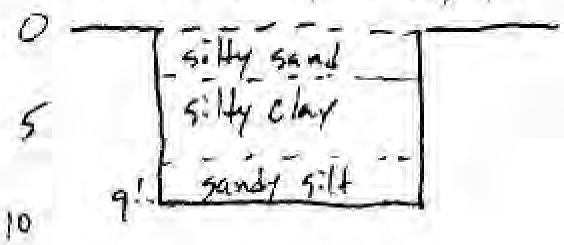
915 Start on POND3-014 but no sample b/c no supplies

920 Move to POND3-037 b/c ground is still frozen

930 POND3-TP-037 (0-0.5)
- brn silty sand

935 POND3-TP-037 (5-5.5)
- brn, silty clay, med-high plasticity

940 POND3-TP-037 (8.5-9.0)
- brn, moist, low plasticity, sandy silt



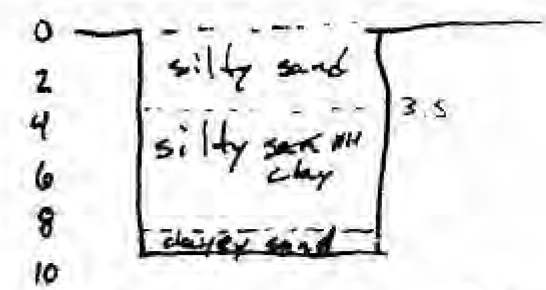
950 Move to POND3-TP-029

1000 POND3-TP-029 (6.0-6.5)
- gravely sand, brn, cobbles, low plasticity
? native

1015 POND3-TP-029 (9-9.5) clayey sand
- grey clayey chunks, oxidation - no cobbles

Location Date 12-5-06

Project / Client



1025 POND3-TP-029 (3-3.5) (Photo #14)
- fine-med grained sand, <1" cobbles
→ Micro-T readings dropped w/ increased depth

1035 Poking around POND3-030, but not sampling, dug to 3.5', silty sand, no obvious indication of pond seds

1045 Move back to POND3-TP-(014) ?

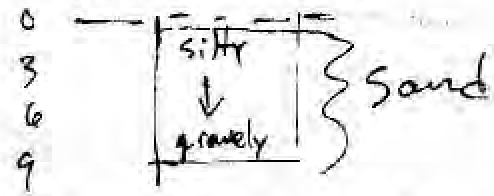
1050 POND3-TP-014 (6.5-7.0)
- brn silty sand, low plasticity
- some small cobbles

1105 POND3-TP-014 (8.5-9.0)
- gravely sand, light brn, cobbles, ss frags
- erosion channel shows gravel w/ 6" rock frags ~4' below bottom of TP-014

→ Very hard to distinguish native from pond seds

Date 12-5-06

POND3 - TP-014



- 3" topsoil hard to determine, but definitely darker, harder (?frost?),

1135 move to POND3-TP-007

1145 POND3-TP-007(5-5.5)

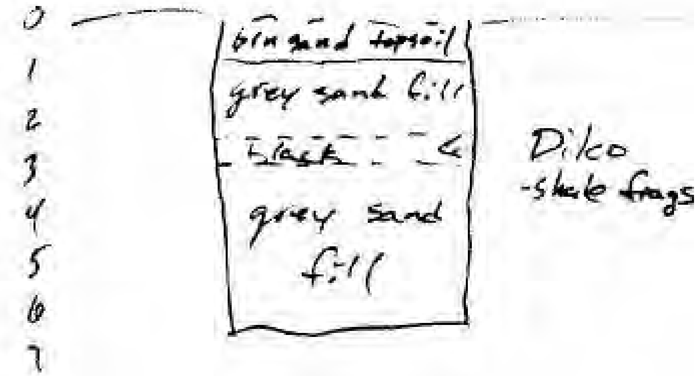
1150 POND3-TP-007(9-9.5)
- Hbrn sand

1205 Move to NEMSA 004 to sample missed intervals

1207 NEMSA-TP-004 (1-1.5)
- pre-cap grey sand fill

1215 NEMSA-TP-004(6-6.5) Photo # 26
- grey sand fill

Date 12-5-06



1335: Dump extra samples in POND1

1400: Map cliff wall @ NECR2 + SANDFILL2

1420: Map arroyo just outside sed pond

1440: NECR1 to resample 028

1440: NECR1-SS-028
- collected for Ag analysis b/c Ag was not marked on previous COC

1300 on 11/15/06 - NECR Drilling
1330 - Tailgate safety meeting
1400 - setting up @ NECR1-SB-90

Sample #1
NECR1-SB-090 (0-0.5)

$\left.\begin{array}{l} \cdot 090 \\ \cancel{X} 130 \\ \cdot 131 \\ 46 \\ 16 \end{array}\right\}$ NECR SBs

1430 - Drilling begins @ SB-90
1455 - Drilled to 15'
Collected:
NECR1-SB-90 (0.5)
(10.0)
(15.0)
1630 - Drilled to 45'. Native material at ~30' bgs

1700 - Back to office to sort samples

[signature]

1/16/04 NECR Drilling

0800 - Load at office. Do scanning + H&S meeting
0850 - Mob out to NECR-1
0900 - Setting up on 095.
Collect surface sample:
NECR1-SB-095 (0-0.5)
0915 - Drilling starts

0945 - Hit bedrock @ 15'
Collected 4 samples
0.5
5.0
10.0
15.0
1000 - Moved over to SB-131
1010 - Drilling starts
1045 - In SB-131 we encountered black, petroleum smelling soil from ~17-19' bgs
1100 - Finished drilling
1230 - Drums becoming again
Break for lunch

1350 - Set up on NECRI-SB-046
1454 Finished drilling to 30'
Samples
0' 20'
5' 25'
10' 30'
15'
Native ground @ ~24'

1510 - Moved over to NECRI-SB-~~061~~ 016
1515 - Drilling begins
1600 - Drilled to 20'. Samples @ 0, 5, 10 + 20'.
1605 - Moved over to S/3c-SB-01
1700 - Drilled to 25'. EOH.
1730 - Back to office, packed Samples

R [signature]

11-17-06
0800 - Arrived at office. Packed TPH/VOC sample from NECRI-SB-151 (20)
0830 - Attend tailgate safety meeting.
0900 - Moved w/drillers to Pond 1/2 SB-02
0907 - Drilling begins.
1000 - TD @ 22' in bedrock
Samples @ 0, 5, 10, 15 + 20'

1030 - Moved over to 1/2-SB-01
1035 - Drilling begins
1115 - Drilled to 20', hit bedrock @ ~15.5'. Samples at 0, 5, 10 + 15'.
1300 - Today leaving site. HydroGeophys will finish on their own.

RS [signature]

- Arrived @ NECR offices
met w/ Chris Baldygary
HydroGeophysics. Checked
in w/Rick @ UNC jgatkey
- Drove to NECR w/chris
- Field checked each of
the areas to be surveyed
- Setting up EM/MAG
equipment adjacent to
NEMSA.
- Set-up mag base station
- Survey of NEMSA begins.
- Completed Survey of
NEMSA + Boneyard.
Completed breakdown.
Done for day

2/18/07 - Day 2 of Geophys Surv

0800 - Still in town, waiting
for HydroGeophys HG is
trouble-shooting some
software problems
1000 - Now @ mine office
waiting for HG's arrival
1045 - HydroGeophysics arrives
1100 - Arrived @ NECR +
setting up equipment.
1210 - Set-up complete. Commence
Survey of Magazine Area.

FIELD CHANGE REQUEST FORMS

FIELD CHANGE REQUEST FORM
UNC Northeast Churchrock Mine Removal Site Evaluation

Task Name: Arroyo Characterization

Requested By: Leah Wolf Martin –MWH

FCR No: FCR#001

Date: 11/16/06

Task or activity description:
The sediments in the unamed arroyo will be evaluated by collection of sediments in the top one foot of ground. Ten transects will be evenly spaced between the the former NPDES discharge point and the confluence with the next unnamed arroyo. Along each transect, three grab samples from 0 to 1 foot bgs will be collected for laboratory analysis of Ra-226 and metals. The three samples will be evenly spaced across the bottom of the arroyo. A scanning gamma radiation survey will also be performed longitudanally along the axis of the channel.

Affected Plan or Procedures:
Final Removal Site Evaluation Work Plan (MWH, August 2006) Section 3.7.2 and Section 5.1.2

Requested Variation:
The sediments in the unnamed arroyo will be evaluated by collection of sediments in the top three feet of ground. Ten transects will be evenly spaced between the the former NPDES discharge point and the confluence with the next unnamed arroyo. Along each transect, one grab samples from the middle of the channel from 0 to 1 foot bgs, 1 to 2 feet bgs, and 2 to 3 feet bgs will be collected for laboratory analysis of Ra-226 and metals. The samples will be collected with a hand auger. A scanning gamma radiation survey will also be performed longitudinally along each bank of the channel.

Justification:
The results of the correlation samples collected in the unnamed arroyo on August 17th 2006 and summarized in the Background and Correlation Technical Memorandum (MWH, October 2006) show that the surface soil sediments are above the field screening level of 2.2 pCi/g. The range of Ra-226 concentrations along the length of the arroyo from NECR-1 north to the confluence with the next unnamed arroyo ranged from 9.7 to 27.6 pCi/g. Additional surface soil samples and a centerline scan will provide redundant information. A more useful data collection strategy would include samples with depth and a scan of the bank of each channel to determine the vertical and lateral distribution of potential contamination.

Comments:

Approved by: ______________________________ **Date:** ____________
MWH Project Manager

Authorized by: ______________________________ **Date:** ____________
UNC Project Manager

Approval/Concurrence: ______________________________ **Date:** ____________
EPA Project Manager

FIELD CHANGE REQUEST FORM
UNC Northeast Churchrock Mine Removal Site Evaluation

Task Name: Judgmental Scan of Boneyard and NEMSA **Requested By:** Leah Wolf Martin –MWH	**FCR No:** FCR#002 **Date:** 11/16/06

Task or activity description:
A scan will be performed over a maximum of 20 percent of the Boneyard and NEMSA.

Affected Plan or Procedures:
Final Removal Site Evaluation Work Plan (MWH, August 2006) Section 3.7.4

Requested Variation:
Do not perform a radiological scanning at the Boneyard and NEMSA.

Justification:
The Boneyard and NEMSA were reclaimed in 1994 with approximately one foot of toposiol/cover material. Material beneath the cover in the Boneyard and NEMSA are emitting gamma radiation that is not completely shielded by the one foot over cover material. Therefore, the 2"x2" NaI detector measurement is above the field screening level of 4,600 cpm (2.2 pCi/g) throughout the the Boneyard and NEMSA. The judgemental surface and subsurface soil samples will confirm that the topsoil/cover material is below the field screening level and the subsurface locations will provide information as to the depth of buried materials in these survey areas.

Comments:

Approved by: ______________________________ **Date:** ______________
MWH Project Manager

Authorized by: ______________________________ **Date:** ______________
UNC Project Manager

Approval/Concurrence: ______________________________ **Date:** ______________
EPA Project Manager

FIELD CHANGE REQUEST FORM
UNC Northeast Churchrock Mine Removal Site Evaluation

Task Name: NECR-1 Step Out Areas **Requested By:** Leah Wolf Martin –MWH	**FCR No:** FCR#003 **Date:** 11/16/06

Task or activity description:
Static surveys will be performed at specified grid nodes within survey areas or other locations, such as correlation sampling points as needed in the field. The grid nodes were determined using VSP on a 80-foot triangular grid cast on a random origin. The 80-foot triangular grid will be extended beyond the initial survey area boundary to assist with the boundary delineation evaluation.

Affected Plan or Procedures:
Final Removal Site Evaluation Work Plan (MWH, August 2006) Section 5.3.3.2

Requested Variation:
Collect soil samples at step-out locations in NECR-1 near the field screening level to confirm that those locations are elevated over screening level due to shine from pile. A total of 13 surface soil samples will be collected from the areas north east of NECR-1 in the NECR-1 step-out areas. Some of the samples will be biased at the low end, the rest will provide a range in the step-out area. In addition soil samples will be collected at equally spaced transects along the drainage running from east side to fenceline/water pond road.

Justification:
Static gamma measurements due to step-outs for NECR-1 show readings above the action level that require additional characterization.

Comments:

Approved by: ____ **Date:** ______________________
MWH Project Manager

Authorized by: ____ **Date:** ______________________
UNC Project Manager

Approval/Concurrence: ____________________________________ **Date:** ______________________
EPA Project Manager

FIELD CHANGE REQUEST FORM
UNC Northeast Churchrock Mine Removal Site Evaluation

Task Name: Additional Survey Areas **Requested By:** Leah Wolf Martin –MWH	**FCR No:** FCR#004 **Date:** 11/27/06

Task or activity description:
Vent Hole 8 and the former Trailer Park area will be added as site screening survey areas. Radiological scans will be performed at each of these areas using the same scanning methods as the home sites. Areas elevated above the field screening level will be marked with flagging and the points/areas will be located by GPS.

Affected Plan or Procedures:
Final Removal Site Evaluation Work Plan (MWH, August 2006) Section 3.7.4 and 5.3.3.2

Requested Variation:
These two survey areas were not identified in the Final Removal Site Evaluation Work Plan (MWH, August 2006).

Justification:
During site walks conducted by the EPA during the week of August 15, 2006 and November 13, 2006 areas in the Trailer Park and Vent Hole 8 areas reported elevated measurements using a Ludlum micro-r-meter. The EPA guided MWH and AVM to the elevated areas in each of the two survey areas. A judgmental scan was selected to characterize each of these areas.

Comments:

Approved by: ______________________________ **Date:** ____________________
MWH Project Manager

Authorized by: ______________________________ **Date:** ____________________
UNC Project Manager

Approval/Concurrence: ______________________________ **Date:** ____________________
EPA Project Manager

FIELD CHANGE REQUEST FORM
UNC Northeast Churchrock Mine Removal Site Evaluation

Task Name: GPR of Survey Areas **Requested By:** Leah Wolf Martin –MWH	**FCR No:** FCR#005 **Date:** 11/21/06

Task or activity description:
Use ground penetrating radar (GPR) to identify buried materials in the subsurface and to identify the vertical and lateral extent of buried materials in the Boneyard and XXX. GPR will be performed along X foot transects in each area.

Affected Plan or Procedures:
Final Removal Site Evaluation Work Plan (MWH, August 2006) Section 3.7.4

Requested Variation:
Use GPR as a field investigation tool to identify the presence of buried materials as well as define the vertical and later extent of buried materials in the Boneyard and XXX. The Final Removal Site Evaluation Work Plan (MWH, August 2006) did specify the use of GPR as an investigation tool for the Boneyard. In addition, the other areas were not identified in the Work Plan as area requiring any investigation.

Justification:

Comments:

Approved by: ______________________________ **Date:** ____________
MWH Project Manager

Authorized by: ______________________________ **Date:** ____________
UNC Project Manager

Approval/Concurrence: ______________________________ **Date:** ____________
EPA Project Manager

BORING LOGS

LOCATION COORDINATES: N: *3948695.7* **E:** *725413.9* **LOGGED BY:** *T. Leeson*

GROUND ELEVATION (FAMSL): **TOC ELEVATION (FAMSL):** *NECR* **DRILLING COMPANY:** *WDC* **DRILL RIG:**

DRILLING START DATE/TIME: *11/17/2006* **DATE/TIME FINISHED:** *11/17/2006*

DEPTH TO WATER DURING DRILLING (ft bgs): **DATE/TIME of WATER DEPTH (ft TOC):**

TOTAL DEPTH: *20.0*

ELEV. / ELEVATION (FT)	SOIL PROFILE: SOIL DESCRIPTION	SAMPLES: USCS CLASS	SAMPLES: SPLIT SPOON NO.	SAMPLES: Blow Count/6"	SAMPLES: DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	silty SAND, angular frags of sandstone, yellowish-brn	*SM*	*2*	*7/12/14*	6		
					8		
	same as above	*SM*	*3*	*10/8/20*	10		
					12		
					14		
	silty SAND, yellowish brn, ROCK at 15.5', able to drill beyond	*SM*	*4*	*50*			
					16		
					18		

Continued Next Page

Project No.: *1004896*	**Design By:** *H. Hoffman*	**Scale:** *24:1*	*NECR*
File: *NECR Borelogs*	**Drawn By:** *H. Hoffman*	**Date:** *4/7/2007*	

MONTGOMERY WATSON

UNC

LOCATION COORDINATES: N: *3948695.7*	**E:** *725413.9*	**LOGGED BY:** *T. Leeson*	
GROUND ELEVATION (FAMSL):	**TOC ELEVATION (FAMSL):** *NECR*	**DRILLING COMPANY:** *WDC*	**DRILL RIG:**
DRILLING START DATE/TIME: *11/17/2006*		**DATE/TIME FINISHED:** *11/17/2006*	
DEPTH TO WATER DURING DRILLING (ft bgs): **TOTAL DEPTH:** *20.0*		**DATE/TIME of WATER DEPTH (ft TOC):**	

ELEV. ELEVATION (FT)	SOIL PROFILE: SOIL DESCRIPTION	SAMPLES: USCS CLASS	SPLIT SPOON NO.	Blow Count/6"	DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	sandstone bedrock, TD=20.0'	*ROCK*		*50*	*20*		
					22		
					24		
					26		
					28		
					30		
					32		

Project No.: *1004896*	**Design By:** *H. Hoffman*	**Scale:** *24:1*	*NECR*
File: *NECR Borelogs*	**Drawn By:** *H. Hoffman*	**Date:** *4/7/2007*	

MONTGOMERY WATSON

UNC

LOCATION COORDINATES: N: *3948738.2* **E:** *725389.9* **LOGGED BY:** *T. Leeson*

GROUND ELEVATION (FAMSL): **TOC ELEVATION (FAMSL):** *NECR* **DRILLING COMPANY:** *WDC* **DRILL RIG:**

DRILLING START DATE/TIME: *11/17/2006* **DATE/TIME FINISHED:** *11/17/2006*

DEPTH TO WATER DURING DRILLING (ft bgs): *19.0* **DATE/TIME of WATER DEPTH (ft TOC):**

TOTAL DEPTH: *22.0*

ELEV. / ELEVATION (FT)	SOIL PROFILE: SOIL DESCRIPTION	SAMPLES: USCS CLASS	SAMPLES: SPLIT SPOON NO.	SAMPLES: Blow Count/6"	SAMPLES: DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	silty SAND, brown, low plasticity, moist, fine, wood	*SM*	*1*	*5/10/12*	6, 8		
	same as above, with wood	*SM*	*2*	*6/9/8*	10, 12, 14		
	wx SANDSTONE, yellowish brown, silty fine sand	*ROCK*	*3*	*13/28/50*	16, 18		

Continued Next Page

Project No.:	Design By:	Scale:
1004896	H. Hoffman	24:1
File:	**Drawn By:**	**Date:**
NECR Borelogs	H. Hoffman	4/7/2007

NECR

MONTGOMERY WATSON

UNC

LOCATION COORDINATES: N: 3948738.2	**E:** 725389.9	**LOGGED BY:** T. Leeson
GROUND ELEVATION (FAMSL):	**TOC ELEVATION (FAMSL):** NECR	**DRILLING COMPANY:** WDC **DRILL RIG:**
DRILLING START DATE/TIME: 11/17/2006		**DATE/TIME FINISHED:** 11/17/2006
DEPTH TO WATER DURING DRILLING (ft bgs): 19.0 **TOTAL DEPTH:** 22.0		**DATE/TIME of WATER DEPTH (ft TOC):**

ELEV. ELEVATION (FT)	SOIL PROFILE: SOIL DESCRIPTION	SAMPLES: USCS CLASS	SPLIT SPOON NO.	Blow Count/6"	DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	wx SANDSTONE, brown silty sand, drilling in bedrock	*ROCK*	*4*	*25/50*	20		
	TD=22.0'	*ROCK*			22		
					24		
					26		
					28		
					30		
					32		

Project No.: 1004896	**Design By:** H. Hoffman	**Scale:** 24:1	NECR
File: NECR Borelogs	**Drawn By:** H. Hoffman	**Date:** 4/7/2007	

MONTGOMERY WATSON

UNC

LOCATION COORDINATES: N: *3949056.6* **E:** *725570.2* **LOGGED BY:** *H. Hoffman/T. Leeson*

GROUND ELEVATION (FAMSL): **TOC ELEVATION (FAMSL):** *NECR* **DRILLING COMPANY:** *WDC* **DRILL RIG:**

DRILLING START DATE/TIME: *11/16/2006 10:10* **DATE/TIME FINISHED:** *11/16/2006 11:00*

DEPTH TO WATER DURING DRILLING (ft bgs): **DATE/TIME of WATER DEPTH (ft TOC):**

TOTAL DEPTH: *23.0*

ELEV. ELEVATION (FT)	SOIL PROFILE: SOIL DESCRIPTION	SAMPLES: USCS CLASS	SPLIT SPOON NO.	Blow Count/6"	DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	SAND, reddish grey, low plasticity, moist	*SP*	*1*	*3/2/4*	*6*		
					8		
	SAND, clayey silt, brown, mod plasticity, moist to wet	*SP*	*2*	*4/5/10*	*10*		
					12		
					14		
	clayey SILT, crumbled sandstone, brown, moist, mod to high plasticity	*CL-ML*	*3*	*16/8/6*	*16*		
					18		

Continued Next Page

Project No.: *1004896*	**Design By:** *H. Hoffman*	**Scale:** *24:1*	*NECR*
File: *NECR Borelogs*	**Drawn By:** *H. Hoffman*	**Date:** *4/7/2007*	

MONTGOMERY WATSON

UNC

LOCATION COORDINATES: N: 3949056.6	**E:** 725570.2	**LOGGED BY:** H. Hoffman/T. Leeson	
GROUND ELEVATION (FAMSL):	**TOC ELEVATION (FAMSL):** NECR	**DRILLING COMPANY:** WDC	**DRILL RIG:**
DRILLING START DATE/TIME: 11/16/2006 10:10		**DATE/TIME FINISHED:** 11/16/2006 11:00	
DEPTH TO WATER DURING DRILLING (ft bgs): **TOTAL DEPTH:** 23.0		**DATE/TIME of WATER DEPTH (ft TOC):**	

ELEV. ELEVATION (FT)	SOIL PROFILE SOIL DESCRIPTION	SAMPLES USCS CLASS	SPLIT SPOON NO.	Blow Count/6"	DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	clayey SILT, black, mod plasticity, wx mancos, sampled mancos separate, petroleum smell	*CL-ML*	*4*	*22/25/26*	20		
	SILT, black to brown, med plasticity, moist, mancos at top of sample, petroleum smell, bedrock at 22', TD=23.0'	*ML*	*5*	*50/48/R*	22		
					24		
					26		
					28		
					30		
					32		

Project No.: 1004896	**Design By:** H. Hoffman	**Scale:** 24:1	NECR
File: NECR Borelogs	**Drawn By:** H. Hoffman	**Date:** 4/7/2007	UNC
MONTGOMERY WATSON			

LOCATION COORDINATES: N: 3949015.1	**E:** 725434.4	**LOGGED BY:** T. Leeson	
GROUND ELEVATION (FAMSL):	**TOC ELEVATION (FAMSL):** NECR	**DRILLING COMPANY:** WDC	**DRILL RIG:**
DRILLING START DATE/TIME: 11/15/06 14:30		**DATE/TIME FINISHED:** 11/15/06 16:30	
DEPTH TO WATER DURING DRILLING (ft bgs): **TOTAL DEPTH:** 45.0		**DATE/TIME of WATER DEPTH (ft TOC):**	

ELEV.	**SOIL PROFILE**	**SAMPLES**					
ELEVATION (FT)	SOIL DESCRIPTION	USCS CLASS	SPLIT SPOON NO.	Blow Count/6"	DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	gravely SAND, brown, moist, some pieces of rock, minor silt	SP	1	11/13/17	6		
					8		
	silty SAND, fine grained, moist, yellowish brown	SM	2	15/14/19	10		
					12		
					14		
	silty SAND, grey, fine graineds, moist, well sorted	SM	3	9/12/12	16		
					18		

Continued Next Page

Project No.: 1004896	**Design By:** H. Hoffman	**Scale:** 24:1	NECR
File: NECR Borelogs	**Drawn By:** H. Hoffman	**Date:** 4/7/2007	

MONTGOMERY WATSON

UNC

LOCATION COORDINATES: N: *3949015.1* E: *725434.4*	LOGGED BY: *T. Leeson*
GROUND ELEVATION (FAMSL): TOC ELEVATION (FAMSL): *NECR*	DRILLING COMPANY: *WDC* DRILL RIG:
DRILLING START DATE/TIME: *11/15/06 14:30*	DATE/TIME FINISHED: *11/15/06 16:30*
DEPTH TO WATER DURING DRILLING (ft bgs): TOTAL DEPTH: *45.0*	DATE/TIME of WATER DEPTH (ft TOC):

ELEV. ELEVATION (FT)	SOIL PROFILE: SOIL DESCRIPTION	SAMPLES: USCS CLASS	SPLIT SPOON NO.	Blow Count/6"	DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	same as above, with some angular pieces of red brick	*SM*	*4*	*5/8/24*	*20*		
					22		
					24		
	same as above	*SM*	*5*	*4/6/8*	*26*		
					28		
	silty SAND, yellowish brown, v fine grained, moist, piece of wire	*SM*	*6*	*4/9/8*	*30*		
					32		

Continued Next Page

Project No.: *1004896*	Design By: *H. Hoffman*	Scale: *24:1*	*NECR*
File: *NECR Borelogs*	Drawn By: *H. Hoffman*	Date: *4/7/2007*	

MONTGOMERY WATSON

UNC

LOCATION COORDINATES: N: *3949015.1*	**E:** *725434.4*	**LOGGED BY:** *T. Leeson*	
GROUND ELEVATION (FAMSL):	**TOC ELEVATION (FAMSL):** *NECR*	**DRILLING COMPANY:** *WDC*	**DRILL RIG:**
DRILLING START DATE/TIME: *11/15/06 14:30*		**DATE/TIME FINISHED:** *11/15/06 16:30*	
DEPTH TO WATER DURING DRILLING (ft bgs): **TOTAL DEPTH:** *45.0*		**DATE/TIME of WATER DEPTH (ft TOC):**	

ELEV.	SOIL PROFILE	SAMPLES					
ELEVATION (FT)	SOIL DESCRIPTION	USCS CLASS	SPLIT SPOON NO.	Blow Count/6"	DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
					34		
	same as above	*SM*	*7*	*4/5/8*	36		
					38		
	same as above	*SM*	*8*	*4/5/8*	40		
					42		
					44		
	same as above, increasing clay TD=45.0'	*SM*	*9*	*3/3/6*	46		

Project No.: *1004896*	**Design By:** *H. Hoffman*	**Scale:** *24:1*
File: *NECR Borelogs*	**Drawn By:** *H. Hoffman*	**Date:** *4/7/2007*

NECR

LOCATION COORDINATES: N: *3948933.0* **E:** *725424.0* **LOGGED BY:** *H. Hoffman*

GROUND ELEVATION (FAMSL): **TOC ELEVATION (FAMSL):** *NECR* **DRILLING COMPANY:** *WDC* **DRILL RIG:**

DRILLING START DATE/TIME: *11/16/2006 13:50* **DATE/TIME FINISHED:** *11/16/2006 14:50*

DEPTH TO WATER DURING DRILLING (ft bgs): **DATE/TIME of WATER DEPTH (ft TOC):**

TOTAL DEPTH: *30.0*

ELEV. ELEVATION (FT)	SOIL PROFILE: SOIL DESCRIPTION	SAMPLES: USCS CLASS	SAMPLES: SPLIT SPOON NO.	SAMPLES: Blow Count/6"	DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	SAND, grey-lt brn, low plasticity, moist	*SW*	*1*	*3/3/4*	6		
					8		
	SAND, grey-lt brn, low plasticity, moist	*SW*	*2*	*8/10/6*	10		
					12		
					14		
	clayey SILT, with some sand, dk brn, mod plasticity, moist	*SC-SM*	*3*	*4/5/7*	16		
					18		

Continued Next Page

Project No.: *1004896*	**Design By:** *H. Hoffman*	**Scale:** *24:1*	*NECR*
File: *NECR Borelogs*	**Drawn By:** *H. Hoffman*	**Date:** *4/7/2007*	

MONTGOMERY WATSON

UNC

LOCATION COORDINATES: N: *3948933.0* **E:** *725424.0*	**LOGGED BY:** *H. Hoffman*
GROUND ELEVATION (FAMSL): **TOC ELEVATION (FAMSL):** *NECR*	**DRILLING COMPANY:** *WDC* **DRILL RIG:**
DRILLING START DATE/TIME: *11/16/2006 13:50*	**DATE/TIME FINISHED:** *11/16/2006 14:50*
DEPTH TO WATER DURING DRILLING (ft bgs): **TOTAL DEPTH:** *30.0*	**DATE/TIME of WATER DEPTH (ft TOC):**

ELEV.	SOIL PROFILE	SAMPLES					
ELEVATION (FT)	SOIL DESCRIPTION	USCS CLASS	SPLIT SPOON NO.	Blow Count/6"	DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	SILT, brn, mod-low plasticity, moist, native at 24'	*ML*	*4*	*6/11/12*	20		
					22		
					24		
					26		
					28		
	SILT, brn, mod plasticity, moist, native, TD=30.0'	*ML*	*5*	*4/11/11*	30		
					32		

Project No.: 1004896	**Design By:** H. Hoffman	**Scale:** 24:1	*NECR*
File: NECR Borelogs	**Drawn By:** H. Hoffman	**Date:** 4/7/2007	

MONTGOMERY WATSON

UNC

LOCATION COORDINATES: N: *3949017.9* **E:** *725546.1* **LOGGED BY:** *T. Leeson*

GROUND ELEVATION (FAMSL): **TOC ELEVATION (FAMSL):** *NECR* **DRILLING COMPANY:** *WDC* **DRILL RIG:**

DRILLING START DATE/TIME: *11/16/2006 9:15* **DATE/TIME FINISHED:** *11/16/2006 9:45*

DEPTH TO WATER DURING DRILLING (ft bgs): **DATE/TIME of WATER DEPTH (ft TOC):**

TOTAL DEPTH: *15.0*

ELEV. ELEVATION (FT)	SOIL PROFILE SOIL DESCRIPTION	SAMPLES USCS CLASS	SPLIT SPOON NO.	Blow Count/6"	DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	poorly graded SAND, greyish brn, moist, low plasticity	*SP*	*1*	*5/6/5*	6		
					8		
	sandy SILT, brn, moist, mod plasticity	*SM*	*2*	*3/7/13*	10		
					12		
					14		
	clayey SILT, lt brn, moist, mod-high plasticity, bedrock at 15', TD=15.0'	*ML*	*3*	*13/R/R*			
					16		
					18		

Project No.:	Design By:	Scale:
1004896	H. Hoffman	24:1
File:	**Drawn By:**	**Date:**
NECR Borelogs	H. Hoffman	4/7/2007

MONTGOMERY WATSON

NECR

UNC

LOCATION COORDINATES: N: 3948850.4	**E:** 725323.6	**LOGGED BY:** H. Hoffman	
GROUND ELEVATION (FAMSL):	**TOC ELEVATION (FAMSL):** NECR	**DRILLING COMPANY:** WDC	**DRILL RIG:**
DRILLING START DATE/TIME: 11/16/2006		**DATE/TIME FINISHED:** 11/16/2006	
DEPTH TO WATER DURING DRILLING (ft bgs): **TOTAL DEPTH:** 25.0		**DATE/TIME of WATER DEPTH (ft TOC):**	

ELEV. ELEVATION (FT)	SOIL PROFILE: SOIL DESCRIPTION	SAMPLES: USCS CLASS	SAMPLES: SPLIT SPOON NO.	SAMPLES: Blow Count/6"	SAMPLES: DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	silty SAND, brown w/ some red streaks, moist, low plasticity	*SM*	*1*	*16/18/19*	*6*		
					8		
	silty SAND, brown, moist low plasticity	*SM*	*2*	*12/19/22*	*10*		
					12		
					14		
	same as above	*SM*	*3*	*15/17/18*	*16*		
					18		

Continued Next Page

Project No.: 1004896	**Design By:** H. Hoffman	**Scale:** 24:1	*NECR*
File: NECR Borelogs	**Drawn By:** H. Hoffman	**Date:** 4/7/2007	
MONTGOMERY WATSON			UNC

LOCATION COORDINATES: N: 3948850.4	**E:** 725323.6	**LOGGED BY:** H. Hoffman	
GROUND ELEVATION (FAMSL):	**TOC ELEVATION (FAMSL):** NECR	**DRILLING COMPANY:** WDC	**DRILL RIG:**
DRILLING START DATE/TIME: 11/16/2006		**DATE/TIME FINISHED:** 11/16/2006	
DEPTH TO WATER DURING DRILLING (ft bgs): **TOTAL DEPTH:** 25.0		**DATE/TIME of WATER DEPTH (ft TOC):**	

ELEV.	SOIL PROFILE	SAMPLES					
ELEVATION (FT)	SOIL DESCRIPTION	USCS CLASS	SPLIT SPOON NO.	Blow Count/6"	DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	same as above	SM	4	17/18/16	20		
					22		
					24		
	same as above, TD=25.0	SM	5	9/13/18	26		
					28		
					30		
					32		

Project No.: 1004896	**Design By:** H. Hoffman	**Scale:** 24:1	NECR
File: NECR Borelogs	**Drawn By:** H. Hoffman	**Date:** 4/7/2007	
MONTGOMERY WATSON			UNC

LOCATION COORDINATES: N: *3948869.8*	**E:** *725366.1*	**LOGGED BY:** *H. Hoffman*	
GROUND ELEVATION (FAMSL):	**TOC ELEVATION (FAMSL):** *NECR*	**DRILLING COMPANY:** *WDC*	**DRILL RIG:**
DRILLING START DATE/TIME: *11/16/2006 15:15*		**DATE/TIME FINISHED:** *11/16/2006 16:00*	
DEPTH TO WATER DURING DRILLING (ft bgs): **TOTAL DEPTH:** *20.0*		**DATE/TIME of WATER DEPTH (ft TOC):**	

ELEV.	SOIL PROFILE	SAMPLES					
ELEVATION (FT)	SOIL DESCRIPTION	USCS CLASS	SPLIT SPOON NO.	Blow Count/6"	DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	SAND, rock frags, lt brn to grey, moist, low plasticity	*SP*	*1*	*10/19/32*	6		
					8		
	Same as above	*SP*	*2*	*2/2/3*	10		
					12		
					14		
	same as above	*SP*	*3*	*3/4/8*	16		
					18		

Continued Next Page

Project No.: *1004896*	**Design By:** *H. Hoffman*	**Scale:** *24:1*	*NECR*
File: *NECR Borelogs*	**Drawn By:** *H. Hoffman*	**Date:** *4/7/2007*	

MONTGOMERY WATSON

UNC

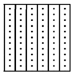
LOCATION COORDINATES: N: *3948869.8*	**E:** *725366.1*	**LOGGED BY:** *H. Hoffman*	
GROUND ELEVATION (FAMSL):	**TOC ELEVATION (FAMSL):** *NECR*	**DRILLING COMPANY:** *WDC*	**DRILL RIG:**
DRILLING START DATE/TIME: *11/16/2006 15:15*		**DATE/TIME FINISHED:** *11/16/2006 16:00*	
DEPTH TO WATER DURING DRILLING (ft bgs): **TOTAL DEPTH:** *20.0*		**DATE/TIME of WATER DEPTH (ft TOC):**	

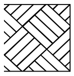
ELEV.	SOIL PROFILE	SAMPLES					
ELEVATION (FT)	SOIL DESCRIPTION	USCS CLASS	SPLIT SPOON NO.	Blow Count/6"	DEPTH (Feet)	GRAPHIC LOG	WELL SCHEMATIC
	SILT, brn, low-mod plasticity, moist, native, TD=20.0'	*ML*	*4*	*6/8/8*	*20*		
					22		
					24		
					26		
					28		
					30		
					32		

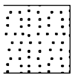
Project No.: *1004896*	**Design By:** *H. Hoffman*	**Scale:** *24:1*	*NECR*
File: *NECR Borelogs*	**Drawn By:** *H. Hoffman*	**Date:** *4/7/2007*	
MONTGOMERY WATSON			UNC

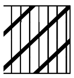
Symbol Description

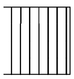
Strata symbols

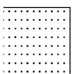
 Silty sand

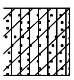
 Basalt
(or generic rock)

 Poorly graded sand

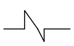
 Silty low plasticity
clay

 Silt

 Well graded sand

 Poorly graded clayey
silty sand

Misc. Symbols

 Boring continues

 Water table during
drilling

otes:

. These logs are subject to the limitations, conclusions, and recommendations in this report.

. Results of tests conducted on samples recovered are reported on the logs.

TEST PIT LOGS

TEST PIT LOG
Test Pit No.: NECR1-TP-138

PROJECT		PROJECT NO.
NECR		1004896
CLIENT: UNC		DATE: 12/02/2006 15:55
LOCATION: NECR		LOGGER: L.W. Martin
EXCAVATION METHOD: backhoe	Test Pit Width (ft):	Total Depth (ft): 4.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SP	SAND, reworked native soil
2				as above, 1" broken plastic pipe
			SP	SAND and weathered SANDSTONE
		1		as above, sample collected
4				SANSTONE, end of TP
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	NECR1-TP-138		UNC

TEST PIT LOG
Test Pit No.: NECR2-TP-015

PROJECT	PROJECT NO.
NECR	1004896
CLIENT: UNC	DATE: 11/14/2006 16:35
LOCATION: NECR	LOGGER: L.W. Martin
EXCAVATION METHOD: backhoe	Test Pit Width (ft):
	Total Depth (ft): 1.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SM	silty SAND, native soil, >6" pieces of angular competent sandstone, 20% rock, 80% sand
		1		as above, sample collected
				SANDSTONE, end of TP
2				
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	NECR2-TP-015		UNC

TEST PIT LOG
Test Pit No.: NECR2-TP-020

PROJECT		PROJECT NO.
NECR		1004896
CLIENT: UNC		DATE: 11/14/2006 16:15
LOCATION: NECR		LOGGER: L.W. Martin
EXCAVATION METHOD: backhoe	Test Pit Width (ft):	Total Depth (ft): 1.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			FILL	SAND, white-lt grey, <5% cobbles, 95% f.-med grained sand, dry, loose, no strat, no cement
			SP	SAND, brn, dry, loose, 10% angular cobbles, native soil
		1		as above, sample collected
			SP	as above, end of TP
2				
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	NECR2-TP-020		UNC

TEST PIT LOG
Test Pit No.: NECR2-TP-035

PROJECT		PROJECT NO.
NECR		1004896
CLIENT: UNC		DATE: 11/14/2006 14:55
LOCATION: NECR		LOGGER: L.W. Martin
EXCAVATION METHOD: backhoe	Test Pit Width (ft):	Total Depth (ft): 2.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SP	SAND, brn, dry, loose, 10% angular cobbles, native soil
		1		as above, sample collected
2				SANDSTONE, end of TP
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	NECR2-TP-035		UNC

TEST PIT LOG
Test Pit No.: NECR2-TP-039

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 11/14/2006 16:20
LOCATION NECR	LOGGER L.W. Martin
EXCAVATION METHOD backhoe; Test Pit Width (ft):	Total Depth (ft): 1.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SM	silty SAND, native, dry, loose, brn, no cement, no strat, 50% angular weathered sandstone, 1-4" angular fragments
		1		as above, sample collected
				SANDSTONE, competent, end of TP
2				
4				
6				
8				

Project no: *1004896*	Design By: H.	Scale: 2	NECR
	NECR2-TP-039		UNC

TEST PIT LOG
Test Pit No.: NECR2-TP-052

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 11/14/2006 na
LOCATION NECR	LOGGER L.W. Martin
EXCAVATION METHOD backhoe — Test Pit Width (ft):	Total Depth (ft): 5.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SM	silty SAND, reworked native
2		1		silty SAND, reworked native, cloth, popcan, Mancos fragments, plastic, sample collected
			SM	silty SAND, no debris, clean native
4		2		as above, sample collected
				as above, end of TP
6				
8				

Project no:	*1004896*	Design By:	H.	Scale:	2	NECR
			NECR2-TP-052			UNC

TEST PIT LOG
Test Pit No.: POND 1/2-TP-030

PROJECT		PROJECT NO.
NECR		1004896
CLIENT		DATE
UNC		12/02/2006 11:25
LOCATION		LOGGER
NECR		H. Hoffman
EXCAVATION METHOD: backhoe	Test Pit Width (ft):	Total Depth (ft): 7.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			ML	SILT, grey/brn, med plasticity, some clay and sand
2		1		SILT, grey/brn, med plasticity, some clay and sand, sample collected
4		2		SANDSTONE, native, highly weathered, sample collected
6				
7				SANDSTONE, native, highly weathered, end of TP
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	POND 1/2-TP-030		UNC

TEST PIT LOG
Test Pit No.: POND1/2-TP-035

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 12/02/2006 9:40
LOCATION NECR	LOGGER H. Hoffman
EXCAVATION METHOD backhoe / Test Pit Width (ft):	Total Depth (ft): 9.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			CL-ML	silty CLAY, grey
		1		as above, sample collected
2		2	SP	SAND, minor silt and clay, fine sand layer, sample collected
4			FILL	alternating layers of pond sediments
6				
8				
		3		as above, sample collected
				end of TP

Project no: *1004896*	Design By: H.	Scale: 2	NECR
	POND1/2-TP-035		UNC

TEST PIT LOG
Test Pit No.: POND1/2-TP-058

PROJECT	PROJECT NO.
NECR	1004896
CLIENT: UNC	DATE: 12/02/2006 10:15
LOCATION: NECR	LOGGER: H. Hoffman
EXCAVATION METHOD: backhoe; Test Pit Width (ft):	Total Depth (ft): 9.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			FILL	grey pond sediments
3.5			VS	sandy SILT, some layered clays
4.5		1		as above, sample collected
8.5		2		as above, not sure if native, sample collected
9.0			VS	end of TP

Depth scale: 0, 2, 4, 6, 8

Project no: 1004896	Design By: H.	Scale: 2	NECR
	POND1/2-TP-058		UNC

TEST PIT LOG
Test Pit No.: POND3/3A-TP-007

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 12/05/2006 11:35
LOCATION NECR	LOGGER H. Hoffman
EXCAVATION METHOD backhoe	Test Pit Width (ft):
	Total Depth (ft): 9.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SW	SAND, grey
1.5			SM	silty SAND, brown, dense
2				
				SAND, fine
4				
5		1		as above, sample collected
6				
8				
9		2		as above, sample collected
9.5			SW	end of TP

Project no: 1004896	Design By: H.	Scale: 2	NECR
	POND3/3A-TP-007		UNC

TEST PIT LOG
Test Pit No.: POND3/3A-TP-014

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 12/05/2006 10:45
LOCATION NECR	LOGGER H. Hoffman
EXCAVATION METHOD backhoe	Test Pit Width (ft):
	Total Depth (ft): 9.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SM	silty SAND
6.5		1		silty SAND, brn, low plasticity, some small cobbles
8.5		2	GP-SP	gravely SAND, light brown, cobbles, ss fragments, very hard to distinguish native from pond sediments end of TP

Depth scale: 0, 2, 4, 6, 8

Project no: 1004896	Design By: H.	Scale: 2	NECR
	POND3/3A-TP-014		UNC

TEST PIT LOG
Test Pit No.: POND3/3A-TP-029

PROJECT		PROJECT NO.
NECR		1004896
CLIENT		**DATE**
UNC		12/05/2006 9:50
LOCATION		**LOGGER**
NECR		H. Hoffman
EXCAVATION METHOD	Test Pit Width (ft):	Total Depth (ft): 9.5
backhoe		

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SM	silty SAND
3		1		silty SAND, f.-med grained sand, <1" cobbles, micro-r readings dropped with increased depth, sample colelcted
6		2	GP-SP	gravely SAND, brn, cobbles, low plasticity, ?native?, sample collected
9		3	SC	clayey SAND, grey clayey chunks, oxidation, no cobbles, sample collected
9.5			SC	end of TP

Depth scale marks: 0, 2, 4, 6, 8

Project no: 1004896	Design By: H.	Scale: 2	NECR
	POND3/3A-TP-029		UNC

TEST PIT LOG
Test Pit No.: POND3/3A-TP-037

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 12/05/2006 9:30
LOCATION NECR	LOGGER H. Hoffman
EXCAVATION METHOD backhoe / Test Pit Width (ft):	Total Depth (ft): 9.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0		1	SM	silty SAND, brown, sample collected
2.5			CH	silty CLAY, brn, med-high plasticity
5		2		as above, sample collected
8.5		3	ML	sandy SILT, brn, moist, low plasticity as above, end of TP

Depth scale: 0, 2, 4, 6, 8

Project no: 1004896	Design By: H.	Scale: 2	NECR
	POND3/3A-TP-037		UNC

TEST PIT LOG
Test Pit No.: SEDPAD-TP-006

PROJECT	PROJECT NO.
NECR	1004896
CLIENT: UNC	DATE: 11/28/2006 16:02
LOCATION: NECR	LOGGER: L.W. Martin

EXCAVATION METHOD	Test Pit Width (ft):	Total Depth (ft):
backhoe		4.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			FILL	FILL, sandy, grey, buried pipes
		1		as above, sample collected
2				
		2	ML	clayey SILT, brn, low plasticity, moist, dense
4				as above, end of TP
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SEDPAD-TP-006		UNC

TEST PIT LOG
Test Pit No.: SEDPAD-TP-012

PROJECT		PROJECT NO.
NECR		1004896
CLIENT		DATE
UNC		11/28/2006 15:42
LOCATION		LOGGER
NECR		L.W. Martin
EXCAVATION METHOD backhoe	Test Pit Width (ft):	Total Depth (ft): 2.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			FILL	sand FILL, grey, moist
		1		as above, sample collected
		2	ML	SILT, native, brown, minor clay, sample collected
2				
				SANDSTONE AND SILT, end of TP
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SEDPAD-TP-012		UNC

TEST PIT LOG
Test Pit No.: SEDPAD-TP-014

PROJECT	PROJECT NO.
NECR	1004896
CLIENT	DATE
UNC	11/28/2006 15:20
LOCATION	LOGGER
NECR	L.W. Martin

EXCAVATION METHOD		
backhoe	Test Pit Width (ft):	Total Depth (ft): 2.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SP	SAND, gray, loose
		1		as above, sample collected
		2	ML	SILT, native, brn, no cobbles, minor clay, loose, low-med plasticity, sample collected
2				as above, end of TP
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SEDPAD-TP-014		UNC

TEST PIT LOG
Test Pit No.: SEDPAD-TP-021

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 11/28/2006 9:55
LOCATION NECR	LOGGER L.W. Martin
EXCAVATION METHOD backhoe	Test Pit Width (ft):
	Total Depth (ft): 11.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			FILL	sand FILL, 80% sand, 20% fines, grey/green, loose, slightly moist
2				
4				
		1		as above, sample collected
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SEDPAD-TP-021		UNC

TEST PIT LOG
Test Pit No.: SEDPAD-TP-021

PROJECT	PROJECT NO.
NECR	1004896
CLIENT	DATE
UNC	11/28/2006 9:55
LOCATION	LOGGER
NECR	L.W. Martin

EXCAVATION METHOD	Test Pit Width (ft):	Total Depth (ft): 11.0
backhoe		

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
10		2	FILL	sand FILL, grey/green, unable to reach native soil due to limitations of backhoe
			FILL	as above, end of TP
12				
14				
16				
18				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SEDPAD-TP-021		UNC

TEST PIT LOG
Test Pit No.: SEDPAD-TP-026

PROJECT	PROJECT NO.
NECR	1004896
CLIENT: UNC	DATE: 11/28/2006 16:20
LOCATION: NECR	LOGGER: H. Hoffman
EXCAVATION METHOD: backhoe; Test Pit Width (ft):	Total Depth (ft): 3.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			ML	clayey SILT, native
		1		as above, sample collected
2				
			ML	as above, end of TP
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SEDPAD-TP-026		UNC

TEST PIT LOG
Test Pit No.: SAND1-TP-030

PROJECT		PROJECT NO.
NECR		1004896
CLIENT		DATE
UNC		12/02/2006 14:50
LOCATION		LOGGER
NECR		L.W. Martin
EXCAVATION METHOD backhoe	Test Pit Width (ft):	Total Depth (ft): 4.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			ML	sandy SILT, brn
		1	SW	SAND, grey, sample collected
2				SANDSTONE, weathered
		2		as above, sample collected
4				SANDSTONE, more competent, can't dig in, leave teethmarks from hoeend of TP
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SAND1-TP-030		UNC

TEST PIT LOG
Test Pit No.: SAND1-TP-043

PROJECT		PROJECT NO.
NECR		1004896
CLIENT: UNC		DATE: 12/02/2006 14:00
LOCATION: NECR		LOGGER: L.W. Martin
EXCAVATION METHOD: backhoe	Test Pit Width (ft):	Total Depth (ft): 1.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			FILL	sand FILL, lt brn
		1		SANDSTONE, grey and tan, crumbly, platy, bedded, weathered to sandy soil, sample collected
				end of TP
2				
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SAND1-TP-043		UNC

TEST PIT LOG
Test Pit No.: SAND1-TP-049

PROJECT		PROJECT NO.
NECR		1004896
CLIENT		DATE
UNC		12/02/2006 13:40
LOCATION		LOGGER
NECR		H. Hoffman
EXCAVATION METHOD		
backhoe	Test Pit Width (ft):	Total Depth (ft): 3.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			FILL	sand FILL
		1		as above, sample collected
2				SANDSTONE, native, weathered, fragemented
		2		as above, sample collected
4				end of TP
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SAND1-TP-049		UNC

TEST PIT LOG
Test Pit No.: SAND1-TP-063

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 12/02/2006
LOCATION NECR	LOGGER L.W. Martin
EXCAVATION METHOD backhoe	Test Pit Width (ft):
	Total Depth (ft): 2.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			FILL	sand FILL, grey, med to crs, moist
		1		as above, sample collected
				SANDSTONE, weathered, tan gray, sandy soil
		2		as above, sample collected
2				as above, end of TP
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SAND1-TP-063		UNC

TEST PIT LOG
Test Pit No.: SAND1-TP-068

PROJECT	PROJECT NO.
NECR	1004896
CLIENT: UNC	DATE: 12/02/2006 14:35
LOCATION: NECR	LOGGER: L.W. Martin
EXCAVATION METHOD: backhoe	Test Pit Width (ft):
	Total Depth (ft): 2.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			FILL	sand FILL, gry, med-crs grained
		1		as above, sample collected
				SANDSTONE, weathered, tan
		2		as above, sample collected
2				as above, end of TP
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SAND1-TP-068		UNC

TEST PIT LOG
Test Pit No.: SAND2-TP-008

PROJECT		PROJECT NO.
NECR		1004896
CLIENT		DATE
UNC		11/14/2006 16:00
LOCATION		LOGGER
NECR		L.W. Martin
EXCAVATION METHOD: backhoe	Test Pit Width (ft):	Total Depth (ft): 1.2

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SM	silty SAND mixed with SANDSTONE fragments, highly weathered, dry, loose, 1-3" angular frags
		1		as above, sample collected
				SANDSTONE, end of TP
2				
4				
6				
8				

Project no: *1004896*	Design By: H.	Scale: 2	NECR
	SAND2-TP-008		UNC

TEST PIT LOG
Test Pit No.: SAND2-TP-011

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 11/14/2006 14:00
LOCATION NECR	LOGGER L.W. Martin
EXCAVATION METHOD backhoe	Test Pit Width (ft): / Total Depth (ft): 1.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SM	silty SAND, 80% f. sand, low plasticity silt, 5% ang cobbles, dry, loose, brn
		1		as above, sample collected
				SANDSTONE, bedding, white to light grey, brittle, crumbly
				as above, end of TP
2				
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SAND2-TP-011		UNC

TEST PIT LOG
Test Pit No.: SAND2-TP-012

PROJECT NECR		PROJECT NO. 1004896
CLIENT UNC		DATE 11/14/2006 14:30
LOCATION NECR		LOGGER L.W. Martin
EXCAVATION METHOD backhoe	Test Pit Width (ft):	Total Depth (ft): 3.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SM	silty SAND, native soil, 80% f. sand, 20% silt, lt brn to brn, loose, roots, <5% ang cobbles
		1		as above, collect sample
2				
				SANDSTONE, end of TP
4				
6				
8				

Project no: *1004896*	Design By: H.	Scale: 2	NECR
	SAND2-TP-012		UNC

TEST PIT LOG
Test Pit No.: SAND2-TP-017

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 11/14/2006 14:45
LOCATION NECR	LOGGER L.W. Martin
EXCAVATION METHOD backhoe	Test Pit Width (ft):
	Total Depth (ft): 2.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SM	silty SAND, native soil, 25% angular cobbles
		1		as above, sample collected
2				SANDSTONE, end of TP
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SAND2-TP-017		UNC

TEST PIT LOG
Test Pit No.: SAND2-TP-019

PROJECT		PROJECT NO.
NECR		1004896
CLIENT		DATE
UNC		11/14/2006 15:30
LOCATION		LOGGER
NECR		L.W. Martin
EXCAVATION METHOD backhoe	Test Pit Width (ft):	Total Depth (ft): 2.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			SM	silty SAND, native, 10% lrg cobbles, 15% <6" cobbles
		1		silty SAND, native, 10% lrg cobbles, 15% <6" cobbles, sample collected
2				SANDSTONE, end of TP
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SAND2-TP-019		UNC

TEST PIT LOG
Test Pit No.: SAND3-TP-005

PROJECT		PROJECT NO.
NECR		1004896
CLIENT		DATE
UNC		11/30/2006 10:20
LOCATION		LOGGER
NECR		H. Hoffman
EXCAVATION METHOD: backhoe	Test Pit Width (ft):	Total Depth (ft): 2.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			FILL	sand FILL
		1		as above, sample collected
		2	ML	SILT, native, sample collected
2			ML	as above, end of TP
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SAND3-TP-005		UNC

TEST PIT LOG
Test Pit No.: SAND3-TP-006

PROJECT	PROJECT NO.
NECR	1004896
CLIENT: UNC	DATE: 11/30/2006 10:10
LOCATION: NECR	LOGGER: H. Hoffman
EXCAVATION METHOD: backhoe; Test Pit Width (ft):	Total Depth (ft): 1.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			ML	SILT, native
		1		as above, sample collected
				as above, end of TP
2				
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SAND3-TP-006		UNC

TEST PIT LOG
Test Pit No.: SAND3-TP-009

PROJECT		PROJECT NO.
NECR		1004896
CLIENT		DATE
UNC		11/30/2006 10:05
LOCATION		LOGGER
NECR		H. Hoffman
EXCAVATION METHOD backhoe	Test Pit Width (ft):	Total Depth (ft): 2.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			ML	SILT, native
		1		as above, sample collected
2			ML	as above, end of TP
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SAND3-TP-009		UNC

TEST PIT LOG
Test Pit No.: SAND3-TP-014

PROJECT		PROJECT NO.
NECR		1004896
CLIENT UNC		DATE 11/30/2006 9:50
LOCATION NECR		LOGGER H. Hoffman
EXCAVATION METHOD backhoe	Test Pit Width (ft):	Total Depth (ft): 2.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			FILL	sand FILL
		1		as above, sample collected
		2	ML	SILT, native, sample collected
2			ML	as above, end of TP
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SAND3-TP-014		UNC

TEST PIT LOG
Test Pit No.: SAND3-TP-025

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 11/30/2006 9:40
LOCATION NECR	LOGGER H. Hoffman
EXCAVATION METHOD backhoe	Test Pit Width (ft):
	Total Depth (ft): 1.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0			ML	SILT, native
		1		as above, sample collected
			ML	as above, end of TP
2				
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	SAND3-TP-025		UNC

TEST PIT LOG
Test Pit No.: NEMSA-TP-001

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 11/14/2006 10:50
LOCATION NECR	LOGGER L.W. Martin

EXCAVATION METHOD	Test Pit Width (ft):	Total Depth (ft): 6.0
backhoe		

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0		1	SM	silty SAND, light brown, low plasticity, dry soil cap/cover, sample collected
		2	FILL	gray coarse non economic material, sample collected
2				
4		3		as above, sample collected
		4	SW	native SAND, sample collected
6			SW	as above, end of TP
8				

Project no:	1004896	Design By:	H.	Scale:	2	NECR
		NEMSA-TP-001				UNC

TEST PIT LOG
Test Pit No.: NEMSA-TP-002

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 11/30/2006 10:40
LOCATION NECR	LOGGER H. Hoffman
EXCAVATION METHOD backhoe / Test Pit Width (ft):	Total Depth (ft): 7.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0		1	SM	soil cap/cover, sample collected
		2	FILL	gray coaarse, non economic material, sample collected
2				
4				
		3		as above, sample collected
6				
		4	SW	native SAND, minor silty clay, sample collected
			SW	as above, end of TP
8				

Project no: *1004896*	Design By: H.	Scale: 2	NECR
	NEMSA-TP-002		UNC

TEST PIT LOG
Test Pit No.: NEMSA-TP-003

PROJECT		PROJECT NO.
NECR		1004896
CLIENT		DATE
UNC		11/30/2006 11:20
LOCATION		LOGGER
NECR		H. Hoffman
EXCAVATION METHOD: backhoe	Test Pit Width (ft):	Total Depth (ft): 4.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0		1	SM	soil cap/cover, sample collected
2		2	FILL	gray coarse non economic material, sample collected
4		3	ML	native SILT as above, sample collected
			ML	as above, end of TP
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	NEMSA-TP-003		UNC

TEST PIT LOG
Test Pit No.: NEMSA-TP-004

PROJECT	PROJECT NO.
NECR	1004896
CLIENT: UNC	DATE: 12/01/2006 15:35
LOCATION: NECR	LOGGER: H. Hoffman
EXCAVATION METHOD: backhoe / Test Pit Width (ft):	Total Depth (ft): 9.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0		1	SM	soil cap/cover, sample collected
		2	FILL	gray coarse, non economic material, sample collected
2				
4				
6		3		as above, sample collected
8		4		as above, sample collected
			FILL	native soil not reached, end of TP

missed pre-cap and mid-depth samples, re-excavated on 12/05/2206

Project no: 1004896	Design By: H.	Scale: 2	NECR
	NEMSA-TP-004		UNC

TEST PIT LOG
Test Pit No.: NEMSA-TP-005

PROJECT		PROJECT NO.
NECR		1004896
CLIENT: UNC		DATE: 12/01/2006 16:00
LOCATION: NECR		LOGGER: H. Hoffman
EXCAVATION METHOD: backhoe	Test Pit Width (ft):	Total Depth (ft): 8.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0		1	SM	silty SAND, sample collected
1			FILL	sand FILL, and debris, rock bolts, cable
4		2		as above, collected sample
8		3	SW	native SAND, collected sample
8.5			SW	as above, end of TP

Project no: 1004896	Design By: H.	Scale: 2	NECR
	NEMSA-TP-005		UNC

TEST PIT LOG
Test Pit No.: YARD-TP-001

PROJECT		PROJECT NO.
NECR		1004896
CLIENT		DATE
UNC		11/30/2006 14:00
LOCATION		LOGGER
NECR		H. Hoffman
EXCAVATION METHOD backhoe	Test Pit Width (ft):	Total Depth (ft): 1.5

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0		1	SW	SAND, native, no visible cap/cover surface, sample collected
		2		as above, sample collected
2			SW	as above, end of TP
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	YARD-TP-001		UNC

TEST PIT LOG
Test Pit No.: YARD-TP-002

PROJECT		PROJECT NO.
NECR		1004896
CLIENT: UNC		DATE: 11/30/2006 14:30
LOCATION: NECR		LOGGER: H. Hoffman
EXCAVATION METHOD: backhoe	Test Pit Width (ft):	Total Depth (ft): 10.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0		1	SP	SAND, reworked native, sample collected, no visible pre cap surface
		2		as above, refusal at rock at 2 ft
2				
4				
6				
8				
		3	SW	SAND, native, excavated past rock on second attempt (12/1/2006), sample

Project no: 1004896	Design By: H.	Scale: 2	NECR
	YARD-TP-002		UNC

TEST PIT LOG
Test Pit No.: YARD-TP-002

PROJECT NECR		PROJECT NO. 1004896
CLIENT UNC		DATE 11/30/2006 14:30
LOCATION NECR		LOGGER H. Hoffman
EXCAVATION METHOD backhoe	Test Pit Width (ft):	Total Depth (ft): 10.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
10				collected
			SW	as above, end of TP
12				
14				
16				
18				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	YARD-TP-002		UNC

TEST PIT LOG
Test Pit No.: YARD-TP-003

PROJECT		PROJECT NO.
NECR		1004896
CLIENT		DATE
UNC		12/1/2006 10:00
LOCATION		LOGGER
NECR		H. Hoffman
EXCAVATION METHOD	Test Pit Width (ft):	Total Depth (ft): 1.5
backhoe		

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0		1	SW	SAND, native, sample collected
		2		as above, sample collected
2			SW	as above, end of TP
4				
6				
8				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	YARD-TP-003		UNC

TEST PIT LOG
Test Pit No.: YARD-TP-004

PROJECT NECR		PROJECT NO. 1004896
CLIENT UNC		DATE 12/1/2006 10:30
LOCATION NECR		LOGGER H. Hoffman
EXCAVATION METHOD backhoe	Test Pit Width (ft):	Total Depth (ft): 10.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0		1	SM	silty SAND, soil cap/cover, sample collected
		2	FILL	sand FILL and debris, buried cable, rubber, misc. metal, sample collected
2				
4				
		3		as above, collect sample
6				
		4		sand fill and debris, inner tube, fencing, rock bolts, misc garbage, sample collected
8				
		5	SW	native SAND, no debris, sample collected

Project no: *1004896*	Design By: H.	Scale: 2	NECR
	YARD-TP-004		UNC

TEST PIT LOG
Test Pit No.: YARD-TP-004

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 12/1/2006 10:30
LOCATION NECR	LOGGER H. Hoffman
EXCAVATION METHOD backhoe / Test Pit Width (ft):	Total Depth (ft): 10.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
10			SW	native SAND, end of TP
12				
14				
16				
18				

Project no: 1004896	Design By: H.	Scale: 2	NECR
	YARD-TP-004		UNC

TEST PIT LOG
Test Pit No.: YARD-TP-005

PROJECT NECR	PROJECT NO. 1004896
CLIENT UNC	DATE 12/1/2006 11:50
LOCATION NECR	LOGGER H. Hoffman
EXCAVATION METHOD backhoe	Test Pit Width (ft):
	Total Depth (ft): 9.0

DEPTH (FT)	GRAPHIC	Sample Number	USCS	DESCRIPTION
0		1	SM	silty SAND
2		2	FILL	sand FILL and debris, sample collected
4		3		as above, sample collected
6				
8		4	SW-SP	native SAND with gravel, sample collected
			SW-SP	as above, end of TP

Project no: *1004896*	Design By: H.	Scale: 2	NECR
	YARD-TP-005		UNC

Symbol	Description

Strata symbols

Symbol	Description
	Poorly graded sand
	Sandstone
	Silty sand
	Fill
	Silt
	Silty low plasticity clay
	Variable sand and silt mix
	Well graded sand
	Poorly graded gravel and sand
	Clayey sand
	High plasticity clay
	Interlayered well/poorly graded sand

Misc. Symbols

Symbol	Description
	Boring continues

otes:

. These logs are subject to the limitations, conclusions, and recommendations in this report.

. Results of tests conducted on samples recovered are reported on the logs.

APPENDIX D

HUMAN HEALTH EXPOSURE POINT CALCULATIONS & EPA FIELD TRIP REPORT FOR HOME SITES REMOVAL ACTION

SUMMARY OF HOME SITE REMOVAL ACTION
EPA FIELD TRIP REPORT

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Tuesday, September 11, 2007

Attn: Harry Allen, USEPA On-Scene Coordinator
Andy Bain, USEPA Remedial Project Manager

Subject: NECR Home Site Investigation Trip Report
NECR Home Sites,
Red Water Pond Road
Church Rock, McKinley County, New Mexico

Introduction

The United States Environmental Protection Agency Region 9 (EPA) Emergency Response Section (ERS), and Remedial Program Management (RPM) sections tasked the Ecology and Environment Inc. under a General Services Administration (GSA) contract to provide technical assistance with an in-depth site assessment and removal of surface soils at the North East Church Rock (NECR) home site locations. The NECR home site investigation included indoor air radon sampling, outdoor airborne particulate sampling and monitoring, and post removal confirmation soil sampling. The EPA offered the United States Coast Guard (USCG) Pacific Strike Team members for additional site support during the scheduled field activities.

The purpose of this report is provide a brief presentation of the un-validated radiation data from EPA sampling activities conducted at the NECR home sites. Confirmation soil and indoor air samples were collected in April through June 2007. The Final Status Survey (FSS) analysis of the confirmation soil sample data will be prepared in a separate report and submitted to EPA later this year.

Background

The NECR mine site is an inactive uranium mine site that operated from 1968 until 1982 with waste water treatment activities from 1979 until 1983. The mine was closed between 1986 and 1994 in accordance with Nuclear Regulatory Commission (NRC) requirements under Title II of the Uranium Mill Tailings Radiation Control Act (UMTRCA). The mine was operated by United Nuclear Corporation (UNC), the Potentially Responsible Party (PRP), who retained MWH to conduct investigations at the mine. Most of the mine is located on Navajo Indian Trust land with portions on Navajo Indian Reservation and UNC owned land.

The NRC regulated cleanup action only addresses mill tailings, thus contamination remains on the site. At the request of the Navajo Nation Environmental Protection Agency (NNEPA), the EPA became involved in November of 2005 to oversee the investigation and remediation of the site. The EPA required UNC to conduct a Removal Site Evaluation (RSE) to determine the extent of contamination and perform a risk assessment, the initial fieldwork was completed in December 2006. MWH issued the draft RSE in April 2007 and it is currently undergoing revisions. Additional mine history, mining practices, and pertinent background information is detailed in the Final Removal Site Evaluation Work Plan (MWH 2006).

During the RSE, EPA identified nine home sites for surface soil investigation. However, UNC refused to investigate one of the properties, thereby only eight home sites investigations were performed for surface soil contamination. Of those eight locations, three were found to have elevated radiation levels above the screening level of 2.24 pCi/g (picoCuries per gram) Radium-226. Based on those results, the EPA initiated further investigations and actions to mitigate potential exposures to the radioactive contamination. On April 18 and 19, 2007, E&E staff and sub-contractor Carl Palladino of The Palladino Company (TPC), conducted indoor radiation surveys of the three home sites and investigated one additional home site for surface soil contamination. The three homes did not demonstrate elevated levels of indoor gamma radiation. The soil survey conducted at the additional home site showed elevated levels of gamma radiation and five surface soil samples were collected and submitted to a laboratory for Radium 226 analysis. The analytical results for this sampling event are located in Appendix A. On May 29, 2007, EPA signed a separate Action Memorandum to address one additional property located to the east of Red Water Pond Road.

Site Location

The Northeast Church Rock Mine Residential Removal Site is located near Red Water Pond Road and Highway 566 in Church Rock, New Mexico, (Figure 1) in the Coyote Chapter of the Navajo Reservation. The site consists of several residential areas down gradient and down wind of the 125-acre Northeast Church Rock Mine Site (Figure 2). Figures 1 and 2 are located in Appendix B. Based on sampling performed by GE in November and December 2006, three residential areas demonstrated elevated levels of radium 226 in the surface soil. The contaminated areas exceeded the site clean up level of 2.24 pCi/g (approximately twice background).

Sampling Approach

In consultation with the Navajo Nation Environmental Protection Agency, EPA determined the need to take prompt action to address the residential areas, following evaluation of the RP-conducted RSE. EPA signed the NECR Residential Action Memo on April 18, 2007 and immediately initiated negotiations with the PRPs. EPA issued a Unilateral Administrative Order on May 4, 2007 ordering UNC to undertake transportation and disposal, while EPA took responsibility for the excavation and sampling components.

Beginning on May 7, 2007 for approximately 4 weeks, EPA On-Scene Coordinator Harry L. Allen, RPM Andy Bain, representatives from the United State Coast Guard (USCG) Pacific Strike Team, GSA contractors from E&E and TPC mobilized to site to begin the NECR home site investigation. Using the EPA established a soil cleanup goal of 2.24 pCi/g radium 226 for surface soil sampling, and 4.0 pCi/L for radon for the indoor air sampling, GSA contractors conducted the following activities at each home site location.

1. Conduct perimeter air sampling and monitoring during soil removal activities,
2. Conduct air sampling for radon-222 inside residential homes,
3. Delineate the extent of soil contamination to direct removal activities,
4. Conduct confirmation soil sampling for laboratory analysis,
5. Conduct final status surveys at all residential properties in accordance with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM).

Sampling and Analytical Results

Perimeter Air Monitoring and Sampling

During soil excavation operations air samplers and personal dust meters were set up around the perimeter of the property. No readings on the samplers or dust meters exceeded the site action level of 150 pCi/m^3 (pico Curies per meter cubed). Photo documentation of the air sampling and monitoring is located in Appendix C.

Indoor Air Sampling

Indoor air sampling was set up in the main section of each home and hogan within each property utilizing diffusion barrier charcoal canisters. Radon results for each home site are located below in Table 1. The EPA recommended action level for radon is 4.0 pico Curies per Liter (pCi/L). In order to protect the property owners, the properties will be identified as properties A-D and area E.

Table 1
NECR Home Site Survey Unit Data
Indoor Air Radon Results
May – June 2007

Canister Serial Number	Location/Location Code	Radon Activity Results (pCi/L)
870035	A-2	0.9
870036	A-3	**5.2***
866483	*Post Removal Re-Sample	2.6
870037	C-2	1.7
870038	B-1	2.5
870039	B-2	2.4
870041	B-4	2.6
870043	C-3	2.2
870044	A-4	**5.4***
866482	*Post Removal Re-Sample	3.1
870045	C-1	1.4
870046	B-3	2.4
870047	A-1	1.0
870048	C-4	2.5
866484	D-1	1.6

863735	D-2	1.6

Pico Curies per Liter (pCi/L)
Bolded results exceed the site action level of 4.0 pCi/L

Samples labeled with the numbers 1 or 2, indicate samples collected within the houses. Samples labeled with numbers 3 or 4, indicate the samples were collected from the hogan. During the initial indoor sampling event, the radon results were all within normal range except for canisters A-3 and A-4. This hogan was rescanned and contaminated sections of concrete and soil were removed. After the new concrete set, the hogan was re-sampled for radon. The radon results for the re-sampled hogan were within in the normal range of less than 4.0 pCi/L.

Surface Soil Screening and Confirmation Sampling

GSA contractors began pre-excavation gamma scanning to determine the lateral bounds of contamination for each parcel. Each defined area was excavated and evaluated using the MARSSIM Final Status Survey approach prior to backfilling and restoring the properties. Following MARSSIM guideline, excavated areas were 100% scanned. For additional sampling specific information, the Emergency Response (ER) Quality Assurance Sampling Plan (QASP) is located in Appendix D.

After the affected areas were delineated and excavated, the GSA contactor with assistance from the USCG, performed another 100% scan of the newly exposed soil. Areas continuing to demonstrate elevated gamma levels were re-excavated until gamma levels were below the site action level. Listed below is an example of the MARSSIM FSS calculation values used to determine the sampling locations within each sampling grid on each of the four home sites A-D and road E between the home sites B and C:

Area = 22,000 ft^2
Samples = 32 (Minimum)
Length of Triangle grid = 28 ft
Area of Triangle = 679 ft^2
DCGLw = 2.24 pCi/g
DCGLemc = 3.1 pCi/g

An Excel random number generator established the first sample point within each grid. Subsequent sampling locations were at 28 foot triangular distances. A total of nine survey units were delineated on the four home sites and the connecting road that demonstrated elevated levels of gamma radiation. The survey units were delineated as listed below.

Survey Unit and ID	**Location/Property Sampling ID**
1 – HS01	A
2 – HS02	C
3 – HS03	C
4 – HS04	B, C, and E
5 – HS05	B
6 – HS06	B
7 – HS07	B
8 – HS08	D
9 – HS09	D

A total of 371 confirmation soil sample locations were collected from four residential properties. Soils were excavated from 3 inches to 12 inches in depth, depending on the gamma concentrations from the field screening. The un-validated Radium-226 analytical results for the soil samples collected in each of the survey units, is located in Tables one through nine in Appendix A. Also available on those Tables are the sampling identification/locations and gamma screening data collected from the field survey units one through seven. Gamma survey data for survey units eight and nine are not available. Additionally, the sample maps for properties A, B and C are labeled respectively Figure 3, Figure 4 and Figure 5 are located in Appendix B. In the Tables one through nine, bolded analytical results are radium 226 levels detected above the site action level of 2.24 pCi/g.

Conclusion

EPA Region 9 (Superfund Division) Heath Physicist, Robert Terry reviewed the ER QASP and the analytical data for Radon and Radium 226. He concluded that the data sets were of good quality and nearly all the measurements are quite low. In summary, this report was a brief presentation of the data collected during EPA field activities in April through June 2007. Later this year, an FSS analysis report will be written to evaluate the confirmation soil sample data based on MARSSIM requirements.

Sincerely,

Robin Clemens
GSA Contractor
Ecology and Environment, Inc.
Project Manager

Appendix A – NECR Home Site Data
Appendix B – NECR Home Site Maps and Figures
Appendix C – Photo Documentation
Appendix D– NECR ER Home Site QASP

APPENDIX A

NECR HOME SITE DATA

Table 1
NECR Home Site Survey Unit 1 Data
Field Screening Results and
Confirmation Soil Sampling Radium 226 Results

				Field Screening Results		Confirmation Soil Analytical Results	
Collection Date	**Matrix**	**Sample ID**	**Sample Location ID**	**Gamma (x 10^3)**	**Units**	**Radium 226**	**Units**
05-15-2007	SOIL	HS01-01	A1-1	13.1	C/M	0.505	pCi/g
05-15-2007	SOIL	HS01-02	A1-2	13.3	C/M	1.30	pCi/g
05-15-2007	SOIL	HS01-03	A1-3	13.1	C/M	0.759	pCi/g
05-15-2007	SOIL	HS01-04	A1-4	12.9	C/M	0.610	pCi/g
05-15-2007	SOIL	HS01-05	A1-5	13.6	C/M	0.723	pCi/g
05-15-2007	SOIL	HS01-06	A1-6	13.5	C/M	0.602	pCi/g
05-15-2007	SOIL	HS01-07	A1-7	13.0	C/M	0.842	pCi/g
05-15-2007	SOIL	HS01-08	A1-8	13.7	C/M	0.932	pCi/g
05-15-2007	SOIL	HS01-09	A1-9	13.2	C/M	0.764	pCi/g
05-15-2007	SOIL	HS01-10	A1-10	12.7	C/M	0.462	pCi/g
05-15-2007	SOIL	HS01-11	A1-11	13.1	C/M	0.642	pCi/g
05-15-2007	SOIL	HS01-12	A1-12	13.4	C/M	0.707	pCi/g
05-15-2007	SOIL	HS01-13	A1-13	12.7	C/M	0.715	pCi/g
05-15-2007	SOIL	HS01-14	A1-14	12.7	C/M	0.653	pCi/g
05-15-2007	SOIL	HS01-15	A1-15	13.4	C/M	0.635	pCi/g
05-15-2007	SOIL	HS01-16	A1-16	12.8	C/M	0.630	pCi/g
05-15-2007	SOIL	HS01-17	A1-17	12.7	C/M	0.701	pCi/g
05-15-2007	SOIL	HS01-18	A1-18	12.9	C/M	0.733	pCi/g
05-15-2007	SOIL	HS01-19	A1-19	13.6	C/M	1.48	pCi/g
05-15-2007	SOIL	HS01-20	A1-20	13.5	C/M	0.871	pCi/g
05-15-2007	SOIL	HS01-21	A1-21	13.3	C/M	0.601	pCi/g
05-15-2007	SOIL	HS01-22	A1-22	13.4	C/M	0.580	pCi/g
05-15-2007	SOIL	HS01-23	A1-23	13.6	C/M	1.01	pCi/g
05-15-2007	SOIL	HS01-24	A1-24	13.9	C/M	0.878	pCi/g
05-15-2007	SOIL	HS01-25	A1-25	13.6	C/M	0.878	pCi/g
05-15-2007	SOIL	HS01-26	A1-26	13.3	C/M	0.756	pCi/g
05-15-2007	SOIL	HS01-27	A1-27	15.5	C/M	1.18	pCi/g
05-15-2007	SOIL	HS01-28	A1-28	15.4	C/M	0.977	pCi/g
05-15-2007	SOIL	HS01-29	A1-29	20.7	C/M	**3.46**	pCi/g
05-15-2007	SOIL	HS01-30	A1-30	13.4	C/M	1.05	pCi/g
05-15-2007	SOIL	HS01-31	A1-31	14.0	C/M	1.06	pCi/g
05-15-2007	SOIL	HS01-32	A1-32	14.4	C/M	0.967	pCi/g
05-15-2007	SOIL	HS01-33	A1-33	14.0	C/M	1.19	pCi/g
05-15-2007	SOIL	HS01-34	A1-34	14.0	C/M	1.10	pCi/g
05-15-2007	SOIL	HS01-35	A1-11-Dup	13.1	C/M	0.853	pCi/g
05-15-2007	SOIL	HS01-36	A1-18Dup	12.9	C/M	0.772	pCi/g
05-15-2007	SOIL	HS01-37	A1-33Dup	14.0	C/M	1.20	pCi/g

-Bolded results are levels about the site action level of 2.24 pCi/g (pico Curies per Gram).
-C/M is Counts per Minute.

Table 2
NECR Home Site Survey Unit 2 Data
Field Screening Results and
Confirmation Soil Sampling Radium 226 Results

				Field Screening Results		Confirmation Soil Analytical Results	
Collection Date	**Matrix**	**Sample ID**	**Sample Location ID**	**Gamma (x 10^3)**	**Units**	**Radium 226**	**Units**
05-19-2007	SOIL	HS02-01	C2-2	14.2	C/M	0.738	pCi/g
05-19-2007	SOIL	HS02-02	C2-6	13.0	C/M	0.709	pCi/g
05-19-2007	SOIL	HS02-03	C2-7	13.6	C/M	0.776	pCi/g
05-19-2007	SOIL	HS02-04	C2-11	14.2	C/M	0.836	pCi/g
05-19-2007	SOIL	HS02-05	C2-12	13.4	C/M	0.817	pCi/g
05-19-2007	SOIL	HS02-06	C2-13	13.8	C/M	0.760	pCi/g
05-19-2007	SOIL	HS02-07	C2-18	14.0	C/M	0.812	pCi/g
05-19-2007	SOIL	HS02-08	C2-19	13.9	C/M	0.840	pCi/g
05-19-2007	SOIL	HS02-09	C2-20	13.2	C/M	0.692	pCi/g
05-19-2007	SOIL	HS02-10	C2-26	13.8	C/M	0.802	pCi/g
05-19-2007	SOIL	HS02-11	C2-27	13.7	C/M	0.773	pCi/g
05-19-2007	SOIL	HS02-12	C2-28	12.7	C/M	0.743	pCi/g
05-19-2007	SOIL	HS02-13	C2-29	12.9	C/M	0.729	pCi/g
05-19-2007	SOIL	HS02-14	C2-34	14.2	C/M	1.02	pCi/g
05-19-2007	SOIL	HS02-15	C2-35	13.6	C/M	0.755	pCi/g
05-19-2007	SOIL	HS02-16	C2-36	12.3	C/M	0.723	pCi/g
05-19-2007	SOIL	HS02-17	C2-42	13.6	C/M	1.04	pCi/g
05-19-2007	SOIL	HS02-18	C2-43	13.4	C/M	0.968	pCi/g
05-19-2007	SOIL	HS02-19	C2-44	13.3	C/M	0.744	pCi/g
05-19-2007	SOIL	HS02-20	C2-45	13.4	C/M	0.961	pCi/g
05-19-2007	SOIL	HS02-21	C2-50	14.1	C/M	0.934	pCi/g
05-19-2007	SOIL	HS02-22	C2-51	12.8	C/M	0.840	pCi/g
05-19-2007	SOIL	HS02-23	C2-52	14.3	C/M	0.731	pCi/g
05-19-2007	SOIL	HS02-24	C2-56	13.8	C/M	0.836	pCi/g
05-19-2007	SOIL	HS02-25	C2-57	13.4	C/M	0.783	pCi/g
05-19-2007	SOIL	HS02-26	C2-58	12.1	C/M	0.822	pCi/g
05-19-2007	SOIL	HS02-27	C2-59	12.0	C/M	0.810	pCi/g
05-19-2007	SOIL	HS02-28	C2-65	13.8	C/M	0.789	pCi/g
05-19-2007	SOIL	HS02-29	C2-66	12.9	C/M	0.791	pCi/g
05-19-2007	SOIL	HS02-30	C2-67	12.9	C/M	0.870	pCi/g
05-19-2007	SOIL	HS02-31	C2-73	14.3	C/M	0.887	pCi/g
05-19-2007	SOIL	HS02-32	C2-74	14.3	C/M	0.951	pCi/g
05-19-2007	SOIL	HS02-33	C2-75	13.6	C/M	0.877	pCi/g
05-19-2007	SOIL	HS02-34	C2-81	13.5	C/M	0.796	pCi/g
05-19-2007	SOIL	HS02-35	C2-82	13.8	C/M	0.893	pCi/g
05-19-2007	SOIL	HS02-36	C2-83	14.5	C/M	0.771	pCi/g
05-19-2007	SOIL	HS02-37	C2-86	14.6	C/M	0.878	pCi/g
05-19-2007	SOIL	HS02-38	C2-87	14.5	C/M	0.836	pCi/g
05-19-2007	SOIL	HS02-39	C2-88	15.0	C/M	0.975	pCi/g
05-19-2007	SOIL	HS02-41	Dup of C2-57	13.4	C/M	0.841	pCi/g
05-19-2007	SOIL	HS02-42	Dup of C2-66	12.9	C/M	0.816	pCi/g
05-19-2007	SOIL	HS02-43	Dup of C2-81	13.5	C/M	0.894	pCi/g
05-19-2007	SOIL	HS02-44	Dup of C2-67	12.9	C/M	0.839	pCi/g

-Bolded results are levels about the site action level of 2.24 pCi/g (pico Curies per Gram).
-C/M is Counts per Minute.

Table 3
NECR Home Site Survey Unit 3 Data
Field Screening Results and
Confirmation Soil Sampling Radium 226 Results

				Field Screening Results		Confirmation Soil Analytical Results	
Collection Date	**Matrix**	**Sample ID**	**Sample Location ID**	**Gamma (x 10^3)**	**Units**	**Radium 226**	**Units**
05-19-2007	SOIL	HS03-01	C3-3	13.2	C/M	0.662	pCi/g
05-19-2007	SOIL	HS03-02	C3-4	13.2	C/M	0.623	pCi/g
05-19-2007	SOIL	HS03-03	C3-8	13.6	C/M	0.644	pCi/g
05-19-2007	SOIL	HS03-04	C3-9	13.9	C/M	0.646	pCi/g
05-19-2007	SOIL	HS03-05	C3-14	13.6	C/M	0.631	pCi/g
05-19-2007	SOIL	HS03-06	C3-15	14.1	C/M	0.750	pCi/g
05-19-2007	SOIL	HS03-07	C3-21	13.2	C/M	0.699	pCi/g
05-19-2007	SOIL	HS03-08	C3-22	13.3	C/M	0.775	pCi/g
05-19-2007	SOIL	HS03-09	C3-30	13.3	C/M	0.685	pCi/g
05-19-2007	SOIL	HS03-10	C3-31	14.1	C/M	0.967	pCi/g
05-19-2007	SOIL	HS03-11	C3-37	13.0	C/M	0.672	pCi/g
05-19-2007	SOIL	HS03-12	C3-38	14.9	C/M	1.81	pCi/g
05-19-2007	SOIL	HS03-13	C3-39	13.4	C/M	0.692	pCi/g
05-19-2007	SOIL	HS03-14	C3-40	14.8	C/M	0.917	pCi/g
05-19-2007	SOIL	HS03-15	C3-41	13.1	C/M	0.871	pCi/g
05-19-2007	SOIL	HS03-16	C3-46	13.5	C/M	0.757	pCi/g
05-19-2007	SOIL	HS03-17	C3-47	13.5	C/M	0.787	pCi/g
05-19-2007	SOIL	HS03-18	C3-48	14.3	C/M	0.929	pCi/g
05-19-2007	SOIL	HS03-19	C3-49	14.1	C/M	0.904	pCi/g
05-19-2007	SOIL	HS03-20	C3-53	13.4	C/M	0.834	pCi/g
05-19-2007	SOIL	HS03-21	C3-54	14.0	C/M	0.540	pCi/g
05-19-2007	SOIL	HS03-22	C3-55	14.1	C/M	0.942	pCi/g
05-19-2007	SOIL	HS03-23	C3-60	13.8	C/M	0.959	pCi/g
05-19-2007	SOIL	HS03-24	C3-61	13.2	C/M	0.598	pCi/g
05-19-2007	SOIL	HS03-25	C3-63	14.7	C/M	1.63	pCi/g
05-19-2007	SOIL	HS03-26	C3-64	14.7	C/M	0.844	pCi/g
05-19-2007	SOIL	HS03-27	C3-68	12.8	C/M	0.622	pCi/g
05-19-2007	SOIL	HS03-28	C3-69	14.8	C/M	0.638	pCi/g
05-19-2007	SOIL	HS03-29	C3-70	14.2	C/M	0.823	pCi/g
05-19-2007	SOIL	HS03-30	C3-71	13.6	C/M	0.720	pCi/g
05-19-2007	SOIL	HS03-31	C3-72	14.0	C/M	0.826	pCi/g
05-19-2007	SOIL	HS03-32	C3-76	13.6	C/M	0.610	pCi/g
05-19-2007	SOIL	HS03-33	C3-77	14.2	C/M	0.799	pCi/g
05-19-2007	SOIL	HS03-34	C3-78	13.4	C/M	0.648	pCi/g
05-19-2007	SOIL	HS03-35	C3-79	14.1	C/M	0.795	pCi/g
05-19-2007	SOIL	HS03-36	C3-80	14.3	C/M	0.835	pCi/g
05-19-2007	SOIL	HS03-37	C3-84	14.5	C/M	0.624	pCi/g
05-19-2007	SOIL	HS03-38	C3-85	13.5	C/M	0.654	pCi/g
05-19-2007	SOIL	HS03-39	C3-89	13.4	C/M	0.791	pCi/g
05-19-2007	SOIL	HS03-40	C3-90	12.3	C/M	0.567	pCi/g
05-19-2007	SOIL	HS03-41	Dup of C3-64	14.7	C/M	0.995	pCi/g
05-19-2007	SOIL	HS03-42	Dup of C3-68	12.8	C/M	0.472	pCi/g
05-19-2007	SOIL	HS03-43	Dup of C3- 4	13.2	C/M	0.685	pCi/g
05-19-2007	SOIL	HS03-44	Dup of C3-85	13.5	C/M	0.644	pCi/g
05-19-2007	SOIL	HS03-45	Dup of C3-62	14.8	C/M	1.03	pCi/g

Table 4
NECR Home Site Survey Unit 4 Data
Field Screening Data and
Confirmation Soil Sampling Radium 226 Results

				Field Screening Results		Confirmation Soil Analytical Results	
Collection Date	**Matrix**	**Sample ID**	**Sample Location ID**	**Gamma (x 10^3)**	**Units**	**Radium 226**	**Units**
05-19-2007	SOIL	HSO4-01	C4-1	12.8	C/M	0.594	pCi/g
05-19-2007	SOIL	HSO4-02	C4-5	13.3	C/M	0.786	pCi/g
05-19-2007	SOIL	HSO4-03	C4-10	13.2	C/M	0.601	pCi/g
05-19-2007	SOIL	HSO4-04	C4-16	16.7	C/M	0.691	pCi/g
05-19-2007	SOIL	HSO4-05	C4-17	14.2	C/M	1.66	pCi/g
05-19-2007	SOIL	HSO4-06	C4-23	13.3	C/M	0.759	pCi/g
05-19-2007	SOIL	HSO4-07	C4-24	14.4	C/M	0.929	pCi/g
05-19-2007	SOIL	HSO4-08	C4-25	13.8	C/M	0.948	pCi/g
05-19-2007	SOIL	HSO4-09	C4-32	14.0	C/M	0.901	pCi/g
05-19-2007	SOIL	HSO4-10	C4-33	14.4	C/M	0.903	pCi/g
05-20-2007	SOIL	HSO4-11	E4-1	14.0	C/M	0.803	pCi/g
05-20-2007	SOIL	HSO4-12	E4-2	13.7	C/M	0.826	pCi/g
05-20-2007	SOIL	HSO4-13	E4-3	13.6	C/M	0.606	pCi/g
05-20-2007	SOIL	HSO4-14	E4-4	12.8	C/M	0.944	pCi/g
05-20-2007	SOIL	HSO4-15	E4-5	12.9	C/M	0.987	pCi/g
05-20-2007	SOIL	HSO4-16	E4-6	12.9	C/M	0.679	pCi/g
05-20-2007	SOIL	HSO4-17	E4-7	13.2	C/M	0.674	pCi/g
05-20-2007	SOIL	HSO4-18	E4-8	13.5	C/M	0.768	pCi/g
05-20-2007	SOIL	HSO4-19	E4-9	12.8	C/M	0.725	pCi/g
05-20-2007	SOIL	HSO4-20	E4-10	12.0	C/M	0.590	pCi/g
05-20-2007	SOIL	HSO4-21	E4-11	13.2	C/M	0.575	pCi/g
05-20-2007	SOIL	HSO4-22	E4-12	13.0	C/M	0.730	pCi/g
05-20-2007	SOIL	HSO4-23	E4-13	12.5	C/M	0.604	pCi/g
05-20-2007	SOIL	HSO4-24	E4-14	12.9	C/M	0.497	pCi/g
05-20-2007	SOIL	HSO4-25	E4-15	12.4	C/M	0.750	pCi/g
05-20-2007	SOIL	HSO4-26	E4-16	13.1	C/M	0.562	pCi/g
05-20-2007	SOIL	HSO4-27	E4-17	12.4	C/M	0.579	pCi/g
05-20-2007	SOIL	HSO4-28	E4-18	12.9	C/M	0.642	pCi/g
05-20-2007	SOIL	HSO4-29	E4-19	12.2	C/M	0.741	pCi/g
05-20-2007	SOIL	HSO4-30	E4-20	12.0	C/M	0.555	pCi/g
05-22-2007	SOIL	HSO4-31	B4-1	13.1	C/M	0.679	pCi/g
05-22-2007	SOIL	HSO4-32	B4-2	13.2	C/M	0.717	pCi/g
05-22-2007	SOIL	HSO4-33	B4-3	13.0	C/M	1.29	pCi/g
05-22-2007	SOIL	HSO4-34	B4-4	14.8	C/M	3.37	pCi/g
05-22-2007	SOIL	HSO4-35	B4-5	14.6	C/M	0.815	pCi/g
05-22-2007	SOIL	HSO4-36	B4-6	12.8	C/M	0.546	pCi/g
05-22-2007	SOIL	HSO4-37	B4-7	12.6	C/M	0.579	pCi/g
05-22-2007	SOIL	HSO4-38	B4-8	13.2	C/M	0.813	pCi/g
05-22-2007	SOIL	HSO4-39	B4-9	13.8	C/M	1.09	pCi/g
05-22-2007	SOIL	HSO4-40	B4-10	13.9	C/M	0.747	pCi/g
05-22-2007	SOIL	HSO4-41	B4-11	13.3	C/M	0.422	pCi/g
05-22-2007	SOIL	HSO4-42	B4-12	12.5	C/M	0.562	pCi/g

05-22-2007	SOIL	HSO4-43	B4-13	12.6	C/M	0.650	pCi/g
05-22-2007	SOIL	HSO4-44	B4-14	14.4	C/M	0.956	pCi/g
05-22-2007	SOIL	HSO4-45	B4-15	13.8	C/M	1.02	pCi/g
05-22-2007	SOIL	HSO4-46	B4-16	14.5	C/M	0.719	pCi/g
05-22-2007	SOIL	HSO4-47	B4-17	13.0	C/M	0.508	pCi/g
05-22-2007	SOIL	HSO4-48	B4-18	12.9	C/M	0.590	pCi/g
05-22-2007	SOIL	HSO4-49	B4-19	13.6	C/M	0.680	pCi/g
05-22-2007	SOIL	HSO4-50	B4-20	13.0	C/M	0.613	pCi/g
05-22-2007	SOIL	HSO4-51	B4-21	12.6	C/M	0.743	pCi/g
05-22-2007	SOIL	HSO4-52	B4-22	13.1	C/M	0.521	pCi/g
05-22-2007	SOIL	HSO4-53	B4-23	13.8	C/M	0.693	pCi/g
05-22-2007	SOIL	HSO4-54	Dup of C4-5	13.3	C/M	0.734	pCi/g
05-22-2007	SOIL	HSO4-55	Dup of E4-7	13.2	C/M	0.757	pCi/g
05-22-2007	SOIL	HSO4-56	Dup of E4-16	13.1	C/M	0.504	pCi/g
05-22-2007	SOIL	HSO4-57	Dup of B4-8	13.2	C/M	1.10	pCi/g
05-22-2007	SOIL	HSO4-58	Dup of B4-11	13.3	C/M	0.501	pCi/g
05-22-2007	SOIL	HSO4-59	Dup of B4-22	13.1	C/M	0.547	pCi/g

-Bolded results are levels about the site action level of 2.24 pCi/g (pico Curies per Gram).
-C/M is Counts per Minute.

Table 5
NECR Home Site Survey Unit 5 Data
Field Screening Results and
Confirmation Soil Sampling Radium 226 Results

				Field Screening Results		Confirmation Soil Analytical Results	
Collection Date	**Matrix**	**Sample ID**	**Sample Location ID**	**Gamma (x 10^3)**	**Units**	**Radium 226**	**Units**
05-22-2007	SOIL	HS05-01	B5-24	13.6	C/M	0.670	pCi/g
05-22-2007	SOIL	HS05-02	B5-25	13.4	C/M	0.702	pCi/g
05-22-2007	SOIL	HS05-03	B5-26	13.4	C/M	0.602	pCi/g
05-22-2007	SOIL	HS05-04	B5-27	14.2	C/M	0.665	pCi/g
05-22-2007	SOIL	HS05-05	B5-28	14.0	C/M	0.545	pCi/g
05-22-2007	SOIL	HS05-06	B5-29	13.3	C/M	0.677	pCi/g
05-22-2007	SOIL	HS05-07	B5-30	13.3	C/M	0.776	pCi/g
05-22-2007	SOIL	HS05-08	B5-31	13.4	C/M	0.783	pCi/g
05-22-2007	SOIL	HS05-09	B5-32	12.7	C/M	0.815	pCi/g
05-22-2007	SOIL	HS05-10	B5-33	12.5	C/M	0.663	pCi/g
05-22-2007	SOIL	HS05-11	B5-34	13.6	C/M	0.730	pCi/g
05-22-2007	SOIL	HS05-12	B5-35	13.4	C/M	0.743	pCi/g
05-22-2007	SOIL	HS05-13	B5-36	13.1	C/M	0.538	pCi/g
05-22-2007	SOIL	HS05-14	B5-37	13.0	C/M	1.75	pCi/g
05-22-2007	SOIL	HS05-15	B5-38	12.2	C/M	0.576	pCi/g
05-22-2007	SOIL	HS05-16	B5-39	13.5	C/M	0.629	pCi/g
05-22-2007	SOIL	HS05-17	B5-40	13.6	C/M	0.764	pCi/g
05-22-2007	SOIL	HS05-18	B5-41	13.4	C/M	0.732	pCi/g
05-22-2007	SOIL	HS05-19	B5-42	13.2	C/M	0.802	pCi/g
05-22-2007	SOIL	HS05-20	B5-43	13.4	C/M	0.697	pCi/g
05-22-2007	SOIL	HS05-21	B5-44	12.5	C/M	0.661	pCi/g
05-22-2007	SOIL	HS05-22	B5-45	13.1	C/M	0.767	pCi/g
05-22-2007	SOIL	HS05-23	B5-46	14.3	C/M	0.604	pCi/g
05-22-2007	SOIL	HS05-24	B5-47	13.7	C/M	0.771	pCi/g
05-22-2007	SOIL	HS05-25	B5-48	14.2	C/M	0.741	pCi/g
05-22-2007	SOIL	HS05-26	B5-49	13.7	C/M	0.781	pCi/g
05-22-2007	SOIL	HS05-27	B5-51	12.3	C/M	0.773	pCi/g
05-22-2007	SOIL	HS05-28	B5-52	12.6	C/M	0.906	pCi/g
05-22-2007	SOIL	HS05-29	B5-53	13.5	C/M	0.611	pCi/g
05-22-2007	SOIL	HS05-30	B5-54	13.1	C/M	0.680	pCi/g
05-22-2007	SOIL	HSO5-31	B5-55	14.0	C/M	0.639	pCi/g
05-22-2007	SOIL	HSO5-32	B5-56	13.8	C/M	0.628	pCi/g
05-22-2007	SOIL	HSO5-33	B5-57	13.8	C/M	0.791	pCi/g
05-22-2007	SOIL	HSO5-34	B5-58	13.2	C/M	0.535	pCi/g
05-22-2007	SOIL	HSO5-35	B5-59	13.8	C/M	0.840	pCi/g
05-22-2007	SOIL	HSO5-36	B5-60	13.5	C/M	0.862	pCi/g
05-22-2007	SOIL	HSO5-37	B5-61	12.6	C/M	0.606	pCi/g
05-22-2007	SOIL	HSO5-38	B5-62	14.0	C/M	0.663	pCi/g
05-22-2007	SOIL	HSO5-39	B5-63	13.7	C/M	0.801	pCi/g
05-22-2007	SOIL	HSO5-40	B5-64	12.9	C/M	0.621	pCi/g

05-22-2007	SOIL	HSO5-41	B5-65	12.3	C/M	0.742	pCi/g
05-22-2007	SOIL	HSO5-42	B5-66	12.3	C/M	0.678	pCi/g
05-22-2007	SOIL	HSO5-43	B5-67	14.2	C/M	0.741	pCi/g
05-22-2007	SOIL	HSO5-44	B5-68	13.3	C/M	0.721	pCi/g
05-22-2007	SOIL	HSO5-45	B5-69	14.5	C/M	0.731	pCi/g
05-22-2007	SOIL	HSO5-46	B5-70	13.6	C/M	0.750	pCi/g
05-22-2007	SOIL	HSO5-47	Dup of B5-30	13.3	C/M	0.559	pCi/g
05-22-2007	SOIL	HSO5-48	Dup of B5-40	13.6	C/M	0.627	pCi/g
05-22-2007	SOIL	HSO5-49	Dup of B5-43	13.4	C/M	0.911	pCi/g
05-22-2007	SOIL	HSO5-50	Dup of B5-53	13.5	C/M	0.694	pCi/g
05-22-2007	SOIL	HSO5-51	Dup of B5-67	14.2	C/M	0.681	pCi/g

-Bolded results are levels about the site action level of 2.24 pCi/g (pico Curies per Gram).
-C/M is Counts per Minute.

Table 6
NECR Home Site Survey Unit 6 Data
Field Screening Results and
Confirmation Soil Sampling Radium 226 Results

				Field Screening Results		Confirmation Soil Analytical Results	
Collection Date	**Matrix**	**Sample ID**	**Sample Location ID**	**Gamma ($x 10^3$)**	**Units**	**Radium 226**	**Units**
05-22-2007	SOIL	HSO6-01	B6-71	13.5	C/M	0.566	pCi/g
05-22-2007	SOIL	HSO6-02	B6-72	13.9	C/M	1.58	pCi/g
05-22-2007	SOIL	HSO6-03	B6-73	13.0	C/M	0.811	pCi/g
05-22-2007	SOIL	HSO6-04	B6-74	14.0	C/M	0.835	pCi/g
05-22-2007	SOIL	HSO6-05	B6-75	14.2	C/M	0.691	pCi/g
05-22-2007	SOIL	HSO6-06	B6-76	13.7	C/M	**2.43**	pCi/g
05-22-2007	SOIL	HSO6-07	B6-78	13.2	C/M	0.788	pCi/g
05-22-2007	SOIL	HSO6-08	B6-79	14.3	C/M	0.720	pCi/g
05-22-2007	SOIL	HSO6-09	B6-80	13.2	C/M	0.652	pCi/g
05-22-2007	SOIL	HSO6-10	B6-81	14.3	C/M	0.697	pCi/g
05-22-2007	SOIL	HSO6-11	B6-82	13.0	C/M	0.746	pCi/g
05-22-2007	SOIL	HSO6-12	B6-83	13.5	C/M	0.720	pCi/g
05-22-2007	SOIL	HSO6-13	B6-84	13.8	C/M	0.695	pCi/g
05-22-2007	SOIL	HSO6-14	B6-85	15.0	C/M	1.10	pCi/g
05-22-2007	SOIL	HSO6-15	B6-86	14.6	C/M	1.26	pCi/g
05-22-2007	SOIL	HSO6-16	B6-87	13.3	C/M	0.670	pCi/g
05-22-2007	SOIL	HSO6-17	B6-88	13.6	C/M	0.599	pCi/g
05-22-2007	SOIL	HSO6-18	B6-89	13.6	C/M	0.680	pCi/g
05-22-2007	SOIL	HSO6-19	B6-90	15.3	C/M	0.815	pCi/g
05-22-2007	SOIL	HSO6-20	B6-91	15.3	C/M	0.637	pCi/g
05-22-2007	SOIL	HSO6-21	B6-92	13.7	C/M	1.11	pCi/g
05-22-2007	SOIL	HSO6-22	B6-93	13.8	C/M	0.575	pCi/g
05-22-2007	SOIL	HSO6-23	B6-94	13.7	C/M	0.699	pCi/g
05-22-2007	SOIL	HSO6-24	B6-95	13.5	C/M	0.950	pCi/g
05-22-2007	SOIL	HSO6-25	B6-96	14.6	C/M	0.698	pCi/g
05-22-2007	SOIL	HSO6-26	B6-97	14.5	C/M	0.697	pCi/g
05-22-2007	SOIL	HSO6-27	B6-99	14.2	C/M	0.639	pCi/g
05-22-2007	SOIL	HSO6-28	B6-100	14.2	C/M	0.764	pCi/g
05-22-2007	SOIL	HSO6-29	B6-101	15.1	C/M	0.553	pCi/g
05-22-2007	SOIL	HSO6-30	B6-102	14.2	C/M	0.792	pCi/g
05-22-2007	SOIL	HSO6-31	B6-103	14.0	C/M	0.652	pCi/g
05-22-2007	SOIL	HSO6-32	B6-104	14.1	C/M	0.697	pCi/g
05-22-2007	SOIL	HSO6-33	B6-105	14.7	C/M	0.946	pCi/g
05-22-2007	SOIL	HSO6-34	B6-106	13.5	C/M	0.843	pCi/g
05-22-2007	SOIL	HSO6-35	B6-107	14.9	C/M	0.725	pCi/g
05-22-2007	SOIL	HSO6-36	B6-108	14.6	C/M	0.646	pCi/g
05-22-2007	SOIL	HSO6-37	B6-109	15.0	C/M	0.596	pCi/g
05-22-2007	SOIL	HSO6-38	B6-110	14.8	C/M	0.854	pCi/g
05-22-2007	SOIL	HSO6-39	B6-112	15.4	C/M	0.616	pCi/g
05-22-2007	SOIL	HSO6-40	B6-113	15.0	C/M	1.54	pCi/g

05-22-2007	SOIL	HSO6-41	B6-114	15.6	C/M	1.31	pCi/g
05-22-2007	SOIL	HSO6-42	B6-115	14.4	C/M	0.964	pCi/g
05-22-2007	SOIL	HSO6-43	B6-116	15.8	C/M	0.808	pCi/g
05-22-2007	SOIL	HSO6-44	Dup of B6-73	13.0	C/M	0.531	pCi/g
05-22-2007	SOIL	HSO6-45	Dup of B6-88	13.6	C/M	0.590	pCi/g
05-22-2007	SOIL	HSO6-46	Dup of B6-106	13.5	C/M	0.748	pCi/g
05-22-2007	SOIL	HSO6-47	Dup of B6-110	14.8	C/M	0.742	pCi/g
05-22-2007	SOIL	HSO6-48	Dup of B6-77	14.1	C/M	0.726	pCi/g

-Bolded results are levels about the site action level of 2.24 pCi/g (pico Curies per Gram).
-C/M is Counts per Minute.

Table 7 NECR Home Site Survey Unit 7 Data Field Screening Results and Confirmation Soil Sampling Radium 226 Results							
				Field Screening Results		**Confirmation Soil Analytical Results**	
Collection Date	**Matrix**	**Sample ID**	**Sample Location ID**	**Gamma (x 10^3)**	**Units**	**Radium 226**	**Units**
05-22-2007	SOIL	HS07-01	B7-50	13.6	C/M	0.586	pCi/g
05-22-2007	SOIL	HS07-02	B7-98	14.4	C/M	0.850	pCi/g
05-22-2007	SOIL	HS07-03	B7-111	15.1	C/M	1.19	pCi/g
05-22-2007	SOIL	HS07-04	B7-1	16.1	C/M	0.586	pCi/g
05-22-2007	SOIL	HS07-05	B7-2	15.2	C/M	0.868	pCi/g
05-22-2007	SOIL	HS07-06	B7-3	14.8	C/M	0.665	pCi/g
05-22-2007	SOIL	HS07-07	B7-4	15.4	C/M	0.822	pCi/g
05-22-2007	SOIL	HS07-08	B7-5	14.7	C/M	0.692	pCi/g
05-22-2007	SOIL	HS07-09	B7-6	16.1	C/M	0.577	pCi/g
05-22-2007	SOIL	HS07-10	B7-7	15.4	C/M	0.809	pCi/g
05-22-2007	SOIL	HS07-11	B7-8	15.9	C/M	0.773	pCi/g
05-22-2007	SOIL	HS07-12	B7-9	15.0	C/M	0.803	pCi/g
05-22-2007	SOIL	HS07-13	B7-10	15.7	C/M	0.536	pCi/g
05-22-2007	SOIL	HS07-14	B7-11	15.4	C/M	0.520	pCi/g
05-22-2007	SOIL	HS07-15	B7-12	16.1	C/M	0.746	pCi/g
05-22-2007	SOIL	HS07-16	B7-13	16.7	C/M	0.783	pCi/g
05-22-2007	SOIL	HS07-17	B7-14	16.6	C/M	0.956	pCi/g
05-22-2007	SOIL	HS07-18	B7-15	15.5	C/M	0.587	pCi/g
05-22-2007	SOIL	HS07-19	B7-16	16.1	C/M	0.645	pCi/g
05-22-2007	SOIL	HS07-20	B7-17	15.7	C/M	0.596	pCi/g
05-22-2007	SOIL	HS07-21	B7-18	15.6	C/M	1.20	pCi/g
05-22-2007	SOIL	HS07-22	B7-19	15.4	C/M	0.600	pCi/g
05-22-2007	SOIL	HS07-23	B7-20	15.8	C/M	0.586	pCi/g
05-22-2007	SOIL	HS07-24	B7-21	16.4	C/M	0.626	pCi/g
05-22-2007	SOIL	HS07-25	B7-22	16.2	C/M	0.502	pCi/g
05-22-2007	SOIL	HS07-26	B7-23	16.7	C/M	0.617	pCi/g
05-22-2007	SOIL	HS07-27	B7-24	16.1	C/M	0.552	pCi/g
05-22-2007	SOIL	HS07-28	B7-25	16.1	C/M	0.872	pCi/g
05-22-2007	SOIL	HS07-29	B7-26	16.6	C/M	0.822	pCi/g
05-22-2007	SOIL	HS07-30	B7-27	16.8	C/M	0.780	pCi/g
05-22-2007	SOIL	HS07-31	B7-28	15.2	C/M	0.698	pCi/g
05-22-2007	SOIL	HS07-32	B7-29	15.1	C/M	0.722	pCi/g
05-22-2007	SOIL	HS07-33	Dup of B7-5	14.7	C/M	0.682	pCi/g
05-22-2007	SOIL	HS07-34	Dup of B7-10	15.7	C/M	0.755	pCi/g
05-22-2007	SOIL	HS07-35	Dup of B7-21	16.4	C/M	0.733	pCi/g

-Bolded results are levels about the site action level of 2.24 pCi/g (pico Curies per Gram).
-C/M is Counts per Minute.

Table 8
NECR Home Site Survey Unit 8 Data
Confirmation Soil Sampling Radium 226 Results

Collection Date	Matrix	Sample ID	Analyte	R_Result	R_Units	R_MDL	R_PQL
06-01-2007	SOIL	HSO8-01	Radium-226	**4.24**	pCi/g	0.136	0.500
06-01-2007	SOIL	HSO8-02	Radium-226	1.22	pCi/g	0.121	0.500
06-01-2007	SOIL	HSO8-03	Radium-226	1.10	pCi/g	0.139	0.500
06-01-2007	SOIL	HSO8-04	Radium-226	0.988	pCi/g	0.105	0.500
06-01-2007	SOIL	HSO8-05	Radium-226	1.69	pCi/g	0.0988	0.500
06-01-2007	SOIL	HSO8-06	Radium-226	**3.20**	pCi/g	0.128	0.500
06-01-2007	SOIL	HSO8-07	Radium-226	0.931	pCi/g	0.101	0.500
06-01-2007	SOIL	HSO8-08	Radium-226	1.59	pCi/g	0.110	0.500
06-01-2007	SOIL	HSO8-09	Radium-226	1.07	pCi/g	0.143	0.500
06-01-2007	SOIL	HSO8-10	Radium-226	1.30	pCi/g	0.128	0.500
06-01-2007	SOIL	HSO8-11	Radium-226	1.01	pCi/g	0.115	0.500
06-01-2007	SOIL	HSO8-12	Radium-226	0.955	pCi/g	0.106	0.500
06-01-2007	SOIL	HSO8-13	Radium-226	1.01	pCi/g	0.100	0.500
06-01-2007	SOIL	HSO8-14	Radium-226	0.887	pCi/g	0.0992	0.500
06-01-2007	SOIL	HSO8-15	Radium-226	0.788	pCi/g	0.116	0.500
06-01-2007	SOIL	HSO8-16	Radium-226	0.912	pCi/g	0.101	0.500
06-01-2007	SOIL	HSO8-17	Radium-226	0.996	pCi/g	0.133	0.500
06-01-2007	SOIL	HSO8-18	Radium-226	1.34	pCi/g	0.120	0.500
06-01-2007	SOIL	HSO8-19	Radium-226	1.01	pCi/g	0.146	0.500
06-01-2007	SOIL	HSO8-20	Radium-226	0.823	pCi/g	0.120	0.500
06-01-2007	SOIL	HSO8-21	Radium-226	0.947	pCi/g	0.106	0.500
06-01-2007	SOIL	HSO8-22	Radium-226	0.869	pCi/g	0.114	0.500
06-01-2007	SOIL	HSO8-23	Radium-226	1.87	pCi/g	0.152	0.500
06-01-2007	SOIL	HSO8-24	Radium-226	0.779	pCi/g	0.117	0.500
06-01-2007	SOIL	HSO8-25	Radium-226	0.942	pCi/g	0.100	0.500
06-01-2007	SOIL	HSO8-26	Radium-226	**3.07**	pCi/g	0.126	0.500
06-01-2007	SOIL	HSO8-27	Radium-226	0.927	pCi/g	0.0911	0.500
06-01-2007	SOIL	HSO8-28	Radium-226	0.947	pCi/g	0.101	0.500
06-01-2007	SOIL	HSO8-29	Radium-226	0.680	pCi/g	0.0865	0.500
06-01-2007	SOIL	HSO8-30	Radium-226	1.14	pCi/g	0.144	0.500
06-01-2007	SOIL	HSO8-31	Radium-226	0.749	pCi/g	0.119	0.500
06-01-2007	SOIL	HSO8-32	Radium-226	2.20	pCi/g	0.109	0.500

-Bolded results are levels about the site action level of 2.24 pCi/g (pico Curies per Gram).

Table 9 NECR Home Site Survey Unit 9 Data Confirmation Soil Sampling Radium 226 Results							
Collection Date	**Matrix**	**Sample ID**	**Analyte**	**R_Result**	**R_Units**	**R_MDL**	**R_PQL**
06-02-2007	SOIL	HSO9-01	Radium-226	**2.60**	pCi/g	0.109	0.500
06-02-2007	SOIL	HSO9-02	Radium-226	1.09	pCi/g	0.0977	0.500
06-02-2007	SOIL	HSO9-03	Radium-226	1.03	pCi/g	0.165	0.500
06-02-2007	SOIL	HSO9-04	Radium-226	0.786	pCi/g	0.0896	0.500
06-02-2007	SOIL	HSO9-05	Radium-226	1.04	pCi/g	0.094	0.500
06-02-2007	SOIL	HSO9-06	Radium-226	0.882	pCi/g	0.130	0.500
06-02-2007	SOIL	HSO9-07	Radium-226	0.876	pCi/g	0.0988	0.500
06-02-2007	SOIL	HSO9-08	Radium-226	0.968	pCi/g	0.108	0.500
06-02-2007	SOIL	HSO9-09	Radium-226	0.832	pCi/g	0.0968	0.500
06-02-2007	SOIL	HSO9-10	Radium-226	1.11	pCi/g	0.120	0.500
06-02-2007	SOIL	HSO9-11	Radium-226	1.06	pCi/g	0.116	0.500
06-02-2007	SOIL	HSO9-12	Radium-226	0.841	pCi/g	0.122	0.500
06-02-2007	SOIL	HSO9-13	Radium-226	0.705	pCi/g	0.136	0.500
06-02-2007	SOIL	HSO9-14	Radium-226	0.804	pCi/g	0.139	0.500
06-02-2007	SOIL	HSO9-15	Radium-226	0.900	pCi/g	0.121	0.500
06-02-2007	SOIL	HSO9-16	Radium-226	0.745	pCi/g	0.123	0.500
06-02-2007	SOIL	HSO9-17	Radium-226	0.958	pCi/g	0.129	0.500
06-02-2007	SOIL	HSO9-18	Radium-226	0.970	pCi/g	0.120	0.500
06-02-2007	SOIL	HSO9-19	Radium-226	1.04	pCi/g	0.110	0.500
06-02-2007	SOIL	HSO9-20	Radium-226	0.907	pCi/g	0.116	0.500

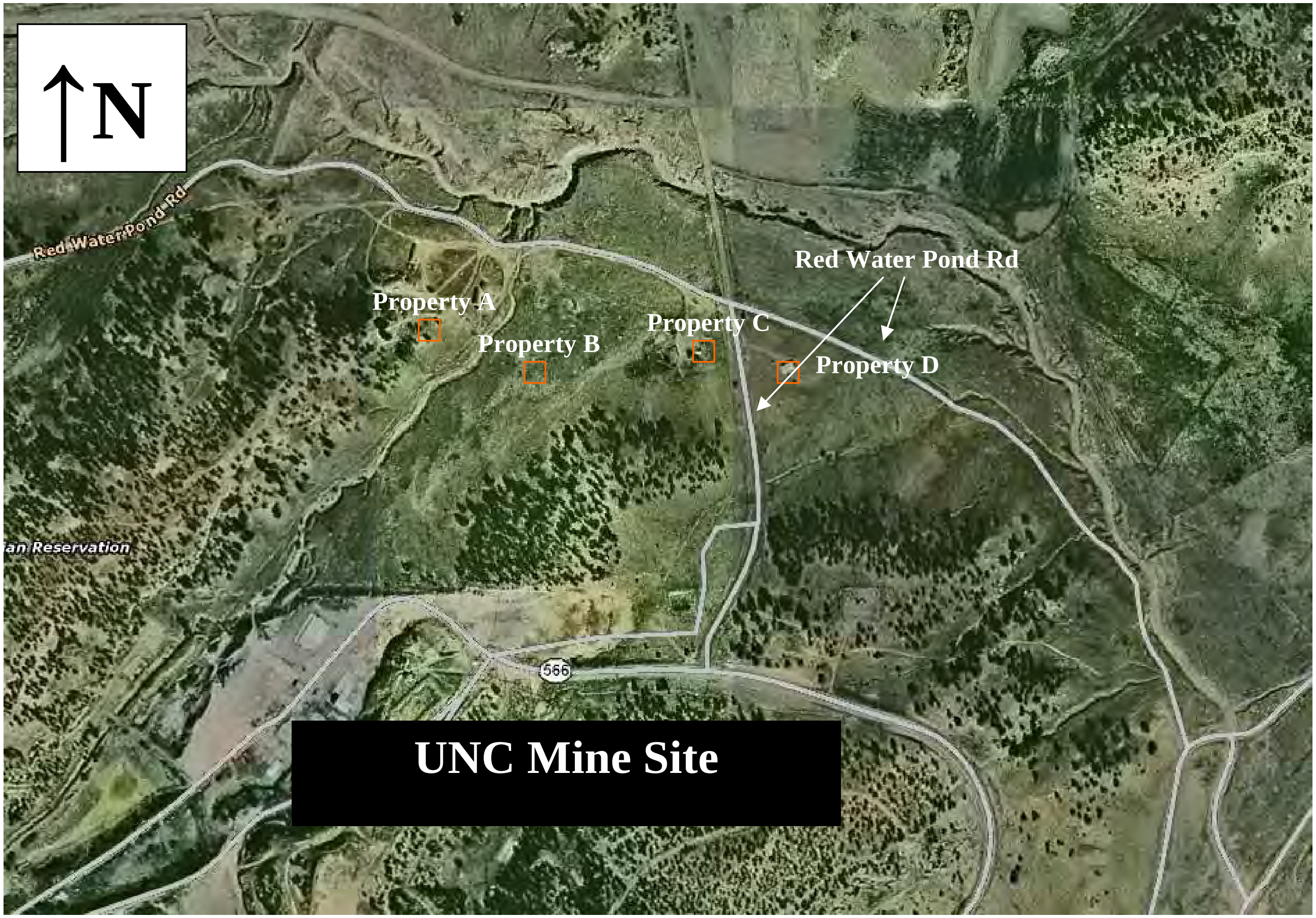
-Bolded results are levels about the site action level of 2.24 pCi/g (pico Curies per Gram).

APPENDIX B

NECR HOME SITE MAPS AND FIGURES

North East Church Rock Home Site Investigation
Church Rock, McKinley County, New Mexico
GSA Contact Number: GS-10F-0160J
E&E Project Number: 001096.OX42.01
August 2007

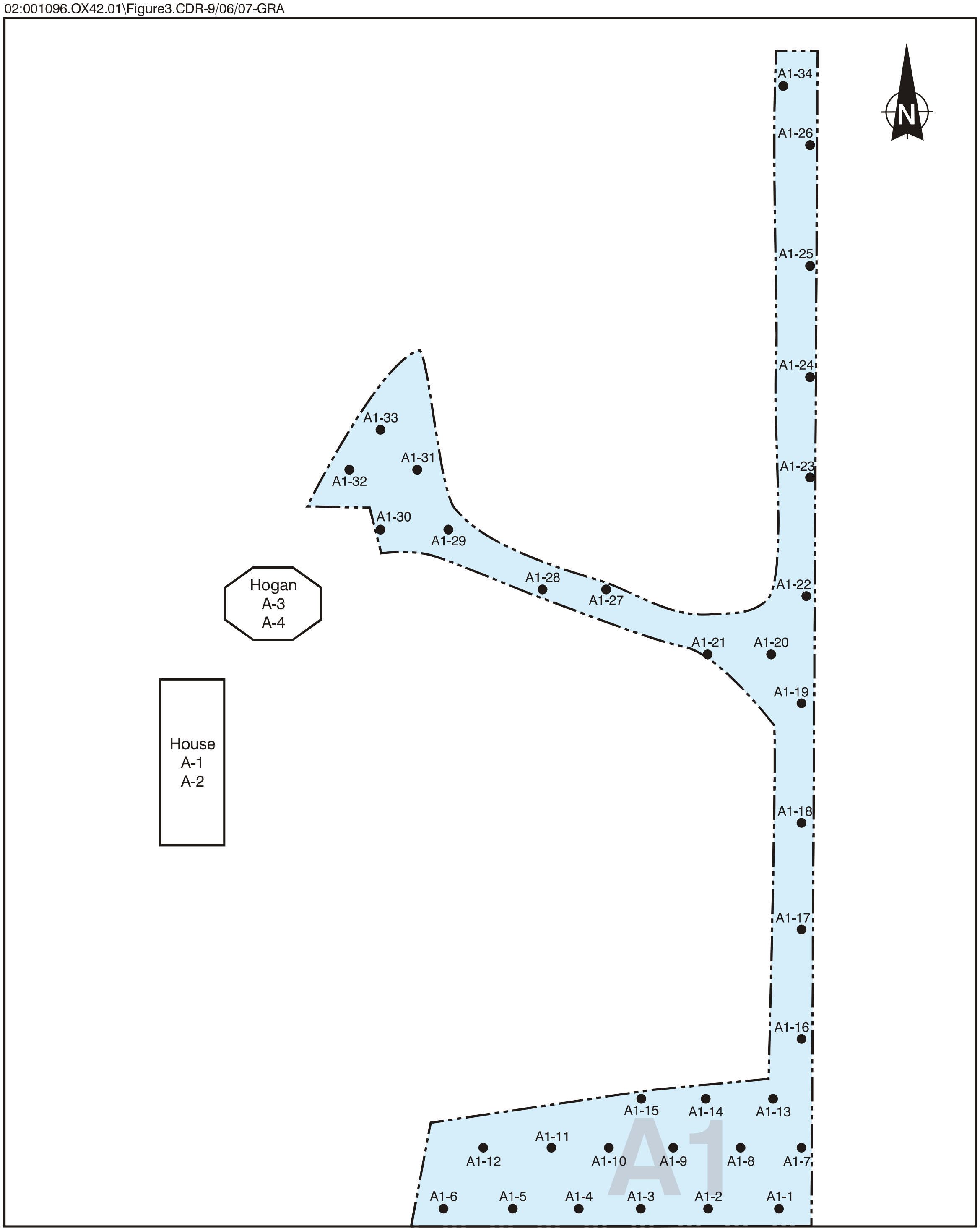
Figure 1: Aerial view of NECR Home Site location with relationship to the city of Church Rock and Interstate 40.



North East Church Rock Home Site Investigation
Church Rock, McKinley County, New Mexico
GSA Contact Number: GS-10F-0160J
E&E Project Number: 001096.OX42.01
August 2007

Figure 2: Aerial view of the NECR Home Site Property Locations A, B, C and D.

02:001096.OX42.01\Figure3.CDR-9/06/07-GRA



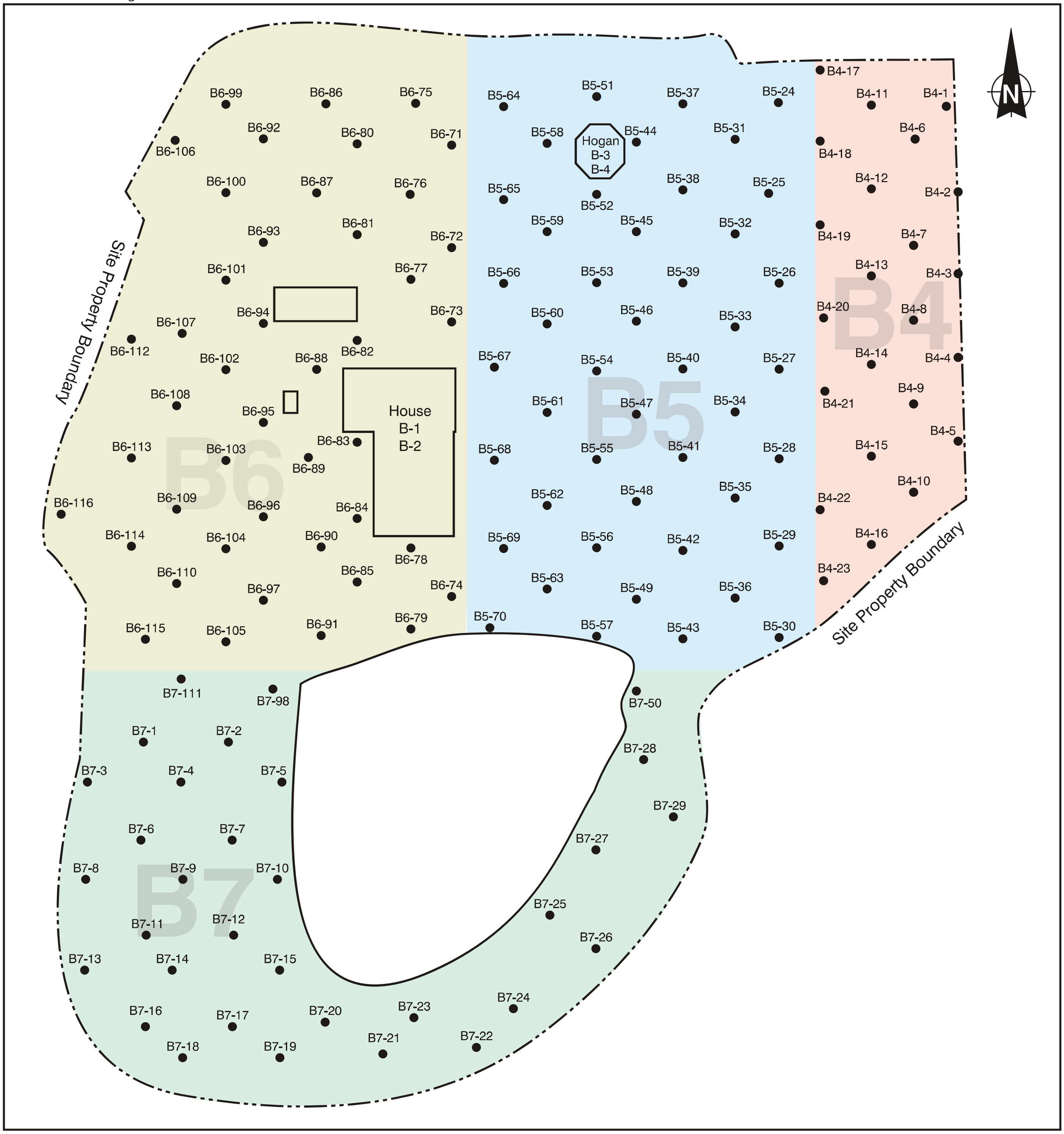
SOURCE: Ecology and Environment, Inc. 2007

Approximate Scale

0 20 40 Feet

Figure 3
NECR Home Site Property Location A
North East Church Rock Home Site Investigation
Church Rock, McKinley County, New Mexico
GSA Contact Number: GS-10F-0160J
E&E Project Number: 001096.OX42.01
September 2007

02:001096.OX42.01\Figure4.CDR-9/06/07-GRA



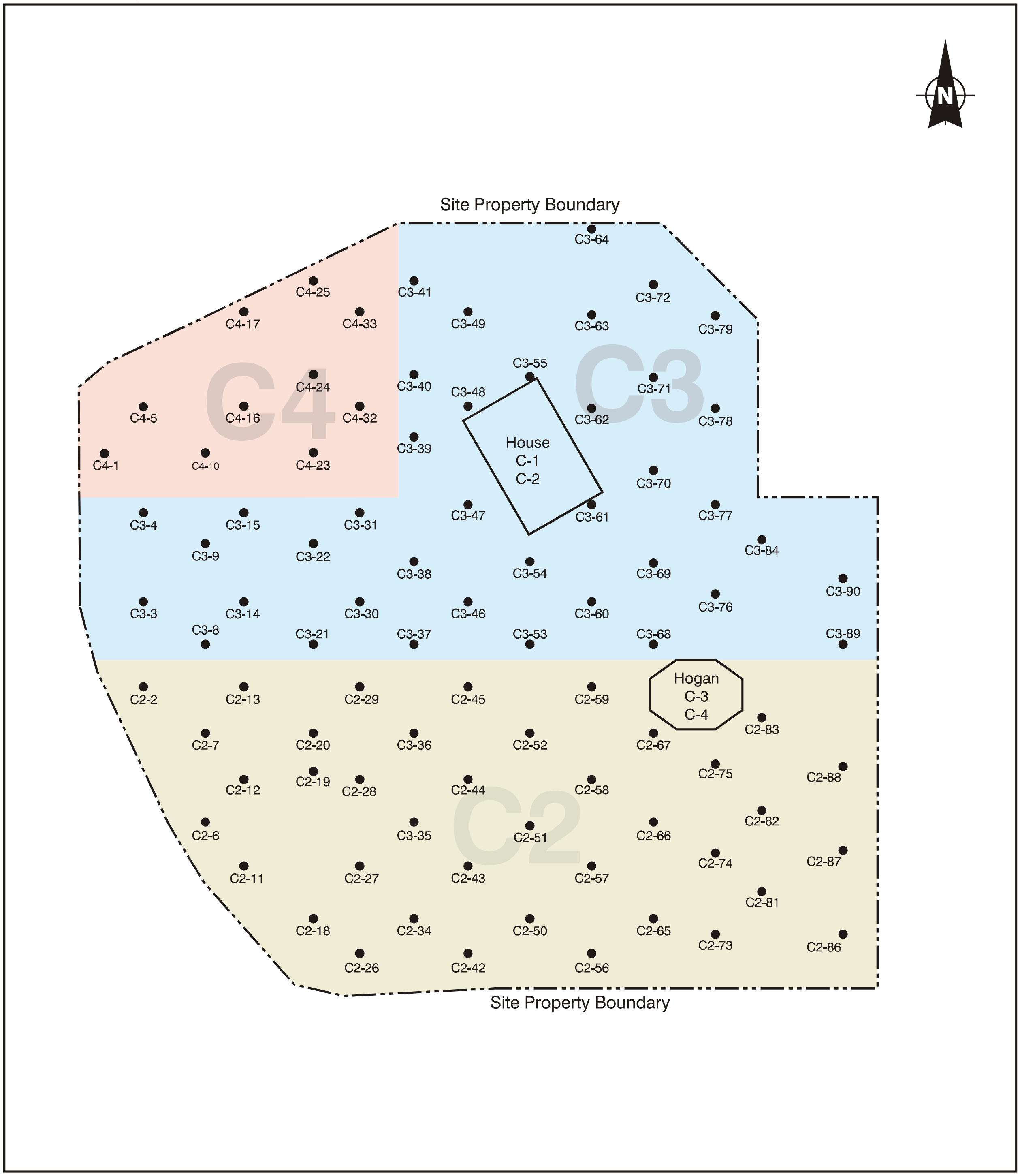
SOURCE: Ecology and Environment, Inc. 2007

Approximate Scale

0 20 40 Feet

Figure 4
NECR Home Site Property Location B
North East Church Rock Home Site Investigation
Church Rock, McKinley County, New Mexico
GSA Contact Number: GS-10F-0160J
E&E Project Number: 001096.OX42.01
September 2007

02:001096.OX42.01\Figure5.CDR-09/06/07-GRA



SOURCE: Ecology and Environment, Inc. 2007

Approximate Scale
0 20 40 Feet

Figure 5
NECR Home Site Property Location C
North East Church Rock Home Site Investigation
Church Rock, McKinley County, New Mexico
GSA Contact Number: GS-10F-0160J
E&E Project Number: 001096.OX42.01
September 2007

APPENDIX C

PHOTOGRAPHIC DOCUMENTATION

ECOLOGY AND ENVIRONMENT, INC.
North East Church Rock Home Site Investigation
Church Rock, McKinley County, New Mexico

Photographer: Robin Clemens/Coast Guard　　　　Date: May 2007

Photo 1: Coast Guard and E&E setting up air sampling at Property C.

Photo 2: Personal Dust Meter staged downwind during the excavation of Property B.

ECOLOGY AND ENVIRONMENT, INC.
North East Church Rock Home Site Investigation
Church Rock, McKinley County, New Mexico

Photographer: Coast Guard Date: May, 2007

Photo 3: Indoor air radon canister sampling.

Photo 4: NECR area where soil removed from the homes sites was stockpiled.

ECOLOGY AND ENVIRONMENT, INC.
North East Church Rock Home Site Investigation
Church Rock, McKinley County, New Mexico

Photographer: Robin Clemens

Date: May 2007

Photo 5: Delineated screening lanes ensure 100% screening for gamma radiation.

Photo 6: Coast Guard collecting gamma readings from collected soil samples in Survey Unit 3.

APPENDIX D

ER HOME SITE QASP

United States Environmental Protection Agency
Emergency Response Section

Emergency Response and Time Critical Quality Assurance Sampling Plan for Air and Soil Sampling

Response Location: Northeast Church Rock Mine, McKinley County, New Mexico
(Site Name): Northeast Church Rock (NECR)

Date: April 30, 2007

Prepared by: Carl Palladino, The Palladino Company, Inc.

Reviewed by: Robin Clemens, Ecology and Environment, Inc.

Approved by: Harry Allen, U.S. Environmental Protection Agency

This sampling plan was prepared and delivered to the EPA OSC (select one):
■ **Prior to Sampling** ☐ **Post Sampling (within one month of sampling)**

This emergency sampling plan is intended to be used in conjunction with the Environmental Protection Agency's (EPA) Region 9 Emergency Response Section's (ERS) Generic Data Quality Objectives (DQOs) for Emergency Responses and Time Critical Evaluations. This Quality Assurance Sampling Plan (QASP) has been designed to assist field responders in their preparation for collecting, analyzing, shipping, storing and handling samples collected during an emergency response. The use of this generic sampling plan will involve forethought and planning that should help direct the sampling and analytical work. It is meant to be used in the case of emergency responses or time-critical responses when sampling teams may not have the opportunity to write a more thorough sampling plan. Sampling teams should always reference standard quality procedures, standard operations procedures, standard methods for sampling and analytical guidance.

The development of this generic plan will improve the documentation, communication, planning, and overall quality associated with the sampling and analysis by:

1) encouraging field teams to consider their goals and objectives before the generation of environmental data,
2) documenting predetermined information in a standardize format,
3) increasing the communication between sampling personnel and decision makers, and
4) detailing expectations and objective before samples are collected.

1.0 Introduction and Background. ***Describe the site and specify the geographic boundaries for the site and any specific areas of concern.*** *What is the problem, what precipitated the response, which agencies and other entities (e.g., contractors) are on site, who has taken the lead for the response and for environmental clean-up actions?*

The NECR mine site is an inactive uranium mine site that operated from 1968 until 1982 with waste water treatment activities from 1979 until 1983. The mine was closed between 1986 and 1994 in accordance with Nuclear Regulatory Commission (NRC) requirements under Title II of the Uranium Mill Tailings Radiation Control Act (UMTRCA). The mine was operated by United Nuclear Corporation (UNC), the Potentially Responsible Party (PRP), who retained MWH to conduct investigations at the mine. Most of the mine is located on Navajo Indian Trust land with a portions on Navajo Indian Reservation and UNC owned land.

The NRC regulated cleanup action only addresses mine tailings, thus contamination remains on the site. At the request of the Navajo Nation Environmental Protection Agency (NNEPA), the EPA became involved in November of 2005 to oversee the investigation and remediation of the site. The EPA required UNC to conduct a Removal Site Evaluation (RSE) to determine the extent of contamination and perform a risk assessment, which was completed in December 2006. The investigation report is pending. Additional mine history, mining practices, and pertinent background information is detailed in the Final Removal Site Evaluation Work Plan (MWH 2006).

During the RSE eight Home Sites were investigated for surface soil contamination and three were found to have elevated levels above the screening level of 2.24 pCi/g Ra-226. Based on the results, the EPA initiated further investigations and actions to mitigate potential exposures to the radioactive contamination. The three Home Sites were investigated for indoor contamination and one additional Home Site was investigated for surface soil contamination on April 18 and 19, 2007 by the EPA (E&E 2007). No indoor gamma radiation above twice background levels were detected. Elevated levels of gamma radiation above twice background were detected from the surface soil survey performed at the ninth Home Site, thus five surface soil samples were collected for analysis. Results are pending.

This QASP addresses the third phase of the Home Site investigation involving indoor air radon sampling, outdoor airborne particulate sampling and monitoring, and soil sampling during the remediation of the contaminated soil.

Reference: MWH, Final Removal Site Evaluation Work Plan, August 2006
E&E, Quality Assurance Sampling Plan for Home Sites Indoor Assessment, April 2007

2.0 Objectives. *Brief statement on the general project objective. What is the overall goal or objective? Specific objectives are summarized in Table D.*

The project objectives are as follows:

1. Conduct perimeter air sampling and monitoring during soil removal activities
2. Conduct air sampling for radon-222 inside residential homes
3. Delineate the extent of soil contamination to direct removal activities
4. Conduct confirmation soil sampling for laboratory analysis
5. Conduct final status surveys at all residential properties in accordance with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)

2.1 Data Use Objectives. (How will the data be used?)

Data that are generated will be used: (Select Appropriate Boxes)

1 ☐ To be compared with a background or reference sample(s).

2 ☐ To be compared with an available detection or quantification level.

3 ■ To assist in determining the presence or absence of a hazardous material or substance at levels above an available detection or quantification level.

4 ■ To assist with determining the area of impact due to a hazardous material release. (i.e., horizontal and lateral extent).

5 ■ To be compared with site-specific action levels or risk-based action levels (e.g., EPA PRGs) to assist in determination if health threats exist.

6 ■ As definitive confirmatory data for confirmation of non-definitive (screening) data.

7 ■ Other objectives: To meet MARSSIM final status survey requirements

2.2 Sampling Objectives. (What are you proposing to do?)

1 ☐ Sampling to determine only the presence or absence of a hazardous substance within the area of concern.

2 ■ Sampling to estimate:

■ contamination levels within the area of concern. (Indoor residential Rn-222 sampling)

☐ contamination area(s) within a site.

3 ☐ Sampling to determine the location of hot spots within the area of concern..

4 ■ Surface soil sampling to estimate the lateral extent of contamination

■ of specific source area(s) or areas of concern

☐ over entire site

5 ■ Sub-surface sampling to estimate the vertical extent of contamination

■ of specific source area(s) or areas of concern

☐ over entire site.

6 ■ Sampling off site to determine: Migration of airborne contamination at the perimeter of site. Background for radiation instrumentation.

2.3 Sample Matrices

1 ■ Surface soils

2 ■ Subsurface soil
Depth(s): To be determined in the field by the depth of excavation.

3 ☐ Surface water

4 ☐ Groundwater
Depth(s):

5 ☐ Other aqueous matrices
Please specify:

6 ☐ Wipe samples

7 ☐ Biota
Please specify:

8 ■ Other matrices: Airborne particulate and radon-222 gas

2.4 Data Type

In general, data type and data needs should be decided prior to data generation. The data can be generally divided into three categories: definitive methodology data (generally data generated using standardize methods), non-definitive methodology data (also referred to as screening data) and screening data with at least 10% definitive conformation. The generation of definitive data is preferable, however in emergency and time critical situations where definitive data is not available, non-definitive data should be generated. Note that the data type is not an indicator of precision, accuracy or documentation completeness, or quality! Reported data should be verified (by a party other than the laboratory) as meeting specific quality control and data category requirements by following a verification or validation procedure. Refer to the START or ERS Quality Assurance Plans for specific quality parameters and requirements.

Check appropriate box(es):

1 ■ Screening data will be generated. The data by itself may not be verifiable. **Due to the time critical situation, the data must be reported and may be used to make decisions.**

2a ■ Screening data with at least 10 percent definitive data will be generated. Data using non-definitive analytical methodologies will be generated. **Due to the time critical situation, the data must be reported and may be used to make decisions prior to generation of definitive data.** The screening data by itself may not be verifiable. Screening data will be evaluated and reported with definitive data at a later time.

2b ☐ Screening data with 10 percent definitive data will be generated. Data using non-definitive analytical methodologies will be generated. **Data will not be reported until it is evaluated against definitive data.**

3a ☐ Definitive data will be generated. The sampling and analysis must be done on an emergency basis. **Due to the time critical situation, the preliminarily data must be reported and used for comparison without validation. Analytical data packages will be required. However, since the data was not used or intended for decision making, validation of the data package will not be performed.** (Document generic DQO deviation in Section 4.4)

3b ■ Definitive data will be generated. The sampling must be done on an emergency basis. **Due to the time critical situation, preliminary data must be reported and may be used to make decisions without validation. The generated analytical documentation packages will be reviewed and validated. Qualified data will be reported after validation.**

3c ☐ Definitive data will be generated. **Full documentation will be required. Analytical data packages will be reviewed and validated prior to reporting.**

2.5 Contaminants of Concern

Potential contaminants of potential concern (COPC), proposed analytical method, proposed action levels and available reporting limit are summarized in Table A.

Table A
Contaminants of Concern

Potential COC	Proposed Analytical Method	Proposed Action Level	Available Reporting Limit
Radium-226 (soil)	EPA Method 901.1 (Modified) equivalent per General Engineering Laboratory procedures	USEPA Region 9 Residential 1E-4 risk PRG of 1.24 pCi/g + background of 1.0 pCi/g equals 2.24 pCi/g	0.5 pCi/g
Radium-226 (air filter)	Determination of Radium-226 (GL-RAD-A-008 Revision 8) Applicable to EPA 600/4-80-032 Method 903.1 (Modified)	1×10^{-3} pCi/L	1×10^{-7} pCi/L
Radium-226 (total particulate)	FOP 5, Ludlum Model 2200 with Model 43-78	$1 \text{ X } 10^{-3}$ pCi/L	TBD (sampling time adjusted to obtain sufficient RL)
Radon-222 gas	TBD	4 pCi/L	TBD
Total airborne particulates	Personal DataRAM or DataRam	5 mg/m^3 (OSHA PNOR PEL)	0.001 mg/m^3
Gross gamma radiation	FOP 2, Radiation Survey Scanning or FOP 3, Radiation Static Measurement	TBD	TBD (sampling time adjusted to obtain sufficient RL)
Other Data Collection Activity (non-chemical) *(circle all that apply)*	GPS **Visual** Interviews Magnetometer Other Geophysical Modeling **Photography** File Search		

Add additional pages if necessary.

Key:
TBD: To be determined
FOP: Field Operating Procedure

3.0 Approach and Sampling Methodologies

3.1 Sampling Approach

Indicate sampling approaches to be used (select approach)

1 ■ Due to the lack of site information the approach will be determined in the field based on professional judgment of the field team.

2 ☐ Due to the lack of site information the approach will be determined in the field based on professional judgment of US EPA.

3 ☐ Due to the lack of site information the approach will be determined in the field based on professional judgment of local regulator.

4 ■ Judgmental (Biased for extent of delineation surveys)

5 ☐ Random

6 ■ Systematic (systematic random grid)

7 ■ Transects

8 ☐ Search-Grid

If a search-grid, specify grid type (circle one): Square Triangle Rectangle

Size of contamination hot-spot to be detected:________________

Shape of hot-spot (circle one): Circle Elliptical Elongated-Elliptical

Required Grid Spacing :________________

Acceptable probability of missing hot-spot (circle one): 5 % 10 % 20% 40%

3.2 Field Analysis Equipment

Field analysis equipment requirements are summarized in Table B1.

Table B1
Field Analytical Equipment

Analysis Equipment Specify the field analytical procedures to be used. Select the appropriate boxes.	**Model**	**Analyses**	**Matrix**	**Resource/Contractor**
☐ X-Ray Fluorescence (XRF) Device [for metals]				
☐ Lumex (XRF) Mercury Instrument				
☐ Oil Analysis Kit [for oils]				
☐ Immunoassay Test Kits [pesticides, oils, chlorinated substances]				
☐ Chlor-N-Soil/Chlor-N-Oil test kits[PCBs, chlorinated substances]				
☐ pH Meter				
☐ Other field test kits [for pesticides] ______				
■ Ludlum ratemeter with gamma detector	2241-2 or 2221 with 44-10	gamma radiation	soil	EPA
■ Ludlum ratemeter with alpha detector	2200 with 43-78	alpha radiation	air filter	EPA ORIA
☐				
☐				

3.3 Field Sampling Equipment

Field equipment requirements are summarized in Table B2.

Table B2
Field Sampling and Decontamination Equipment

Analyses and Matrix	Sampling Equipment	Dedicated or Reusable	Decontamination Solution	Resource/ Contractor
EPA Method 901.1, Gamma Emitting Radionuclides / Soil	Plastic scoop	Dedicated	Not Applicable	General Engineering Laboratory and EPA
EPA method 903.1, Radium-226 Radon Emanation Technique / Air filter	Hi-Q high volume air sampler with F&J, Model FR-4.0 M filter	Reusable	Water with wipe	General Engineering Laboratory and EPA ORIA
FOP 5, Air Filter Field Screening / Air filter	Hi-Q high volume air sampler with F&J, Model FR-4.0 M filter	Reusable	Water with wipe	EPA ORIA
Method TBD, Radon-222 / Gas	TBD	Reusable	Water with wipe	ORIA
FOP 2, Radiation Scanning Survey / Gamma in air	Ludlum Model 2241-2 or Model 2221 with Model 44-10	Reusable	Water with wipe	EPA
FOP 3, Radiation Static Measurement / Gamma in air	Ludlum Model 2241-2 or Model 2221 with Model 44-10	Reusable	Water with wipe	EPA

Add additional pages if necessary.

3.4 Field Methods and Procedures

3.4.1 Sample Locations. Indicate the sampling location name, describe location, and indicate rationale for each sample location chosen.

Sample locations to delineate the extent of contamination will be selected in the field based on professional judgment. Sample locations for the final status survey will be determined in the field upon completion of the removal action (locations are dependant on the size of each survey unit). Sample numbers, for both soil samples and static gamma measurements, will follow the format below:

Survey unit abbreviation-survey unit number-sequential number in the form of XX#-##-##, where X represent a letter and # represent a number from zero to nine.

For example, Home Site 1 will have a survey unit abbreviation of HS1, thus the third sample number collected from the second survey unit would have the sample number HS1-02-03.

Sketch a map of the site and any areas of concern. Indicate sampling locations or sampling areas in Figure A and included names. Use a scale that is meaningful for the sampling work covered under this plan. Sketch out where the samples will be collected and include sampling location names. Attach a local map to this plan if it is available.

Figure A **Sample Location Map**
To be drawn in the field and/or documented in the project logbook. Samples locations will determine in the field and recorded with GPS and a sketch will be made in the field logbook. In addition, measurements will be made for soil samples relative to a fixed position selected in the field.

Add additional maps if necessary.

3.4.2 Sample Labeling and Documentation

Sample Jar Labels
Sample labels will clearly identify the particular sample and should include the following:

1. Site name
2. Time and date samples were taken
3. Sample preservation
4. Analysis requested
5. Sample location and/or identification number

Sample labels will be securely affixed to the sample container.

Chain of Custody Record
A chain of custody record will be maintained from the time the sample is taken to its final deposition. Every transfer of custody must be noted and signed for, and a copy of this record kept by each individual who has signed. When samples (or groups of samples) are not under direct control of the individual responsible for them, they must be stored in a secured container sealed with a custody seal.

The chain of custody record should include (at minimum) the following:

1. Sample identification number
2. Sample information
3. Sample location
4. Sample date and time
5. Names(s) and signature(s) of sampler(s)
6. Signature(s) of any individual(s) with control over samples

Custody Seals
Custody seals demonstrate that a sample container has not been tampered with or opened. The individual in possession of the sample(s) will sign and date the seal, affixing it in such a manner that the container cannot be opened without breaking the seal. The name of this individual, along with a description of the samples' packaging, should be noted in the field book.

All sample documents will be completed legibly in ink. Any corrections or revisions will be made by lining through the incorrect entry and by initialing the error. These include the logbooks, the chain of custody forms, this field QASP and any other tracking forms.

Field Logbook
The field logbook is essentially a descriptive notebook detailing site activities and observations so that an accurate account of field procedures can be reconstructed in the writer's absence. All entries will be dated and signed by the individuals making the entries and will include the following:

1. Site name and project number
2. Names of sampling personnel
3. Dates and times of all entries (military time preferred)
4. Descriptions of all site activities, especially sampling start and ending times. Include site entry and exit times
5. Noteworthy events and discussions
6. Weather conditions
7. Site observations
8. Identification and description of samples and locations

9. Subcontractor information and names of on-site personnel
10. Date and time of sample collections, along with chain of custody information
11. Record of photographs
12. Site sketches
13. Exact times of various activities and occurrences related to sampling
14. Deviations from standard procedures or methods and the rational for the deviations.

3.4.3 Sample Containers and Preservatives

Containers and preservatives are summarized in Table C.

Table C
Containers and Preservatives

Analyses and Matrix	Container Type (per sample)	Preservation Method	Holding Time
EPA Method 901.1 / Soil	8 ounce jar	None	6 months
EPA Method 903.1 / Air filter	Paper envelope	None	6 months
FOP 5, Air Filter Field Screening / Air filter	Paper envelope	None	24 hours
TBD / Radon-222 gas	TBD	None	TBD
FOP 2, Radiation Scanning Survey / Gamma radiation	None (real-time measurement)	None	None
FOP 3, Radiation Static Measurement / Gamma radiation	None (real-time measurement)	None	None

Add additional pages if necessary.

3.5 Analytical Methods and Procedures

The analytical methods per sample and sample location are presented in Table D. General field QC considerations and requirements are presented in Table E.

Table D
Sample Locations and Data Objective Summary

Sampling Locations and Identifiers should correspond to location indicated on Figure A					
Sample Location(s) (should match with 3.3.1 and Figure A)	**Sample Identifiers**	**Analytical Method** Refer to Table A	**Data Use Objective(s)** Refer to Section 2.1	**Data Category** Refer to Section 2.3	**Samples Matrix**
Each survey unit for Home Site number 4, 6, 7, 8, and 9	Assigned in the field depending on the final status survey	EPA Method 901.1	4, 5, 7	3C	Soil
Each survey unit for Home Site number 4, 6, 7, 8, and 9	Assigned in the field depending on location	Field screening static gamma measurement with Ludlum 44-10 sodium iodide scintillation detector	4, 5, 7	2B	Soil
Each survey unit for Home Site number 4, 6, 7, 8, and 9	None	Field screening scanning gamma measurement with Ludlum 44-10 sodium iodide scintillation detector	4, 5, 7	1	Soil

Add additional pages if necessary.

3.6 Quality Assurance and Quality Control

General field QA/QC considerations and requirements are presented in Table E.

Table E
Quality Control Samples and Data Quality Indicator Goals

C Sample	Number/Frequency	Data Quality Indicator Goals & Evaluation Criteria	Comments/Exceptions *Site specific remarks:*
FIELD SPECIFIED QA/QC			
ckground or reference sample	At least one sample should be collected from an area believed to be unaffected by source contamination.	Source samples should be at least 3 times background.	Surface soil: up-slope. Surface water: upstream. Ground water: up-gradient. *:Not Applicable, background concentration already determined.*
eld Blanks	1 per SDG[1], per matrix, per method	Source samples should be at least 3 times the blank.	Water only. *:Not Applicable*
avel Blanks	1 per SDG, per matrix, per method	Source samples should be at least 3 times the blank.	Volatile analytes, water only. *:Not Applicable*
uipment Blanks	1 per SDG, per matrix, per method	Source samples should be at least 3 times the blank.	Only when the use of decontaminated non-dedicated equipment is involved. *: Not Applicable*
eld Duplicates or Replicates	1 per SDG, per matrix, per method	Water - 25% RPD[2] Soil - 35% RPD[2] Other - 35%	As needed by sampling objectives. The procedure for collecting duplicate samples can greatly effect the reproducibility. *:One sample per set of ten.*
erformance Standards	1 per project, per matrix, per method	75 -125 %R[3]	If available. *:Performed by the laboratory*
SELECTED LABORATORY QA/AC			
lethod Blank	1 per SDG, per matrix, per method	Stds and samples should be at least 3 times the blank.	Mandatory.
latrix Spike	1 per SDG, per matrix, per method on field designated sample.	75 -125 %R	Designate sample on COC.
latrix Spike Duplicate or eplicate	1 per SDG, per matrix, per method on field designated sample.	≤50 RPD for organics; ≤20 RPD for metals	Designate sample on COC.
eference Standards	1 per SDG, per matrix, per method	75 -125 %R	If available.
nternal Standards	All samples	50 -200 %R	All GC/MS and some GC analyses only.
aboratory Control Standards	1 per SDG, per matrix, per method	75 - 125 %R	Per method for organic analyses.

[1] SDG = Sample Delivery Group (Maximum 20 samples)
[2] RPD = Relative Percent Difference
[3] %R = Percent Recovery

Revised: March 15, 2005

4.0 Project Organization and Responsibilities

4.1 Schedule of Sampling Activities

Sampling activities are summarized in Table F.

Table F Proposed Schedule of Work For Sampling Activities		
Activity	**Start Date**	**End Date**
Confirmatory data collection for comparison to PRP data	November 2006	December 2006

Add additional pages if necessary.

4.2 Project Laboratories

Laboratories used for this project are summarized in Table G.

Table G Laboratories	
Lab Name/ Location	**Methods**
TBD	EPA 901.1

Add additional pages if necessary.

4.3 Project Personnel and Responsibilities

Personnel and responsibilities are summarized in Table H.

Table H Sample Team(s) Personnel	
Personnel (Agency)	**Responsibility**
Robin Clemens	Project Manager, Sampler
Carl Palladino	Sampler, Support

Add additional pages if necessary.

4.4 Modification or Additions to the Generic Data Quality Objective for Emergency and Time Critical Sampling

Project specific modification to the generic DQO statements for this are summarized in Table I. Also indicate which DQO step corresponds to the addition or modification.

Table I DQO Modifications and Additions	
Additions or Modifications to the Generic DQO Output Statements	**DQO Step**

Add additional pages if necessary

UPPER CONFIDENCE LIMIT TABLES

Table D-1
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - NECR-1 [a]
Northeast Church Rock Mine Site, New Mexico

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	47	44	15	<0.25	2.9	4.4	0.67	Inconclusive	na	nc	nc	Gamma	**5.2**	**5.2**
Molybdenum	47	4	214	11	32	8.8	3.6	Inconclusive	na	nc	nc	Non-parametric	**29**	**29**
Radium-226	48	48	93	1.2	27	29	0.91	Inconclusive	na	nc	nc	Gamma	**39**	**39**
Selenium	47	44	69	<0.10	17	14	1.3	Inconclusive	na	nc	nc	Gamma	**20**	**20**
Uranium	47	47	758	1.2	148	82	1.8	Inconclusive	na	nc	nc	Gamma	**117**	**117**
Vanadium	47	47	76	19	13	39	0.32	Normal	na	nc	nc	Normal	**42**	**42**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-2
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - NECR-2 [a]
Northeast Church Rock Mine Site, New Mexico

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	19	19	8.1	1.3	1.70	4.0	0.43	Normal	na	nc	nc	Normal	**4.6**	**4.6**
Radium-226	24	24	160	1.2	37	23	1.6	Inconclusive	na	nc	nc	Gamma	**39**	**39**
Selenium	19	15	27	<0.10	7.4	5.8	1.3	Inconclusive	na	nc	nc	Gamma	**11**	**11**
Uranium	19	19	370	1.5	85	40	2.1	Inconclusive	na	nc	nc	Gamma	**85**	**85**
Vanadium	19	19	67	16	12	35	0.34	Inconclusive	na	nc	nc	Gamma	**40**	**40**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-3
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Ponds 1 & 2 [a]
Northeast Church Rock Mine Site, New Mexico

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	23	23	8.8	2.2	1.5	4.3	0.3	Inconclusive	na	nc	nc	Gamma	**4.9**	**4.9**
Radium-226	24	24	655	1.0	161	89	1.8	Inconclusive	na	nc	nc	Gamma	**179**	**179**
Selenium	23	21	159	<0.10	37	21	1.8	Inconclusive	na	nc	nc	Gamma	**43**	**43**
Uranium	23	23	1,080	1.0	239	104	2.3	Inconclusive	na	nc	nc	Gamma	**223**	**223**
Vanadium	23	23	198	25	39	53	0.7	Inconclusive	na	nc	nc	Non-parametric	**89**	**89**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-4
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Ponds 3/3a [a]
Northeast Church Rock Mine Site, New Mexico

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	15	15	8.1	2.7	1.4	5.3	0.25	Normal	na	nc	nc	Normal	**6.0**	**6.0**
Radium-226	16	16	875	1.4	226	102	2.2	Lognormal	na	nc	nc	Lognormal	**253**	**253**
Selenium	15	15	72	0.70	18	11	1.7	Inconclusive	na	nc	nc	Gamma	**21**	**21**
Uranium	15	15	3,970	1.9	1,052	437	2.4	Lognormal	na	nc	nc	Lognormal	**1,141**	**1,141**
Vanadium	15	15	118	19	25	46	0.54	Inconclusive	na	nc	nc	Gamma	**58**	**58**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-5
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Sediment Pad [a]
Northeast Church Rock Mine Site, New Mexico

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	14	13	12	<0.25	2.9	2.9	1.0	Inconclusve	na	nc	nc	Gamma	**4.5**	**4.5**
Radium-226	14	14	236	0.50	64	61	1.1	Inconclusve	na	nc	nc	Gamma	**109**	**109**
Selenium	14	13	79	<0.10	24	22	1.1	Inconclusve	na	nc	nc	Gamma	**43**	**43**
Uranium	14	14	1,640	1.9	433	196	2.2	Lognormal	na	nc	nc	Lognormal	**513**	**513**
Vanadium	14	14	502	22	433	79	1.6	Inconclusve	na	nc	nc	Non-parametric	**223**	**223**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-6
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Sandfill #1 [a]
Northeast Church Rock Mine Site, New Mexico

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	18	18	6.7	2.0	1.4	4.2	0.35	Normal	na	nc	nc	Normal	**4.7**	**4.7**
Radium-226	18	18	47	0.80	11	9.3	1.2	Inconclusive	na	nc	nc	Gamma	**15**	**15**
Selenium	18	18	19	0.20	4.5	2.6	1.7	Inconclusive	na	nc	nc	Gamma	**4.5**	**4.5**
Uranium	18	18	41	0.70	13	7.8	1.6	Lognormal	na	nc	nc	Lognormal	**16**	**16**
Vanadium	18	18	81	12	16	28	0.55	Inconclusive	na	nc	nc	Gamma	**35**	**35**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-7
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Sandfill #2 [a]
Northeast Church Rock Mine Site, New Mexico

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	13	13	9.0	3.2	2.1	5.2	0.39	Inconclusive	na	nc	nc	Gamma	**6.4**	**6.4**
Radium-226	13	13	36	0.80	11	10	1.1	Inconclusive	na	nc	nc	Gamma	**19**	**19**
Selenium	13	12	6.3	<0.10	1.98	1.8	1.1	Inconclusive	na	nc	nc	Gamma	**3.4**	**3.4**
Uranium	13	13	41	0.70	13	10	1.3	Inconclusive	na	nc	nc	Gamma	**20**	**20**
Vanadium	13	13	54	12	12	36	0.32	Normal	na	nc	nc	Normal	**42**	**42**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-8
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Sandfill #3 [a]
Northeast Church Rock Mine Site, New Mexico

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	13	13	5.3	1.5	1.2	3.5	0.34	Normal	na	nc	nc	Normal	**4.0**	**4.0**
Radium-226	14	14	123	1.0	27	17	1.60	Inconclusive	na	nc	nc	Non-parametric	**69**	**69**
Selenium	13	12	34	<0.10	11	8.8	1.29	Inconclusive	na	nc	nc	Gamma	**18**	**18**
Uranium	13	13	396	0.90	110	66	1.67	Inconclusive	na	nc	nc	Gamma	**185**	**185**
Vanadium	13	13	55	21	124	79	1.56	Inconclusive	na	nc	nc	Non-parametric	**223**	**55**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-9
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - NEMSA [a]
Northeast Church Rock Mine Site, New Mexico

	Number of									Z-score Plots				
Surface Soil COPC	**Samples**	**Detections**	**Max Detect**	**Min Result**	**Stdev**	**Mean**	**CV**	**Shapiro-Wilkes Test**	**D'Agostino's Test**	**Normal r^2**	**Lognormal r^2**	**Assumed Distribution**	**ProUCL EPC [b]**	**EPC [c]**
Arsenic	6	6	4.3	0.70	1.4	3.4	0.41	Inconclusive	na	nc	nc	Non-parametric	**5.9**	**4.3**
Radium-226	6	6	47	0.90	18	9.1	2.0	Inconclusive	na	nc	nc	Non-parametric	**42**	**42**
Selenium	6	5	19	<0.10	7.4	3.9	1.9	Lognormal	na	nc	nc	Lognormal	**12**	**12**
Uranium	6	6	80	0.90	31	16	2.0	Lognormal	na	nc	nc	Lognormal	**75**	**75**
Vanadium	6	6	42	18	7.6	30	0.26	Normal	na	nc	nc	Normal	**36**	**36**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-10
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Boneyard [a]
Northeast Church Rock Mine Site, New Mexico

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	5.5	1.3	1.6	3.9	0.42	Normal	na	nc	nc	Normal	**5.5**	**5.5**
Radium-226	5	5	46	1.10	20	10	1.9	Normal	na	nc	nc	Non-parametric	**49**	**46**
Selenium	5	4	17	<0.10	7.3	3.7	2.0	Lognormal	na	nc	nc	Lognormal	**11**	**11**
Uranium	5	5	17	0.80	7.2	4.6	1.6	Lognormal	na	nc	nc	Lognormal	**12**	**12**
Vanadium	5	5	41	26	5.7	32	0.18	Normal	na	nc	nc	Normal	**37**	**37**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-11
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Vents 3 & 8 [a]
Northeast Church Rock Mine Site, New Mexico

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	5.1	2.3	1.1	3.3	0.33	Normal	na	nc	nc	Normal	**4.4**	**4.4**
Radium-226	5	5	137	1.4	59	31	1.9	Lognormal	na	nc	nc	Lognormal	**92**	**92**
Selenium	5	5	27	0.20	11	7.3	1.6	Lognormal	na	nc	nc	Lognormal	**30**	**27**
Uranium	5	5	358	1.1	157	77	2.0	Lognormal	na	nc	nc	Lognormal	**224**	**224**
Vanadium	5	5	55	9.0	17	30	0.57	Normal	na	nc	nc	Normal	**47**	**47**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-12
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Trailer Park [a]
Northeast Church Rock Mine Site, New Mexico

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	4	6.1	<0.25	2.4	4.2	0.57	Normal	na	nc	nc	Normal	**6.4**	**6.1**
Radium-226	5	5	33	2.1	16	17	0.95	Normal	na	nc	nc	Normal	**32**	**32**
Selenium	5	5	101	0.80	43	30	1.4	Normal	na	nc	nc	Normal	**71**	**71**
Uranium	5	5	139	1.7	56	43	1.3	Normal	na	nc	nc	Normal	**96**	**96**
Vanadium	5	5	78	32	20	50	0.40	Normal	na	nc	nc	Normal	**69**	**69**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-13
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - NECR-1 [a]
Northeast Church Rock Mine Site, New Mexico

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	11	8	7.9	<0.25	2.8	3.7	0.75	Normal	na	nc	nc	Normal	**5.2**	**5.2**
Radium-226	11	11	67	1.9	22	25	0.89	Inconclusive	na	nc	nc	Gamma	**46**	**46**
Selenium	11	10	30	<0.10	10.0	9.8	1.01	Normal	na	nc	nc	Normal	**15**	**15**
Uranium	11	11	141	8.5	38	66	0.57	Normal	na	nc	nc	Normal	**87**	**87**
Vanadium	11	11	54	31	6	43	0.15	Normal	na	nc	nc	Normal	**46**	**46**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-14
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - NECR-2 [a]
Northeast Church Rock Mine Site, New Mexico

Subsurface Soil COPC	Number of: Samples	Number of: Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots: Normal r^2	Z-score Plots: Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	6	6	3.6	2.9	0.27	3.3	0.08	Normal	na	nc	nc	Normal	**3.5**	**3.5**
Radium-226	6	6	13	1.2	4.6	5.9	0.79	Normal	na	nc	nc	Normal	**9.7**	**9.7**
Selenium	6	6	4.0	0.80	1.2	1.7	0.72	Normal	na	nc	nc	Normal	**2.7**	**2.7**
Uranium	6	6	71	9.7	21	33	0.64	Normal	na	nc	nc	Normal	**50**	**50**
Vanadium	6	6	35	19	6.4	29	0.22	Normal	na	nc	nc	Normal	**34**	**34**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-15
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Ponds 1 & 2 [a]
Northeast Church Rock Mine Site, New Mexico

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	11	9	6.4	1.4	1.4	4.6	0.29	Normal	na	nc	nc	Normal	**5.3**	**5.3**
Radium-226	11	11	438	0.7	167	90	1.9	Inconclusive	na	nc	nc	Gamma	**352**	**352**
Selenium	11	11	227	<0.25	77	40	1.9	Inconclusive	na	nc	nc	Gamma	**168**	**168**
Uranium	11	11	760	1.3	223	148	1.51	Inconclusive	na	nc	nc	Gamma	**380**	**380**
Vanadium	11	11	173	30	53	59	0.90	Inconclusive	na	nc	nc	Non-parametric	**129**	**129**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-16
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Ponds 3/3a [a]
Northeast Church Rock Mine Site, New Mexico

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	11	11	6.7	2.9	1.3	4.8	0.27	Normal	na	nc	nc	Normal	**5.5**	**5.5**
Radium-226	11	11	16	0.70	5.6	4.0	1.4	Inconclusive	na	nc	nc	Non-parametric	**11**	**11**
Selenium	11	4	3.1	<0.10	1.1	0.8	1.5	Inconclusive	na	nc	nc	Non-parametric	**2.3**	**2.3**
Uranium	11	11	116	0.70	41	29	1.4	Inconclusive	na	nc	nc	Gamma	**93**	**93**
Vanadium	11	11	46	22	7	30	0.22	Normal	na	nc	nc	Normal	**34**	**34**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-17
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Sediment Pad [a]
Northeast Church Rock Mine Site, New Mexico

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	9	9	5.5	0.60	1.9	2.7	0.71	Normal	na	nc	nc	Normal	**3.8**	**3.8**
Radium-226	9	9	165	2.8	55	70	0.78	Normal	na	nc	nc	Normal	**104**	**104**
Selenium	9	9	161	2.4	51	55	0.93	Normal	na	nc	nc	Normal	**86**	**86**
Uranium	9	9	357	19	111	161	0.69	Normal	na	nc	nc	Normal	**230**	**230**
Vanadium	9	9	75	29	19	53	0.35	Normal	na	nc	nc	Normal	**65**	**65**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-18
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Sandfill #1 [a]
Northeast Church Rock Mine Site, New Mexico

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	9	9	14	1.1	4.0	5.3	0.767	Normal	na	nc	nc	Normal	**7.8**	**7.8**
Radium-226	9	9	113	0.60	43	39	1.1	Inconclusive	na	nc	nc	Gamma	**106**	**106**
Selenium	9	9	34	0.40	12	11	1.1	Normal	na	nc	nc	Normal	**18**	**18**
Uranium	9	9	92	0.80	35	38	0.93	Normal	na	nc	nc	Normal	**60**	**60**
Vanadium	9	9	49	10	14	34	0.42	Normal	na	nc	nc	Normal	**43**	**43**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-19
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Sandfill #2 [a]
Northeast Church Rock Mine Site, New Mexico

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	5.3	3.1	0.83	3.9	0.22	Normal	na	nc	nc	Normal	**4.7**	**4.7**
Radium-226	5	5	3.8	1.1	1.0	2.2	0.46	Normal	na	nc	nc	Normal	**3.2**	**3.2**
Selenium	5	3	0.70	<0.10	0.26	0.36	0.72	Normal	na	nc	nc	Normal	**0.61**	**0.61**
Uranium	5	5	27	2.5	11	10	1.1	Normal	na	nc	nc	Normal	**20**	**20**
Vanadium	5	5	51	30	8.2	41	0.20	Normal	na	nc	nc	Normal	**48**	**48**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-20
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Sandfill #3 [a]
Northeast Church Rock Mine Site, New Mexico

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	7	7	6.9	0.80	2.1	3.9	0.54	Normal	na	nc	nc	Normal	**5.4**	**5.4**
Radium-226	7	7	84	1.2	29	28	1.0	Normal	na	nc	nc	Normal	**49**	**49**
Selenium	7	7	39	0.80	16	12	1.3	Inconclusive	na	nc	nc	Gamma	**40**	**39**
Uranium	7	7	488	21	156	163	0.96	Inconclusive	na	nc	nc	Gamma	**356**	**356**
Vanadium	7	7	63	29	12	42	0.28	Normal	na	nc	nc	Normal	**51**	**51**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-21
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - NEMSA [a]
Northeast Church Rock Mine Site, New Mexico

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	12	11	4.9	<0.25	1.8	2.2	0.82	Inconclusive	na	nc	nc	Gamma	**3.7**	**3.7**
Radium-226	12	12	140	0.80	47	45	1.0	Normal	na	nc	nc	Normal	**69**	**69**
Selenium	12	9	132	<0.10	45	32	1.4	Inconclusive	na	nc	nc	Gamma	**119**	**119**
Uranium	12	12	390	1.4	123	125	0.98	Inconclusive	na	nc	nc	Gamma	**242**	**242**
Vanadium	12	12	47	25	7.6	35	0.22	Normal	na	nc	nc	Normal	**39**	**39**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-22
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Boneyard [a]
Northeast Church Rock Mine Site, New Mexico

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	11	11	5.2	0.80	1.41	3.8	0.37	Normal	na	nc	nc	Normal	**4.6**	**4.6**
Radium-226	11	11	51	1.1	19	11	1.75	Inconclusive	na	nc	nc	Non-parametric	**36**	**36**
Selenium	11	8	33	<0.10	12	5.8	1.99	Lognormal	na	nc	nc	Lognormal	**17**	**17**
Uranium	11	11	240	0.80	93	46	2.01	Lognormal	na	nc	nc	Lognormal	**124**	**124**
Vanadium	11	11	38	22	5.3	29	0.18	Normal	na	nc	nc	Normal	**32**	**32**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-23
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Home Site #1 [a]
Northeast Church Rock Site

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	5.7	2.3	1.3	3.4	0.40	Normal	na	nc	nc	Normal	**4.6**	**4.6**
Radium-226	5	5	1.5	0.90	0.24	1.2	0.20	Normal	na	nc	nc	Normal	**1.4**	**1.4**
Selenium	5	5	0.30	0.10	0.089	0.16	0.56	Normal	na	nc	nc	Normal	**0.25**	**0.25**
Uranium	5	5	1.4	0.80	0.22	1.0	0.21	Normal	na	nc	nc	Normal	**1.2**	**1.2**
Vanadium	5	5	32	22	4.2	28	0.15	Inconclusive	na	nc	nc	Normal	**30**	**30**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/g. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-24
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Home Site #2 [a]
Northeast Church Rock Site

Surface Soil COPC	Number of: Samples	Number of: Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots: Normal r^2	Z-score Plots: Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	5.9	3.6	0.89	4.6	0.19	Normal	na	nc	nc	Normal	**5.5**	**5.5**
Radium-226	5	5	0.90	0.90	na	na	na	na	na	nc	nc	na	na	**0.90**
Selenium	5	5	1.2	0.30	0.37	0.62	0.60	Normal	na	nc	nc	Normal	**0.97**	**0.97**
Uranium	5	5	1.0	0.70	0.14	0.90	0.16	Normal	na	nc	nc	Normal	**1.0**	**1.0**
Vanadium	5	5	38	33	1.48	36	0.041	Normal	na	nc	nc	Normal	**37**	**37**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/g. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-25
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Home Site #3 [a]
Northeast Church Rock Site

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	6.4	3.3	1.3	4.2	0.31	Normal	na	nc	nc	Normal	**5.5**	**5.5**
Radium-226	5	5	1.2	0.90	0.11	1.1	0.10	Normal	na	nc	nc	Normal	**1.2**	**1.2**
Selenium	5	5	0.70	0.10	0.30	0.32	0.95	Inconclusive	na	nc	nc	Non-parametric	**0.62**	**0.62**
Uranium	5	5	1.4	0.70	0.26	1.0	0.25	Normal	na	nc	nc	Normal	**1.3**	**1.3**
Vanadium	5	5	43	29	5.6	35	0.16	Normal	na	nc	nc	Normal	**40**	**40**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/g. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-26
Summary Statistics and Derived 95% UCLs for Residential Receptors
Post-Removal Surface Soil - Home Site #4 [a]
Northeast Church Rock Site

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	2	2	3.9	3.0	0.6	3.5	nc	na	na	nc	nc	na	**nc**	**3.9**
Radium-226	7	7	3.46	0.97	0.9	1.59	0.57	NOT NORMAL	na	nc	nc	LOGNORMAL	**2.26**	**2.26**
Selenium	2	1	0.8	0.8	0.49	0.45	nc	na	na	nc	nc	na	**nc**	**0.8**
Uranium	2	2	1.5	1.1	0.3	1.3	nc	na	na	nc	nc	na	**nc**	**1.5**
Vanadium	2	2	34	27	4.9	30	nc	na	na	nc	nc	na	**nc**	**33.5**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/g. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-27
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Home Site #5 [a]
Northeast Church Rock Site

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	7.2	3.0	1.7	4.6	0.37	Normal	na	nc	nc	Normal	**6.2**	**6.2**
Radium-226	5	5	2.1	1.9	0.47	1.3	0.35	Normal	na	nc	nc	Normal	**1.8**	**1.8**
Selenium	5	5	1.2	0.70	0.19	0.92	0.21	Normal	na	nc	nc	Normal	**1.1**	**1.1**
Uranium	5	5	2.4	0.80	0.65	1.3	0.49	Normal	na	nc	nc	Normal	**1.9**	**1.9**
Vanadium	5	5	32	24	3.2	29	0.11	Normal	na	nc	nc	Normal	**32**	**32**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/g. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-28
Summary Statistics and Derived 95% UCLs for Residential Receptors
Post-Removal Surface Soil - Home Site #6 [a]
Northeast Church Rock Site

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Radium-226	35	35	2.43	0.51	0.38	0.79	0.48	NOT NORMAL	na	nc	nc	NON-PARAMETRIC	**0.90**	**0.90**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] Results for radium-226 are presented in pCi/g. Post-removal confirmation samples were not analyzed for metals. Original metals results are presented in Appendix B. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-29
Summary Statistics and Derived 95% UCLs for Residential Receptors
Post-Removal Surface Soil - - Home Site #7 [a]
Northeast Church Rock Site

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Radium-226	49	49	1.58	0.55	0.16	0.74	0.21	NOT NORMAL	na	nc	nc	NON-PARAMETRIC	**0.78**	**0.78**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] Results for radium-226 are presented in pCi/g. Post-removal confirmation samples were not analyzed for metals. Original metals results are presented in Appendix B. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-30
Summary Statistics and Derived 95% UCLs for Residential Receptors
Post-Removal Surface Soil - Home Site #8 [a]
Northeast Church Rock Site

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Radium-226	40	40	1.81	0.54	0.24	0.84	0.29	NOT NORMAL	na	nc	nc	NON-PARAMETRIC	**0.90**	**0.90**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] Results for radium-226 are presented in pCi/g. Post-removal confirmation samples were not analyzed for metals. Original metals results are presented in Appendix B. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E-31
Summary Statistics and Derived 95% UCLs for Residential Receptors
Post-Removal Surface Soil - Home Site #9 [a]
Northeast Church Rock Site

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Radium-226	39	39	1.04	0.54	0.12	0.80	0.15	NORMAL	na	nc	nc	NORMAL	**0.84**	**0.84**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] Results for radium-226 are presented in pCi/g. Post-removal confirmation samples were not analyzed for metals. Original metals results are presented in Appendix B. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-32
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Background Data [a]
Northeast Church Rock Site

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	25	25	10	2.0	2.0	3.7	0.54	Inconclusive	na	nc	nc	Non-Parametric	**4.4**	**4.4**
Radium-226	25	25	1.3	0.60	0.18	1.0	0.18	Normal	na	nc	nc	Normal	**1.1**	**1.1**
Selenium	25	25	0.70	0.10	0.21	0.35	0.59	Inconclusive	na	nc	nc	Non-Parametric	**0.53**	**0.53**
Uranium	25	25	1.8	0.80	0.23	1.1	0.20	Inconclusive	na	nc	nc	Non-Parametric	**1.2**	**1.2**
Vanadium	25	25	41	18	5.84	27	0.22	Normal	na	nc	nc	Normal	**29**	**29**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-33
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Arroyo [a]
Northeast Church Rock Site

	Number of									Z-score Plots				
Surface Soil COPC	**Samples**	**Detections**	**Max Detect**	**Min Result**	**Stdev**	**Mean**	**CV**	**Shapiro-Wilkes Test**	**D'Agostino's Test**	**Normal r^2**	**Lognormal r^2**	**Assumed Distribution**	**ProUCL EPC [b]**	**EPC [c]**
Radium-226	15	15	26	9.7	4.80	17	0.29	Normal	na	nc	nc	Normal	**19**	**19**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table D-34
Summary Statistics and Derived 95% UCLs for Residential Receptors
Subsurface Soil - Arroyo [a]
Northeast Church Rock Site

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	30	30	8.2	1.2	2.0	3.4	0.59	Inconclusive	na	nc	nc	Gamma	**4.1**	**4.1**
Radium-226	30	30	36	8.4	5.97	16	0.36	Inconclusive	na	nc	nc	Gamma	**1.1**	**1.1**
Selenium	30	29	14	0.10	3.68	5.4	0.68	Inconclusive	na	nc	nc	Gamma	**6.9**	**6.9**
Uranium	30	30	108	14	20	27	0.72	Normal	na	nc	nc	Normal	**33**	**33**
Vanadium	30	30	38	20	5.5	29	0.19	Normal	na	nc	nc	Normal	**30**	**30**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Subsurface soil is >0.5 to 10 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

APPENDIX E

HUMAN HEALTH EXPOSURE POINT CALCULATIONS AND RISK ESTIMATES FOR HOME SITES

Table E.1
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - NECR-1 [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	47	44	15	<0.25	2.9	4.4	0.67	Inconclusive	na	nc	nc	Gamma	**5.2**	**5.2**
Molybdenum	47	4	214	11	32	8.8	3.6	Inconclusive	na	nc	nc	Non-parametric	**29**	**29**
Radium-226	48	48	93	1.2	27	29	0.91	Inconclusive	na	nc	nc	Gamma	**39**	**39**
Selenium	47	44	69	<0.10	17	14	1.3	Inconclusive	na	nc	nc	Gamma	**20**	**20**
Uranium	47	47	758	1.2	148	82	1.8	Inconclusive	na	nc	nc	Gamma	**117**	**117**
Vanadium	47	47	76	19	13	39	0.32	Normal	na	nc	nc	Normal	**42**	**42**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.2
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - NECR-2 [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	19	19	8.1	1.3	1.70	4.0	0.43	Normal	na	nc	nc	Normal	**4.6**	**4.6**
Radium-226	24	24	160	1.2	37	23	1.6	Inconclusive	na	nc	nc	Gamma	**39**	**39**
Selenium	19	15	27	<0.10	7.4	5.8	1.3	Inconclusive	na	nc	nc	Gamma	**11**	**11**
Uranium	19	19	370	1.5	85	40	2.1	Inconclusive	na	nc	nc	Gamma	**85**	**85**
Vanadium	19	19	67	16	12	35	0.34	Inconclusive	na	nc	nc	Gamma	**40**	**40**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.3
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Ponds 1 & 2 [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	23	23	8.8	2.2	1.5	4.3	0.3	Inconclusive	na	nc	nc	Gamma	**4.9**	**4.9**
Radium-226	24	24	655	1.0	161	89	1.8	Inconclusive	na	nc	nc	Gamma	**179**	**179**
Selenium	23	21	159	<0.10	37	21	1.8	Inconclusive	na	nc	nc	Gamma	**43**	**43**
Uranium	23	23	1,080	1.0	239	104	2.3	Inconclusive	na	nc	nc	Gamma	**223**	**223**
Vanadium	23	23	198	25	39	53	0.7	Inconclusive	na	nc	nc	Non-parametric	**89**	**89**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.4
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Ponds 3/3a [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	15	15	8.1	2.7	1.4	5.3	0.25	Normal	na	nc	nc	Normal	**6.0**	**6.0**
Radium-226	16	16	875	1.4	226	102	2.2	Lognormal	na	nc	nc	Lognormal	**253**	**253**
Selenium	15	15	72	0.70	18	11	1.7	Inconclusive	na	nc	nc	Gamma	**21**	**21**
Uranium	15	15	3,970	1.9	1,052	437	2.4	Lognormal	na	nc	nc	Lognormal	**1,141**	**1,141**
Vanadium	15	15	118	19	25	46	0.54	Inconclusive	na	nc	nc	Gamma	**58**	**58**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.5
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Sediment Pad [a]

Surface Soil COPC	Number of		Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots		Assumed Distribution	ProUCL EPC [b]	EPC [c]
	Samples	Detections								Normal r^2	Lognormal r^2			
Arsenic	14	13	12	<0.25	2.9	2.9	1.0	Inconclusve	na	nc	nc	Gamma	**4.5**	**4.5**
Radium-226	14	14	236	0.50	64	61	1.1	Inconclusve	na	nc	nc	Gamma	**109**	**109**
Selenium	14	13	79	<0.10	24	22	1.1	Inconclusve	na	nc	nc	Gamma	**43**	**43**
Uranium	14	14	1,640	1.9	433	196	2.2	Lognormal	na	nc	nc	Lognormal	**513**	**513**
Vanadium	14	14	502	22	433	79	1.6	Inconclusve	na	nc	nc	Non-parametric	**223**	**223**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.6
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Sandfill #1 [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	18	18	6.7	2.0	1.4	4.2	0.35	Normal	na	nc	nc	Normal	**4.7**	**4.7**
Radium-226	18	18	47	0.80	11	9.3	1.2	Inconclusive	na	nc	nc	Gamma	**15**	**15**
Selenium	18	18	19	0.20	4.5	2.6	1.7	Inconclusive	na	nc	nc	Gamma	**4.5**	**4.5**
Uranium	18	18	41	0.70	13	7.8	1.6	Lognormal	na	nc	nc	Lognormal	**16**	**16**
Vanadium	18	18	81	12	16	28	0.55	Inconclusive	na	nc	nc	Gamma	**35**	**35**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.7
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Sandfill #2 [a]

Surface Soil COPC	Number of		Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots		Assumed Distribution	ProUCL EPC [b]	EPC [c]
	Samples	Detections								Normal r^2	Lognormal r^2			
Arsenic	13	13	9.0	3.2	2.1	5.2	0.39	Inconclusive	na	nc	nc	Gamma	**6.4**	**6.4**
Radium-226	13	13	36	0.80	11	10	1.1	Inconclusive	na	nc	nc	Gamma	**19**	**19**
Selenium	13	12	6.3	<0.10	1.98	1.8	1.1	Inconclusive	na	nc	nc	Gamma	**3.4**	**3.4**
Uranium	13	13	41	0.70	13	10	1.3	Inconclusive	na	nc	nc	Gamma	**20**	**20**
Vanadium	13	13	54	12	12	36	0.32	Normal	na	nc	nc	Normal	**42**	**42**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.8
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Sandfill #3 [a]

Surface Soil COPC	Number of		Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots		Assumed Distribution	ProUCL EPC [b]	EPC [c]
	Samples	Detections								Normal r^2	Lognormal r^2			
Arsenic	13	13	5.3	1.5	1.2	3.5	0.34	Normal	na	nc	nc	Normal	**4.0**	**4.0**
Radium-226	14	14	123	1.0	27	17	1.60	Inconclusive	na	nc	nc	Non-parametric	**69**	**69**
Selenium	13	12	34	<0.10	11	8.8	1.29	Inconclusive	na	nc	nc	Gamma	**18**	**18**
Uranium	13	13	396	0.90	110	66	1.67	Inconclusive	na	nc	nc	Gamma	**185**	**185**
Vanadium	13	13	55	21	124	79	1.56	Inconclusive	na	nc	nc	Non-parametric	**223**	**55**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.9
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - NEMSA [a]

Surface Soil COPC	Number of		Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots		Assumed Distribution	ProUCL EPC [b]	EPC [c]
	Samples	Detections								Normal r^2	Lognormal r^2			
Arsenic	6	6	4.3	0.70	1.4	3.4	0.41	Inconclusive	na	nc	nc	Non-parametric	**5.9**	**4.3**
Radium-226	6	6	47	0.90	18	9.1	2.0	Inconclusive	na	nc	nc	Non-parametric	**42**	**42**
Selenium	6	5	19	<0.10	7.4	3.9	1.9	Lognormal	na	nc	nc	Lognormal	**12**	**12**
Uranium	6	6	80	0.90	31	16	2.0	Lognormal	na	nc	nc	Lognormal	**75**	**75**
Vanadium	6	6	42	18	7.6	30	0.26	Normal	na	nc	nc	Normal	**36**	**36**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.10
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Boneyard [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	5.5	1.3	1.6	3.9	0.42	Normal	na	nc	nc	Normal	**5.5**	**5.5**
Radium-226	5	5	46	1.10	20	10	1.9	Normal	na	nc	nc	Non-parametric	**49**	**46**
Selenium	5	4	17	<0.10	7.3	3.7	2.0	Lognormal	na	nc	nc	Lognormal	**11**	**11**
Uranium	5	5	17	0.80	7.2	4.6	1.6	Lognormal	na	nc	nc	Lognormal	**12**	**12**
Vanadium	5	5	41	26	5.7	32	0.18	Normal	na	nc	nc	Normal	**37**	**37**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.11
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Vents 3 & 8 [a]

Surface Soil COPC	Number of		Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots		Assumed Distribution	ProUCL EPC [b]	EPC [c]
	Samples	Detections								Normal r^2	Lognormal r^2			
Arsenic	5	5	5.1	2.3	1.1	3.3	0.33	Normal	na	nc	nc	Normal	**4.4**	**4.4**
Radium-226	5	5	137	1.4	59	31	1.9	Lognormal	na	nc	nc	Lognormal	**92**	**92**
Selenium	5	5	27	0.20	11	7.3	1.6	Lognormal	na	nc	nc	Lognormal	**30**	**27**
Uranium	5	5	358	1.1	157	77	2.0	Lognormal	na	nc	nc	Lognormal	**224**	**224**
Vanadium	5	5	55	9.0	17	30	0.57	Normal	na	nc	nc	Normal	**47**	**47**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.12
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Surface Soil - Trailer Park [a]

Surface Soil COPC	Number of		Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots		Assumed Distribution	ProUCL EPC [b]	EPC [c]
	Samples	Detections								Normal r^2	Lognormal r^2			
Arsenic	5	4	6.1	<0.25	2.4	4.2	0.57	Normal	na	nc	nc	Normal	**6.4**	**6.1**
Radium-226	5	5	33	2.1	16	17	0.95	Normal	na	nc	nc	Normal	**32**	**32**
Selenium	5	5	101	0.80	43	30	1.4	Normal	na	nc	nc	Normal	**71**	**71**
Uranium	5	5	139	1.7	56	43	1.3	Normal	na	nc	nc	Normal	**96**	**96**
Vanadium	5	5	78	32	20	50	0.40	Normal	na	nc	nc	Normal	**69**	**69**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.13
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - NECR-1 [a]

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	11	8	7.9	<0.25	2.8	3.7	0.75	Normal	na	nc	nc	Normal	**5.2**	**5.2**
Radium-226	11	11	67	1.9	22	25	0.89	Inconclusive	na	nc	nc	Gamma	**46**	**46**
Selenium	11	10	30	<0.10	10.0	9.8	1.01	Normal	na	nc	nc	Normal	**15**	**15**
Uranium	11	11	141	8.5	38	66	0.57	Normal	na	nc	nc	Normal	**87**	**87**
Vanadium	11	11	54	31	6	43	0.15	Normal	na	nc	nc	Normal	**46**	**46**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.14
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - NECR-2 [a]

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	6	6	3.6	2.9	0.27	3.3	0.08	Normal	na	nc	nc	Normal	**3.5**	**3.5**
Radium-226	6	6	13	1.2	4.6	5.9	0.79	Normal	na	nc	nc	Normal	**9.7**	**9.7**
Selenium	6	6	4.0	0.80	1.2	1.7	0.72	Normal	na	nc	nc	Normal	**2.7**	**2.7**
Uranium	6	6	71	9.7	21	33	0.64	Normal	na	nc	nc	Normal	**50**	**50**
Vanadium	6	6	35	19	6.4	29	0.22	Normal	na	nc	nc	Normal	**34**	**34**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.15
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Ponds 1 & 2 [a]

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	11	9	6.4	1.4	1.4	4.6	0.29	Normal	na	nc	nc	Normal	**5.3**	**5.3**
Radium-226	11	11	438	0.7	167	90	1.9	Inconclusive	na	nc	nc	Gamma	**352**	**352**
Selenium	11	11	227	<0.25	77	40	1.9	Inconclusive	na	nc	nc	Gamma	**168**	**168**
Uranium	11	11	760	1.3	223	148	1.51	Inconclusive	na	nc	nc	Gamma	**380**	**380**
Vanadium	11	11	173	30	53	59	0.90	Inconclusive	na	nc	nc	Non-parametric	**129**	**129**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.16
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Ponds 3/3a [a]

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	11	11	6.7	2.9	1.3	4.8	0.27	Normal	na	nc	nc	Normal	**5.5**	**5.5**
Radium-226	11	11	16	0.70	5.6	4.0	1.4	Inconclusive	na	nc	nc	Non-parametric	**11**	**11**
Selenium	11	4	3.1	<0.10	1.1	0.8	1.5	Inconclusive	na	nc	nc	Non-parametric	**2.3**	**2.3**
Uranium	11	11	116	0.70	41	29	1.4	Inconclusive	na	nc	nc	Gamma	**93**	**93**
Vanadium	11	11	46	22	7	30	0.22	Normal	na	nc	nc	Normal	**34**	**34**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.17
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Sediment Pad [a]

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	9	9	5.5	0.60	1.9	2.7	0.71	Normal	na	nc	nc	Normal	**3.8**	**3.8**
Radium-226	9	9	165	2.8	55	70	0.78	Normal	na	nc	nc	Normal	**104**	**104**
Selenium	9	9	161	2.4	51	55	0.93	Normal	na	nc	nc	Normal	**86**	**86**
Uranium	9	9	357	19	111	161	0.69	Normal	na	nc	nc	Normal	**230**	**230**
Vanadium	9	9	75	29	19	53	0.35	Normal	na	nc	nc	Normal	**65**	**65**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.18
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Sandfill #1 [a]

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	9	9	14	1.1	4.0	5.3	0.767	Normal	na	nc	nc	Normal	**7.8**	**7.8**
Radium-226	9	9	113	0.60	43	39	1.1	Inconclusive	na	nc	nc	Gamma	**106**	**106**
Selenium	9	9	34	0.40	12	11	1.1	Normal	na	nc	nc	Normal	**18**	**18**
Uranium	9	9	92	0.80	35	38	0.93	Normal	na	nc	nc	Normal	**60**	**60**
Vanadium	9	9	49	10	14	34	0.42	Normal	na	nc	nc	Normal	**43**	**43**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.19
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Sandfill #2 [a]

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	5.3	3.1	0.83	3.9	0.22	Normal	na	nc	nc	Normal	**4.7**	**4.7**
Radium-226	5	5	3.8	1.1	1.0	2.2	0.46	Normal	na	nc	nc	Normal	**3.2**	**3.2**
Selenium	5	3	0.70	<0.10	0.26	0.36	0.72	Normal	na	nc	nc	Normal	**0.61**	**0.61**
Uranium	5	5	27	2.5	11	10	1.1	Normal	na	nc	nc	Normal	**20**	**20**
Vanadium	5	5	51	30	8.2	41	0.20	Normal	na	nc	nc	Normal	**48**	**48**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.20
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Sandfill #3 [a]

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	7	7	6.9	0.80	2.1	3.9	0.54	Normal	na	nc	nc	Normal	**5.4**	**5.4**
Radium-226	7	7	84	1.2	29	28	1.0	Normal	na	nc	nc	Normal	**49**	**49**
Selenium	7	7	39	0.80	16	12	1.3	Inconclusive	na	nc	nc	Gamma	**40**	**39**
Uranium	7	7	488	21	156	163	0.96	Inconclusive	na	nc	nc	Gamma	**356**	**356**
Vanadium	7	7	63	29	12	42	0.28	Normal	na	nc	nc	Normal	**51**	**51**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.21
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - NEMSA [a]

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	12	11	4.9	<0.25	1.8	2.2	0.82	Inconclusive	na	nc	nc	Gamma	**3.7**	**3.7**
Radium-226	12	12	140	0.80	47	45	1.0	Normal	na	nc	nc	Normal	**69**	**69**
Selenium	12	9	132	<0.10	45	32	1.4	Inconclusive	na	nc	nc	Gamma	**119**	**119**
Uranium	12	12	390	1.4	123	125	0.98	Inconclusive	na	nc	nc	Gamma	**242**	**242**
Vanadium	12	12	47	25	7.6	35	0.22	Normal	na	nc	nc	Normal	**39**	**39**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.22
Summary Statistics and Derived 95% UCLs for Onsite Receptors
Subsurface Soil - Boneyard [a]

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	11	11	5.2	0.80	1.41	3.8	0.37	Normal	na	nc	nc	Normal	**4.6**	**4.6**
Radium-226	11	11	51	1.1	19	11	1.75	Inconclusive	na	nc	nc	Non-parametric	**36**	**36**
Selenium	11	8	33	<0.10	12	5.8	1.99	Lognormal	na	nc	nc	Lognormal	**17**	**17**
Uranium	11	11	240	0.80	93	46	2.01	Lognormal	na	nc	nc	Lognormal	**124**	**124**
Vanadium	11	11	38	22	5.3	29	0.18	Normal	na	nc	nc	Normal	**32**	**32**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.23
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Home Site #1 [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	5.7	2.3	1.3	3.4	0.40	Normal	na	nc	nc	Normal	**4.6**	**4.6**
Radium-226	5	5	1.5	0.90	0.24	1.2	0.20	Normal	na	nc	nc	Normal	**1.4**	**1.4**
Selenium	5	5	0.30	0.10	0.089	0.16	0.56	Normal	na	nc	nc	Normal	**0.25**	**0.25**
Uranium	5	5	1.4	0.80	0.22	1.0	0.21	Normal	na	nc	nc	Normal	**1.2**	**1.2**
Vanadium	5	5	32	22	4.2	28	0.15	Inconclusive	na	nc	nc	Normal	**30**	**30**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.24
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Home Site #2 [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	5.9	3.6	0.89	4.6	0.19	Normal	na	nc	nc	Normal	**5.5**	**5.5**
Radium-226	5	5	0.90	0.90	na	na	na	na	na	nc	nc	na	na	**0.90**
Selenium	5	5	1.2	0.30	0.37	0.62	0.60	Normal	na	nc	nc	Normal	**0.97**	**0.97**
Uranium	5	5	1.0	0.70	0.14	0.90	0.16	Normal	na	nc	nc	Normal	**1.0**	**1.0**
Vanadium	5	5	38	33	1.48	36	0.041	Normal	na	nc	nc	Normal	**37**	**37**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.25
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Home Site #3 [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	6.4	3.3	1.3	4.2	0.31	Normal	na	nc	nc	Normal	**5.5**	**5.5**
Radium-226	5	5	1.2	0.90	0.11	1.1	0.10	Normal	na	nc	nc	Normal	**1.2**	**1.2**
Selenium	5	5	0.70	0.10	0.30	0.32	0.95	Inconclusive	na	nc	nc	Non-parametric	**0.62**	**0.62**
Uranium	5	5	1.4	0.70	0.26	1.0	0.25	Normal	na	nc	nc	Normal	**1.3**	**1.3**
Vanadium	5	5	43	29	5.6	35	0.16	Normal	na	nc	nc	Normal	**40**	**40**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.26
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Home Site #4 [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	6.0	3.0	1.2	4.1	0.29	Normal	na	nc	nc	Normal	**5.2**	**5.2**
Radium-226	5	5	3.6	1.3	1.0	2.3	0.42	Normal	na	nc	nc	Normal	**3.2**	**3.2**
Selenium	5	5	1.6	0.10	0.55	0.86	0.64	Normal	na	nc	nc	Normal	**1.4**	**1.4**
Uranium	5	5	3.5	1.1	1.0	2.1	0.49	Normal	na	nc	nc	Normal	**3.0**	**3.0**
Vanadium	5	5	34	29	3.0	29	0.11	Normal	na	nc	nc	Normal	**31**	**31**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.27
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Home Site #5 [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	7.2	3.0	1.7	4.6	0.37	Normal	na	nc	nc	Normal	**6.2**	**6.2**
Radium-226	5	5	2.1	1.9	0.47	1.3	0.35	Normal	na	nc	nc	Normal	**1.8**	**1.8**
Selenium	5	5	1.2	0.70	0.19	0.92	0.21	Normal	na	nc	nc	Normal	**1.1**	**1.1**
Uranium	5	5	2.4	0.80	0.65	1.3	0.49	Normal	na	nc	nc	Normal	**1.9**	**1.9**
Vanadium	5	5	32	24	3.2	29	0.11	Normal	na	nc	nc	Normal	**32**	**32**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.28
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Home Site #6 [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	4.5	4.2	0.15	4.4	0.035	Normal	na	nc	nc	Normal	**4.5**	**4.5**
Radium-226	5	5	15	5.6	3.9	9.4	0.41	Normal	na	nc	nc	Normal	**13**	**13**
Selenium	5	5	2.7	1.5	0.45	2.0	0.23	Normal	na	nc	nc	Normal	**2.4**	**2.4**
Uranium	5	5	13	5.7	2.6	9.8	0.27	Normal	na	nc	nc	Normal	**12**	**12**
Vanadium	5	5	38	34	1.8	36	0.051	Normal	na	nc	nc	Normal	**38**	**38**

Notes:

95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.

COPC - Chemical of potential concern.

CV - Coefficient of variation.

EPC - Exposure point concentration.

Lognormal r^2 - Correlation coefficient for the lognormal plot.

na - Not applicable.

nc - Not calculated.

Normal r^2 - Correlation coefficient for the normal plot.

Stdev - Standard deviation.

[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Surface soil is 0.0 to 0.5 ft bgs.

[b] Based upon calculations performed using ProUCL v.3.

[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.29
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Home Site #7 [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	5.5	3.4	0.82	4.7	0.18	Normal	na	nc	nc	Normal	**5.5**	**5.5**
Radium-226	5	5	30	3.4	11	11	0.96	Inconclusive	na	nc	nc	Inconclusive	**30**	**30**
Selenium	5	5	6.3	1.2	2.17	2.5	0.88	Inconclusive	na	nc	nc	Gamma	**5.9**	**5.9**
Uranium	5	5	21	2.3	6.8	10	0.68	Normal	na	nc	nc	Normal	**17**	**17**
Vanadium	5	5	50	28	8.9	37	0.24	Normal	na	nc	nc	Normal	**46**	**46**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.30
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Home Site #8 [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	5.3	2.7	1.0	3.7	0.28	Normal	na	nc	nc	Normal	**4.7**	**4.7**
Radium-226	5	5	5.6	2.3	1.3	3.4	0.39	Normal	na	nc	nc	Normal	**4.6**	**4.6**
Selenium	5	5	1.2	0.10	0.43	0.50	0.86	Normal	na	nc	nc	Normal	**0.91**	**0.91**
Uranium	5	5	6.4	2.1	1.8	4.3	0.42	Normal	na	nc	nc	Normal	**6.0**	**6.0**
Vanadium	5	5	39	31	2.9	34	0.084	Normal	na	nc	nc	Normal	**37**	**37**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.31
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Home Site #9 [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	5	5	5.0	2.8	0.85	4.0	0.21	Normal	na	nc	nc	Normal	**4.8**	**4.8**
Radium-226	5	5	6.7	2.6	1.7	4.3	0.40	Normal	na	nc	nc	Normal	**5.9**	**5.9**
Selenium	5	5	1.8	0.40	0.53	1.0	0.52	Normal	na	nc	nc	Normal	**1.5**	**1.5**
Uranium	5	5	19	3.3	5.9	10	0.59	Normal	na	nc	nc	Normal	**16**	**16**
Vanadium	5	5	33	26	2.6	29	0.089	Normal	na	nc	nc	Normal	**32**	**32**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.32
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Background Data [a]

Surface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	25	25	10	2.0	2.0	3.7	0.54	Inconclusive	na	nc	nc	Non-Parametric	**4.4**	**4.4**
Radium-226	25	25	1.3	0.60	0.18	1.0	0.18	Normal	na	nc	nc	Normal	**1.1**	**1.1**
Selenium	25	25	0.70	0.10	0.21	0.35	0.59	Inconclusive	na	nc	nc	Non-Parametric	**0.53**	**0.53**
Uranium	25	25	1.8	0.80	0.23	1.1	0.20	Inconclusive	na	nc	nc	Non-Parametric	**1.2**	**1.2**
Vanadium	25	25	41	18	5.84	27	0.22	Normal	na	nc	nc	Normal	**29**	**29**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.33
Summary Statistics and Derived 95% UCLs for Residential Receptors
Surface Soil - Arroyo [a]

Surface Soil COPC	Number of		Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots		Assumed Distribution	ProUCL EPC [b]	EPC [c]
	Samples	Detections								Normal r^2	Lognormal r^2			
Radium-226	15	15	26	9.7	4.80	17	0.29	Normal	na	nc	nc	Normal	**19**	**19**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Surface soil is 0.0 to 0.5 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

Table E.34
Summary Statistics and Derived 95% UCLs for Residential Receptors
Subsurface Soil - Arroyo [a]

Subsurface Soil COPC	Number of Samples	Number of Detections	Max Detect	Min Result	Stdev	Mean	CV	Shapiro-Wilkes Test	D'Agostino's Test	Z-score Plots Normal r^2	Z-score Plots Lognormal r^2	Assumed Distribution	ProUCL EPC [b]	EPC [c]
Arsenic	30	30	8.2	1.2	2.0	3.4	0.59	Inconclusive	na	nc	nc	Gamma	**4.1**	**4.1**
Radium-226	30	30	36	8.4	5.97	16	0.36	Inconclusive	na	nc	nc	Gamma	**1.1**	**1.1**
Selenium	30	29	14	0.10	3.68	5.4	0.68	Inconclusive	na	nc	nc	Gamma	**6.9**	**6.9**
Uranium	30	30	108	14	20	27	0.72	Normal	na	nc	nc	Normal	**33**	**33**
Vanadium	30	30	38	20	5.5	29	0.19	Normal	na	nc	nc	Normal	**30**	**30**

Notes:
95% UCL - 95 percent upper confidence limit (UCL) on the mean concentration.
COPC - Chemical of potential concern.
CV - Coefficient of variation.
EPC - Exposure point concentration.
Lognormal r^2 - Correlation coefficient for the lognormal plot.
mg/kg - Milligrams per kilogram.
na - Not applicable.
nc - Not calculated.
Normal r^2 - Correlation coefficient for the normal plot.
Stdev - Standard deviation.
[a] All results in mg/kg except for radium-226 which are presented in pCi/L. Subsurface soil is >0.5 to 10 ft bgs.
[b] Based upon calculations performed using ProUCL v.3.
[c] The EPC is based on either the 95% UCL or the maximum concentration, which ever is lower.

TABLE E-35
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - WESTERN HOME SITES
Pre-Removal Shallow Soil - Residential Receptor - Scenario 1
Northeast Church Rock Mine Site, New Mexico

		Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
HOME SITE #4									
Arsenic	5.2	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	2E-06	0.03
Radium-226	3.2	**3E-06**	NA	2E-09	NA	**3E-06**	0	**2E-06**	0
Selenium	1.4	NA	0.004	NA	NA	0E+00	0.004	0E+00	0.002
Uranium	3.0	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.04
Vanadium	31	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.005
Cumulative ILCR/HQ:		**2E-05**	0.3	2E-08	NA	**2E-05**	0.3	**4E-06**	0.08
BACKGROUND									
Arsenic	4.4	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	NA	NA
Radium-226	1.1	1E-06	NA	7E-10	NA	1E-06	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	1E-08	NA	**1E-05**	0.3	NA	NA
USEPA Risk Range:						10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Yellow highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.

TABLE E-36
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - WESTERN HOME SITES
Pre-Removal Shallow Soil - Residential Receptor - Scenario 2
Northeast Church Rock Mine Site, New Mexico

														Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Ingestion of Produce		Ingestion of Meat		Ingestion of Eggs		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
HOME SITE #4																	
Arsenic	5.2	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	**2E-06**	0.03
Radium-226	3.2	**3E-06**	NA	**5E-05**	NA	**1E-04**	NA	**3E-06**	NA	2E-09	NA	**2E-04**	NA	**4E-04**	0	**3E-04**	0
Selenium	1.4	NA	0.004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.004	0E+00	0.002
Uranium	3.0	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.04
Vanadium	31	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.005
Cumulative ILCR/HQ:		**2E-05**	0.3	**5E-05**	NA	**1E-04**	NA	**3E-06**	NA	2E-08	NA	**2E-04**	NA	**4E-04**	0.3	**3E-04**	0.08
BACKGROUND																	
Arsenic	4.4	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	NA	NA
Radium-226	1.1	1E-06	NA	**2E-05**	NA	**4E-05**	NA	9E-07	NA	7E-10	NA	**8E-05**	NA	**1E-04**	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	**2E-05**	NA	**4E-05**	NA	9E-07	NA	1E-08	NA	**8E-05**	NA	**2E-04**	0.3	NA	NA
													USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Yellow highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4 or HQ of 1.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.

NA - Not applicable.
USEPA - U. S. Environmental Protection Agency

TABLE E-37
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - EASTERN HOME SITES
Pre-Removal Shallow Soil - Residential Receptor - Scenario 1
Northeast Church Rock Mine Site, New Mexico

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates[a]: Ingestion of Soil ILCR	Ingestion of Soil HQ	Inhalation of Fugitive Dust ILCR	Inhalation of Fugitive Dust HQ	Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard ILCR	Total Cancer Risk and Hazard HQ	Incremental Cancer Risk and Hazard[c] ILCR	Incremental Cancer Risk and Hazard[c] HQ
HOME SITE #6									
Arsenic	4.5	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	1E-07	0.003
Radium-226	13	1E-05	NA	8E-09	NA	**1E-05**	0	**1E-05**	0
Selenium	2.4	NA	0.006	NA	NA	0E+00	0.006	0E+00	0.005
Uranium	12	NA	0.3	NA	NA	0E+00	0.3	0E+00	0.2
Vanadium	38	NA	0.07	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**2E-05**	0.5	2E-08	NA	**2E-05**	0.5	1E-05	0.3
HOME SITE #7									
Arsenic	5.5	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	**2E-06**	0.04
Radium-226	30	3E-05	NA	2E-08	NA	**3E-05**	0	**3E-05**	0
Selenium	5.9	NA	0.02	NA	NA	0E+00	0.02	0E+00	0.01
Uranium	17	NA	0.4	NA	NA	0E+00	0.4	0E+00	0.3
Vanadium	46	NA	0.08	NA	NA	0E+00	0.08	0E+00	0.03
Cumulative ILCR/HQ:		**4E-05**	0.7	3E-08	NA	**4E-05**	0.7	**3E-05**	0.4
HOME SITE #8									
Arsenic	4.7	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	6E-07	0.01
Radium-226	4.6	**4E-06**	NA	3E-09	NA	**4E-06**	0	**3E-06**	0
Selenium	0.91	NA	0.002	NA	NA	0E+00	0.002	0E+00	0.001
Uranium	6.0	NA	0.1	NA	NA	0E+00	0.1	0E+00	0.1
Vanadium	37	NA	0.07	NA	NA	0E+00	0.07	0E+00	0.01
Cumulative ILCR/HQ:		**2E-05**	0.4	2E-08	NA	**2E-05**	0.4	**4E-06**	0.1
HOME SITE #9									
Arsenic	4.8	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	9E-07	0.02
Radium-226	5.9	**5E-06**	NA	4E-09	NA	**5E-06**	0	**4E-06**	0
Selenium	1.5	NA	0.004	NA	NA	0E+00	0.004	0E+00	0.003
Uranium	16	NA	0.3	NA	NA	0E+00	0.3	0E+00	0.3
Vanadium	32	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.006
Cumulative ILCR/HQ:		**2E-05**	0.6	2E-08	NA	**2E-05**	0.6	**5E-06**	0.3

TABLE E-37
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - EASTERN HOME SITES
Pre-Removal Shallow Soil - Residential Receptor - Scenario 1
Northeast Church Rock Mine Site, New Mexico

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
		Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
		ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
BACKGROUND									
Arsenic	4.4	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	NA	NA
Radium-226	1.1	1E-06	NA	7E-10	NA	1E-06	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	1E-08	NA	**1E-05**	0.3	NA	NA
USEPA Risk Range:						10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).
[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Yellow highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.

TABLE E-38
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - EASTERN HOME SITES
Pre-Removal Shallow Soil - Residential Receptor - Scenario 2
Northeast Church Rock Mine Site, New Mexico

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates[a]: Ingestion of Soil ILCR	Ingestion of Soil HQ	Ingestion of Produce ILCR	Ingestion of Produce HQ	Ingestion of Meat ILCR	Ingestion of Meat HQ	Ingestion of Eggs ILCR	Ingestion of Eggs HQ	Inhalation of Fugitive Dust ILCR	Inhalation of Fugitive Dust HQ	External Exposure ILCR	External Exposure HQ	Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard ILCR	Total Cancer Risk and Hazard HQ	Incremental Cancer Risk and Hazard[c] ILCR	Incremental Cancer Risk and Hazard[c] HQ
HOME SITE #6																	
Arsenic	4.5	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	1E-07	0.003
Radium-226	13	**1E-05**	NA	**2E-04**	NA	**5E-04**	NA	**1E-05**	NA	8E-09	NA	**1E-03**	NA	**2E-03**	0	**2E-03**	0
Selenium	2.4	NA	0.006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.006	0E+00	0.005
Uranium	12	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.3	0E+00	0.2
Vanadium	38	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**2E-05**	0.5	**2E-04**	NA	**5E-04**	NA	**1E-05**	NA	2E-08	NA	**1E-03**	NA	**2E-03**	0.5	**2E-03**	0.3
HOME SITE #7																	
Arsenic	5.5	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	**2E-06**	0.04
Radium-226	30	**3E-05**	NA	**4E-04**	NA	**1E-03**	NA	**2E-05**	NA	2E-08	NA	**2E-03**	NA	**4E-03**	0	**4E-03**	0
Selenium	5.9	NA	0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.02	0E+00	0.01
Uranium	17	NA	0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.4	0E+00	0.3
Vanadium	46	NA	0.08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.08	0E+00	0.03
Cumulative ILCR/HQ:		**4E-05**	0.7	**4E-04**	NA	**1E-03**	NA	**2E-05**	NA	3E-08	NA	**2E-03**	NA	**4E-03**	0.7	**4E-03**	0.4
HOME SITE #8																	
Arsenic	4.7	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	6E-07	0.01
Radium-226	4.6	**4E-06**	NA	**7E-05**	NA	**2E-04**	NA	**4E-06**	NA	3E-09	NA	**4E-04**	NA	**6E-04**	0	**5E-04**	0
Selenium	0.9	NA	0.002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.001
Uranium	6.0	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.1	0E+00	0.1
Vanadium	37	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.01
Cumulative ILCR/HQ:		**2E-05**	0.4	**7E-05**	NA	**2E-04**	NA	**4E-06**	NA	2E-08	NA	**4E-04**	NA	**6E-04**	0.4	**5E-04**	0.1
HOME SITE #9																	
Arsenic	4.8	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	9E-07	0.02
Radium-226	5.9	**5E-06**	NA	**9E-05**	NA	**2E-04**	NA	**5E-06**	NA	4E-09	NA	**5E-04**	NA	**8E-04**	0	**6E-04**	0
Selenium	1.5	NA	0.004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.004	0E+00	0.003
Uranium	16	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.3	0E+00	0.3
Vanadium	32	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.006
Cumulative ILCR/HQ:		**2E-05**	0.6	**9E-05**	NA	**2E-04**	NA	**5E-06**	NA	2E-08	NA	**5E-04**	NA	**8E-04**	0.6	**6E-04**	0.3
BACKGROUND																	
Arsenic	4.4	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	NA	NA
Radium-226	1.1	1E-06	NA	**2E-05**	NA	**4E-05**	NA	9E-07	NA	7E-10	NA	**8E-05**	NA	**1E-04**	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	**2E-05**	NA	**4E-05**	NA	9E-07	NA	1E-08	NA	**8E-05**	NA	**2E-04**	0.3	NA	NA
													USEPA Risk Range:	10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Yellow highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4 or HQ of 1.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.

NA - Not applicable.
USEPA - U. S. Environmental Protection Agency

TABLE E-39
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - WESTERN HOME SITES
Shallow Soil - Residential Receptor - Scenario 1
Northeast Church Rock Mine Site, New Mexico

		Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	EPC[b]	ILCR	HQ	ILCR	HQ	ILCR	HQ	ILCR	HQ
HOME SITE #1									
Arsenic	4.6	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	5E-07	0.009
Radium-226	1.4	1E-06	NA	9E-10	NA	1E-06	0	3E-07	0
Selenium	0.25	NA	0.0006	NA	NA	0E+00	0.0006	0E+00	***-0.0007***
Uranium	1.2	NA	0.03	NA	NA	0E+00	0.03	0E+00	0.001
Vanadium	30	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.003
Cumulative ILCR/HQ:		**1E-05**	0.3	1E-08	NA	**1E-05**	0.3	8E-07	0.01
HOME SITE #2									
Arsenic	5.5	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	2E-06	0.04
Radium-226	0.90	8E-07	NA	6E-10	NA	8E-07	0	***-2E-07***	0
Selenium	0.97	NA	0.002	NA	NA	0E+00	0.002	0E+00	0.001
Uranium	1.0	NA	0.02	NA	NA	0E+00	0.02	0E+00	***-0.004***
Vanadium	37	NA	0.07	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**1E-05**	0.3	2E-08	NA	**1E-05**	0.3	**2E-06**	0.06
HOME SITE #3									
Arsenic	5.5	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	**2E-06**	0.04
Radium-226	1.2	**1E-06**	NA	7E-10	NA	1E-06	0	**8E-08**	0
Selenium	0.62	NA	0.002	NA	NA	0E+00	0.002	0E+00	0.0002
Uranium	1.3	NA	0.03	NA	NA	0E+00	0.03	0E+00	0.001
Vanadium	40	NA	0.07	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**1E-05**	0.3	2E-08	NA	**1E-05**	0.3	**3E-06**	0.07
HOME SITE #4									
Arsenic	5.2	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	2E-06	0.03
Radium-226	3.2	**3E-06**	NA	2E-09	NA	**3E-06**	0	**2E-06**	0
Selenium	1.4	NA	0.004	NA	NA	0E+00	0.004	0E+00	0.002
Uranium	3.0	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.04
Vanadium	31	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.005
Cumulative ILCR/HQ:		**2E-05**	0.3	2E-08	NA	**2E-05**	0.3	**4E-06**	0.08

TABLE E-39
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - WESTERN HOME SITES
Shallow Soil - Residential Receptor - Scenario 1
Northeast Church Rock Mine Site, New Mexico

		Pathway-Specific Cancer Risk and Noncancer Hazard Estimates [a]				Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Inhalation of Fugitive Dust		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard [c]	
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
HOME SITE #5									
Arsenic	6.2	**1E-05**	0.3	2E-08	NA	**1E-05**	0.3	4E-06	0.08
Radium-226	1.8	**2E-06**	NA	1E-09	NA	**2E-06**	0	6E-07	0
Selenium	1.1	NA	0.003	NA	NA	0E+00	0.003	0E+00	0.001
Uranium	1.9	NA	0.04	NA	NA	0E+00	0.04	0E+00	0.02
Vanadium	32	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.006
Cumulative ILCR/HQ:		**2E-05**	0.4	2E-08	NA	**2E-05**	0.4	**5E-06**	0.1
BACKGROUND									
Arsenic	4.4	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	NA	NA
Radium-226	1.1	1E-06	NA	7E-10	NA	1E-06	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	1E-08	NA	**1E-05**	0.3	NA	NA
USEPA Risk Range:						10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).
[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Yellow highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.

TABLE E-40
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - WESTERN HOME SITES
Shallow Soil - Residential Receptor - Scenario 2
Northeast Church Rock Mine Site, New Mexico

												Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	**Ingestion of Soil**		**Ingestion of Produce**		**Ingestion of Meat**		**Inhalation of Fugitive Dust**		**External Exposure**		**Total Cancer Risk and Hazard**		**Incremental Cancer Risk and Hazard [c]**	
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
HOME SITE #1															
Arsenic	4.6	**1E-05**	0.2	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	5E-07	0.009
Radium-226	1.4	1E-06	NA	**2E-05**	NA	**5E-05**	NA	9E-10	NA	**1E-04**	NA	**2E-04**	0	**4E-05**	0
Selenium	0.25	NA	0.0006	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.0006	0E+00	*-0.0007*
Uranium	1.2	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.001
Vanadium	30	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.003
Cumulative ILCR/HQ:		**1E-05**	0.3	**2E-05**	NA	**5E-05**	NA	1E-08	NA	**1E-04**	NA	**2E-04**	0.3	**4E-05**	0.01
HOME SITE #2															
Arsenic	5.5	**1E-05**	0.2	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	**2E-06**	0.04
Radium-226	0.90	8E-07	NA	**1E-05**	NA	**3E-05**	NA	6E-10	NA	**7E-05**	NA	**1E-04**	0	*-3E-05*	0
Selenium	0.97	NA	0.002	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.001
Uranium	1.0	NA	0.02	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.02	0E+00	*-0.004*
Vanadium	37	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**1E-05**	0.3	**1E-05**	NA	**3E-05**	NA	2E-08	NA	**7E-05**	NA	**1E-04**	0.3	*-2E-05*	0.06
HOME SITE #3															
Arsenic	5.5	**1E-05**	0.2	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	**2E-06**	0.04
Radium-226	1.2	1E-06	NA	**2E-05**	NA	**4E-05**	NA	7E-10	NA	**9E-05**	NA	**2E-04**	0	**1E-05**	0
Selenium	0.62	NA	0.002	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.0002
Uranium	1.3	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	0E+00	0.001
Vanadium	40	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**1E-05**	0.3	**2E-05**	NA	**4E-05**	NA	2E-08	NA	**9E-05**	NA	**2E-04**	0.3	**1E-05**	0.07
HOME SITE #4															
Arsenic	5.2	**1E-05**	0.2	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	**2E-06**	0.03
Radium-226	3.2	**3E-06**	NA	**5E-05**	NA	**1E-04**	NA	2E-09	NA	**2E-04**	NA	**4E-04**	0	**3E-04**	0
Selenium	1.4	NA	0.004	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.004	0E+00	0.002
Uranium	3.0	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.04
Vanadium	31	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.005
Cumulative ILCR/HQ:		**2E-05**	0.3	**5E-05**	NA	**1E-04**	NA	2E-08	NA	**2E-04**	NA	**4E-04**	0.3	**3E-04**	0.08
HOME SITE #5															
Arsenic	6.2	**1E-05**	0.3	NA	NA	NA	NA	2E-08	NA	NA	NA	**1E-05**	0.3	**4E-06**	0.08
Radium-226	1.8	**2E-06**	NA	**3E-05**	NA	**6E-05**	NA	1E-09	NA	**1E-04**	NA	**2E-04**	0	**9E-05**	0
Selenium	1.1	NA	0.003	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.003	0E+00	0.001
Uranium	1.9	NA	0.04	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.04	0E+00	0.02
Vanadium	32	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.006
Cumulative ILCR/HQ:		**2E-05**	0.4	**3E-05**	NA	**6E-05**	NA	2E-08	NA	**1E-04**	NA	**2E-04**	0.4	**9E-05**	0.1
BACKGROUND															
Arsenic	4.4	**1E-05**	0.2	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	NA	NA
Radium-226	1.1	1E-06	NA	**2E-05**	NA	**4E-05**	NA	7E-10	NA	**8E-05**	NA	**1E-04**	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	**2E-05**	NA	**4E-05**	NA	1E-08	NA	**8E-05**	NA	**2E-04**	0.3	NA	NA
USEPA Risk Range:												10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Yellow highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4 or HQ of 1.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk

NA - Not applicable.
USEPA - U. S. Environmental Protection Agency

TABLE E-41
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - EASTERN HOME SITES
Shallow Soil - Residential Receptor - Scenario 1
Northeast Church Rock Mine Site, New Mexico

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates[a]: Ingestion of Soil ILCR	Ingestion of Soil HQ	Inhalation of Fugitive Dust ILCR	Inhalation of Fugitive Dust HQ	Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard ILCR	Total Cancer Risk and Hazard HQ	Incremental Cancer Risk and Hazard[c] ILCR	Incremental Cancer Risk and Hazard[c] HQ
HOME SITE #6									
Arsenic	4.5	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	1E-07	0.003
Radium-226	13	1E-05	NA	8E-09	NA	**1E-05**	0	**1E-05**	0
Selenium	2.4	NA	0.006	NA	NA	0E+00	0.006	0E+00	0.005
Uranium	12	NA	0.3	NA	NA	0E+00	0.3	0E+00	0.2
Vanadium	38	NA	0.07	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**2E-05**	0.5	2E-08	NA	**2E-05**	0.5	1E-05	0.3
HOME SITE #7									
Arsenic	5.5	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	**2E-06**	0.04
Radium-226	30	3E-05	NA	2E-08	NA	**3E-05**	0	**3E-05**	0
Selenium	5.9	NA	0.02	NA	NA	0E+00	0.02	0E+00	0.01
Uranium	17	NA	0.4	NA	NA	0E+00	0.4	0E+00	0.3
Vanadium	46	NA	0.08	NA	NA	0E+00	0.08	0E+00	0.03
Cumulative ILCR/HQ:		**4E-05**	0.7	3E-08	NA	**4E-05**	0.7	**3E-05**	0.4
HOME SITE #8									
Arsenic	4.7	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	6E-07	0.01
Radium-226	4.6	**4E-06**	NA	3E-09	NA	**4E-06**	0	**3E-06**	0
Selenium	0.91	NA	0.002	NA	NA	0E+00	0.002	0E+00	0.001
Uranium	6.0	NA	0.1	NA	NA	0E+00	0.1	0E+00	0.1
Vanadium	37	NA	0.07	NA	NA	0E+00	0.07	0E+00	0.01
Cumulative ILCR/HQ:		**2E-05**	0.4	2E-08	NA	**2E-05**	0.4	**4E-06**	0.1
HOME SITE #9									
Arsenic	4.8	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	9E-07	0.02
Radium-226	5.9	**5E-06**	NA	4E-09	NA	**5E-06**	0	**4E-06**	0
Selenium	1.5	NA	0.004	NA	NA	0E+00	0.004	0E+00	0.003
Uranium	16	NA	0.3	NA	NA	0E+00	0.3	0E+00	0.3
Vanadium	32	NA	0.06	NA	NA	0E+00	0.06	0E+00	0.006
Cumulative ILCR/HQ:		**2E-05**	0.6	2E-08	NA	**2E-05**	0.6	**5E-06**	0.3

TABLE E-41
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - EASTERN HOME SITES
Shallow Soil - Residential Receptor - Scenario 1
Northeast Church Rock Mine Site, New Mexico

Location	Soil Concentration EPC[b]	Pathway-Specific Cancer Risk and Noncancer Hazard Estimates[a]: Ingestion of Soil		Inhalation of Fugitive Dust		Combined Pathway Risk and Hazard Estimates: Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard[c]	
		ILCR	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
BACKGROUND									
Arsenic	4.4	**1E-05**	0.2	1E-08	NA	**1E-05**	0.2	NA	NA
Radium-226	1.1	1E-06	NA	7E-10	NA	1E-06	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	1E-08	NA	**1E-05**	0.3	NA	NA
USEPA Risk Range:						10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Yellow highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.

TABLE E-42
SUMMARY OF HUMAN HEALTH RISK ESTIMATES - EASTERN HOME SITES
Shallow Soil - Residential Receptor - Scenario 2
Northeast Church Rock Mine Site, New Mexico

		Pathway-Specific Cancer Risk and Noncancer Hazard Estimates[a]												Combined Pathway Risk and Hazard Estimates			
	Soil Concentration	Ingestion of Soil		Ingestion of Produce		Ingestion of Meat		Ingestion of Eggs		Inhalation of Fugitive Dust		External Exposure		Total Cancer Risk and Hazard		Incremental Cancer Risk and Hazard[c]	
Location	**EPC[b]**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**	**ILCR**	**HQ**
HOME SITE #6																	
Arsenic	4.5	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	1E-07	0.003
Radium-226	13	**1E-05**	NA	**2E-04**	NA	**5E-04**	NA	**1E-05**	NA	8E-09	NA	**1E-03**	NA	**2E-03**	0	**2E-03**	0
Selenium	2.4	NA	0.006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.006	0E+00	0.005
Uranium	12	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.3	0E+00	0.2
Vanadium	38	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.02
Cumulative ILCR/HQ:		**2E-05**	0.5	**2E-04**	NA	**5E-04**	NA	**1E-05**	NA	2E-08	NA	**1E-03**	NA	**2E-03**	0.5	**2E-03**	0.3
HOME SITE #7																	
Arsenic	5.5	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	**2E-06**	0.04
Radium-226	30	**3E-05**	NA	**4E-04**	NA	**1E-03**	NA	**2E-05**	NA	2E-08	NA	**2E-03**	NA	**4E-03**	0	**4E-03**	0
Selenium	5.9	NA	0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.02	0E+00	0.01
Uranium	17	NA	0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.4	0E+00	0.3
Vanadium	46	NA	0.08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.08	0E+00	0.03
Cumulative ILCR/HQ:		**4E-05**	0.7	**4E-04**	NA	**1E-03**	NA	**2E-05**	NA	3E-08	NA	**2E-03**	NA	**4E-03**	0.7	**4E-03**	0.4
HOME SITE #8																	
Arsenic	4.7	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	6E-07	0.01
Radium-226	4.6	**4E-06**	NA	**7E-05**	NA	**2E-04**	NA	**4E-06**	NA	3E-09	NA	**4E-04**	NA	**6E-04**	0	**5E-04**	0
Selenium	0.9	NA	0.002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.002	0E+00	0.001
Uranium	6.0	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.1	0E+00	0.1
Vanadium	37	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.07	0E+00	0.01
Cumulative ILCR/HQ:		**2E-05**	0.4	**7E-05**	NA	**2E-04**	NA	**4E-06**	NA	2E-08	NA	**4E-04**	NA	**6E-04**	0.4	**5E-04**	0.1
HOME SITE #9																	
Arsenic	4.8	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	9E-07	0.02
Radium-226	5.9	**5E-06**	NA	**9E-05**	NA	**2E-04**	NA	**5E-06**	NA	4E-09	NA	**5E-04**	NA	**8E-04**	0	**6E-04**	0
Selenium	1.5	NA	0.004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.004	0E+00	0.003
Uranium	16	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.3	0E+00	0.3
Vanadium	32	NA	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.06	0E+00	0.006
Cumulative ILCR/HQ:		**2E-05**	0.6	**9E-05**	NA	**2E-04**	NA	**5E-06**	NA	2E-08	NA	**5E-04**	NA	**8E-04**	0.6	**6E-04**	0.3
BACKGROUND																	
Arsenic	4.4	**1E-05**	0.2	NA	NA	NA	NA	NA	NA	1E-08	NA	NA	NA	**1E-05**	0.2	NA	NA
Radium-226	1.1	1E-06	NA	**2E-05**	NA	**4E-05**	NA	9E-07	NA	7E-10	NA	**8E-05**	NA	**1E-04**	0	NA	NA
Selenium	0.53	NA	0.001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.001	NA	NA
Uranium	1.2	NA	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.03	NA	NA
Vanadium	29	NA	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0E+00	0.05	NA	NA
Cumulative ILCR/HQ:		**1E-05**	0.3	**2E-05**	NA	**4E-05**	NA	9E-07	NA	1E-08	NA	**8E-05**	NA	**2E-04**	0.3	NA	NA
												USEPA Risk Range:		10-6 - 10-4	1	10-6 - 10-4	1

Notes:

[a] Based on the Soil Screening Guidance for Radionuclides, Online SSL Calculator for chemicals and radionuclides (USEPA, 2007).

[b] The exposure point concentration (EPC) is the lower of the maximum or 95% UCL concentration. All results are in mg/kg with the exception of Radium-226 which is reported in pCi/g.

[c] Represents the chemical-specific and cumulative risk/hazard for each home site with the background risk/hazard removed.

Boldface indicates ILCR or HQ estimates within USEPA's risk management range.

Italics indicates ILCR or HQ estimates less than zero.

Yellow highlighting indicates potential cause for remedial action due to risk driving status for indicated pathway and/or analyte at a particular location. Risk exceeds USEPA range of 10-6 to 10-4 or HQ of 1.

HQ - Hazard quotient.
ILCR - Incremental lifetime cancer risk.

NA - Not applicable.
USEPA - U. S. Environmental Protection Agency