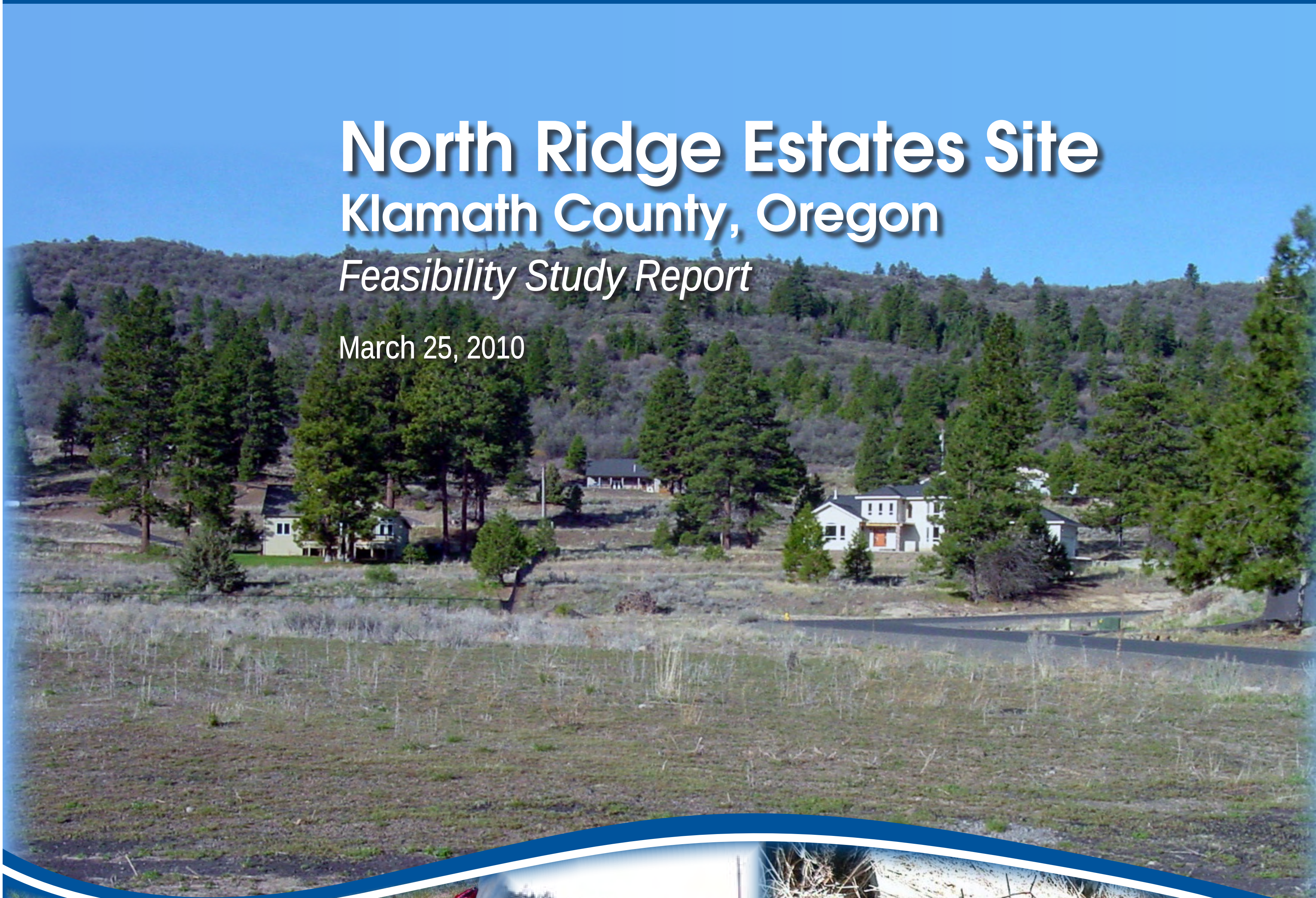
CDM

North Ridge Estates Site
Klamath County, Oregon

Feasibility Study Report

March 25, 2010



FINAL

Response Action Contract
for Remedial, Enforcement Oversight, and Non-Time Critical Removal Activities at Sites of Release or Threatened Release of Hazardous Substances
in EPA Region 8

U.S. EPA Contract No. EP-W-05-049

Final Feasibility Study Report
North Ridge Estates Site
Klamath County, Oregon

Work Assignment No. 217-RICO-10BT

March 25, 2010

Prepared for:

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Region 10
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Abbreviations and Acronyms

ABS	activity-based sampling
ACBM	asbestos containing building material
ACM	asbestos containing material
AMSL	above mean sea level
AOC	Administrative Order of Consent
ARARs	applicable or relevant and appropriate requirements
ARI	ARI Technologies, Inc.
ATSDR	Agency for Toxic Substances and Disease Registry
BLRA	baseline human health risk assessment
CAB	cement asbestos board
CC&Rs	covenants, conditions, and restrictions
CDM	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
COI	contaminant of interest
COPC	contaminant of potential concern
DCE	cis-1,2-dichloroethylene
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DHS	Oregon Department of Human Services
DoD	United States Department of Defense
DOE	U.S. Department of Energy
DOT	Department of Transportation
DQO	data quality objectives
EDC	1,2-dichloroethane
E&E	Ecology and Environmental
EHAP	Oregon Environmental Health Assessment Program
EPA	U. S. Environmental Protection Agency
ERA	ecological risk assessment
FR	forest/range
FRTR	Federal Remediation Technologies Roundtable
FS	feasibility study
GCL	geosynthetic clay liner
GRA	general response action
GSA	General Services Administration
HQ	Hazard Quotient
MAG	magnesium silicate asbestos
MAO	Mutual Agreement and Order
MBK	Melvin Bercot Kenneth Partnership
MRB	marine recuperation barracks
NBEC	nitrate base explosive compound
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NRCS	National Resources Conservation Service
NRE	North Ridge Estates

O&M	operations and maintenance
OAR	Oregon Administrative Rule
OIT	Oregon Institute of Technology
Oregon DEQ	Oregon Department of Environmental Quality
ORS	Oregon Revised Statutes
OSHA	Occupational Safety Health Administration
OTI	Oregon Technology Institute
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PBS	PBS Engineering and Environmental
PCB	polychlorinated biphenyl
PCE	tetracholorethylene
PCME	polarized light microscopy equivalent
PLM	polarized light microscopy
PP	proposed plan
PPE	personal protective equipment
PRAO	preliminary remedial action objective
PRG	preliminary remediation goal
QA/QC	quality assurance/quality control
RA	remedial action
RAC	Remedial Action Contract
RAO	remedial action objective
RD	remedial design
RG	remedial goal
RI	remedial investigation
RL	low density residential
RM	medium density residential
ROD	record of decision
RSL	regional screening level
SCM	site conceptual model
site	North Ridge Estates site
SLV	screening level value
SRC	Syracuse Research Corporation
START-2	EPA Superfund Technical Assistance and Response Team 2 Contract
SVOC	semi-volatile organic compound
TBC	to be considered
TCCT	thermo-chemical conversion technology
TCE	trichloroethene
TEM	transmission electron microscopy
TPH	total petroleum hydrocarbon
TSI	thermal system insulation
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USGS	United States Geological Survey
UST	underground storage tank
VAT	vinyl asbestos tile
VOC	volatile organic compound
WWII	World War II
WWTP	wastewater treatment plant

<	less than
>	greater than
%	percent
°F	degrees Fahrenheit
bgs	below ground surface
cy	cubic yards
ft	feet
ft^2	square feet
lf	linear feet
mg/kg	milligrams per kilogram
mm/year	millimeter per year

Executive Summary

This feasibility study (FS) report for the North Ridge Estates (NRE) site (site) was prepared for the U. S. Environmental Protection Agency (EPA) Region 10 by CDM Federal Programs Corporation (CDM) for Work Assignment No. 217-RICO-10BT under EPA Remedial Action Contract (RAC) No. EP-W-05-049.

This report presents the results of the development, screening, and detailed evaluation of remedial alternatives to address contaminated media for the site in Klamath County, Oregon. The work performed during the FS was in accordance with guidance developed by EPA for conducting RI/FS under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (EPA 1988). In addition, the cost estimates for each alternative were developed in accordance with *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000a).

The NRE site is located approximately 3 miles north of the City of Klamath Falls, in Klamath County, Oregon, on Old Fort Road and North Ridge Drive (Figure 1-1). NRE is sited on the former location of a Marine Recuperation Barracks (MRB) and the Oregon Technology Institute (OTI; now Oregon Institute of Technology [OIT]). While the City of Klamath Falls is at an elevation of 4,100 feet above mean sea level (amsl), the site is at an elevation of 4,800 feet amsl. Peaks surrounding NRE are as high as 5,360 feet amsl to the east and 5,460 feet amsl to the west.

The site has been divided into two Operable Units (OUs) (Figure 1-1):

- OU1 encompasses the footprint for the former MRB and includes all areas where contamination associated with demolition of the MRB, including asbestos containing material (ACM) and/or asbestos, has been observed and/or detected with the exception of the former firing range. Portions of the (b) (6) (Parcel BP) and (b) (6) (Parcel BQ) properties south of the former MRB are included in OU1.This FS focuses on OU1, which is estimated to include approximately 125 acres. OU1 is interchangeably referred to as the site in the remainder of this document.

- OU2 includes the area of the former firing range. It is EPA's current understanding that the United States Army Corps of Engineers (USACE) will be responsible for any further actions in OU2; therefore, this FS will not address remediation of this operable unit. OU2 is estimated to include approximately 46 acres.

The boundary of OU1 has changed since previous versions of this document to reflect only the locations where contamination associated with MRB demolition, including ACM and/or asbestos, has been observed and/or detected with the exception of the former firing range. The observations used to make the boundary changes include all data collected by the responsible party and EPA.

Contaminant of Concern (COC)

The main COC at the site is asbestos. The main source of asbestos at the site is ACM that was used in the original construction of a MRB. As was common in the 1940s, a variety of different types of ACM was used in the construction of the barracks, including cement asbestos board (CAB) on exterior and interior walls, asphalt-asbestos roofing material, vinyl asbestos floor tiles (VAT), floor tile mastic, and several different types of asbestos steam pipe insulation. When buildings containing ACM were demolished, some of the ACM debris was consolidated into waste piles or burial pits, and the rest of the ACM was dispersed in surface and subsurface soil in the vicinity of the demolition. During site development most of this ACM was covered or buried with soil, but some was left exposed.

Types of ACM and Asbestos at NRE

The types of ACM present at NRE include: CAB, VAT, floor tile mastic, roofing material, and steam pipe wrap consisting of insulation (AirCell and magnesium silicate asbestos [MAG]) and tar paper. CAB, VAT, floor tile mastic, roofing materials, and tar paper found at the site contain chrysotile asbestos.

Two lesser known types of ACM used as thermal system insulation (TSI) to wrap steam pipes are found throughout the site. One type of TSI material, AirCell, is a corrugated asbestos paper product used as an outer coating for pipe insulation. Another type of TSI material known as MAG, so called because the major asbestos content in the product is a magnesium silicate, was used to insulate high temperature utilities such as steam or condensate lines. Samples of the insulation present at the site indicate that the AirCell contains chrysotile asbestos and the MAG contains chrysotile and amosite asbestos.

Summary of Asbestos Contamination

ACM is present at the site as both dispersed material scattered across many areas of the site and concentrated portions located at specific areas. The exhibit below summarizes the findings:

General Location	Specific Location	Surficial ACM	Subsurface ACM
Large Land Units	WWTP	App. 5,000 ft^2 as building debris.	None observed
	Landfill	App. 311,893 ft^2 as building debris.	App. 8,890 cy in a centralized location
	Swimming Pool	App. 65,240 ft^2 as building debris.	App. 270 cy
Surface Area of Site	Random dispersal across site	App. 54.65 acres (2,380,637 ft^2) as dispersed debris across the site.	N/A
Burial Areas	48 discrete areas identified in 2003 and 2006 investigations	Most, but not all, of the burial areas are associated with ACM observed at the surface.	Est. 39,328 cy of material, generally shallow depth (2.6 ft deep) but occasionally up to 10 ft deep
	45 discrete areas identified in 2005 and 2006 investigations	See the row "Surface Area of Site" above.	Est. 36,736 cy of material between surface and 6 inches bgs
Buried Steam Piping	Pipe runs across the site	Included as surficial debris.	Est. 12,203 lf of ACM-wrapped pipe (Kennedy/Jenks); Est. 14,695 lf of ACM wrapped pipe (OTI Survey)

Notes: App.-approximate; Est.-estimated; bgs-below ground surface; WWTP – waste water treatment plant; ACM – asbestos containing material; cy – cubic yards; ft^2 – square feet; ft – feet; lf – linear feet

Mechanisms present that could cause previously buried ACM to surface include: migration to the ground surface as a result of "frost jacking" (also known as frost heave); transport to the ground surface by burrowing animals; mechanical wedging and jacking by plant roots; erosion of surficial soil; and human activities (e.g., recreational activities, gardening/yard work and site development).

Once ACM is exposed at the surface ACM may be subjected to the following processes that can result in the release of free asbestos fibers to soil and/or outdoor air:

- Above-ground weathering of the ACM binders
- Fracturing and pulverizing of ACM binders during building demolition, bulldozing, burial, or burning
- Below-ground chemical and physical weathering of the buried ACM binders

Because of the physical properties of asbestos, especially when included in a building material matrix, it is resistant to heat, cold, and weathering. Once released from the building material matrix, asbestos does not break down chemically into other minerals only into smaller fibers. However these smaller fibers can persist for an indefinite period of time. Therefore, without physical removal of ACM or eliminating weathering of ACM asbestos will persist at the site.

Current or future residents at NRE may be exposed to asbestos by three main pathways:

- Inhalation of fibers released during active soil disturbance activities
- Inhalation of fibers in indoor air
- Inhalation of fibers in outdoor (ambient) air

Based on the information currently available and presented in the RI the following conclusions regarding potential risk from ACM have been drawn for the site:

- Current site conditions are such that MAG and AirCell containing friable amosite and chrysotile, present a current risk to residents when soil containing this type of ACM is disturbed by routine outdoor activities. Given the current risk and the widespread distribution of MAG and AirCell at the site, remedial actions are required at the site to mitigate current exposures.
- Due to the potential for future increased risk to residents at the site from ACM that is yet to breakdown, remedial actions should also include alternatives that reduce future exposures to residents and/or can prevent further emergence of ACM to the surface that results in weathering causing the release of asbestos fibers to site soils.
- Currently, asbestos fibers have been observed in indoor and outdoor ambient air below a risk level of 1E-06 that is usually considered to be negligible by EPA and Oregon Department of Environmental Quality (Oregon DEQ); however, these inhalation exposure pathways may be of concern in the future.
- Methods are not presently available to support quantitative evaluation of risks to ecological receptors from asbestos. Based on current site conditions, it is expected that risks are likely to be low for large home range receptors, but might be of concern for small home range receptors, especially those that burrow into the ground and/or chew on ACM. Risks would be expected to increase in the future as ACM continues to break down and release free fibers into the environment.

Other Contaminants of Interest

In addition to the ACM and asbestos concerns at the site, other contaminants of interest (COIs) have been investigated. Based on a non-ACM soil investigation completed in June 2006, concentrations of arsenic at the former power plant were detected above screening level values (SLVs). Coal is known to contain low levels of metals such as arsenic, and arsenic could have accumulated as a byproduct of coal combustion during the operation of the former power plant.

This qualitative assessment also indicated potential risks to ecological receptors from exposure to pesticides (dichlorodiphenyltrichloroethane [DDT] and dichlorodiphenyldichloroethylene [DDE]) in debris and soil within the former landfill. EPA has subsequently performed an evaluation that indicates ecological risks from DDT and DDE at this location do not require further consideration in this FS.

Additional details regarding this issue are documented in the Administrative Record for the site.

Summary of Non-ACM Contamination

Historical uses at the NRE site included activities associated with the release of non-ACM COIs. The COIs that were detected from previous non-ACM investigations above SLVs are summarized in the exhibit below:

Analyte/Location	Power Plant	Maintenance Shop	Laundry Building	Landfill	OTI Maintenance Shop	Paint Shops	Service Station	Fire Station	Rifle Range
TPH									
Gasoline-Range	X	X	NC	X	X	X	X	X	NC
Diesel-Range	X	X		X	X	X	X	X	
Motor-Oil-Range	X	X		X	X	X	X	X	
Organic Contaminants									
EDC	X	X	✓	X	✓	X	X	NC	NC
TCE	X	X	✓	X	✓	X	X		
SVOCs	X	NC	X	X	NC	X	X	NC	NC
PCBs	X	NC	NC	X	NC	X	X	NC	NC
Pesticides	NC	NC	NC	X	NC	X	X	NC	NC
Metals									
Arsenic*	✓	X	NC	✓	X	X	X	NC	X
Lead	X	X	X	X	X	X	X	X	✓

Notes: **X** – all results are below established SLVs for the listed compound; ✓ - at least one sample result is above the established SLV; **NC** – samples for this parameter were not collected at this location; * - The summary for arsenic concentrations only indicates locations where observed levels are above the SLV and the expected background levels; EDC – 1,2-dichloroethane; TCE – trichloroethylene; PCB – polychlorinated biphenyl; SVOC – semi volatile organic compounds; SLV – screening level value; VOC – volatile organic compounds; TPH – total petroleum hydrocarbons

Based on the information currently available and presented in the RI the following conclusions regarding non-ACM risk have been drawn the site:

- Non-ACM COI that exceeded SLVs in soil include: arsenic, mercury, EDC, benzene, chloroform, DCE, PCE, and TCE. There were no contaminants whose maximum concentration exceeded the SLV for excavation workers, and only arsenic was above the SLV for construction workers. Therefore, only arsenic in soil at the former power plant was retained as a COPC for the construction worker.

- Non-asbestos contaminants do not appear to be of concern to ecological receptors except for the potential for risks from DDT and DDE in the landfill. However, further study would be needed to reliably characterize the magnitude of these risks. EPA has subsequently performed an evaluation that indicates ecological risks from DDT and DDE at the landfill do not require further consideration in this FS. Additional details regarding this issue are documented in the Administrative Record for the site.

Applicable or Relevant and Appropriate Requirements (ARARs):

Although all ARARs must be met by a remedial alternative to be selected as a remedy, some ARARs significantly control the scope of alternatives. For this site, two significant ARARs affect determinations of protectiveness. These are the Oregon Environmental Cleanup Law (ORS 465.200 through ORS 465.900) and the Oregon Hazardous Substance Remedial Action Rules (OAR 340-122). These ARARs provide the state's regulatory framework for the determination of removal and remedial action necessary to assure protection of the present and future public health, safety and welfare, and the environment in the event of a release or threat of a release of a hazardous substance. These state laws and regulations have been identified as "applicable" ARARs and thus compliance with the substantive requirements of these laws and regulations is required.

The two related ARARs described above contain a significant difference from EPA guidance with regards to determining protectiveness for remediation of the primary carcinogen identified at the site (asbestos). In general, the EPA considers excess cancer risks that are below 1E-06 to be so small as to be negligible, and risks above 1E-04 to be sufficiently large that some sort of response action is desirable. Excess cancer risks that range between 1E-04 and 1E-06 are generally considered by EPA to be acceptable, although this is evaluated on a case by case basis. The Oregon Hazardous Substance Remedial Action Rules define the level of acceptable risk level for exposures of humans to a single carcinogen to be a lifetime excess cancer risk of one per one million (1E-06) for an individual at an upper-bound exposure.

Preliminary Remedial Action Objectives (PRAOs): Based on the current and future risks posed by site contamination and anticipated land uses for the site (current residential use and future residential or combined residential/non-residential use), the following PRAOs were developed for contamination at the site:

1. Mitigate the potential for inhalation and ingestion exposures by human and ecological receptors to asbestos fibers in soil and indoor air that would result in risks that exceed the target cancer risk specified by Oregon DEQ of 1E-06.

2. Control erosion of asbestos by wind and water to prevent the spread of contamination from source locations to unimpacted locations and media.

3. Mitigate the potential for inhalation and ingestion exposures by human receptors to arsenic in soil within the extent of the former Power Plant that exceed site background concentrations of arsenic in soil and result in risks that exceed the target cancer risk specified by Oregon DEQ of 1E-06.

Identification and Screening of General Response Actions (GRAs), Remedial Technologies, and Response Actions: GRAs, remedial technologies, and process options that are potentially useful to address the PRAOs for contaminated materials are identified and screened in accordance with the NCP. The purpose of this identification and screening process is to retain representative technologies and process options that can be assembled into remedial alternatives.

GRAs are initial broad response actions considered to address the PRAOs for the contaminated material identified at the site. To simplify FS evaluations and alternative descriptions, the contaminated media (debris and soil contaminated with asbestos and/or arsenic) were grouped together and defined as "contaminated materials" to simplify FS evaluations. The GRAs identified to address contaminated materials at the site included the following:

- No Action
- Monitoring
- Land Use Controls
- Containment
- Removal, Transport, and Disposal
- Treatment

Remedial technologies and process options were identified for each of the GRAs and broadly evaluated using a two-step screening process. The first screening step evaluated overall technical implementability and suitability of the technology for treatment of sitewide contamination. Remedial technologies and process options that are retained from the first step are further evaluated for effectiveness, implementability, and relative cost.

The retained remedial technologies and process options were used to assemble remedial alternatives that could comprehensively address human health and ecological risks posed by contaminated materials.

Remedial Technology	Process Option
Physical and/or Chemical Monitoring	- Non-Intrusive Visual Inspection (i.e., surficial inspection) - Intrusive Visual Inspection (i.e., inspection using excavations or boreholes) - Sample Collection and Analysis
Institutional Controls	- Governmental Controls, Proprietary Controls, and Informational Devices
Community Awareness Activities	- Informational and Educational Programs
Access Controls	- Posted Warnings
Surface Source Controls	- Water-Based Suppression - Chemical-Based Suppression - Negative Pressure Enclosure - Soil or Rock Exposure Barrier/Cover - Asphalt or Concrete Exposure Barrier/Cover - Geosynthetic Multi-Layer Exposure Barrier/Cover

Remedial Technology	Process Option
Removal	- Mechanical Excavation - Pneumatic Excavation (Vacuum Extraction/Pumping)
Transport	- Mechanical Transport (Hauling/Conveying) - Pneumatic Transport (Vacuum Extraction/Pumping)
Disposal	- Onsite Disposal - Offsite Disposal
Physical and/or Chemical Treatment	- Physical Separation/ Segregation - Size Reduction
Thermal/Chemical Treatment	- Thermo-Chemical Treatment

Development and Screening of Alternatives: Eight remedial alternatives were assembled by combining the retained remedial technologies and process options. Following are the remedial alternatives that were assembled by combining the retained remedial technologies and process options:

Alternative 1: No Action
Alternative 2: Interior Cleaning and Land Use Controls with Monitoring
Alternative 3: Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring
Alternative 4: Capping of Contaminated Materials and Land Use Controls with Monitoring
Alternative 5a: Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring
Alternative 5b: Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring
Alternative 6: Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring
Alternative 7: Excavation and Offsite Thermo-Chemical Treatment of Contaminated Materials at Permitted Facilities, Reuse of Treated Material, and Land Use Controls with Monitoring

These remedial alternatives were evaluated using the three screening criteria (effectiveness, implementability, and cost). Two alternatives (Alternative 2 and Alternative 7) were eliminated from further consideration.

Detailed Analysis of Retained Alternatives: Six remedial alternatives retained after the initial screening and evaluation underwent detailed analysis. Each alternative is assessed using criteria mandated by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Detailed analysis was performed on each of the following alternatives:

Alternative 1:	No Action
Alternative 3:	Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring
Alternative 4:	Capping of Contaminated Materials and Land Use Controls with Monitoring
Alternative 5a:	Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring
Alternative 5b:	Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring
Alternative 6:	Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

Comparative Analysis: Each remedial alterative that underwent detailed analysis was then compared to each other using the two threshold and five balancing evaluation criteria as presented in Table ES-1.

After the FS is finalized, a preferred alternative for the site is presented to the public in the proposed plan. The proposed plan briefly summarizes the RI and FS, alternatives studied in the detailed analysis phase of the FS, and highlights the key factors that led to identifying the preferred alternative. The proposed plan allows the State of Oregon (represented on this project by the Oregon DEQ) and the community to comment on the preferred alternative.

The final phase of the RI/FS process is to prepare a record of decision (ROD). Following the receipt of public comments and any final comments from Oregon DEQ, EPA selects and documents the remedy selection decision for the site in the ROD.

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Table ES-1
Summary of Comparative Analysis of Alternative

Remedial Alternative	Description	Threshold Criteria		Balancing Criteria					
		Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume through Treatment	Short-Term Effectiveness	Implementability	Present Value Cost (Dollars)	
1	No Action	⓿ Not protective of human health and the environment and does not meet PRAOs.	⓿ Not compliant with chemical-specific ARARs. Specifically, the risk standards in the Oregon Hazardous Substance Remedial Action Rules for asbestos are exceeded because exposure to contamination is not addressed.	⓿No additional cleanup measures are initiated and contaminated materials are left exposed.	⓿ No treatment; therefore, does not reduce toxicity, mobility, or volume of contaminants through treatment.	⓿ No additional cleanup measures are initiated and contaminated materials are left exposed. Thus there are no short-term effectiveness issues for this alternative.	⓿ No action is taken other than 5-year site reviews. Since no new remedial action is taken, this alternative has no implementability issues.	$	$186,000
3	Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring	❷ Contaminated materials that remain exposed outside of capped areas pose human health and ecological risks through dispersal across the site. Contaminated materials also still remain beneath covers across a large extent of the site and could pose additional risks if the covers are compromised.	❸ Addresses the location- and action-specific ARARs through adherence of the ARARs during implementation of the remedial action. This alternative leaves contaminated materials exposed at the site. Thus compliance with the chemical-specific ARARs is questionable.	❷ Contaminated materials that remain exposed outside of capped areas pose human health and ecological risks through dispersal across the site. Contaminated materials also still remain beneath covers across a large extent of the site and could pose additional risks if the covers are compromised.	⓿ No treatment; therefore, does not reduce toxicity, mobility, or volume of contaminants through treatment.	❹ Addresses short-term risks to workers, the community, and the environment. Trucks used to haul offsite borrow are also used to construct the covers, which slightly increases short-term risks to the community.	❹ Construction resources and materials needed to construct covers for this alternative should be available. Institutional controls have been implemented in a similar manner on other contaminated residential sites in Oregon. Interior cleaning has not been performed at this site and would require coordination with affected residents, but has been successfully performed at similar sites with asbestos contamination.	$$$	$10,152,000

Table ES-1 (continued)

Remedial Alternative	Description	Threshold Criteria: Overall Protection of Human Health and the Environment	Threshold Criteria: Compliance with ARARs	Balancing Criteria: Long-Term Effectiveness and Permanence	Balancing Criteria: Reduction of Toxicity, Mobility, or Volume through Treatment	Balancing Criteria: Short-Term Effectiveness	Balancing Criteria: Implementability	Present Value Cost (Dollars)	
4	Capping of Contaminated Materials and Land Use Controls with Monitoring	❸ Contaminated materials still remain beneath covers across a large extent of the site and could pose risks if the covers are compromised.	❺ Addresses the location- and action-specific ARARs through adherence of the ARARs during implementation of the remedial action. Addresses chemical-specific ARARs by in-place capping of contamination.	❸ Contaminated materials still remain beneath covers across a large extent of the site and could pose risks if the covers are compromised. Long-term effectiveness and permanence is not as certain as for remedies that remove and consolidate contaminated materials for onsite and offsite disposal.	⓿ No treatment; therefore, does not reduce toxicity, mobility, or volume of contaminants through treatment.	❸ Similar to Alternative 3. However Alternative 4 involves significantly more surface disturbance of contaminated materials and larger number of haul trucks than Alternative 3.	❸ Similar to Alternative 3. However Alternative 4 requires covering a larger area of the site than Alternative 3 and requires a larger volume of borrow from offsite areas. Maintenance of the additional covered areas and monitoring, especially on privately owned parcels, could provide difficulties in the future.	$$$	$12,798,000
5a	Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring	❷ Contaminated subsurface materials also remain across a large extent of the site beneath covers at disposal locations and backfill placed in excavations. These materials could pose risks if the covers or backfill are compromised. Upward migration of subsurface contaminated materials through backfill to the surface may occur over time and pose additional risks. Future excavations may only partially address these risks since they would only occur periodically.	❸This alternative has a higher potential of future exposure at the surface to significant quantities of contaminated materials through frost heave processes than other alternatives. Thus compliance with the chemical-specific ARARs is questionable.	❷ Contaminated materials still remain under covers at onsite disposal locations. Contaminated subsurface materials also remain across a large extent of the site beneath backfill placed in excavations. These materials could pose current and future human health and ecological risks if the covers at the onsite disposal locations are compromised or contaminated materials become exposed at the surface in backfilled excavations.	⓿ No treatment; therefore, does not reduce toxicity, mobility, or volume of contaminants through treatment.	❷ Requires disturbance and consolidation of a large amount of contaminated materials across the site and large volumes of offsite borrow. These activities pose increased short-term risks to workers and the community than the surface disturbance activities under Alternative 4. Alternative 5a involves initial excavation and future excavation of contaminated materials over a long period of time which increases the risks.	❸ Excavation and onsite consolidation of contaminated materials could be difficult in areas of underground utilities, trees, roads, and near structures. This alternative requires less overall offsite borrow than Alternative 4, but additional logistical coordination is needed since both contaminated materials and offsite borrow will be transported simultaneously. Alternative 5a requires less initial excavation than Alternative 5b. However, there may be difficulties in performing periodic future excavations of contaminated surface materials.	$$$	$10,467,000

Table ES-1 (continued)

Remedial Alternative	***Description***	***Threshold Criteria***		***Balancing Criteria***					
		Overall Protection of Human Health and the Environment	***Compliance with ARARs***	***Long-Term Effectiveness and Permanence***	***Reduction of Toxicity, Mobility, or Volume through Treatment***	***Short-Term Effectiveness***	***Implementability***	***Present Value Cost (Dollars)***	
5b	Excavation and Onsite Consolidation/ Disposal of Contaminated Materials, and Land Use Controls with Monitoring	❸ Since the majority of the contaminated materials are excavated and disposed of at onsite disposal locations protected by land use controls, long-term protection of human health and the environment is more certain across the site than alternatives that leave contaminated materials across a larger extent of the site.	❺Addresses the location- and action-specific ARARs through adherence of the ARARs during implementation of the remedial action. Addresses chemical-specific ARARs by excavation of contaminated materials, onsite consolidation and disposal, and backfilling of excavations.	❹ Since the majority of the contaminated materials are excavated and disposed of at onsite disposal locations protected by land use controls, long-term protection of human health and the environment is more certain across the site than alternatives that leave contaminated materials across a larger extent of the site.	⓿ No treatment; therefore, does not reduce toxicity, mobility, or volume of contaminants through treatment.	❷ Similar to Alternative 5a. While Alternative 5b involves initial excavation and consolidation of a larger volume of contaminated materials than Alternative 5b, the increase in initial short-term risks during excavation is offset by not requiring future excavation of contaminated materials as under Alternative 5a.	❸ Similar to Alternative 5a. Alternative 5b requires more initial excavation than Alternative 5a, but does not have the difficulties in performing future excavations as for Alternative 5a.	$$$	$14,028,000
6	Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring	❹ Similar to Alternative 5b, except that contaminated materials are excavated and disposed of offsite rather than consolidated and disposed of onsite. Since the majority of the contaminated materials are excavated and disposed of offsite, long-term protection of human health and the environment is more certain than Alternative 5b.	❺ Addresses the location- and action-specific ARARs through adherence of the ARARs during implementation of the remedial action. Addresses chemical-specific ARARs by excavation of contaminated materials, offsite disposal, and backfilling of excavations.	❹ Similar to Alternative 5b, except offsite rather than onsite disposal of excavated contaminated materials is performed.	⓿ No treatment; therefore, does not reduce toxicity, mobility, or volume of contaminants through treatment.	❷Similar to Alternative 5b, offsite rather than onsite disposal of excavated contaminated materials is performed. Short-term impacts to workers and especially the community are greatly increased over alternatives that do not require offsite disposal due to truck traffic to the offsite disposal facilities.	❷ Similar to Alternative 5b except offsite rather than onsite disposal of excavated contaminated materials is performed. Offsite disposal of large volumes of removed materials requires additional coordination with the offsite disposal facilities. Additional difficulties exist in obtaining the necessary approvals and the logistics of transporting large volumes of contaminated materials for long distances to offsite disposal facilities.	$$$$$	$29,472,000

Table ES-1 (continued)

Notes:

1. The detailed analysis of retained alternatives involves a qualitative assessment of the degree to which remedial alternatives address evaluation criteria. The numerical designations for the qualitative ratings system used in this table are not used to quantitatively assess remedial alternatives (for instance, individual rankings for an alternative are not additive).

Legend for Qualitative Ratings System:

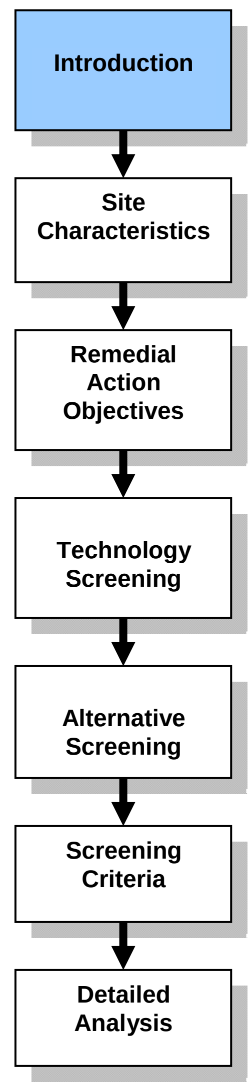
Threshold and Balancing Criteria (Excluding Cost)		Balancing Criteria (Present Value Cost in Dollars)	
⓿	**None**	⓿	**None ($0)**
❶	**Low**	$	**Low ($0 through $5M)**
❷	**Low to moderate**	$$	**Low to moderate ($5M through $10M)**
❸	**Moderate**	$$$	**Moderate ($10M through $15M)**
❹	**Moderate to high**	$$$$	**Moderate to high ($15M through $20M)**
❺	**High**	$$$$$	**High (Greater than $20M)**

Section 1
Introduction

1.1 Purpose and Organization

This feasibility study (FS) report for the North Ridge Estates (NRE) site (site) was prepared for the U. S. Environmental Protection Agency (EPA) Region 10 by CDM Federal Programs Corporation (CDM) for Work Assignment No. 217-RICO-10BT under EPA Remedial Action Contract (RAC) No. EP-W-05-049.

The FS is the mechanism for the identification, development, screening, and detailed evaluation of remedial alternatives that are capable of addressing risks to human health and the environment from contaminated media. The final remedial investigation (RI) report for the site (CDM 2010) details the information used to characterize site conditions, determines the nature and extent of contamination, and summarizes risks to human health and the environment. The RI and FS were conducted concurrently; data collected and summarized in the RI report influenced the development of remedial alternatives in the FS.



When the FS is finalized, a preferred alternative for the site is presented to the public in the proposed plan (PP). The PP briefly summarizes the RI and FS, alternatives studied in the detailed analysis phase of the FS, and highlights the key factors that led to identifying the preferred alternative. The PP allows the State of Oregon (represented on this project by the Oregon Department of Environmental Quality [Oregon DEQ]) and the community to comment on the preferred alternative.

The final phase of the RI/FS process is to prepare a record of decision (ROD). Following the receipt of public comments and any final comments from Oregon DEQ, EPA selects and documents the remedy selection decision for the site in the ROD.

This report presents the results of the development, screening, and detailed evaluation of remedial alternatives to address contaminated media for the site in Klamath County, Oregon. The work performed during the FS was in accordance with guidance developed by EPA for conducting RI/FS under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (EPA 1988). In addition, the cost estimates for each alternative were developed in accordance with *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000a).

The progress between major process steps of the FS is graphically illustrated at the beginning of each section. This report is organized as follows:

- The Executive Summary provides a brief summary of the key information and conclusions included in the FS.
- Section 1 discusses the purpose of the FS report, the report organization, and site background information (site location, site description, operational history, and summary of previous investigations).
- Section 2 describes the characteristics of the site, including the site conceptual model (SCM), site features and physical characteristics, a summary of the nature and extent of contamination resulting from past activities at the site, and a summary of human health risks posed by site contamination.
- Section 3 describes the process for identifying preliminary remedial action objectives (PRAOs) and preliminary remediation goals (PRGs) based on the results of the baseline human health risk assessments (BLRAs) and the ecological risk assessment (ERA). This section also identifies potential applicable or relevant and appropriate requirements (ARARs) and "to be considered" (TBC) information for the site.
- Section 4 describes the options for general response actions (GRAs) and the screening and evaluation of different remedial technologies and process options used to develop remedial alternatives for the site.
- Section 5 identifies and describes the remedial alternatives and the screening process followed to reduce the remedial alternatives to those considered to be most suitable for further analysis.
- Section 6 describes the criteria used to evaluate the alternatives retained for further analysis in Section 7.
- Section 7 presents a detailed analysis of the remedial alternatives and summarizes the comparative analysis conducted to compare and contrast the remedial alternatives.
- Section 8 lists the references and documents referred to in this FS.
- Appendix A provides a freeze depth and capping thickness recommendation for the site prepared by the United States Army Cold Region Research and Engineering Laboratory.
- Appendix B provides a summary of federal and state ARARs and TBCs.
- Appendix C provides quantity calculations for the screening and detailed analysis of remedial alternatives.

- Appendix D documents the alternative screening evaluation.

- Appendix E documents the alternative screening cost information. Screening cost estimates have an expected accuracy range between +100 percent and -50 percent of the actual costs.

- Appendix F provides a summary of applicable institutional controls for the site and the monitoring protocol for alternatives retained for detailed analysis.

- Appendix G provides the detailed analysis of alternatives.

- Appendix H provides the detailed alternative analysis cost information. Detailed analysis cost estimates have an expected accuracy range between +50 percent and -30 percent of the actual costs.

1.2 Site Location and Description

NRE is located approximately 3 miles north of the City of Klamath Falls, in Klamath County, Oregon, along Old Fort Road and North Ridge Drive (Figure 1-1). NRE is the former location of marine recuperation barracks (MRB) and the Oregon Technology Institute (OTI; now Oregon Institute of Technology [OIT]).

The site is defined as the area where contamination associated with demolition of the MRB, including asbestos containing material (ACM), has been observed or detected as delineated by the site boundary in Figure 1-2. The site has been divided into two operable units (OUs) (Figure 1-1):

- OU1 encompasses the footprint for the former MRB and includes all areas where contamination associated with demolition of the MRB, including ACM and/or asbestos, has been observed and/or detected with the exception of the former firing range. Portions of the (b) (6) (Parcel BP) and (b) (6) (Parcel BQ) properties south of the former MRB are included in OU1. This FS focuses on OU1, which is estimated to include approximately 125 acres. OU1 is interchangeably referred to as the site in the remainder of this document.

- OU2 includes the area of the former firing range. It is EPA's current understanding that the United States Army Corps of Engineers (USACE) will be responsible for any further actions in OU2; therefore, this FS will not address remediation of this OU. OU2 is estimated to include approximately 46 acres.

The boundary of OU1 has changed since previous versions of this document to reflect only the locations where contamination associated with MRB demolition, including ACM and/or asbestos, has been observed and/or detected with the exception of the former firing range. The observations used to make the boundary changes include all data collected by the responsible party and EPA.

1.3 Site Background and History

1.3.1 Site Ownership

Exhibit 1-1 provides a brief summary of the ownership of the site. This exhibit was generated from site background and historic information from the final RI report (CDM 2010).

Exhibit 1-1. Summary of Site Ownership

Year	Owner	Summary of Site Activities
1944 to 1946	United States Navy	United States Navy purchased approximately 745 acres of land, including 11 acres of utility easements. The site was used as an MRB for recovery of World War II (WWII) veterans returning from the Pacific theater with malaria. Building materials containing asbestos were used in the construction of the facility. The estimated quantity of ACM used during construction was 1,522 tons.
1947 to 1964	State of Oregon	State of Oregon acquired the property through a quit claim deed. Oregon used the MRB facilities for a vocational technical college. During OTI occupation of the site, six of the original MRB structures were demolished.
1964 to 1965	General Services Administration (GSA)	Ownership was transferred to the federal GSA when OTI left the site. The site sat idle and was not occupied or used.
1965 to 1977	Private Ownership	A partnership of private individuals purchased the site from GSA. At least 22 of the original MRB buildings were demolished.
1977 to 2005	Melvin Bercot Kenneth Partnership (MBK) Ownership	MBK purchased the site and redeveloped it into a residential subdivision. Significant demolition occurred and much of the ACM building debris was disposed of on site. As a result of the ACM contamination, MBK was sued by homeowners and declared bankruptcy in 2004.
2005 to Present	Private Ownership and Receivership	All vacated homes were transferred to a receiver paid to maintain the value of the parcels until the remedial action (RA) for the site can be carried out. The entity responsible for maintaining the homes is referred to as the Receivership.

The ownership of parcels within the site (either privately-owned or receiver-managed parcels) is identified in Figure 1-3. Ownership and occupancy of the parcels can be classified as follows:

- Privately-owned parcels include all parcels east of Old Fort Road and six parcels west of Old Fort Road. In addition, two parcels south of the main NRE subdivision are also privately owned. In total, 29 privately-owned parcels occupy the site.

- Receiver-managed parcels include parcels west of Old Fort Road, excluding the six privately-owned parcels. No receiver-managed parcels are located east of Old Fort Road. In total, 28 receiver-managed parcels occupy the site.

Parcel development status is based on the presence of a residence (i.e., house) for each parcel at the site.

- Parcels that currently have a house are referred to as developed parcels. Each house can be either occupied or unoccupied, depending on whether there are current residents living in the home.

- All parcels without a house are referred to as undeveloped parcels, even if other types of initial development have occurred.

Figure 1-3 shows the location of developed and undeveloped parcels; the inset table lists the parcels that are currently occupied.

At the time of FS issuance, all developed private parcels were occupied and all developed receivership parcels were unoccupied. Undeveloped private and receivership parcels were unoccupied.

1.3.2 Regulatory Activities

Exhibit 1-2 summarizes the regulatory enforcement actions and investigation history at the site. This exhibit was generated from site background and historic information from the RI report. For additional information pertaining to the following regulatory enforcement actions, refer to Section 2 of the final RI report (CDM 2010).

Exhibit 1-2. Summary of Regulatory Enforcement Actions

Year	Enforcing Agency	Summary of Enforcement Actions
1978	Oregon DEQ	Oregon DEQ responded to complaints about openly accumulated asbestos. Oregon DEQ directed the collection and onsite burial of the material.
1979	EPA	EPA issued Compliance Order No X79-08-14-113 regarding hazardous air pollutants to MBK. MBK agreed to change demolition and disposal practices at the site.
2001	Oregon DEQ	Oregon DEQ received a complaint about asbestos pipe insulation exposed at NRE and issued a Notice of Noncompliance to MBK. Tomahawk Abatement removed 180 feet of piping.
2002	Oregon DEQ	MBK and Oregon DEQ entered into a Mutual Agreement and Order (MAO). All parcels currently or previously owned by MBK were surveyed for the presence of ACM, and approximately 50 tons were collected and disposed by Malot Environmental Inc.
2003	Oregon DEQ and Oregon Department of Human Services (DHS).	Oregon DEQ and DHS jointly determined that friable asbestos not removed from the site continued to pose a hazard to public health. Oregon DEQ requested a referral to EPA for emergency removal and assessment. MBK entered into an Administrative Order on Consent (AOC) with EPA.

Exhibit 1-2. Summary of Regulatory Enforcement Actions (continued)

Year	Enforcing Agency	Summary of Enforcement Actions
2005	EPA	A unilateral order became effective that directed MBK to conduct RI/FS activities at the site under the oversight of EPA.
2005	EPA	Most of the residents west of Old Fort Road at NRE entered into a legal settlement (consent decree) with the United States and vacated most homes within the site. The settlement relieved MBK of further responsibilities for the RI/FS, and EPA issued a Stop Work Notice to MBK. All vacated homes were transferred to the NRE receiver as a potential resource to fund future cleanup of the site. Currently, six homes remain occupied west of Old Fort Road and are privately owned. The RA will be conducted under the CERCLA; however, the site is not on the National Priorities List (NPL), so EPA does not currently have a source of funding to complete remediation under the Superfund program.

1.4 Previous Removal Actions

Removal and actions, such as the excavation and disposal of ACM, polychlorinated biphenyl (PCB)-contaminated soil, and lead-contaminated soil, were performed at the site in conjunction with site investigation activities and emergency response actions. These actions were taken to reduce volumes of ACM and to reduce further exposure to source material. From 2001 until 2009, several removal activities were completed and are summarized below. Exhibit 1-3 was generated from site background and historic information from the RI report. For additional information pertaining to the following remedial actions, refer to Section 2 of the final RI report (CDM 2010).

Exhibit 1-3. Summary of Previous Removal Actions

Year	Material Removed	Summary of Remedial Actions
2001	Steam Pipe Insulation	Abatement contractor removed approximately 180 feet from the site.
2002	Surface ACM	MBK removed and disposed of surface ACM from MBK parcels as required in an MAO.
2003	Surface ACM	Cement Asbestos Board (CAB), roofing material, vinyl asbestos tile (VAT), and AirCell were removed from the surface at 25 developed residential parcels and several MBK-owned parcels. In addition, areas with concentrated ACM debris were removed from nine parcels. All ACM material was disposed at the Klamath County Landfill.
2003	Buried ACM	During burial pile exploration activities, contaminated soils were removed from the site.
2004	Lead-Contaminated Soil	Lead-contaminated soil identified at the MBK-C property, by the EPA Superfund Technical Assistance and Response Team 2 Contract (START-2) contractor in 2003, was removed.

Exhibit 1-3. Summary of Previous Removal Actions (continued)

Year	Material Removed	Summary of Remedial Actions
2005	AirCell and MAG	Large amounts of thermal system insulation (i.e., AirCell and MAG) material had surfaced throughout the site. Much of the material was removed or "picked-up" and was disposed. Tackifier was sprayed on areas where MAG had been observed.
2008	Surface and Subsurface ACM and PCB and Lead-Contaminated Soil Removal	Approximately 23,000 cubic yards (cy) of ACM-contaminated soil was removed from various properties. The soil was consolidated in an onsite repository. At Parcels Q and MBK-C, lead-contaminated soil was removed. At Parcel B, PCB-contaminated soil was removed.
2009	Surface ACM and PCB-Contaminated Soil Removal	A follow-up removal to the 2008 activities was completed to remove additional surface ACM and PCB-contaminated soil.

1.5 Summary of Study Area Investigations

Data from numerous sources were used in the site's final RI report (CDM 2010), which forms the basis for this FS.

1.5.1 ACM Site Investigations

The following site investigations were performed from 2003 through 2008 to determine the nature and extent of ACM and asbestos-contaminated soil. Sampling activities included soil sampling, air sampling, and activity-based sampling (ABS) at various locations at the site. The exhibit summarizes previous site investigations as documented in the RI report. For additional information pertaining to the following site investigations, refer to Section 2 of the final RI report (CDM 2010).

Exhibit 1-4. Summary of Previous ACM Site Investigations by Year

Type of Investigation	Activity Lead	Summary of Site Investigations
2003		
Residential Soil Sampling	EPA	The START-2 contractor collected composite soil samples along a grid system developed by Dr. Berman. Twenty-two residential properties were sampled, with 10 subsamples collected from each property to yield one targeted composite sample per property.
Baseline and Hot Spot Soil Sampling	MBK	MBK hired Aeolus, Inc. to develop a sampling and analysis plan to evaluate the baseline ACM content in soils over a large portion of the site.
Asbestos Soil Sampling	MBK	PBS Engineering and Environmental (PBS) collected soil samples from concentrated areas with ACM to determine if soils from these specific areas had a larger number of fibers.
Burial Pile Exploration	MBK	Areas with unnatural topography and areas with suspected high concentrations of surface ACM were investigated using test pits to determine underground sources.
Buried Steam Pipe Investigation	MBK	A geophysical survey was conducted to determine the locations of buried steam pipe. Due to construction activities that have occurred at the site, it is unknown if all buried asbestos-insulated pipe has been identified.

Exhibit 1-4. Summary of Previous ACM Site Investigations by Year (continued)

Type of Investigation	Activity Lead	Summary of Site Investigations
2003		
Residential Air Sampling	EPA	Concentrations of asbestos in indoor and outdoor air were measured at residential parcels. Several background outdoor air samples were also collected at remote locations off site.
Ambient Air Sampling	EPA	High-volume air pumps were used to conduct ambient air sampling at the site to assess levels of airborne asbestos particles.
2004		
ABS	EPA	EPA conducted ABS to assess the exposure risk associated with the physical disturbance of asbestos-contaminated soils. Activities included weed-trimming, tilling soil, and child play in ACM-containing soil.
2005		
Free Asbestos Fiber Content Soil Sampling	EPA	The START-2 contractor conducted an investigation to determine the relationship between observed ACM and free asbestos fibers in surface soils.
Asbestos Fiber Size Distribution Study	EPA	Six types of ACM found at the site were collected and submitted for a fiber size distribution study.
Ambient Air Sampling	EPA	The START-2 contractor collected ambient air samples from six locations to assess ambient air conditions during excavation and surface cleanup activities.
2006		
Asbestos RI Investigation using Parcel Classification System (Bins)	EPA	EPA developed a modified sampling strategy that was based on a classification of all parcels (e.g., Bin A, Bin B, and Bin C). In general, the following investigations were performed where ACM debris was likely present: **Burial Pile Investigations:** Estimate the vertical and lateral extent of ACM and associated soils for the purpose of estimating quantities requiring remediation. **Surficial Visual Inspection:** Estimate the locations of the burial areas that require investigation. **Remedial Boundary Investigations:** Estimate the lateral boundary to which RAs may be required. Along parcels that were not within the footprint of the former MRB and where no ACM has been observed, the following investigations were performed: **Surficial Visual Inspection:** Determine if the property was properly classified and if ACM remediation or additional investigations are required. If ACM was observed, the parcel was reclassified. **Bulk Soil Sampling:** Determine if free asbestos fibers are present in areas where ACM is not observed.
ABS	EPA	The purpose of this investigation was to measure asbestos levels in the breathing zone of individuals engaged in activities such as yard maintenance and gardening around homes at the site; investigate the relative importance of ACM and free asbestos to airborne releases during active soil disturbance; and measure indoor dust asbestos concentrations from homes that were occupied at the site.

The parcel classification system mentioned as part of the RI investigation in 2006 was primarily used for investigational purposes and will no longer be addressed as part of the FS evaluations discussed in this report. For additional information on the parcel classification system, refer to the final RI report (CDM 2010).
Results from the ACM site investigations are discussed in Section 2.4 of this report.

1.5.2 Non-ACM Site Investigations

The following investigations were performed to determine the presence of other contaminants of interest (COIs) at the site.

Exhibit 1-5. Summary of Previous Non-ACM Site Investigations

Type of Investigation	Activity Lead	Summary of Site Investigations
2003		
Lead-Contaminated Soil Sampling	EPA	The START-2 contractor conducted soil sampling and analytical screening for lead to assess the extent of lead contaminated in the site soils. Lead-containing soils above the PRG were removed.
PCB Soil Sampling	EPA	Soil samples were collected at a site suspected to be the location of a PCB spill.
2004		
Firing Range Investigation	EPA	The START-2 contractor conducted a preliminary assessment at various locations within the Kingsley Firing Range for the presence of nitrate base explosive compounds (NBECs) and/or metal analysis. The firing range is not currently considered part of the site and any required remedial actions will be addressed by the USACE and other Department of Defense (DoD) agencies.
2006		
Non-ACM RI Investigation	EPA	The objective of the investigation was to determine the types of suspected materials that were potentially used at the site, whether they exist above levels of concern, and where potential releases could have impacted site soils. Nine former use areas were investigated for at least one of the following COIs: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), PCBs, metals, and pesticides.
2007		
VOC Investigation	EPA	Additional investigation in 2007 was required to further delineate the extent of VOC impacts in soil, soil gas, and indoor air at the site at five former use areas.
Former Service Station Underground Storage Tank (UST) Investigation	EPA	The purpose of this investigation was to determine the orientation of a tank discovered during the 2006 investigation and locate any additional USTs in the area. No additional USTs were discovered in the area. Soil impacted with petroleum products was encountered during this investigation.

Exhibit 1-5. Summary of Previous Non-ACM Site Investigations (continued)

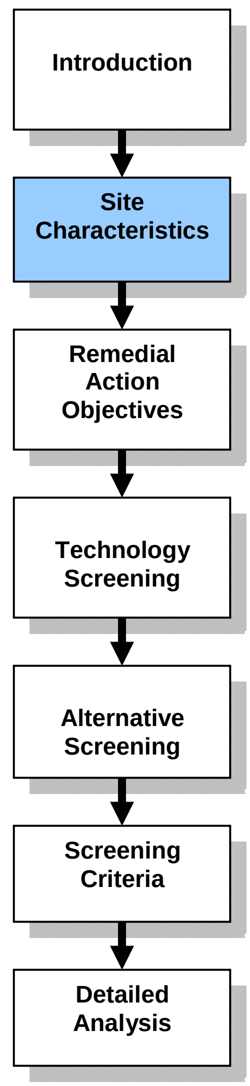
Type of Investigation	Activity Lead	Summary of Site Investigations
2008		
ABS	EPA	The purpose of this ABS sampling event was to monitor potential exposure to asbestos during common outdoor activities in locations where asbestos had not been previously detected either by visual observation or bulk sample analysis.
VOC Investigation	EPA	Additional VOC samples were collected in May 2008 due to data quality concerns with the 2007 VOC data. Since the 2007 VOC data were determined to not be usable, date gaps remained to fully describe the nature and extent of VOCs at the site. The 2008 VOC data were collected to fill these data gaps and to minimize any uncertainty in the evaluation of risks from the vapor intrusion pathway.

Results from the non-ACM site investigations are discussed in Section 2.4 of this report.

Section 2
Site Characteristics

The RI and the BLRA reports have identified ACM and free asbestos fibers as the primary source of contamination that contributes to human health risks at the site. Arsenic concentrations in soil at the former power plant are the sole contributor to human health risk from a non-ACM contaminant of potential concern (COPC). The ERA has identified that methods are not presently available to support quantitative evaluation of risks to ecological receptors from asbestos; however, a qualitative assessment has been completed that determined there are potential risks to ecological receptors from exposure to asbestos on a site-wide basis.

This qualitative assessment also indicated potential risks to ecological receptors from exposure to pesticides (dichlorodiphenyltrichloroethane [DDT] and dichlorodiphenyldichloroethylene [DDE]) in debris and soil within the former landfill. EPA has subsequently performed an evaluation that indicates ecological risks from DDT and DDE at this location do not require further consideration in this FS. Additional details regarding this issue are documented in the Administrative Record for the site.



This section summarizes topics discussed in the RI and BLRA (SCM, site features, physical characteristics, nature and extent of contamination, and BLRA). This section also provides information on the importance of remediating or managing ACM and asbestos at the site.

For complete details of the site characteristics and the nature and extent of contamination, please refer to the RI report (CDM 2010).

2.1 Site Conceptual Model

The SCM incorporates the primary mechanisms that lead to release of contaminants from source materials, migration routes of contaminants in the environment, exposure pathways, and human/ecological receptors. As mentioned previously, asbestos is the predominant human health and ecological concern at the site.

2.1.1 Sources of ACM and Asbestos

ACM and asbestos are present at the site due to the demolition and onsite disposal of asbestos containing building materials (ACBM) at the site. The disposal practices believed to be used at the site included burying building debris near the original building location and/or transporting the ACM debris to other areas of the site for burial, with potential spillage of the material as it was being transported.

Due to the physical properties of asbestos, especially when included in a building material matrix, it is resistant to physical weathering. Asbestos is an inert mineral; once asbestos fibers are released from ACM, asbestos fibers do not breakdown chemically into other minerals, only into smaller fibers. However, these smaller fibers can persist in the environment for an indefinite period of time. Therefore, without physical removal of ACM, asbestos will persist at the site.

2.1.2 Migration Routes

Observations at the site suggest that buried ACM migrates to the surface over time. Asbestos fibers may be released into the atmosphere during the breakdown of ACM once it is at the surface. The time required for ACM to breakdown varies, depending on the type of ACM. CAB and VAT will breakdown slower than MAG or AirCell. Asbestos fibers found in the surface soils can be transported across the site or to indoor areas on clothes, shoes, and via pets as a result of contact with soils containing fibers. Fibers may also become airborne and dispersed across the site due to wind and ground disturbance. Surface soil erosion due to surface water movement may also transport ACM and asbestos fibers across the site.

In general, the migration of ACM and asbestos across the site can be caused either by anthropogenic activities or naturally occurring actions. The following list summarizes the activities influencing migration of ACM and asbestos at the site:

Exhibit 2-1. Activities Influencing Migration of ACM and Asbestos

Human Based Activity	Naturally Occurring Actions
Soil-disturbing activities: gardening, landscaping, recreation	Migration to the ground surface through “frost jacking” (frost heaving)
Site development	Wind and water erosion of surface soils
	Mechanical wedging and jacking by plant roots
	Wind transport
	Burrowing animals

2.1.3 Exposure Pathways and Potential Receptors

Human receptors at the site that are of potential concern to EPA include current and future residents, workers, and site visitors. The exposure route of chief concern for asbestos is by inhalation of asbestos fibers in air. Human populations at the site may be exposed to asbestos in air by four main pathways:

- Inhalation of fibers released during active soil disturbance activities
- Inhalation of fibers in indoor air
- Inhalation of fibers in outdoor (ambient) air
- Inhalation of fibers released during direct handling of pieces of ACM

Of these pathways, inhalation exposure resulting from active soil disturbance is believed to be the most likely to be significant. Section 2.6 provides a summary of human exposure and risk estimates that have been derived to date.

2.2 General Site Features

2.2.1 Site Features

The MRB buildings remaining at the site include a warehouse, the former brig (renovated into a five-unit apartment building), and several residences on Thicket Court (used as officers' quarters during the time the military used the property and as faculty housing during OTI occupation), and a guard shack for the military base shooting range.

Although the other former military base structures at the site have been demolished, the concrete foundations for many of the buildings remain intact. Some of the roads used during military use of the site are still present, although they are cracked and vegetation is growing through them. At the site, Old Fort Road and North Ridge Drive appear to follow approximately the same route they did when the base was operating (Oregon DHS 2004).

2.3 Summary of Physical Characteristics

2.3.1 Climate

General climatic conditions at the site include cool winter temperatures with warm and dry summers. The average daily temperature is 48.5° Fahrenheit (°F). Klamath Falls has received an average of 13.95 inches of precipitation annually from 1971 to 2000, with most precipitation falling in January and December. Average annual precipitation ranges from 10 to 15 inches in the valleys, 16 to 25 inches in nearby hills, and 30 to 40 inches at the lower levels in the Cascades to the west. Snowfall accounts for 30 percent of the moisture in the valleys and as much as 50 percent of the moisture in the mountains. Annual snowfall averages 15 to 45 inches in the valleys, 60 to 125 inches in the foothills, and over 160 inches in some places at more than 4,500 feet above mean sea level (AMSL). Maximum snow depths have varied from 2 to 3 feet in the valleys and from 5 to 6 feet in the hills and mountains (National Resources Conservation Service [NRCS] 1985).

In Klamath Falls, prevailing winds are southerly for November through February; westerly from March through July; and northerly during August, September, and October. Monthly wind speeds average from 4.4 miles per hour in September to 7.3 miles per hour in March (NRCS 1985).

2.3.2 Geology

The location of the site, in an area of transition between the Cascade Mountains and the Basin and Range provinces, results in complex geology. The Klamath basin is primarily composed of volcanic deposits with lowland fluviolacustrian deposits that have been described as consolidated volcanic rocks consisting largely of lava;

unconsolidated to semi-consolidated volcanic ejecta deposited around eruptive centers; and lowland fluviolacustrian deposits consisting of dolomite, water-lain volcanic sediment, tephra, and lava (U.S. Geological Survey [USGS] 1999b).

The Klamath basin is, in part, a composite graben formed by north and northwest trending normal faults. Vertical displacements are generally less than 330 feet but locally exceed 1,000 feet (USGS 1999b). The Klamath graben fault system confines the Klamath Lake basin at the intersection of the northwestern Basin and Range and Cascade Mountains in southern Oregon. The slip rate along this fault system is between 0.2 and 1.0 millimeter per year (mm/year). The Klamath graben fault system is divided into three sections: the west Klamath Lake section, the east Klamath Lake section, and the south Klamath Lake section. Faults in the south Klamath Lake section form composite grabens in the vicinity of Klamath Falls. To the north, large escarpments on Miocene and Pliocene bedrock define a graben that confines Upper Klamath Lake; fault scarps are formed on Holocene and Pleistocene talus deposits along these escarpments. The lack of extensive alluvial fans at the mouths of canyons that empty into Upper Klamath Lake may indicate late Quaternary subsidence along the margins of the Upper Klamath Basin. South of Klamath Falls, the graben system widens into a series of fault blocks and grabens (USGS 2002).

2.3.3 Surface Water

The site is located within the Upper Klamath Lake subbasin of the Upper Klamath basin. Klamath Lake, the largest freshwater lake in Oregon and one of the largest in the United States, is located in the Upper Klamath Lake watershed. The Upper Klamath basin covers 5.6 million acres, with the Upper Klamath Lake subbasin comprising nearly 500,000 acres (USGS 1999a).

In the arid to semi-arid locations of Klamath County, most precipitation-replenished soil moisture evaporates or is transpired by vegetation. Little is left to maintain stream flow or recharge aquifers. Precipitation that falls as snow generally does not become runoff until spring thaws begin (USGS 1999b).

The occurrence of surface water at the site is limited to an intermittent stream that flows north from the site, roughly following Old Fort Road. The stream ultimately terminates at a canal for Upper Klamath Lake that is used to irrigate lands in the Lost River basin of Oregon and California.

2.3.4 Groundwater

The primary hydrogeologic units in Klamath County were described in 1958, 1970, and 1974, as: (1) a highly permeable lower (older) basalt unit, which serves as the principal aquifer in the area; (2) the Yonna Formation (a medial zone of stratified lacustrine deposits consisting of tuff, agglomerate, shale, diatomite, sandstone, and volcanic ash with some volcanic intrusives or interbeds of thin lava flows), which primarily confines groundwater; and (3) upper, younger units (lava flow forming cap rock in place, eruptive deposits, and alluvium), which occur above the water table or yield small quantities of perched water (USGS 1999a).

USGS has worked to improve the earlier descriptions of the aquifer system in Klamath County. The USGS classifies the aquifer system underlying much of Klamath County, including the area covered by the site, as a volcanic and sedimentary rock aquifer. The volcanic rocks that compose the aquifers consist primarily of Pliocene and younger basaltic rocks; unconsolidated volcanic deposits included in the aquifers are ash and cinders. The sedimentary rocks that compose the aquifers consist primarily of semi-consolidated sand and gravel eroded mostly from volcanic rocks. In some places, the aquifer might consist of a single rock type; in other places, the aquifers might consist of several interbedded rock types (USGS 1999b).

The hydrogeologic characteristics of the volcanic and sedimentary rock aquifers are largely unknown. Also, the subsurface extent of these aquifers is largely unknown because of limited outcrop areas where they are shown overlaying older rocks or because they are too deep for many wells to reach economically. In Klamath and Lake counties, the volcanic and sedimentary rock aquifers are extremely permeable in places, and large quantities of water are withdrawn by wells for public supply, domestic, commercial, agricultural, and industrial purposes (USGS 1999a).

A geothermal system within the Klamath Basin is indicated by the occurrence of hot springs and hundreds of warm water wells in the vicinity of the City of Klamath Falls and areas to the south near Olene Gap and Klamath Hills (USGS 1999a).

Basin and range style faulting has divided the Klamath basin into a series of small subbasins. It has been indicated that geologic structures generally impact groundwater flow locally rather than having basin-wide impacts and that groundwater moves freely across fault zones in most areas. In addition, it has been found that regional, intermediate, and local groundwater flow occurs within the Klamath Basin. Groundwater flow between subbasins has been speculated to occur, although supporting data are limited. Earlier work has identified uplands as the primary groundwater recharge areas for all the flow systems because of greater precipitation and permeability. Discharge occurs locally in mountain slope springs and nearby lowlands and regionally at the lowest basin elevations, via upward seepage and springs (USGS 1999a).

A domestic supply well was installed in August of 2000, approximately 0.8 miles north of the site at a residence on Old Fort Road. Groundwater was first encountered at 518 feet below ground surface (bgs) during drilling; the static water level of this well is 378 feet bgs.

2.3.5 Demography and Land Use

According to Klamath County tax lot records, land purchased for the NRE subdivision includes land in tax lots of Sections 14 and 15, Township 38 South, Range 9 East, and covers approximately 422 acres. The tax lots in Section 15 comprise approximately 250 acres and include properties along Old Fort Road, Hunter's Ridge Drive, North Ridge Drive, and Thicket Court, as well as several parcels on Scott Valley Road. In addition, tax parcels in Section 14 (14-500, 14-600, 14-700, 14-800, 14-801, and 14-900), described as "North Ridge Estates 3rd Addition," comprise 172.44 acres of the NRE subdivision.

The developed area of the subdivision along Old Fort Road and North Ridge Drive currently includes 23 single-family homes, 8 undeveloped vacant lots, a warehouse, and a memorial park. Oregon DHS (2004) indicated that in 2002 there were 77 residents, including 35 children, in the developed area of the site. The developed area east of Old Fort Road includes several homes, a five-unit apartment building (the former MRB brig), the Thicket Court residential homes, and additional vacant lots. According to the 2000 U.S. Census, there are 98 residents within one-half mile of the site. Land to the west, east, and north of the site is zoned for forestry, animal husbandry, and agriculture (CDM 2010).

Within the site boundary, only six homes remain occupied west of Old Fort Road. These include parcels F, P, N, AQ, BS, and BR. The total number of people living full time at these four parcels is between 12 and 14. The parcels east of Old Fort Road remain occupied. Private ownership of parcels within the site is shown in Figure 1-3.

2.4 Summary of Nature and Extent of Contamination

This section discusses the nature and extent of contamination of ACM and asbestos and non-ACM at the site.

2.4.1 ACM

The types of ACM present at NRE include CAB, VAT, floor tile mastic, roofing material, and insulation (AirCell and MAG), with tar paper used in steam piping. The types of asbestos contained in these materials are chrysotile and amosite. The asbestos content of these materials varies from <1 percent to 55 percent, depending on the material (Ecology and Environment [E&E] 2006). The following exhibit summarizes the different types and concentration of asbestos observed in each type of building material at the site:

Exhibit 2-2. Building Material Type and Asbestos Content

Material Type	Asbestos Type	Percent Asbestos
CAB	Chrysotile	3 - 25
Roofing Material	Chrysotile	30 - 45
VAT	Chrysotile	<1 - 10
AirCell	Chrysotile	35 - 40
MAG Insulation	Chrysotile	3 - 40
	Amosite	20 - 55
Tar Paper	Chrysotile	35 - 40

Notes: < - less than

ACM is present at the site as both dispersed material at the surface scattered across the site and concentrated in burial areas and as pipe insulation, shown in Figure 1-2. The findings from the RI report are summarized below (CDM 2010):

Exhibit 2-3. Summary of RI Findings

General Location	Specific Location	Surficial ACM	Subsurface ACM
Large Land Units	WWTP	App. 5,000 ft^2 as building debris.	None observed
	Landfill	App. 311,893 ft^2 as building debris.	App. 8,890 cy in a centralized location
	Swimming Pool	App. 65,240 ft^2 as building debris.	App. 270 cy
Surface Area of Site	See Figure 2-1	App. 54.65 acres (2,380,637 ft^2) as dispersed debris across the site.	N/A
Burial Areas	See Figure 2-2	Most, but not all, of the burial areas are associated with ACM observed at the surface.	Est. 39,328 cy of material, generally shallow depth (2.6 ft deep) but occasionally up to 10 ft deep
		See the row "Surface Area of Site".	Est. 36,736 cy of material between surface and 6 inches bgs
Buried Steam Piping	See Figure 2-4	Included as surficial debris.	Est. 12,203 lf of ACM-wrapped pipe (Kennedy/Jenks); Est. 14,695 lf of ACM wrapped pipe (OTI Survey)

Notes: App.-approximate; Est.-estimated; bgs-below ground surface; WWTP – waste water treatment plant; ACM – asbestos containing material; cy – cubic yards; ft^2 – square feet; ft – feet; lf – linear feet

Key findings from the ACM investigation included the following:

- Surficial ACM, meaning visually present at the surface and observed by field personnel, is present across 54.65 acres of the site, as shown in Figure 2-1.
- Discrete burial areas, at an average depth of 2.6 feet, but ranging from 4 inches to 10 feet, are present in many areas of the site, as shown in Figure 2-2. In addition discrete surficial areas ranged from the surface to 6 inches bgs. The total amount of buried material in discrete locations across the site has been estimated to be approximately 76,064 cy.
- MAG and AirCell are randomly distributed in most general areas containing ACM, as shown in Figure 2-3. The specific location of surficial MAG or AirCell follows no pattern.

- Buried steam pipe with asbestos insulation is present across much of the site, as shown in Figure 2-4. It is estimated that there are 14,695 linear feet of steam pipe at an average depth of approximately 4 feet bgs. Removal activities conducted in 2008 confirmed the presence of steam pipe in locations identified by the OTI survey; therefore, the OTI survey data was plotted in Figure 2-4 rather than Kennedy/Jenks data. The total estimated steam pipe length provided by Kennedy/Jenks is shown in Exhibit 2-3.

- Although some of the ACM areas are near still-visible floor slabs, many of the burial areas do not appear to be connected to any specific historic building location. Surficial ACM is present in some, but not all, burial areas and, thus, cannot reliably be used as an indicator of burial.

- There are a number of areas where neither buried ACM nor surficial ACM have been investigated. These areas include locations where parcel access was not granted or along steep slopes and/or heavily vegetated areas where safe access is not feasible. Two parcels owned by (b) (6) (Parcel BR and BS), a parcel owned by (b) (6) (Parcel AV), and a parcel owned by (b) (6) (Parcel AX) denied access for investigation activities.

- Based on the findings of all investigations conducted at the site, changes to the site boundary were made so that the boundary includes only those areas where contamination associated with MRB demolition, including ACM and/or asbestos, have been observed and/or detected with the exception of the former firing range.

2.4.2 Asbestos Fibers in Dust, Air, and Soil

Key findings regarding the occurrence of free asbestos fibers in site media are summarized below.

- Asbestos fibers were not detected in indoor dust at homes remaining occupied in the footprint of the former MRB facility. Only one asbestos structure was observed; however, this was not a polarized light microscopy equivalent (PCME) fiber.

- Currently, asbestos fibers have been observed in indoor and outdoor ambient air below a risk level of 1E-06 that is usually considered to be negligible by EPA and Oregon DEQ; however, these inhalation exposure pathways may be of concern in the future.

- ABS sampling showed the concentration of asbestos fibers observed in outdoor air is elevated when the soil is disturbed even when surficial ACM has been removed and the soil is non-detect by polarized light microscopy (PLM) analysis for free asbestos fibers. However, the PLM analysis method for the measurement of free asbestos fibers present in soil has not been well developed. In general, values lower than about 1 percent are highly uncertain.

- Free amosite asbestos fibers have only been observed in one soil sample collected at the site at a concentration of 0.75 percent by PLM analysis indicating that free amosite fibers are not detected at a high frequency in surface soils at the site at sensitivities evaluated.

- ACM has been observed to make up between 0.01 and 11 percent by weight of soil at the site.

The BLRA, summarized in Section 2.6, provides information regarding the interpretation of these results for site-specific exposures.

2.4.3 Non-ACM Contamination

Historical uses at the site, including operation of the MRB and the college campus, included activities associated with the potential releases of non-ACM COIs. Several non-ACM COIs were detected during the non-ACM soil investigation completed in June 2006, which indicated that such releases have occurred in the past. The COIs that were detected above screening level values (SLVs) are summarized in Exhibit 2-4 below:

Exhibit 2-4. Non-ACM Contaminants of Interest Detected Above Screening Level Values

<table>
<tr><th>Analyte/Location</th><th>Power Plant</th><th>Maintenance Shop</th><th>Laundry Building</th><th>Landfill</th><th>OTI Maintenance Shop</th><th>Paint Shops</th><th>Service Station</th><th>Fire Station</th><th>Rifle Range</th></tr>
<tr><td colspan="10">TPH</td></tr>
<tr><td>Gasoline-Range</td><td>X</td><td>X</td><td rowspan="3">NC</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td rowspan="3">NC</td></tr>
<tr><td>Diesel-Range</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>Motor-Oil-Range</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td colspan="10">Organic Contaminants</td></tr>
<tr><td>EDC</td><td>X</td><td>X</td><td>✓</td><td>X</td><td>✓</td><td>X</td><td>X</td><td rowspan="2">NC</td><td rowspan="2">NC</td></tr>
<tr><td>TCE</td><td>X</td><td>X</td><td>✓</td><td>X</td><td>✓</td><td>X</td><td>X</td></tr>
<tr><td>SVOCs</td><td>X</td><td>NC</td><td>X</td><td>X</td><td>NC</td><td>X</td><td>X</td><td>NC</td><td>NC</td></tr>
<tr><td>PCBs</td><td>X</td><td>NC</td><td>NC</td><td>X</td><td>NC</td><td>X</td><td>X</td><td>NC</td><td>NC</td></tr>
<tr><td>Pesticides</td><td>NC</td><td>NC</td><td>NC</td><td>X</td><td>NC</td><td>X</td><td>X</td><td>NC</td><td>NC</td></tr>
<tr><td colspan="10">Metals</td></tr>
<tr><td>Arsenic*</td><td>✓</td><td>X</td><td>NC</td><td>✓</td><td>X</td><td>X</td><td>X</td><td>NC</td><td>X</td></tr>
<tr><td>Lead</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>✓</td></tr>
</table>

Exhibit 2-4. Non-ACM Contaminants of Interest Detected Above Screening Level Values (continued)

Notes: **X** – all results are below established SLVs for the listed compound; ✓ - at least one sample result is above the established SLV; **NC** – samples for this parameter were not collected at this location; * - The summary for arsenic concentrations only indicates locations where observed levels are above the SLV and the expected background levels; EDC – 1,2-dichloroethane; TCE – trichloroethylene; PCB – polychlorinated biphenyl; SVOC – semi volatile organic compounds; SLV – screening level value; VOC – volatile organic compounds; TPH – total petroleum hydrocarbons

Coal is known to contain low levels of metals such as arsenic and arsenic could have accumulated as a byproduct of coal combustion during the operation of the former power plant. The analytical results from soil samples collected in 2006 ranged from 0.5 to 27.2 milligrams per kilogram (mg/kg). All sample results were above the EPA Region 6 SLVs.

Indoor air, sub-slab air, and soil gas samples collected in 2008 indicate the presence of some VOCs in various sample types in the vicinity of residential homes. VOCs detected include chloroform, 1,2-dichloroethane (EDC), benzene, trichloroethylene (TCE), and tetracholorethylene (PCE). Chloroform and TCE were only detected at a few locations on site. Benzene was detected in all samples collected and EDC was detected in nearly all samples. PCE also had a high frequency of detection. The concentrations of EDC, benzene, and PCE in the samples were below background concentrations from residential indoor air of homes across the United States with exception of EDC which does not have an established background concentration per the BLRA Addendum. Overall comparison of gas concentrations between the different locations (i.e. sub-slab, crawlspace, or living space) indicates that the majority of these low-level VOC detections are a result of other indoor air sources common to residential homes. The homogeneity in sample concentrations at different homes indicates the low-level VOC detections may also be a result of ambient air conditions.

Based on a qualitative assessment of risks to ecological receptors, there are potential risks associated with pesticides (DDT and DDE) in debris and soil within the former landfill. The analytical results from soil samples collected in 2006 ranged from 0.026 to 1.6 mg/kg for DDT and non-detect to 0.16J mg/kg for DDE ("J" indicates an estimated concentration value).

2.5 Summary of Sampling and Analysis Methods

Various sampling and analysis methods may be used to determine the presence of asbestos fiber in different media, such as soil and air. The following list provides examples of these types of methods that have been implemented as part of the remedial activity and risk assessment evaluation at the site:

- ABS – ABS simulates routine activities that would be conducted by users of the site to estimate potential exposures. Personal air samples are collected from contractors engaged in the activity and analyzed for asbestos fibers using transmission electron microscopy (TEM) analysis.

- Ambient air sampling – Ambient air sampling is completed by establishing stationary air monitoring stations within the vicinity or downwind of contaminated areas and collecting continuous air samples using a pump and air filtering cassette. The purpose of ambient air sampling is to determine the extent of friable asbestos fiber release from the soil. Weather data are also collected to correlate weather conditions with measured releases of asbestos fibers. Samples are analyzed for asbestos fibers using TEM analysis.

- PLM with stereomicroscopy analysis – Soil samples were analyzed using EPA/600/R-93/116 with a modified protocol that will use a combination of PLM and stereomicroscopy analysis to identify bulk ACM and/or asbestos fibers that may be present in soils.

- Visual inspection – A visual inspection of ACM is completed by first designating inspection areas to establish a boundary around the inspection zone. The soil is then visually inspected for ACM material using an intrusive or non-intrusive method, described as follows:

  - Non-Intrusive Visual Inspection: A non-intrusive (surficial) visual inspection of the immediate ground surface to determine the presence or absence of ACM debris.

  - Intrusive Visual Inspection: An intrusive visual inspection of the subsurface (using excavations or boreholes) to determine the presence or absence of ACM debris.

The visible ACM is then flagged to document spatial location and a quantitative estimate is provided to document the amount of ACM observed.

2.6 Summary of Baseline Risk Assessments

Pursuant to federal regulations (National Oil and Hazardous Substances Pollution Contingency Plan [NCP] Part 300.430(d)(2)), EPA is required to:

> "…characterize the nature of and threat posed by the hazardous substances and hazardous materials and gather data necessary to assess the extent to which the release poses a threat to human health or the environment…"

This section summarizes the findings of the BLRA performed for EPA by Syracuse Research Corporation (SRC 2009 & SRC 2010).

2.6.1 Baseline Human Health Risk Assessment

2.6.1.1 Scope of the Assessment

The BLRA (SRC 2009a & SRC 2009b) evaluated the current and potential future health risks posed to humans (residents, workers) by asbestos and other non-ACM contaminants (metals, solvents, pesticides, polycyclic aromatic hydrocarbons [PAHs], PCBs, petroleum hydrocarbons) at the site if no steps are taken to remediate the environment or to reduce contact with contaminated environmental media.

2.6.1.2 Exposure and Risk from Asbestos

The main reason for human health concern at the site is the presence of ACM in surface soil. ACM at the surface can breakdown over time, releasing asbestos fibers into the soil. When disturbed, these fibers can enter the air where they can be inhaled by humans. Inhalation of asbestos is known to increase the risk of several serious diseases, including lung cancer, mesothelioma, and asbestosis. Cancer risks to residents and workers under current site conditions were estimated based on measurements of asbestos levels in three types of air:

- General outdoor air (ambient air)
- Air inside homes (indoor air)
- Air above a location where soil is being disturbed by an activity, such as raking or digging

Cancer risks in the future were determined by estimating how much higher the level of asbestos fibers in soil might be in the future (after all of the ACM has migrated to the surface and broken down) compared to levels of fibers in soil now and multiplying the current risk estimates by the estimated increase. Exhibit 2-5 summarizes the estimated current and future risk to residents from these pathways:

Exhibit 2-5. Current and Future Potential Cancer Risk to Residents from Asbestos

Exposure Scenario	Type of ACM	Current Risk Level	Potential Future Risk Level
Soil disturbance	Poorly friable ACM	3E-05	3E-03 to 3E-02
	Easily friable ACM (MAG)	1E-03	2E-03 to 4E-03
Indoor air	-	7E-07	7E-05 to 7E-04
Ambient air	-	2E-07	2E-05 to 2E-04
Total	Poorly friable ACM	3E-05	3E-03 to 3E-02
	Easily friable ACM (MAG)	1E-03	2E-03 to 5E-03

In general, the EPA considers excess cancer risks that are below 1E-06 to be so small as to be negligible, and risks above 1E-04 to be sufficiently large that some sort of response action is desirable. Excess cancer risks that range between 1E-04 and 1E-06 are generally considered to be acceptable (USEPA 1991), although this is evaluated on a case by case basis. The State of Oregon defines the level of acceptable risk level for exposures of humans to a single carcinogen to be a lifetime excess cancer risk of one per one million (1E-06) for an individual at an upper-bound exposure (ORS 415.315, OAR 340-122-115 (2)(a)).

Risks to residents from indoor air and ambient air appear to be below EPA and Oregon DEQ acceptable risk ranges under current site conditions. Likewise risks from soil disturbances under current site conditions are below EPA acceptable risk ranges but above Oregon DEQ limits when poorly-friable ACM is present. Both EPA and Oregon DEQ risk limits from current soil disturbances are exceeded in cases where friable asbestos (e.g., MAG insulation) is present.

No data have been collected to estimate the levels of asbestos that may occur in air as a consequence of construction- or excavation-related soil disturbance activities. Therefore, risks to workers from soil disturbances were estimated using the same ABS air data but modified exposure factors in a similar approach as for exposure of residents during active soil disturbances. The results are summarized in Exhibit 2-6 below:

Exhibit 2-6. Estimated Risk to Workers under Current Site Conditions from Asbestos

ACM Type	Worker Category	
	Construction	Excavation
Poorly friable	4E-06	1E-07
Readily friable	2E-04	8E-06

At locations where only poorly friable ACM is present, risks to construction and excavation workers do not currently exceed the risk level of 1E-04 that EPA usually considers acceptable but do exceed the risk level of 1E-06 that Oregon DEQ considers acceptable.

Estimates of potential future risk to workers are summarized in Exhibit 2-7 below:

Exhibit 2-7. Estimated Future Risks to Workers from Asbestos

ACM Type	Worker Category	
	Construction	Excavation
Poorly friable	4E-04 to 4E-03	1E-05 to 1E-04
Readily friable	4E-04 to 8E-04	2E-05 to 3E-05

It is expected that future risks to construction workers are likely to exceed both EPA and Oregon DEQ's maximum risk ranges, while risks to excavation workers are likely remain at or below EPA's maximum acceptable risk level of 1E-04 but will be above Oregon DEQ's maximum risk of 1E-06. It is expected that risk levels from asbestos will increase in the future because of continuing transport of ACM from the subsurface to surface soil and continuing breakdown of ACM at the surface to yield free asbestos fibers in soil. The time course of future increases in free asbestos levels in surface soil is not known, but is likely to require many years. Screening level calculations suggest the ultimate magnitude of the increase in free fibers (and hence in risk) is likely to be on the order of 100 to 1000 fold. If so, then future risks for all of the three exposure pathways are likely to approach or exceed the level of 1E-04 that EPA considers to be the maximum excess risk that is acceptable. In particular the soil disturbance pathway would be of special concern, with predicted future risks ranging into the 1E-03 to 1E-02 range.

If all or part of the site were converted to non-residential land uses, future risks to humans would be lower than if the site remained residential, but would likely continue to exceed EPA and Oregon DEQ's acceptable cancer risk range, especially for land uses where regular soil disturbances continued to occur.

It is important to emphasize that these quantitative estimates of risk are uncertain due to a number of factors including uncertainty in measured asbestos levels in air and soil under current site conditions, uncertainty in future exposure levels, and uncertainties in the best cancer risk model to use. However, these uncertainties do not substantially alter the key conclusions that risks are likely to be much higher in the future if no steps are taken to prevent future migration and breakdown of ACM and release of fibers into surface soil.

2.6.1.3 Exposure and Risk from Non-ACM Contaminants

Exposure and risk to residents and workers were evaluated for non-ACM contaminants that were detected in site soils. A screening evaluation of these non-ACM contaminants was used to identify which COI would require further assessment.

The COI selection procedure is based on a comparison of the maximum detected concentration in onsite soil to an SLV in soil. An SLV is a concentration in soil that is believed to be without significant risk of either cancer or non-cancer effects. For carcinogens, the SLV is based on an excess cancer risk of 1E-06. For non-carcinogens, the SLV is based on a Hazard Quotient (HQ) of 0.1. If the maximum concentration in soil does not exceed the SLV, the contaminants may be eliminated as a COI. If the maximum concentration exceeds the SLV, the contaminant is retained as a COPC. If a contaminant does not have an SLV, or if the contaminant was never detected but the detection limit used in the analysis was higher than the SLV, the data are not sufficient to determine if the contaminant is of potential concern, and this is identified as a source of uncertainty.

Both the Region 6 and Oregon SLVs values for soil consider the following exposure pathways:

- Incidental ingestion of soil and dust
- Dermal contact with soil
- Inhalation of soil particles in outdoor air (non-volatile contaminants)
- Inhalation of volatile contaminants in outdoor air

Soil samples from the site were analyzed for a total of 150 different contaminants (8 metals, 15 PAHs, 73 SVOCs, 52 VOCs, and 2 TPH fractions). Of these, only eight contaminants were identified in which the maximum detected concentration exceeded the SLV:

- Arsenic
- Mercury
- EDC
- Benzene
- Chloroform
- cis-1,2-Dichloroethylene (DCE)
- PCE
- TCE

These eight contaminants were retained as COPCs for further evaluation of risks to residents, as described below.

SLVs were developed for construction and excavation workers (Oregon DEQ 2007). There were no contaminants whose maximum concentration exceeded the SLV for excavation workers and only one contaminant (arsenic) whose maximum concentration (27 mg/kg) was above the SLV for construction workers (13 mg/kg). Two samples exceed the construction worker SLV, one at the former power plant, and one at the former landfill. However, likely estimates of average concentration at the landfill are below the SLV. Therefore, only arsenic in soil at the former power plant was retained as a COPC for the construction worker.

Based on the 2008 investigation, non-cancer risks from inhalation of VOCs in indoor air appear to be below a level of concern (HQ < 1) for current and future residents at NRE and estimated excess cancer risks are within or below EPA's and Oregon DEQ's risk range. This finding is consistent with previous and updated findings based on data collected in 2007, and with most but not all of the samples collected in 2006. Based on the weight of evidence, it is concluded that the initial indication of concern identified based on the 2006 dataset likely had quality assurance/quality control (QA/QC) problems, and that intrusion of VOCs from subsurface soil into indoor air appears to be minimal, if in fact this pathway is complete.

2.6.2 Ecological Risk Assessment

EPA Region 10 and SRC have prepared an evaluation of risks to ecological receptors in basic accord with EPA guidance for performing an ERA. The intent of the ERA is to assess the risks from asbestos and other non-ACM contaminants to ecological receptors (birds, mammals, plants, soil organisms) at the site if no steps were taken to remediate the contaminated soil.

2.6.2.1 Ecological Risks from Asbestos

The EPA has not yet established any benchmark values for assessing risks to ecological receptors from oral or inhalation exposure to asbestos. Therefore, it is not possible to perform a quantitative risk evaluation based on the HQ approach. Further, even if such benchmarks were available, estimating the level of wildlife exposure to asbestos from ACM in soil would be very difficult and risk estimates would be highly uncertain. For these reasons, the assessment of risks to ecological receptors from asbestos at this site is performed in a qualitative manner. The main qualitative conclusions are as follows:

- Wildlife receptors with large home ranges (most birds and most large mammals) are expected to be present at the site only intermittently and consequently the average level of exposure to asbestos would tend to be low. In contrast, receptors that have small home ranges and that reside on the site are likely to have a high frequency of contact with ACM and would likely have the highest risk. This would include, for example, small ground-dwelling mammals such as mice and voles, and birds with relative small home ranges (e.g., robin).

- Based on the data derived from ABS studies, it appears that the levels of free asbestos fibers in surface soil under current site conditions are relatively low in most areas (except where MAG or possibly AirCell is present). Thus, similar to the situation with humans, exposures (and presumably risks) of small home range receptors to surface fibers under current site conditions are likely to be low. Exposures and risks to animals that burrow into the soil might tend to be higher, especially if the receptor actually chews on or digs through the ACM.

- In the future, if no action is taken to prevent release and breakdown of ACM at the surface, levels of free fibers would be higher and exposure (both oral and inhalation) of small home range receptors would tend to increase. It is not known whether such future exposures would result in adverse effects on any populations of exposed receptors.

- No data were located to indicate that asbestos is toxic to plants, and there is little reason to suppose that it is. However, pieces of ACM that emerge on the surface may impair plant growth by physically covering the soil and preventing exposure of plants to sun and water.

- No data were located to indicate whether asbestos is toxic to soil invertebrates such as earthworms. However, it is considered likely that earthworms will have direct contact with free fibers in soil and will also ingest fibers while feeding. Thus, adverse effects on earthworms could be of potential concern.

- Methods are not presently available to support quantitative evaluation of risks to ecological receptors from asbestos. Based on current site conditions, it is expected that risks are likely to be low for large home range receptors, but might be of concern for small home range receptors, especially those that burrow into the ground and/or chew on ACM. Risks would be expected to increase in the future as ACM continues to break down and release free fibers into the environment.

2.6.2.2 Ecological Risks from Non-ACM Contaminants

Screening-level HQ values for metals must be interpreted with caution because most benchmark values for metals are based on the assumption that the metal is present in a soluble form, while most of the metals in soil are likely to be present as poorly soluble minerals that are not well absorbed when ingested. To investigate further, the risk assessment compared the concentrations of observed values of metals in soils at the site to levels seen in background soils in Oregon or from values used in the derivation of EPA's "Eco-SSL" (ecological soil screening level) values. As indicated in the risk assessment none of the metals in site soils occur in concentration ranges higher than these estimates of background soils. However, arsenic concentrations do appear elevated relative to other areas within the site at the former power plant. Because the power plant is a very small area relative to the home range of likely ecological receptors, and because the measured concentrations are low relative to regional estimates of background, it is concluded that metals in soils are not of significant ecological concern at the site.

Most organic compounds in site soils were below a level of concern at all locations, except for DDE and DDT. These two analytes were detected at levels of potential concern in one area of the site (the landfill). These results indicate that ecological receptors, including birds, mammals, plants, and soil invertebrates, that reside entirely or mainly in the landfill area may be at risk from adverse effects of DDT and DDE. EPA has subsequently performed an evaluation that indicates ecological risks from DDT and DDE at the landfill do not require further consideration in this FS. Additional details regarding this issue are documented in the Administrative Record for the site.

2.7 Summary of Site Characteristics

Based on the information currently available and presented in this summary of the RI report, the following conclusions have been drawn regarding the site:

- Current site conditions are such that MAG and AirCell containing friable amosite and chrysotile present a current risk to residents when soil containing this type of ACM is disturbed by routine outdoor activities. Given the current risk and the widespread distribution of MAG and AirCell at the site, remedial actions are required at the site to mitigate current exposures.

- Due to the potential for future increased risk to residents at the site from ACM that is yet to break down, remedial actions should also include alternatives that reduce future exposures to residents and/or can prevent further emergence of ACM to the surface that results in weathering causing the release of asbestos fibers to site soils.

- Currently, asbestos fibers have been observed in indoor and outdoor ambient air below a risk level of 1E-06 that is usually considered to be negligible by EPA and Oregon DEQ; however, these inhalation exposure pathways may be of concern in the future.

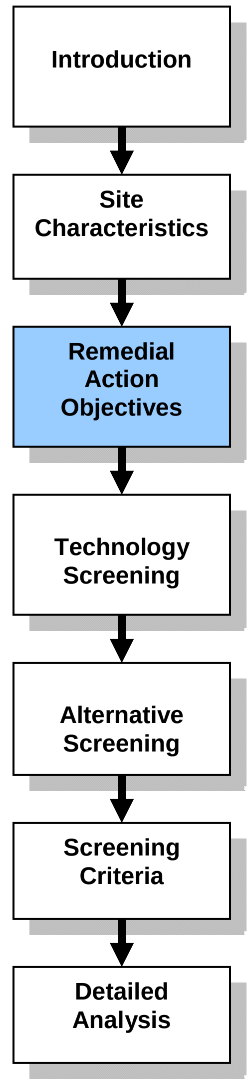
- Non-ACM COIs that exceeded SLVs in soil include: arsenic, mercury, EDC, benzene, chloroform, DCE, PCE, and TCE. There were no contaminants whose maximum concentration exceeded the SLV for excavation workers and only arsenic was above the SLV for construction workers. Therefore, only arsenic in soil at the former power plant was retained as a COPC for the construction worker.

- Methods are not presently available to support quantitative evaluation of risks to ecological receptors from asbestos. Based on current site conditions, it is expected that risks are likely to be low for large home range receptors, but might be of concern for small home range receptors, especially those that burrow into the ground and/or chew on ACM. Risks would be expected to increase in the future as ACM continues to break down and release free fibers into the environment.

- Non-asbestos contaminants do not appear to be of concern to ecological receptors except for the potential for risks from DDT and DDE in the landfill. However, further study would be needed to reliably characterize the magnitude of these risks. EPA has subsequently performed an evaluation that indicates ecological risks from DDT and DDE at the landfill do not require further consideration in this FS. Additional details regarding this issue are documented in the Administrative Record for the site.

The FS evaluates potential remedial alternatives to address risks to human health and the environment posed by contamination at the site.

Section 3
Remedial Action Objectives



Section 300.430(e) of the NCP requires that the remedial alternative development process be initiated by developing PRAOs, identifying general response actions that address these PRAOs, and performing an initial screening of applicable remedial technologies. The goal of the remedy selection process is "to select remedies that are protective of human health and the environment, maintain protection over time, and minimize untreated waste."

PRAOs are media-specific and source-specific goals achieved through completion of a remedial action that is protective of human health and the environment. These objectives are typically expressed in terms of the contaminant, the concentration of the contaminant, and the exposure route and receptor.

PRAOs are typically developed by evaluating several sources of information, including results of the BLRA and ERA and tentatively identified ARARs. These inputs provide the basis for determination of whether protection of human health and the environment is achieved for a remedial alternative.

This section presents the ARARs, PRAOs, and the PRGs that are tentatively identified for the site. Final ARARs, remedial action objectives (RAOs), and remedial goals (RGs) will be developed from evaluations presented within this FS and set forth in the ROD as performance standards for any and all remedial design and subsequent remedial actions.

3.1 Applicable or Relevant and Appropriate Requirements

Identification and evaluation of ARARs are integral components of the FS process to determine whether remedial alternatives can protect human health and the environment. The following paragraphs were developed from EPA's *Introduction to Applicable or Relevant and Appropriate Requirements* (EPA 1998); they give an overview of why ARARs must be identified and evaluated as part of the CERCLA process.

CERCLA and the NCP establish a standardized process through which EPA must respond to spills and clean up the nation's most dangerous hazardous waste sites. The CERCLA response process, while it sets acceptable risk-based goals for cleanups, does not impose specific restrictions on the various activities (such as treatment, storage, and disposal of wastes, construction and use of remediation equipment, and release of contaminants into air, soil, and water) that may occur during a response. EPA instead relies on other federal and state environmental laws and regulations to govern response activities.

A site-specific risk assessment is the foundation on which the selection of a CERCLA remedy is based. When developing PRGs, EPA and Oregon DEQ must also consider readily available, generically applicable information, such as chemical-specific ARARs. In addition, when carrying out the chosen remedy, EPA and Oregon DEQ must implement other substantive and administrative requirements that are applicable or relevant and appropriate to the conditions or actions at each CERCLA site. These ARARs may affect a remedial or a removal response by limiting concentrations of hazardous substances present in wastes or discharges, restricting activities at sensitive locations, or regulating certain actions such as the design and operation of cleanup equipment.

The laws that most often contribute ARARs to the CERCLA response process are federal environmental laws, but other federal, state, and local standards may also be applicable or relevant and appropriate to CERCLA activities. ARARs fill in the substantive gaps in CERCLA's risk-based response framework, ensuring protection of human health and the environment.

EPA and Oregon DEQ have conducted initial discussion concerning potential federal and state ARARs and have tentatively identified regulations that may be applicable or relevant and appropriate to the site. Appendix B constitutes the initial identification and detailed description of ARARs for the implementation of a remedial action at the site.

3.1.1 ARAR Identification Process

Determining exactly which laws and regulations will affect a CERCLA response is somewhat different than determining the effect of laws and regulations on activities that take place outside the boundaries of a site remediated under CERCLA. For onsite activities, CERCLA requires compliance with both directly applicable requirements (i.e., those that would apply to a given circumstance at any site or facility) and those that EPA deems to be relevant and appropriate (even though they do not apply directly), based on the unique conditions at a site.

ARARs are designated as either "applicable" or "relevant and appropriate," according to EPA guidance, and may stem either from federal or state law. ARARs must be identified on a site-specific basis and involve a two-part analysis. A determination must first be made on whether a given requirement is applicable. If it is not applicable, then a second determination must be made on whether it is both relevant and appropriate. When the analysis determines that a requirement is both relevant and appropriate, such a requirement must be complied with to the same degree as if it were applicable. Compliance with ARARs is a threshold criterion that any selected remedy must meet unless a legal waiver as provided by CERCLA Section 121(d)(4) is invoked.

State requirements are potential ARARs for CERCLA response actions as long as they meet the following eligibility criteria:

- State law or regulation
- Environmental or facility siting law or regulation
- Promulgated (of general applicability and legally enforceable)
- Substantive (not procedural or administrative)
- More stringent than federal requirements
- Identified in a timely manner
- Consistently applied

Many state requirements listed as ARARs are promulgated with identical or nearly identical requirements to federal law pursuant to delegated environmental programs administered by EPA and the state. The preamble to the NCP provides that such a situation results in citation to the state provision and treatment of the provision as a federal requirement.

3.1.1.1 Applicable Requirements

Section 300.5 of the NCP defines "applicable requirements" as cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state environmental laws that specifically address a hazardous substance, pollutant, contaminant, removal action, location, or other circumstances at a CERCLA site.

3.1.1.2 Relevant and Appropriate Requirements

Relevant and appropriate requirements specifically refer to cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws. These requirements are not directly applicable to hazardous substances, pollutants, contaminants, remedial actions, locations, or other circumstances at a CERCLA site but address problems or situations sufficiently similar (relevant) to those encountered at the CERCLA site such that their use is well suited to the particular site.

The determination that a requirement is relevant and appropriate is a two-step process: (1) the determination of whether a requirement is relevant and (2) the determination of whether a requirement is appropriate. In general, this involves comparing a number of site-specific factors, including examining the purpose of the requirement and the purpose of the proposed CERCLA action, the medium and substances regulated by the requirement and the proposed remedial action, the actions or activities regulated by the requirement and the remedial action, and the potential use of resources addressed in the requirement and the remedial action.

When the analysis results in a determination that a requirement is both relevant and appropriate, such a requirement must be complied with to the same degree as if it were applicable (EPA 1988).

3.1.1.3 Information to be Considered

In addition to ARARs, the NCP states that where ARARs do not exist, agency advisories, criteria, or guidance are to be considered useful "in helping to determine what is protective at a site or how to carry out certain actions or requirements" (55 Federal Register 8745). These sources of information are referred to as TBC.

The NCP preamble states, however, that provisions in the TBC category "should not be required as cleanup standards, because they are, by definition, generally neither promulgated nor enforceable, so they do not have the same status under CERCLA as do ARARs."Although not enforceable requirements, these documents are important sources of information that EPA and the state may consider during selection of the remedy, especially regarding the evaluation of public health and environmental risks, or which will be referred to, as appropriate, in selecting and developing cleanup actions [40 (Code of Federal Regulations) CFR § 300.400(g)(3), 40 CFR § 300.415(I)].

Appendix B contains a complete list of preliminary TBCs for the site.

3.1.1.4 Other Regulatory Requirements Not Considered ARARs

There are other laws and regulations that have not been identified as ARARs for the site because they are not specifically related to environmental cleanup or facility siting. One example would be the U.S. Department of Transportation (DOT) regulations for transport of hazardous and nonhazardous materials or wastes; another would be Occupational Safety and Health Administration (OSHA) general construction safety regulations.

3.1.2 Categories of ARARs

Environmental laws and regulations fit (more or less) into three categories: 1) those that pertain to the management of certain chemicals; 2) those that restrict activities at a given location; and 3) those that control specific actions. Thus there are three primary types of ARARs: chemical-, location-, and action-specific. An ARAR can be one or a combination of all three types of ARARs.

Chemical-specific requirements address chemical or physical characteristics of compounds or substances on sites. These values establish acceptable amounts or concentrations of contaminants that may be found in or discharged to the ambient environment.

Location-specific requirements are restrictions placed on the concentrations of hazardous substances or the conduct of cleanup activities because they are in specific locations. Location-specific ARARs relate to the geographical or physical positions of sites rather than the nature of contaminants at sites.

Action-specific requirements are usually technology-based or activity-based requirements or limitations on actions taken with respect to hazardous substances, pollutants, or contaminants. A given cleanup activity will trigger an action-specific requirement. Such requirements do not themselves determine the cleanup alternative but define how chosen cleanup methods should be performed.

3.1.3 Waivers of Specific ARARs

CERCLA Section 121(d)(4) authorizes that any ARAR may be waived under one of the following six conditions if the protection of human health and the environment is ensured:

- It is part of a total remedial action that will attain such level or standard of control when completed (i.e., interim action waiver).
- Compliance with the ARAR at a given site will result in greater risk to human health and the environment than alternative options that do not comply with the ARAR.
- Compliance with such a requirement is technically impracticable from an engineering perspective.
- The remedial action will attain a standard or performance equivalent to that required by the ARARs through use of another method or approach.
- The ARAR in question is a state standard and the state has not consistently applied (or demonstrated the intention to consistently apply) the ARAR in similar circumstances at other sites.
- In meeting the ARAR, the selected remedial action will not ensure a balance between the need for protection of public health and welfare and the environment at the site and the availability of Superfund monies to respond to other facilities.

It is not anticipated that ARAR waivers will be required for selecting or implementing a remedy at the site.

3.1.4 ARARs for Onsite and Offsite Actions

The types of legal requirements applying to CERCLA responses will differ to some extent depending on whether the activity in question takes place on site or off site. The term "on site" is defined in the NCP as "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action" (40 CFR § 300.5).

Implementation of onsite remedial actions for the site would not require federal, state, or local permits in accordance with Section 121(e) of CERCLA. Onsite CERCLA actions must comply with all substantive requirements that are "applicable" or "relevant and appropriate." Offsite CERCLA actions would not only require compliance with applicable requirements, but compliance with both substantive and administrative components of the applicable regulations, as well. Exhibit 3-1 contains a summary of the scope and intent of ARARs with regards to onsite and offsite actions.

Exhibit 3-1. Scope and Extent of ARARs

	Scope of Requirements	Extent to Which Other Requirements Apply
Onsite Compliance	Substantive	Applicable or Relevant and Appropriate
Offsite Compliance	Substantive and Administrative	Applicable Requirements

Permits are considered to be procedural or administrative requirements. Thus, onsite activities of a remedial action for the site do not need obtain permits or meet other administrative requirements contained in ARARs in accordance with Section 121(e) of CERCLA. CERCLA Section 121(e)(1), 42 United States Code (U.S.C). § 9621(e)(1), states, "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely on site, where such remedial action is selected and carried out in compliance with this section." The onsite activities must, however, comply with substantive permit requirements.

In most cases, the classification of a particular requirement as substantive or administrative will be clear, but some requirements may fall in an area between provisions related primarily to program administration and those concerned primarily with environmental and human health goals.

3.1.5 Identification of Potential ARARs for Remedial Alternatives

Appendix B lists potential ARARs and TBCs, and with a brief description of ARARs for the implementation of a remedial action at the site. The ARARs are organized by whether they are federal or Oregon ARARs or TBCs. The ARARs or group of related ARARs included in Appendix B are identified by a statutory or regulatory citation, followed by a brief explanation of the ARAR and how and to what extent the ARAR is expected to apply to potential activities to be conducted. The tables in Appendix B also identify whether the ARAR or TBC is chemical-, location-, and/or action-specific.

Appendix B identifies potential ARARs for the purpose of evaluating remedial alternatives in this FS. The potential ARARs in this FS are not binding; final ARARs will be determined in the ROD as performance standards for remedial design and subsequent remedial actions.

3.1.6 Significant ARARs Affecting Protectiveness Determinations

The provisions of the following potential ARARs were identified as significant ARARs affecting protectiveness determinations for remedial alternatives identified in this FS.

The Oregon Environmental Cleanup Law (ORS 465.200 through ORS 465.900) and the Oregon Hazardous Substance Remedial Action Rules (OAR 340-122) provide the state's regulatory framework for the determination of removal and remedial action necessary to assure protection of the present and future public health, safety and welfare, and the environment in the event of a release or threat of a release of a hazardous substance. These state laws and regulations have been identified as "applicable" ARARs and thus compliance with the substantive requirements of these laws and regulations is required.

CERCLA and the NCP form the federal laws and regulations under which a response in the event of a release or threat of a release of a hazardous substance from an abandoned site is performed.

Generally the substantive portions of the Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rules provide standards similar to those within CERCLA and the NCP. However there are a few major differences that fundamentally affect the determination of protectiveness.

Specifically, the NCP indicates the following regarding carcinogens:

- For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 1E-04 and 1E-06 using information on the relationship between dose and response. The 1E-06 risk level shall be used as the point of departure for determining remediation goals for alternatives when ARARs are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure. (Section 300.430(e)(2)(i)(A)(2)).

The Oregon Hazardous Substance Remedial Action Rules indicate the following:

- "Acceptable risk level for human exposure to individual carcinogens" means for deterministic risk assessments, a lifetime excess cancer risk of less than or equal to one per one million (1E-06) for an individual at an upper-bound exposure (OAR 340-122-0115(2)(a).

This is a significant difference in determining protectiveness for remediation of the primary carcinogen identified at the site (asbestos) since many of the analytical techniques relied on for determination of risks from asbestos exposure have poor sensitivity at low concentrations of asbestos fibers that pose risks at these levels. This issue is discussed further in Section 3.4.1.

The issue of background concentrations of COPCs that are naturally occurring is another aspect of the Oregon Hazardous Substance Remedial Action Rules that affects the development of a PRG. Specifically the "Standards" section within OAR 340-122-0040(2)(a) through (c) states:

- "In the event of a release of a hazardous substance, remedial actions shall be implemented to achieve:

(a) Acceptable risk levels defined in OAR 340-122-0115, as demonstrated by a residual risk assessment;

(b) Numeric cleanup standards developed as part of an approved generic remedy identified or developed by the Department (Oregon DEQ) under OAR 340-122-0047, if applicable; or

(c) For areas where hazardous substances occur naturally, the background level of the hazardous substances, if higher than those levels specified in subsections (2)(a) through (2)(b) of this rule."

Arsenic is a COPC but is also naturally-occurring element within soils near the site. Thus, the determination of a PRG for arsenic is not solely based on the determination of risk, but also whether that risk represents concentrations of arsenic above background concentrations for the site.

The issue of background may also affect determinations of protectiveness for forms of asbestos that may be naturally occurring at the site (those not associated with chrysotile and amosite forms of asbestos in ACM that was used in construction of the former MRB).

3.2 Anticipated Land Uses

The current and anticipated future land uses for the site are an important consideration for the development of PRAOs and PRGs to ensure remedial alternatives are protective of human health and the environment. The final condition of the site after remediation must be considered in evaluating future land uses or activities and the related protection to human health that is provided.

The expectation and assumption in this FS t is that yet to be remediated areas that pose unacceptable risks (current or future potential risks) to human health for residential use would also constitute unacceptable risks for non-residential uses. Conversely, areas that are remediated that result in acceptable risks for residential use would also result in acceptable risks for non-residential uses (assuming the remedial measures, such as caps, put in place to address human health risks are kept intact). Land uses or activities (residential or non-residential) that would compromise the remedial measures such as caps implemented under a remedial action would be considered unacceptable.

3.2.1 Residential Use

Based on the current zoning shown on the Klamath County land use zoning map for Township 38S, Range 09E, Zone 15, (Klamath County 2007), the site is predominantly zoned for low density residential (RL) use. However there are small parcels near the site boundary that are zoned as medium density residential (RM) use and forest/range (FR) use.

The site is currently used for residential purposes on 23 private parcels and was partially developed for residential use on receivership parcels. It is further assumed that the site can support future residential development since it has the following:

- Zoning that supports residential development
- Topography and aesthetics favorable to residential development
- Access from paved county roads
- A clean source of drinking and fire protection water and related infrastructure
- Other utilities and services required for residential purposes such as electricity

Various remedial measures considered in this FS may disrupt existing underground utilities. This is of particular concern to septic systems, as occupancy can be precluded if septic systems are rendered inoperable and/or do not meet local code requirements. The NRE receiver is currently working with wastewater consultants to evaluate options for wastewater treatment if septic systems are disrupted during implementation of a selected remedy. This activity is funded through the NRE receiver, independent of the Superfund program.

3.2.2 Non-Residential Use

Non-residential land uses could also be reasonably anticipated based on historical uses of the site, the proximity to Klamath Falls, and the site's aerial extent. These potential land uses could include commercial, industrial, recreational, or nature reserve uses.

While residential use of the site is generally consistent with current county zoning, discussions between EPA and Oregon DEQ concerning potential future land use with respect to implementation of various remedial alternatives are ongoing.

3.3 Preliminary Remedial Action Objectives

PRAOs are media-specific and source-specific goals to be achieved through completion of a remedy that is protective of human health and the environment. These objectives are typically expressed in terms of the chemicals, the concentration of the chemicals, and the exposure routes and receptors.

PRAOs are typically developed by evaluating several sources of information, including results of the BLRA and ERA discussed in Section 2.6 and tentatively identified ARARs presented in Appendix B. These inputs are the basis for determining whether protection of human health and the environment is achieved for a particular remedial alternative.

The PRAOs presented are initially based on anticipated future use of the site for primarily residential purposes:

1. Mitigate the potential for inhalation and ingestion exposures by human and ecological receptors to asbestos fibers in soil and indoor air that would result in risks that exceed the target cancer risk specified by Oregon DEQ of 1E-06.

2. Control erosion of asbestos by wind and water to prevent the spread of contamination from source locations to unimpacted locations and media.

3. Mitigate the potential for inhalation and ingestion exposures by human receptors to arsenic in soil within the extent of the former power plant that exceed site background concentrations of arsenic in soil and result in risks that exceed the target cancer risk specified by Oregon DEQ of 1E-06.

3.4 Preliminary Remediation Goals

PRGs are defined as the average concentration of a chemical in an exposure unit associated with a target risk level such that concentrations at or below the PRG do not pose an unacceptable risk. At this site, EPA and Oregon DEQ identify different target cancer risk levels constituting unacceptable risks as described in Section 3.1.6. The effect of these differences on developing PRGs for asbestos is further discussed with in Section 3.4.1. The PRGs are typically presented as chemical- and media-specific values that directly address the PRAOs.

As stated in Section 3.3, the PRAOs for the site include protection of human and ecological receptors from asbestos fibers within debris and soil distributed across the site, and protection of human receptors from arsenic within soils in the vicinity of the former power plant.

Identification and selection of the PRGs are typically based on PRAOs, the anticipated future land uses, and the tentatively identified ARARs. These values are typically used as a preliminary value in the FS to guide evaluations of remedial alternatives. However it is not technically feasible to develop a PRG for asbestos, and it is difficult to identify PRGs for the non-asbestos COPC (arsenic). The following subsections describe these difficulties.

3.4.1 Asbestos

ACM poses an exposure risk to human receptors through inhalation of asbestos fibers released during active soil disturbance activities, inhalation of asbestos fibers in indoor air, and inhalation of asbestos fibers in outdoor (ambient) air as indicated in Section 2. Risk calculations discussed in Section 2.6 indicate that current risks are unacceptable in areas where readily friable asbestos (e.g., MAG and/or AirCell) is present at the surface and that future risks are likely to be unacceptable at any location where ACM is present and is allowed to undergo future breakdown to release free fibers to soil. Based on this, it is concluded that remedial action is needed for locations with known ACM contamination to address current and future risks from asbestos.

Sites with contamination that pose cancer risks that exceed 1 in 10,000 (or 1E-04) normally require remedial action under CERCLA. However PRAOs have been established to address ACM in debris and soil that poses cancer risks in excess of 1 in 1,000,000 (1E-06) to comply with Oregon DEQ's Hazardous Substance Rules under OAR 340-122-0040 and 340-122-0115 as discussed in Section 3.1.

Normally, PRGs would be developed by computing the concentration of asbestos in soil that corresponds to an excess cancer risk of 1E-06. However, such a computation is not possible at present because of the high variability in the relationship between asbestos in soil and asbestos in air. Even if the computations were possible, the ability to measure asbestos in surface and subsurface soil is presently limited by the available technologies and methods. Noncancer risks from inhalation of asbestos fibers from ACM have also been recognized, but there is no current methodology to quantify noncancer risks for asbestos.

For these reasons, PRGs for asbestos have not been established for site debris and soil. If the PRAOs for asbestos contamination are achieved through implementation of remedial measures that either truncate the exposure pathways and/or convert asbestos to a non-respirable form, then risks to humans from inhalation exposures to asbestos are expected to be acceptable.

3.4.2 Arsenic

Arsenic was identified in Sections 2.6 at concentrations that could potentially pose an exposure risk to human receptors through ingestion or inhalation of soil in the vicinity of the former power plant.

The regional screening level (RSL) identified by EPA as protective for arsenic concentrations in residential soil is 0.39 mg/kg (EPA 2009a). The arsenic concentrations in soil at the former power plant range between 0.5 mg/kg and 27.2 mg/kg. However arsenic is a metalloid that also occurs naturally within soils developed over volcanic rocks such as those that underlie and outcrop near the site. A site-specific background study has not been performed.

For purposes of the FS, the PRG for arsenic will be identified as 0.39 mg/kg or site-specific background, whichever is higher. A site-specific background study will be required to determine the mean background concentration for arsenic in soil.

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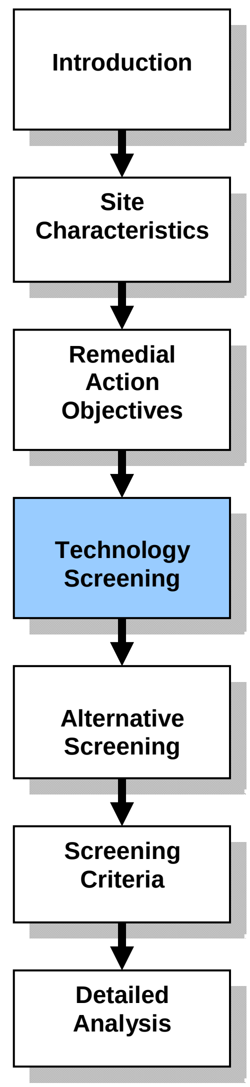
Section 4
Identification and Screening of General Response Actions, Remedial Technologies, and Process Options

4.1 Overview

This section identifies GRAs, remedial technologies, and process options that are potentially useful to address the PRAOs identified in Section 3 for the contaminated media that pose a potential threat to human health and the environment. This section presents the screening of GRAs, remedial technologies, and process options in accordance with the NCP to retain representative technologies and process options that can be assembled into remedial alternatives, which are discussed in Section 5.



The identification and screening process consists of the following general steps:

- Identify the contaminants and affected media that pose risks to human health and the environment and group these into a category or categories of contaminated media for FS evaluation purposes.
- Develop GRAs for the contaminated media that will satisfy the PRAOs identified in Section 3.
- Compile remedial technologies and process options for each GRA that are potentially viable for remediation of the contaminated media.
- Screen the remedial technologies and process options with respect to technical implementability for the contaminated media at the site. Technologies and process options that are not technically implementable relative to the contaminated media are eliminated from further consideration in this FS.
- Evaluate and screen the retained remedial technologies and process options with respect to effectiveness, ease of implementability, and relative cost. Technologies and process options that have low effectiveness, low implementability, or high cost relative to the contaminated media are eliminated from further consideration in this FS.
- Combine and assemble the retained technologies and process options for the contaminated media into site-wide remedial alternatives as presented in Section 5.

The remainder of this section describes the contaminated media and evaluates GRAs, technologies, and process options that are potentially viable for addressing them to meet the PRAOs and ARARs discussed in Section 3.

4.2 Contaminants and Affected Media

The purpose of this subsection is to identify the contaminants and affected media that exhibit a potential risk to human health and the environment, and group these into categories of contaminated media. Creating categories of contaminated media facilitates identification of GRAs, remedial technologies, and process options that can be used to address the PRAOs.

The nature and extent of contamination within media at the site and the human health risks posed by the contaminated media are summarized in Section 2 and fully discussed in the RI report (CDM 2010). The following subsections describe the two contaminants posing human health and/or ecological risks at the site (asbestos and arsenic) and the categories of media affected by these contaminants.

4.2.1 Asbestos

Based on the RI, the primary contamination type that contributes to potential human health and ecological risks at the site is asbestos. Since certain forms of asbestos are naturally occurring within soils near the site, asbestos as discussed in this FS refers to forms of asbestos that are not found naturally in the area and are associated with the former MRB demolition debris (i.e., chrysotile and/or amosite forms of asbestos).

4.2.2 Arsenic

Arsenic was identified in the RI Report (CDM 2010) to pose potential human health risks at the site; however, arsenic was not found to pose ecological risks. Arsenic is naturally occurring within soils near the site, so arsenic as discussed in this FS refers to arsenic contamination derived from demolition of the former MRB.

As identified in the RI report and summarized in Section 2, the only portion of the site with arsenic above background concentrations and associated with demolition of the former MRB is the vicinity of the former power plant.

4.2.3 Affected Media

Debris and associated soil are the predominant contaminated media at the site. Asbestos contamination at the site occurs both in bulk form within exposed and buried MRB demolition debris as well as free fibers within associated soils. Asbestos contamination is widely distributed throughout the site. Arsenic contamination is more localized and occurs primarily within surface and subsurface soil associated with the former power plant. Distribution of asbestos contamination at the site is shown on Figures 2-1 through 2-4; distribution of arsenic contamination at the former power plant is shown on Figure 2-5.

To simplify FS evaluations and alternative descriptions, the contaminated media (debris and soil contaminated with asbestos and/or arsenic) are grouped together and herein defined as "contaminated materials" to simplify FS evaluations. This grouping was based on the following assumptions:

- MRB demolition debris varies widely in size and composition.
- MRB demolition debris is commonly co-mingled with associated soil contamination.
- Debris can generally be addressed using the same remedial technologies and process options as associated contaminated soil since they are both solid media and much of the debris underwent significant size reduction during demolition of the MRB.
- Arsenic and asbestos can generally be addressed using many of the same remedial technologies and process options.

4.3 General Response Actions

GRAs are initial broad response actions considered to address the PRAOs for the contaminated materials identified at the site. GRAs include several remedial categories, such as containment, removal, disposal, and treatment of contaminated materials. Site-specific GRAs are first developed to satisfy the PRAOs and/or ARARs, and then are evaluated as part of the identification and screening of remedial technologies and process options for the contaminated materials.

The GRAs considered for remediation of contaminant materials include the following:

- No Action
- Monitoring
- Land Use Controls
- Containment
- Removal/Transport/Disposal
- Treatment

No Action leaves contaminated materials in their existing condition with no control or cleanup planned. In accordance with the NCP, this GRA must be considered to provide a baseline against which other options can be compared.

Monitoring involves physical and/or chemical measures used at the site to determine if there is contaminant migration. Monitoring is not intended to substitute any engineering aspect of a selected remedy and does not physically address contaminants.

Land Use Controls involve administrative, legal, and/or informational measures intended to control or prevent present and future use of contaminated materials, and inform and warn of dangers associated with these materials. Land use controls are not intended to substitute for engineering aspects of a selected remedy and do not physically address contaminants.

Containment involves physical measures applied to contaminated materials to control the release of contaminants and/or prevent direct contact or exposure to the contaminants.

Removal/ Transport/Disposal involve a complete or partial removal (i.e. excavation) of contaminated materials followed by transportation and disposal of the materials at an onsite/offsite location.

Treatment involves biological, chemical, thermal, and/or physical measures applied to the contaminated materials that reduce toxicity, mobility, and/or volume of the contaminants present.

4.4 Identification of Remedial Technologies and Process Options

In this step of the FS process, remedial technology types and process options that are capable of addressing contaminated materials are identified and organized under each GRA listed in Section 4.3. This section provides potentially viable remedial technologies and process options for the contaminated materials.

The primary source of information used to identify remedial technologies and process options for the contaminated materials is the Federal Remediation Technologies Roundtable (FRTR) Remediation Technologies Screening Matrix and Reference Guide, Version 4.0 (FRTR 2007). Other sources of information used for identification of remedial technologies and process options include previous studies and work conducted at the site, relevant EPA guidance, published literature and vendor information, and engineering judgment based on other asbestos- and arsenic-related remediation projects.

Potentially viable remedial technologies and associated process options identified for the contaminated materials are presented and described on Table 4-1.

4.5 Screening of Remedial Technologies and Process Options for Technical Implementability

The remedial technologies and process options presented on Table 4-1 were first evaluated and screened based on technical implementability. The preliminary screening was very broad, looking at the suitability of a technology for addressing contaminated materials. The sources of information discussed in Section 4.4 were also used to perform screening.

A given technology or process option was eliminated from further consideration in this FS if site conditions or site characterization data indicated that the technology or process option is incompatible with the contaminants or media or cannot be implemented effectively due to physical limitations or constraints at the site.

Some of the process options may be technically implementable on a small-scale basis for a specific location; however, the technical implementability screening and elimination were performed by evaluating use of the process options for the contaminated materials on a large-scale, site-wide basis.

Each of the process options identified in Section 4.4 for contaminated materials has been screened to eliminate those that are not implementable technically at the site. The process options for contaminated materials eliminated from further consideration in this FS (with the rationale for elimination) are indicated on Table 4-1, using grey shading.

Remedial technologies and process options that were not deemed to be technically implementable relative to the contaminated materials were eliminated from further consideration. Retained technologies and process options were then carried forward to the second step of the evaluation process as discussed in Section 4.6.

4.6 Evaluation of Remedial Technologies and Process Options for Effectiveness, Implementability, and Relative Cost

Each of the technically implementable remedial technologies and process options retained from the preliminary screening process presented in Section 4.5 were further evaluated in the second step of the screening process to determine whether they should be eliminated from further consideration in the FS or retained for assembly into remedial alternatives.

4.6.1 Evaluation Criteria

Each remedial technology or process option was qualitatively evaluated for effectiveness, implementability, and relative cost. The criteria used, as defined in this step of the FS process, are as follows:

Effectiveness
This evaluation of the effectiveness of a remedial technology or process option focuses on:

- Potential effectiveness in handling the estimated volumes of contaminated materials and meeting the objectives identified in the PRAOs
- Potential impacts to human health and the environment during construction and implementation
- How proven the remedial technology or process option is with respect to the contaminants and conditions at the site

Implementability
Technically implementable technologies and process options retained in Section 4.5 are evaluated with respect to both the technical and administrative feasibility of implementing a remedial technology or process option. Technical implementability

was used as an initial screening step in Section 4.5 to eliminate remedial technologies and process options that were clearly ineffective or unworkable at the site. This subsequent screening criterion places greater emphasis on the institutional aspects of implementability. This criterion focuses on:

- Ability to obtain permits for offsite actions
- Availability and capacity of treatment, storage, and disposal services
- Availability of necessary equipment and skilled workers

Relative Cost
Cost plays a limited role in the screening of remedial technologies and process options. Relative capital and operations and maintenance (O&M) costs are used rather than detailed estimates. The cost analysis is evaluated based on engineering judgment and is ranked relative to other process options in the same technology type.

4.6.2 Screening Evaluation

Each of the remedial technologies and process options retained from the first screening step for the contaminated materials were evaluated against the three criteria identified in Section 4.6.1 to determine whether they should be eliminated from further consideration in the FS or retained for assembly into remedial alternatives. The results of this second screening step are presented on Table 4-2.

This evaluation and screening process is inherently qualitative. The evaluation criteria described in Section 4.6.1 are specified by EPA RI/FS guidance (EPA 1988); however, the degree to which the criteria are weighted against each other are not specified. Determination of how the individual evaluation criterion should influence the overall rankings is subjective and based on site-specific considerations and professional judgment. The factors considered for each of the three criteria that justify retention or elimination are rated using the qualitative rating system. Exhibit 4-1 presents the qualitative rating system used in conjunction with the stated rationale to justify the ratings with respect to each criterion.

Exhibit 4-1. Qualitative Rating System for Screening of Remedial Technologies and Process Options

	Effectiveness and Implementability		Relative Cost
⓿	None	⓿	None
❶	Low	$	Low
❷	Low to moderate	$$	Low to moderate
❸	Moderate	$$$	Moderate
❹	Moderate to high	$$$$	Moderate to high
❺	High	$$$$$	High

Remedial technologies or process options deemed to have low effectiveness, low administrative implementability, and/or high relative cost for contaminated materials are eliminated from further consideration in the FS, and are indicated on the tables (with the rationale for elimination) using grey shading.

4.7 Retained GRAs, Remedial Technologies, and Process Options

Based on the results of the two-step screening process described in Sections 4.5 and 4.6, a reduced number of remedial technologies and process options for contaminated materials were retained for further evaluation and the development of remedial action alternatives as discussed further in Section 5. These retained remedial technologies and process options are presented on Table 4-3.

Remedial technologies and process options identified to address the contaminated materials are retained because they either have substantial potential and applicability as a stand-alone remedy, or have remedial benefits in combination with other remedial technologies but would only have cost-effective application for specific site elements and particular conditions.

It is unlikely that using or applying a single remedial technology/process option to the contaminated materials will solely be able to achieve the PRAOs or comply with ARARs. Thus, using various remedial technologies/process options in combination is likely to be necessary. Conventional and innovative remedial technologies/process options for contaminated materials are used in various combinations for assembly of remedial alternatives as discussed in Section 5.

The retained conventional and new (innovative) remedial technologies and process options are identified in Sections 4.7.1 and 4.7.2.

4.7.1 Conventional Remedial Technologies and Process Options for Contaminated Materials

Conventional methods for remediation of contaminated materials at the site include monitoring, exclusion from contaminated areas, and removing, transporting and/or containing (isolating) source materials to eliminate transport of dust and/or fibers from the source materials. Exhibit 4-2 presents the conventional methods in remediation strategies for contaminated materials included in this FS:

Exhibit 4-2. Conventional Remedial Technologies and Process Options for Contaminated Materials

Remedial Technology	Process Option
Physical and/or Chemical Monitoring	- Non-Intrusive Visual Inspection - Intrusive Visual Inspection - Sample Collection and Analysis
Institutional Controls	- Governmental Controls, Proprietary Controls, and Informational Devices
Community Awareness Activities	- Informational and Educational Programs
Access Controls	- Posted Warnings
Surface Source Controls	- Water-Based Suppression - Chemical-Based Suppression - Negative Pressure Enclosure - Soil or Rock Exposure Barrier/Cover - Asphalt or Concrete Exposure Barrier/Cover - Geosynthetic Multi-Layer Exposure Barrier/Cover
Removal	- Mechanical Excavation - Pneumatic Excavation (Vacuum Extraction/Pumping)
Transport	- Mechanical Transport (Hauling/Conveying) - Pneumatic Transport (Vacuum Extraction/Pumping)
Disposal	- Onsite Disposal - Offsite Disposal
Physical and/or Chemical Treatment	- Physical Separation/ Segregation - Size Reduction

4.7.2 Innovative Remedial Technologies and Process Options for Contaminated Materials

Several innovative remedial technologies and process options for addressing contaminated materials were evaluated during the two-step screening process; one of those innovative process options (thermo-chemical treatment) was retained for assembly into remedial alternatives.

Thermo-chemical treatment involves mixing contaminated materials with proprietary demineralizing agents within a hydrofluoric acid solution. The mixture is then heated in a rotary hearth furnace. This process is similar to vitrification but does not involve complete melting. Instead, the process results in partial sintering of the material. The resulting reaction product (rock-like material) is an inert waste.

Thermo-chemical conversion technology (TCCT), patented by ARI Technologies Inc. (ARI), is a commercial form of this technology that has been previously demonstrated on other asbestos remediation projects. Currently the contaminated materials would be required to be transported off site for treatment to the closest operating TCCT facility in Washington State. Mobilization of a temporary onsite treatment facility is possible but with high cost. The contaminated materials require size reduction before they are put in the furnace for thermo-chemical conversion. The treatment process does not require physical separation/segregation of contaminated materials into similar types, nor separation from associated soils.

Thermal desorption was retained because of moderate to high effectiveness and moderate implementability when compared to other treatment process options. This innovative remedial technology/process option for contaminated materials is used in the assembly of remedial alternatives as discussed in Section 5.

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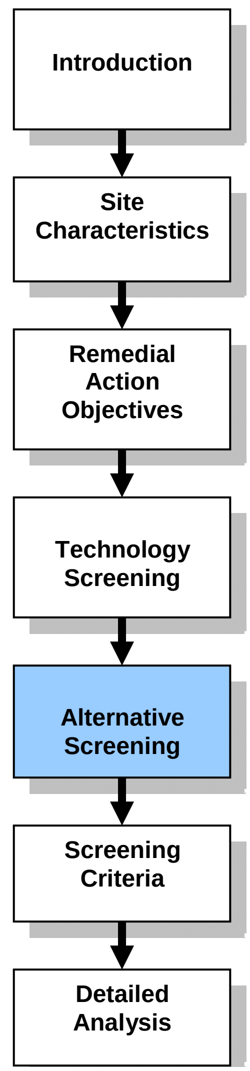
Section 5
Development and Screening of Alternatives

5.1 Overview

In this section, remedial action alternatives (herein referred to as remedial alternatives) are assembled by combining the retained remedial technologies and process options presented in Section 4 for contaminated materials. Remedial alternatives are developed from either stand-alone process options or combinations of the retained process options.



These remedial alternatives are then screened using a qualitative process with standard evaluation to determine overall effectiveness, implementability, and cost. The purpose of alternative screening presented in this section is to reduce the number of remedial alternatives retained for detailed analysis in Section 7.

The remedial alternatives for the site span a range of categories defined by the NCP as follows:

- No action alternative
- Alternatives that address the principal threats but involve little or no treatment; protection would be by prevention or control of exposure through actions such as containment and/or land use controls
- Alternatives that, as their principal element, employ treatment that reduces the toxicity, mobility, or volume of the contaminants
- Alternatives that remove or destroy contaminants to the maximum extent, eliminating or minimizing long-term management
- Alternatives that include innovative treatment technologies

5.2 Assumptions Affecting Development of Remedial Alternatives

Several fundamental assumptions affect the development of remedial alternatives evaluated in this FS (other than a “no action alternative”). These assumptions are driven by requirements of the PRAOs and ARARs identified in Section 3 and site limitations and constraints that cannot be overcome by using one or more remedial technology/process options as described in Section 4. These fundamental assumptions were taken into consideration during development of remedial alternatives for this FS and include the items listed in Exhibit 5-1:

Exhibit 5-1. Assumptions Affecting Development of Remedial Alternatives

Fundamental Assumption	Rationale
Land Use is Generally Considered to be Residential (Except for Receivership Parcels Under Selected Alternatives)	Land use for privately owned parcels (Figure 1-3) is assumed to be residential under all remedial alternatives. ■ It is assumed that privately owned parcels (whether currently developed and occupied or not) could be developed and occupied in the future. ■ It is assumed that homes on privately owned parcels would be preserved and not removed. ■ It is assumed that residents of privately owned parcels would be temporarily relocated as necessary to implement a remedial alternative. Land use for receiver-managed parcels (Figure 1-3) is assumed to be residential except for Alternatives 2 and 3. ■ It is assumed that homes on receiver-managed parcels would be preserved and not removed under remedial alternatives that assume residential use of all parcels (Alternatives 4, 5a, 5b, 6, and 7). ■ It is assumed that homes on receiver-managed parcels would be removed (relocated or demolished) only under alternatives that could potentially have non-residential uses (Alternatives 2 and 3).
Localized Arsenic Contamination Addressed Coincidental to Asbestos Contamination	Section 4.2.3 indicated that contaminated materials include arsenic contamination associated with the former power plant. This contamination is generally localized, co-located with ACM, and can be addressed using the GRAs identified for asbestos contamination. It is assumed that arsenic identified at this location will be addressed coincidental to the co-located ACM and associated soil.
Designation of Surface versus Subsurface Contamination Within Alternatives is Based on Frost Heave Potential	The designation of surface versus subsurface contamination within alternatives is based on the potential of contaminated materials, especially ACM, to have upward migration due to frost heave processes. These designations are not based on soil composition or risk assessment determinations. For purposes of FS evaluations, surface contamination is defined as contamination existing within 2 feet of the ground surface. Subsurface contamination is defined as existing deeper than 2 feet from ground surface. These assumptions are based on the estimated average frost depth of 2 feet in the county as indicated by the Oregon Residential Specialty Code, Table R301.2(1)-Climatic and Geographic Design Criteria. This depth will be confirmed and revised, if necessary, within the ROD or during remedial design (RD)/RA using freeze depth and capping thickness recommendations for the site currently being prepared by the United States Army Cold Regions Research and Engineering Laboratory. A preliminary summary of their results is also included in Appendix A.
Comprehensive Approach of GRAs within Alternatives	The GRAs provided within the alternatives address the asbestos- and arsenic-related contaminants and risks for the site as a whole (i.e. a parcel by parcel approach was not taken for alternatives evaluation). Combinations of GRAs to address specific parcel-related issues will be addressed during identification of the preferred alternative after finalization of the FS and subsequent development of the proposed plan.

Exhibit 5-1. Assumptions Affecting Development of Remedial Alternatives (continued)

Fundamental Assumption	Rationale
Compliance with Risk Standards Identified in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rules for Asbestos Contamination Requires Truncating Exposure Pathways or Converting ACM to a Non-Respirable Form through Treatment	Oregon Environmental Cleanup Law and the implementing Oregon Hazardous Substance Remedial Action Rules (discussed in Section 3.1.6 and Appendix B) establish acceptable risk levels for human health at 1E-06 for individual carcinogens, 1E-05 for multiple carcinogens; and a Hazard Index of 1.0 for non-carcinogens if contaminants are identified above background concentrations. Use of these risk levels during cleanup of non-asbestos contaminants is relatively straightforward. However it is currently not feasible to use existing asbestos sampling and analytical methods to determine carcinogenic risks from asbestos at a risk level of 1E-06 due to poor analytical sensitivity in soil or with ABS. Current analytical methods for soil are unable to consistently identify individual asbestos fibers that may be present in otherwise uncontaminated soils. Since one fiber in an air sample could exceed a 1E-06 risk level, compliance with these standards is uncertain even in soils otherwise free of visible ACM. In addition it is not currently feasible to determine non-carcinogenic risks from asbestos because a reference concentration does not currently exist. To ensure protectiveness, it is assumed that all remedial alternatives presented in this FS would be unable to adequately demonstrate through sampling and analysis compliance with these standards. It is further assumed that compliance with these ARARs for asbestos can only be achieved by truncating the exposure pathways and/or converting asbestos to a non-respirable form. This can be accomplished by excluding receptors from areas of asbestos contamination, placing a barrier between receptors and contaminated materials containing asbestos, and/or using treatment to convert ACM to a non-respirable form. These assumptions also apply to soils in identified contaminated areas that otherwise appear free of ACM after implementing remedial measures, due to the potential presence of individual asbestos fibers.
Land Use Controls and Monitoring are Essential GRA Components of all Alternatives	ABS studies were performed at the site to determine whether unacceptable exposure risks to asbestos fibers in soil exist outside of the site boundary that did not have visual indications of ACM contamination. The result of this limited study was not conclusive, but generally indicated that no to low numbers of fibers were detected in areas that did not otherwise have visible ACM contamination. This indication is significant because the areas outside of the site boundary are not assumed to be an area impacted by releases due to the demolition of the former MRB. Thus it is assumed that monitoring is not required outside of the site boundary. However this same assumption about monitoring cannot be made to areas within the site boundary that have not exhibited ACM contamination because the presumption is that areas within the site boundary have potentially been impacted by releases due their locations within the footprint of the former MRB. As indicated in the previous fundamental assumption, one of the remedial methods to ensure protectiveness is to truncate the exposure pathways through barriers or exclusion from contaminated areas. However periodic monitoring (visual inspection and sampling/analysis) and land use controls (institutional controls and access controls) must be performed to ensure the permanence of these measures.

Exhibit 5-1. Assumptions Affecting Development of Remedial Alternatives (continued)

Fundamental Assumption	Rationale
Land Use Controls and Monitoring are Essential GRA Components of all Alternatives (continued)	It is assumed that monitoring and land use controls are essential GRA components of all remedial alternatives except the "no action" alternative required by the NCP. It is assumed that these activities must be performed to determine protectiveness of the remedy after implementation and the need for any future additional remedial measures. These additional remedial measures are excluded from the screening and evaluation of remedial alternatives since they would be a contingency measure.
Interior Cleaning Only Required to Address Potential Future Risks from Indoor Air	As discussed in Section 2.6, asbestos fibers detected from indoor air within residential homes at the site does not exceed the 1E-06 carcinogenic risk level required to be met to ensure protectiveness for current risk, but does exceed that standard for potential future risks from indoor air (assuming ACM, and specifically MAG or Aircell, is allowed to degrade over time). Thus it is assumed that interior cleaning of homes would not be required for alternatives that fully truncate the exposure pathway for contaminated materials, since current risk to residents from indoor air is acceptable. For alternatives that will continue to leave contaminated materials exposed at the surface (Alternatives 2 and 3), it is assumed that interior cleaning of the homes would be periodically required for homes on privately owned parcels to ensure protectiveness. For homes on receiver-managed parcels under Alternatives 2 and 3, interior cleaning would not be performed since those homes would either be immediately relocated or demolished. It is further assumed that residents on privately owned parcels would be temporarily relocated to perform the interior cleaning.
30-year Period of Evaluation for all Alternatives	It is likely that all remedial alternatives will require an indefinite duration of operations and maintenance due to implementation of land use controls and monitoring. However, evaluation of long durations of operations and maintenance is cumbersome and is generally not necessary for comparative evaluation between alternatives due to cost discounting under present value analysis. Thus for FS purposes a default 30-year period of evaluation has been selected for all remedial alternatives.

Secondary factors and considerations have also been tentatively identified to aid development of remedial alternatives but are not fundamental controlling considerations. Since these considerations vary depending on the remedial approach used in each alternative, they are discussed in Section 7 for retained remedial alternatives.

5.3 Description of Remedial Alternatives

Remedial alternatives were assembled by combining the retained remedial technologies and process options. Table 5-1 provides a comprehensive list of the remedial technologies/process options that were used to develop each remedial alternative. The fundamental site assumptions and factors described in Sections 5.2 were also considered during development of the remedial alternatives.

The remedial alternatives evaluated for NRE include:

- Alternative 1: No Action
- Alternative 2: Interior Cleaning and Land Use Controls with Monitoring
- Alternative 3: Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring
- Alternative 4: Capping of Contaminated Materials and Land Use Controls with Monitoring
- Alternative 5a: Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring
- Alternative 5b: Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring
- Alternative 6: Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring
- Alternative 7: Excavation and Offsite Thermo-Chemical Treatment of Contaminated Materials at Permitted Facilities, Reuse of Treated Material, and Land Use Controls with Monitoring

The following subsections provide generalized descriptions of the remedy components for remedial alternatives to be evaluated during the screening process presented in this section. Detailed information for remedy components, including but not limited to specific quantities of contaminated materials and frequency and types of samples collected for analysis, are discussed in Section 7 for the alternatives retained after screening.

5.3.1 Alternative 1: No Action

Alternative 1 would leave removal action activities previously performed in their current conditions. No new remedial action activities would be initiated at the site to address contaminated materials or otherwise mitigate the associated risks to human health and the environment. A "no action" alternative is required by the NCP to provide an environmental baseline against which impacts of the various remedial alternatives can be compared.

Five-year site reviews would be performed as required by the NCP to evaluate whether adequate protection of human health and the environment is provided since contaminated materials would remain at the site. Monitoring (consisting of non-intrusive visual inspections and sample collection with laboratory analysis) would be performed as necessary to complete the 5-year site reviews.

5.3.2 Alternative 2: Interior Cleaning and Land Use Controls with Monitoring

Alternative 2 includes periodic interior cleaning of homes and residential structures on private parcels. Residential structures on receiver-managed parcels would be relocated or demolished. This alternative leaves the existing onsite waste repository intact, but does not otherwise modify the interim cover over the repository since other areas of contaminated materials on receiver-managed parcels surrounding the repository would be left exposed at the surface.

Interior cleaning would be performed on a periodic basis using vacuum extraction to remove asbestos fibers within residential structures on privately owned parcels. Without periodic interior cleaning, risks from contaminated indoor air would increase due to asbestos fibers tracked inside from exposed contaminated materials located outside the homes. While asbestos fibers in indoor air do not pose a current risk, tracking in contamination from outside in the future is of particular concern since contaminated materials are left exposed at the site and will further degrade over time. Residential structures on receiver-managed parcels would not be cleaned under this alternative since they would be left unoccupied and would be demolished or relocated during implementation of the remedy.

Land use controls would be implemented to restrict access and use of contaminated areas and provide awareness of risks from potential exposure to contaminated materials. Monitoring would consist of non-intrusive (surface) and intrusive (subsurface) visual inspections and sample collection with analysis to ensure that interior cleanings and land use controls are protective of human health and the environment.

Five-year site reviews would be performed since contaminated materials would remain at the site.

5.3.3 Alternative 3: Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

Alternative 3 includes in-place capping (covering) of contaminated materials identified on privately owned parcels and a portion of the contaminated materials on receiver-managed parcels. The remainder of contaminated materials on parcels managed by the receiver would be left exposed at the surface; however, land use controls would be implemented to restrict access and use of these parcels. This alternative leaves the existing onsite waste repository intact, but does not otherwise modify the interim cover on the repository since other areas of contaminated materials on receiver-managed parcels would be left exposed at the surface.

It is assumed, for purposes of the FS, that future land use of the covered portion of receiver-managed parcels could be for either residential or non-residential purposes and that the uses could vary based on the extent of cover construction. Determination of allowable future land uses beyond the current zoning is outside the scope of this FS. Current residential structures on receiver-managed parcels would be relocated or demolished.

Covers over contaminated materials would be constructed to the extent practicable. However, it may not be possible to construct frost-protective soil covers over contaminated materials directly adjacent to obstructions such as homes or structures, trees, subsurface utilities, and roads. For purposes of this FS, a thin profile of clean soil backfill or another barrier material placed adjacent to covers coupled with land use controls are assumed to address these situations.

Covers used to contain contaminated materials are assumed to be constructed from clean soil transported from offsite borrow areas tested to ensure that contamination is not present. The thickness of the covers would be designed to keep contaminated materials from migrating to the surface in the future through frost heave processes.

Interior cleaning would be performed on a periodic basis using vacuum extraction to remove asbestos fibers within residential structures on privately owned parcels. Without periodic interior cleaning, risks from contaminated indoor air would increase due to asbestos fibers tracked inside from exposed contaminated materials located outside the homes. While asbestos fibers in indoor air do not pose a current risk, tracking in contamination from outside in the future is of particular concern since contaminated materials are left exposed at the site and will further degrade over time.

Land use controls would be implemented to protect covered areas as well as restrict access and use of contaminated areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would consist of non-intrusive (surface) and intrusive (subsurface) visual inspections and sample collection with analysis to ensure that covers, interior cleanings, and land use controls are protective of human health and the environment.

Five-year site reviews would be performed since contaminated materials left in place under covers would remain at the site.

5.3.4 Alternative 4: Capping of Contaminated Materials and Land Use Controls with Monitoring

Alternative 4 includes in-place capping (covering) of contaminated materials identified on all parcels, regardless of whether they are privately owned parcels or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository to ensure the interim cover installed in 2009 is protective.

It is assumed, for purposes of the FS that future land use of the receiver-managed parcels would be for residential purposes. Current residential structures on receiver-managed parcels would be kept intact. Covers over contaminated materials would be constructed to the extent practicable. However, it may not be possible to construct frost-protective soil covers over contaminated materials directly adjacent to obstructions such as homes or structures, trees, subsurface utilities, and roads. For purposes of this FS, a thin profile of clean soil backfill or another barrier material placed adjacent to covers coupled with land use controls are assumed to address these situations.

Covers used to contain contaminated materials are assumed to be constructed from clean soil transported from offsite borrow areas tested to ensure that contamination is not present. The thickness of the covers would be designed to keep contaminated materials from migrating to the surface in the future through frost heave processes.

Interior cleaning would not be required under this alternative, since all identified contaminated materials would be isolated beneath covers and not left exposed at the site.

Land use controls would be implemented to protect and restrict use of covered areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would consist of non-intrusive (surface) and intrusive (subsurface) visual inspections and sample collection with analysis to ensure that covers and land use controls are protective of human health and the environment.

Five-year site reviews would be performed since contaminated materials left in place under covers would remain at the site.

5.3.5 Alternative 5a: Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

Alternative 5a includes excavation of contaminated surface materials (assumed to be within 2 feet bgs) identified on all parcels, regardless of whether they are privately owned parcels or receiver-managed parcels. This alternative does not remove subsurface contaminated materials previously identified at the site (assumed to be greater than 2 feet bgs). This alternative includes installation of a permanent cover over the existing onsite waste repository to ensure the interim cover installed in 2009 is protective.

Excavation of contaminated surface materials would be conducted to the extent practicable. However, it may not be possible to fully excavate contaminated surface materials underneath or adjacent to obstructions such as homes or structures, trees, subsurface utilities, and roads. Thus residual contaminated materials may be left in soil underlying or adjacent to these obstructions. For purposes of this FS, a thin profile of clean soil backfill or another barrier material placed in excavations coupled with land use controls are assumed to address these situations.

Excavated contaminated materials would be consolidated at onsite disposal locations specifically constructed to isolate wastes using covers. The covers would be designed to keep contaminated materials from migrating to the surface in the future through frost heave processes.

Clean soil would be used to backfill excavation areas. Clean soil is assumed to be transported from offsite borrow areas tested to ensure that contamination is not present. The backfill would be covered with topsoil and revegetated, or otherwise restored to match the surface conditions that previously existed. While the backfill would provide an initial exposure barrier to subsurface contaminated materials and asbestos fibers, it would not necessarily keep these materials in underlying or adjacent soil from migrating to the surface in the future through frost heave processes.

Since subsurface contaminated materials would not be removed and could potentially migrate to the surface over time, future excavation events (i.e. surface pickup of contaminated materials) would be performed on an as-needed basis. Contaminated materials excavated during these events are assumed to be transported offsite and placed within permitted offsite disposal facilities authorized by Oregon DEQ to receive asbestos and other site COPCs.

It is assumed, for purposes of the FS, that future land use of the receiver-managed parcels would be for residential purposes and that current structures on receiver-managed parcels would be kept intact. Interior cleaning is assumed to not be required under this alternative, since all remaining contaminated materials are isolated beneath covers or excavation backfill and are not left exposed at the site. Although residual or subsurface contaminated materials may incrementally migrate to the surface over time through backfill, the small quantities of these materials would not likely contaminate indoor air to levels posing risks within residential structures.

Land use controls would be implemented to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would consist of non-intrusive (surface) and intrusive (subsurface) visual inspections and sample collection with analysis to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment.

Five-year site reviews would be performed since contaminated materials left in place under covers and backfill would remain at the site.

5.3.6 Alternative 5b: Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

Alternative 5b includes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned parcels or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository to ensure the interim cover installed in 2009 is protective.

Excavation of contaminated surface materials would be conducted to the extent practicable. However, it may not be possible to fully excavate contaminated surface materials underneath or adjacent to obstructions such as homes or structures, trees, subsurface utilities, and roads. Thus residual contaminated materials may be left in soil underlying or adjacent to these obstructions. For purposes of this FS, a thin profile of clean soil backfill or another barrier material placed in excavations coupled with land use controls are assumed to address these situations.

Excavated contaminated materials would be consolidated at onsite disposal locations specifically constructed to isolate wastes using covers. The covers would be designed to keep contaminated materials from migrating to the surface in the future through frost heave processes.

Clean soil would be used to backfill excavation areas. Clean soil is assumed to be transported from offsite borrow areas tested to ensure that contamination is not present. The backfill would be covered with topsoil and revegetated, or otherwise restored to match the surface conditions that previously existed. While the backfill would provide an initial exposure barrier to residual contaminated materials and asbestos fibers, it would not necessarily keep these materials in underlying or adjacent soil from migrating to the surface in the future through frost heave processes.

It is assumed, for purposes of the FS, that future land use of the receiver-managed parcels would be for residential purposes and that current structures on receiver-managed parcels would be kept intact. Interior cleaning is assumed to not be required under this alternative, since all remaining contaminated materials are isolated beneath covers or excavation backfill and are not left exposed at the site. Although residual contaminated materials may migrate to the surface over time through backfill, the small quantities of these materials would not likely contaminate indoor air to levels posing risks within residential structures.

Land use controls would be implemented to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would consist of non-intrusive (surface) and intrusive (subsurface) visual inspections and sample collection with analysis to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment.

Five-year site reviews would be performed since contaminated materials left in place under covers and backfill would remain at the site.

5.3.7 Alternative 6: Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

Alternative 6 includes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned parcels or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository to ensure the interim cover installed in 2009 is protective.

Excavation of contaminated surface materials would be conducted to the extent practicable. However, it may not be possible to fully excavate contaminated surface materials underneath or adjacent to obstructions such as homes or structures, trees, subsurface utilities, and roads. Thus residual contaminated materials may be left in soil underlying or adjacent to these obstructions. For purposes of this FS, a thin profile of clean soil backfill or another barrier material placed in excavations coupled with land use controls are assumed to address these situations.

Removed contaminated materials would be transported offsite and placed within one or more permitted offsite disposal facilities specifically authorized by Oregon DEQ to receive asbestos and other site COPCs.

Clean soil would be used to backfill excavation areas. Clean soil is assumed to be transported from offsite borrow areas tested to ensure that contamination is not present. The backfill would be covered with topsoil and revegetated, or otherwise restored to match the surface conditions that previously existed. While the backfill would provide an initial exposure barrier to residual contaminated materials and asbestos fibers, it would not necessarily keep these materials in underlying or adjacent soil from migrating to the surface in the future through frost heave processes.

It is assumed, for purposes of the FS, that future land use of the receiver-managed parcels would be for residential purposes and that current structures on receiver-managed parcels would be kept intact. Interior cleaning is assumed to not be required under this alternative, since all remaining contaminated materials are isolated beneath covers or excavation backfill and are not left exposed at the site. Although residual contaminated materials may migrate to the surface over time through backfill, the small quantities of these materials would not likely contaminate indoor air to levels posing risks within residential structures.

Land use controls would be implemented to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would consist of non-intrusive (surface) and intrusive (subsurface) visual inspections and sample collection with analysis to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment.

Five-year site reviews would be performed since contaminated materials left in place under covers and backfill would remain at the site.

5.3.8 Alternative 7: Excavation and Offsite Thermo-Chemical Treatment of Contaminated Materials at Permitted Facilities, Reuse of Treated Material, and Land Use Controls with Monitoring

Alternative 7 includes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned parcels or receiver-managed parcels. This alternative includes installation of a cover over the existing onsite waste repository to ensure the interim cover installed in 2009 is protective.

Excavation of contaminated surface materials would be conducted to the extent practicable. However, it may not be possible to fully excavate contaminated surface materials underneath or adjacent to obstructions such as homes or structures, trees, subsurface utilities, and roads. Thus residual contaminated materials may be left in soil underlying or adjacent to these obstructions. For purposes of this FS, a thin profile of clean soil backfill or another barrier material placed in excavations coupled with land use controls are assumed to address these situations.

Excavated contaminated materials would be transported offsite for treatment at a permitted offsite facility that demineralizes asbestos fibers using thermo-chemical conversion. TCCT, patented by ARI, is a commercial form of this technology. Contaminated materials, especially ACM, would be mixed with proprietary demineralizing agents within a hydrofluoric acid solution. The mixture would then be heated in a rotary hearth furnace. The resulting reaction product (rock-like material) is an inert material that is not fibrous like ACM. Testing of the reaction product would be performed before transport from the treatment facility to ensure that it no longer poses risks to human health. Although studies have been performed by ARI to support this assertion (ARI 2007), the technology is relatively new so extensive sets of data are not available to demonstrate long-term irreversibility of the treatment process. This technology also has not been demonstrated to treat non-asbestos COPCs such as arsenic.

The treated inert material would then be transported back to the site and used as backfill material for the excavation areas on the site. Clean soil would be used to supplement inert backfill material derived from the treatment of contaminated materials. Clean soil is assumed to be transported from offsite borrow areas tested to ensure that contamination is not present. The resulting backfill would be covered with topsoil and revegetated, or otherwise restored to match the surface conditions that previously existed. While the backfill would provide an initial exposure barrier to residual contaminated materials and asbestos fibers, it would not necessarily keep these materials in underlying or adjacent soil from migrating to the surface in the future through frost heave processes.

It is assumed, for purposes of the FS, that future land use of the receiver-managed parcels would be for residential purposes and that current structures on receiver-managed parcels would be kept intact. Interior cleaning is assumed to not be required under this alternative, since all remaining contaminated materials are isolated beneath covers or excavation backfill and are not left exposed at the site. Although residual contaminated materials may incrementally migrate to the surface over time through backfill, the small quantities of these materials would not likely contaminate indoor air to levels posing risks within residential structures.

Land use controls would be implemented to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would consist of non-intrusive (surface) and intrusive (subsurface) visual inspections and sample collection with analysis to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment.

Five-year site reviews would be performed since contaminated materials left in place under covers and backfill would remain at the site.

5.4 Screening Evaluation of Alternatives

The purpose of this screening evaluation is to reduce the number of proposed remedial alternatives that undergo the more thorough and extensive analysis presented in Section 7. These alternatives are qualitatively evaluated using a smaller set of screening evaluation criteria than what is used for detailed analysis of retained alternatives after screening. Each of these proposed alternatives is screened using the short- and long-term aspects (where applicable) of three broad criteria: effectiveness, implementability, and cost.

5.4.1 Effectiveness

Effectiveness relates to the ability of the remedial alternative to satisfy screening evaluation criteria detailed in Exhibit 5-2.

Exhibit 5-2. Effectiveness Criteria

Effectiveness Criteria
Overall protection of human health and the environment[1]
Compliance with ARARs[1]
Short-term effectiveness (during the remedial construction and implementation period)
Long-term effectiveness and permanence (following remedial construction)
Reduction of toxicity, mobility, or volume through treatment

[1] These criteria are referred to as “threshold criteria” that an alternative must meet to be viable (except the “no action” alternative); threshold criteria are described further in Section 6.

Effectiveness of each of the proposed alternatives is judged against the five effectiveness screening criteria using the qualitative ratings system in Exhibit 5-3.

Exhibit 5-3. Effectiveness Qualitative Ratings System

Effectiveness Ratings Categories	
⓿	None
❶	Low
❷	Low to moderate
❸	Moderate
❹	Moderate to high
❺	High

5.4.2 Implementability

Implementability relates to the ability of the remedial alternative to satisfy screening evaluation criteria detailed in Exhibit 5-4.

Exhibit 5-4. Implementability Criteria

Implementability Criteria	
Technical feasibility	Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete
	Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete
Administrative feasibility	Ability to obtain approvals from other agencies
	Availability and capacity of treatment, storage, and disposal services
	Availability of property, specific materials and equipment, and technical specialists required for a remedial action

Implementability of each of the proposed alternatives is judged against the screening criteria using the qualitative ratings system presented in Exhibit 5-5.

Exhibit 5-5. Implementability Qualitative Ratings System

Implementability Ratings Categories	
⓿	None
❶	Low
❷	Low to moderate
❸	Moderate
❹	Moderate to high
❺	High

A determination that an alternative is not technically feasible will usually preclude it from further consideration. Negative factors affecting administrative feasibility will normally involve coordination steps to lessen the negative aspects of the alternative but will not necessarily eliminate an alternative from consideration.

5.4.3 Cost

Cost estimates prepared for screening alternatives are typically comparative estimates with relative accuracy so that cost decisions among alternatives are sustained as the accuracy of cost estimates improve in the detailed analysis of alternatives. The procedures used to develop cost estimates for alternative screening are similar to those used for detailed analysis; the differences are in the degree of alternative refinement and cost component development.

The focus of comparative screening estimates is to identify and include items that are essential to the alternatives that control the magnitude of the overall cost. Cost estimates at this step of the FS process are generally determined using cost curves, generic unit costs, vendor information, conventional cost-estimating guides, and prior similar estimates modified by site-specific information rather than detailed cost estimates. Both capital and O&M costs are considered in these estimates. Present value analyses are performed to discount all costs to a common base year. This is performed to fairly evaluate expenditures occurring over different time frames.

The development of alternatives during the alternatives screening process is incomplete because a detailed analysis of the alternative components (such as development of detailed quantities, detailed scoping of remedy components, etc.) has not been performed. Thus the costs developed for the screening analysis of these proposed alternatives are not held to the accuracy required for the detailed analysis of alternatives (i.e. +50 percent to -30 percent of actual costs). Typical cost accuracy ranges for alternative screening are +100 percent to -50 percent of actual costs.

A simplified approach was developed for determining alternative screening costs due to the lack of detailed remedy component scope and associated quantities. This simplified approach involves identifying specific GRAs for contaminated materials that are fundamental cost drivers for the alternative in question and providing costs for these GRA remedy components. If these fundamental GRAs are included in the screening cost estimates, they should be within the accuracy range acceptable for these estimates without development of the secondary remedy components.

The specific GRAs identified as fundamental cost drivers for each alternative are listed below:

Alternative 1:	Monitoring
Alternative 2:	Monitoring, Removal/Transport/Disposal, and Land Use Controls
Alternative 3 and 4:	Monitoring, Removal/Transport/Disposal, Land Use Controls, and Containment
Alternative 5a, 5b, and 6:	Monitoring, Land Use Controls, and Removal/Transport/Disposal
Alternative 7:	Monitoring, Land Use Controls, Removal/Transport/Disposal, and Treatment

It should be noted that GRA components identified for screening cost development purposes pertain only to contaminated materials. For instance, the GRA of "Transport" is specifically for contaminated materials; transport of backfill required to construct covers or place excavation backfill are inherent to the GRAs of "Containment" or "Removal" rather than "Transport". Unit quantities (areas and volumes) required to develop costs for these items are presented in Appendix C.

The cost of each proposed alternative is rated on a comparative basis with other alternatives using a scale determined from the range of costs for the screened alternatives. Due to the likely alternative costs for the site, the cost ranges for the ratings categories are large. The cost rating categories are as follows in Exhibit 5-6:

Exhibit 5-6. Cost Qualitative Ratings System

Cost Ratings Categories		Cost Ranges (Present Value Dollars)
$	**Low**	Less than 5 million dollars
$$	**Low to moderate**	Between 5 million and 10 million dollars
$$$	**Moderate**	Between 10 million and 15 million dollars
$$$$	**Moderate to high**	Between 15 million and 20 million dollars
$$$$$	**High**	Greater than 20 million dollars

5.5 Summary of Alternatives Screening

Appendix D presents the evaluation and screening of each remedial alternative using the three screening criteria. This evaluation and screening process is inherently qualitative in nature (with the exception of approximate cost). The evaluation criteria described in Section 5.4 are specified by EPA CERCLA guidance; however the degree to which the criteria are weighted against each other is not specified. A determination of how the individual evaluation criteria influence the overall rankings is based on site-specific considerations and requires engineering judgment.

Remedial alternatives with similar scope and essential components would have overall rankings that are similar, unless other considerations such as large differences in waste volumes or differing construction durations exist between them. Factors that affect the threshold criteria (overall protection of human health and the environment and compliance with ARARs) are given considerable weight in the overall ranking for effectiveness since alternatives must meet these criteria to be selected as a remedy. Section 6 describes the threshold criteria in further detail.

Each alternative developed and described in Section 5.3 was evaluated to determine its overall effectiveness, implementability, and cost in Appendix D using the qualitative ratings system discussed in Section 5.4.

Exhibit 5-7 summarizes the results for the screening of alternatives for the site. Remedial alternatives deemed to have low effectiveness, low implementability, or high cost were eliminated from further consideration. The remedial alternatives eliminated from further consideration in this FS (indicated with grey shading) on Exhibit 5-7 are Alternatives 2 and 7.

Alternative 2 was eliminated for low effectiveness due to the factors discussed in Appendix D. Long-term effectiveness for this alternative is not entirely ensured since contaminated materials potentially posing a risk are left exposed on site and can continue to degrade and migrate. Interior cleaning is the primary remedial component for protection of human health on privately owned parcels. However cleaning does not ensure protectiveness within the interior of residential structures since contaminated materials continue to be exposed and degrade and could be tracked into the structures. Long-term effectiveness of institutional controls and access controls is not ensured since humans and ecological receptors could ignore them, especially on privately owned parcels.

Alternative 7 was eliminated for low implementability and high cost due to the factors discussed in Appendix D. Implementability of Alternative 7 is more difficult than other excavation-related alternatives. The treatment process (TCCT) is a patented technology and is commercially available but not widespread. The treatment process may require size reduction of larger ACM, and may not be capable of treating non-asbestos COPCs. The treatment capacity of depends upon the size of the offsite treatment facility; in general the capacity is relatively small compared to the volume of contaminated materials generated from the site. Technical equipment and specialists for implementation of thermo-chemical treatment are fairly limited in the United States. In addition, regulatory approval for use of treated material as backfill material may be problematic, depending on Oregon DEQ classification of the treated material.

High cost is the other reason for eliminating Alternative 7 from further consideration. The present value cost of Alternative 7 (approximately $129 million) is approximately four to five times that of Alternative 6 (approximately $29.6 million). While Alternative 7 includes a component of treatment, Alternative 6 provides a similar degree of protection for human health and the environment at a much lower cost.

The remedial alternatives that were retained for detailed analysis are identified in Section 5.6.

Exhibit 5-7. Summary of Alternatives Screening

Alternative	Description	Effectiveness	Implementability	Approximate Cost (Present Value Dollars)	
1	No Action	⓿	⓿	$	$190,000
2	Interior Cleaning and Land Use Controls with Monitoring	❶	❹	$	$2,280,000
3	Capping of Contaminated Materials on Private Parcels, Partial Capping Containment of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring	❷	❹	$$$	$10,130,000
4	Capping of Contaminated Materials and Land Use Controls with Monitoring	❸	❸	$$$	$14,060,000
5a	Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring	❷	❸	$$$	$10,460,000
5b	Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring	❸	❸	$$$	$14,070,000
6	Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring	❹	❷	$$$$$	$29,890,000
7	Excavation and Offsite Thermo-Chemical Treatment of Contaminated Materials at Permitted Facilities, Reuse of Treated Material, and Land Use Controls with Monitoring	❹	❶	$$$$$	$129,270,000

Notes:

1. The alternatives screening process involves a qualitative assessment of the degree to which remedial alternatives meet the evaluation criteria presented in Appendix D. The numerical designations for the qualitative ratings system used in this table are not used to quantitatively assess remedial alternatives (for instance, rankings for a remedial alternative are not additive).
2. Shading indicates the remedial alternative has been eliminated from further consideration based on low effectiveness, low implementability, and/or high costs. Remaining (unshaded) remedial alternatives have been retained for detailed analysis in Section 7.
3. Screening cost backup information (screening cost estimate summaries and present value analyses) for each alternative are presented in Appendix D.

Legend for Qualitative Ratings System:

Effectiveness and Implementability		Cost (Present Value Dollars)	
⓿	None	⓿	None ($0)
❶	Low	$	Low ($0 through $5M)
❷	Low to moderate	$$	Low to moderate ($5M through $10M)
❸	Moderate	$$$	Moderate ($10M through $15M)
❹	Moderate to high	$$$$	Moderate to high ($15M through $20M)
❺	High	$$$$$	High (Greater than $20M)

5.6 Alternatives Retained for Detailed Analysis

Based on the screening of the alternatives in Section 5.5, the following alternatives were retained for detailed analysis as presented in Section 7.

- Alternative 1: No Action
- Alternative 3: Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring
- Alternative 4: Capping of Contaminated Materials and Land Use Controls with Monitoring
- Alternative 5a: Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring
- Alternative 5b: Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring
- Alternative 6: Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

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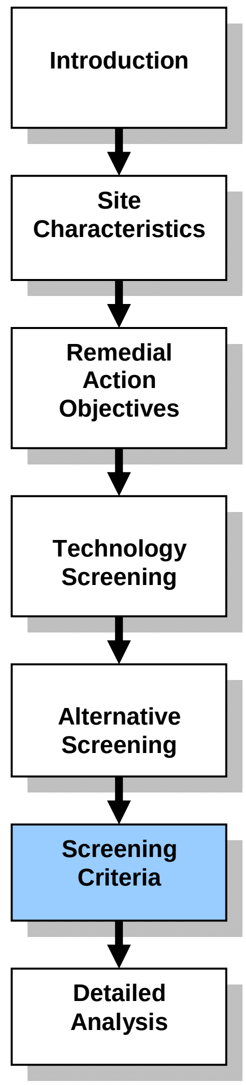
Section 6
Definition of Criteria Used in the Detailed Analysis of Retained Alternatives

The remedial alternatives retained after completion of the preliminary alternative screening step of the FS process (summarized in Section 5) were evaluated using nine evaluation criteria. These criteria were developed to address statutory requirements and considerations for remedial actions in accordance with the NCP and additional technical and policy considerations that have proven to be important for selecting among remedial alternatives (EPA 1988). The following subsections describe the nine evaluation criteria used in the detailed analysis of remedial alternatives and the priority in which the criteria are considered.



6.1 Overall Protection of Human Health and the Environment

Each alternative is assessed to determine whether it can provide adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site. Evaluation of this criterion focuses on how site risks are eliminated, reduced, or controlled through treatment, engineered controls, or institutional controls and whether an alternative poses any unacceptable cross-media impacts.

Criteria Used to Evaluate Remediation Alternatives Address Multiple Areas

- Protection of Human Health and Environment
- Compliance with ARARs
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost
- State Acceptance
- Community Acceptance

6.2 Compliance with ARARs

For this criterion, we evaluate each alternative to determine how chemical-, location-, and action-specific ARARs identified in Appendix B of this document will be met.

If the assessment indicates an ARAR will not be met, then the basis for justifying one of the six ARAR waivers allowed under CERCLA is required to be discussed. These ARAR waivers are detailed in Exhibit 6-1.

Exhibit 6-1. ARAR Waivers

Waiver	Description
Interim Measures	The remedial action selected is only part of a total remedial action that will attain such level or standard of control when completed. (CERCLA §121(d)(4)(A).)
Greater Risk to Health and the Environment	Compliance with such requirement at the facility will result in greater risk to human health and the environment than alternative options. (CERCLA §121(d)(4)(B).)
Technical Impracticability	Compliance with such requirement is technically impracticable from an engineering perspective. (CERCLA §121(d)(4)(C).)
Equivalent Standard of Performance	The remedial action selected will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation through use of another method or approach. (CERCLA §121(d)(4)(D).)
Inconsistent Application of State Requirements	With respect to a state standard, requirement, criteria, or limitation, the state has not consistently applied (or demonstrated the intention to consistently apply) the standard, requirement, criteria, or limitation in similar circumstances at other remedial actions. (CERCLA §121(d)(4)(E).)
Fund Balancing	In the case of a remedial action to be undertaken solely under Section 104 using the fund, selection of a remedial action that attains such level or standard of control will not provide a balance between the need for protection of public health and welfare and the environment at the facility under consideration and the availability of amounts from the fund to respond to other sites which present or may present a threat to public health or welfare or the environment, taking into consideration the relative immediacy of such threats. (CERCLA §121(d)(4)(F).)

6.3 Long-Term Effectiveness and Permanence

Long-term effectiveness evaluates the likelihood that the remedy will be successful and the permanence that it affords. Factors to be considered, as appropriate, include the following:

- Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities. The characteristics of the residuals are considered to the degree that they remain hazardous, taking into account their toxicity, mobility, or volume and propensity to bioaccumulate.

- Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site. This factor includes an assessment of containment systems and institutional controls to determine if they are sufficient to ensure that any exposure to human and ecological receptors is within protective levels. This factor also addresses the long-term reliability of management controls for providing continued protection from residuals, the assessment of the potential need to replace technical components of the alternative, and the potential exposure pathways and risks posed should the remedial action need replacement.

6.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

Each alternative is assessed for the degree to which it employs technology to permanently and significantly reduce toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site. Factors to be considered, as appropriate, include the following:

- The treatment processes the alternatives use and materials they will treat
- The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed
- The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment
- The degree to which the treatment is irreversible
- The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents
- Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action

6.5 Short-Term Effectiveness

This criterion reviews the effects of each alternative during the construction and implementation phase of the remedial action until remedial response objectives are met. The short-term impacts of each alternative are assessed, considering the following factors, as appropriate:

- Short-term risks that might be posed to the community during implementation of an alternative
- Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures
- Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts
- Time until protection is achieved

6.6 Implementability

The technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation is evaluated under this criterion. The ease or difficulty of implementing each alternative will be assessed by considering the following factors detailed in Exhibit 6.2.

Exhibit 6-2 Implementability Factors to be Considered during Alternative Evaluation

Criterion	Factors to be Considered
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology Reliability of the technology, focusing on technical problems that will lead to schedule delays Ease of undertaking additional remedial actions, including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure
Administrative Feasibility	Activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)
Availability of Services and Materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies Availability of prospective technologies

6.7 Cost

Types of costs that are assessed for each alternative include the following:

- Capital costs
- Annual O&M costs
- Periodic costs
- Present value of capital and annual O&M costs

Cost estimates are developed according to *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000a). Flexibility is incorporated into each alternative for the location of remedial facilities, the selection of cleanup levels, and the period in which remedial action will be completed. Assumptions of the project scope and duration are defined for each alternative to provide cost estimates for the various remedial alternatives. Important assumptions specific to each alternative are summarized in the description of the alternative. Additional assumptions are included in the detailed cost estimates in Appendix H.

The levels of detail employed in making these estimates are conceptual but are considered appropriate for making choices between alternatives. The information provided in the cost estimate is based on the best available information regarding the anticipated scope of the remedial alternatives.

The costs are evaluated with respect to the following categories:

- Capital costs are those expenditures that are required to construct a remedial action. They are exclusive of costs required to operate or maintain the action throughout its lifetime. Capital costs consist primarily of expenditures initially incurred to build or install the remedial action. Capital costs include all labor, equipment, and material costs (including contractor markups, such as overhead and profit) associated with activities, such as mobilization/demobilization; site work; installation of containment systems; and disposal. Capital costs also include expenditures for professional/technical services that are necessary to support construction of the remedial action.

- Annual O&M costs are those post-construction costs necessary to ensure or verify the continued effectiveness of a remedial action. These costs are estimated mostly on an annual basis. Annual O&M costs include all labor, equipment, and material costs (including contractor markups, such as overhead and profit) associated with activities, such as monitoring, operating and maintaining containment systems, and disposal. Annual O&M costs also include expenditures for professional/technical services necessary to support O&M activities.

- Periodic costs are those costs that occur only once every few years (e.g., 5-year reviews, equipment replacement) or expenditures that occur only once during the entire O&M period or remedial time frame (e.g., site closeout, remedy failure/replacement). These costs may be either capital or O&M costs but, because of their periodic nature, it is more practical to consider them separately from other capital or O&M costs in the estimating process.

- The present value of each alternative provides the basis for the cost comparison. The present value cost represents the amount of money that, if invested in the initial year of the remedial action at a given rate, would provide the funds required to make future payments to cover all costs associated with the remedial action over its planned life. Future O&M and periodic costs are included and reduced by the appropriate present value discount rate as outlined in *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000a). Per the guidance, the present value analysis was performed on remedial alternatives using a 7 percent discount (interest) rate over the period of evaluation for each alternative. Inflation and depreciation were not considered in preparing the present value costs.

6.8 State Acceptance

This criterion evaluates the technical and administrative issues and concerns the state may have regarding each of the alternatives. Assessment of state concerns will be completed after comments on the FS and proposed plan are received by EPA and addressed in the ROD. Thus, state acceptance is not considered in the detailed evaluation of alternatives presented in this FS.

6.9 Community Acceptance

Assessment of concerns from the public will be completed after comments on the FS and proposed plan are received by EPA and addressed in the ROD. Thus, community acceptance is not considered in the detailed evaluation of alternatives presented in this FS.

6.10 Criteria Priorities

The nine evaluation criteria are separated into three groups to establish priority among these criteria during detailed evaluation of the remedial alternatives as detailed in Exhibit 6-3.

Exhibit 6-3. Criteria Priorities

Group	Criteria	Definition
Threshold Criteria	Overall Protection of Human Health and the Environment Compliance with ARARs	Must be satisfied by the remedial alternative being considered as the preferred remedy
Balancing Criteria	Long-Term Effectiveness and Permanence Reduction of Toxicity, Mobility, or Volume through Treatment Short-Term Effectiveness Implementability Cost	Technical criteria evaluated among those alternatives satisfying the threshold criteria
Modifying Criteria	State Acceptance and Community Acceptance	Not evaluated in this FS; evaluated after comments received on the FS and proposed plan

Section 7
Detailed Analysis of Retained Alternatives

7.1 Overview

This section presents the detailed analysis of the remedial alternatives retained in Section 5. During detailed analysis, each alternative is assessed using the two threshold criteria and five balancing criteria presented in Section 6. The results of the detailed analysis for each remedial alterative are then compared to identify the key tradeoffs between alternatives.

The following alternatives were retained for detailed analysis:

Alternative 1: No Action

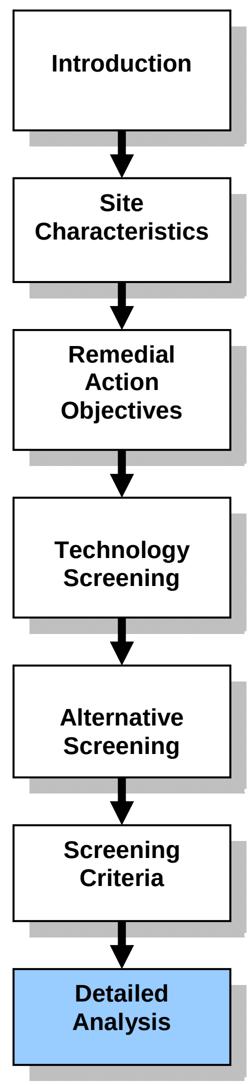
Alternative 3: Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

Alternative 4: Capping of Contaminated Materials and Land Use Controls with Monitoring

Alternative 5a: Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

Alternative 5b: Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

Alternative 6: Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring



7.2 Secondary Assumptions Affecting Detailed Analysis of Remedial Alternatives

Section 5 presents the fundamental assumptions for all remedial alternatives used during alternative development and screening. In addition, there are numerous secondary assumptions that affect the detailed analysis of alternatives but are not fundamental controlling considerations and can vary between alternatives. Some of these secondary assumptions are grouped into distinct categories and include the items listed in Exhibit 7-1.

Exhibit 7-1. Secondary Assumptions Affecting Refinement and Detailed Analysis of Remedial Alternatives

Secondary Assumption Category	Secondary Assumption Description	Rationale
Land Use Control Assumptions	Land Use Controls for Privately Owned Parcels are Primarily Institutional Controls and Community Awareness Activities	Establishment of access control such as posted warnings may be difficult on privately owned parcels that are occupied and are actively used. It is also uncertain whether legal authority exists to install access controls extensively on privately owned parcels. However the legal authority exists to implement certain types of institutional controls (for instance informational devices) as well as community awareness activities. Thus, land use controls for privately owned parcels are assumed to be primarily institutional controls and community awareness activities.
	Land Use Controls for Receiver-Managed Parcels are Primarily Institutional Controls and Access Controls	Establishment of institutional controls and access controls such as posted warnings would be relatively easy on receiver-managed parcels because they are unoccupied, and the legal authority exists with the NRE receiver. The onsite waste repositories that require institutional controls and access controls are also assumed to be located on receiver-managed parcels. Land use controls for receiver-managed parcels are assumed to be primarily institutional controls and access controls since there are no current residents on these parcels. Although community awareness activities are not currently needed for receiver-managed parcels, these activities may be needed in the future if parcels are reoccupied.
Monitoring Assumptions	Monitoring Activities Identified for FS Evaluation Purposes Only	All alternatives (including Alternative 1) include physical and/or chemical monitoring to ensure protectiveness of the remedy. While quantities and types of monitoring activities have been assumed for FS evaluation purposes, data quality objectives (DQOs) have not been established for specific monitoring activities relative to a particular alternative. A detailed evaluation of monitoring requirements for each alternative is presented in Appendix F. These monitoring requirements and related objectives for monitoring were determined for FS evaluation and costing purposes, and are not intended to substitute development of DQOs and determination of remedy-specific monitoring requirements during design and implementation.
Interior Cleaning Assumptions	Periodic Interior Cleaning Required At Least Every 10 Years for Alternative 3	Periodic interior cleaning would be performed under Alternative 3 to address potential future risks from asbestos fibers in indoor air at residential structures on privately owned parcels. Since the fibers originate from exposed contaminated materials that degrade over time and are tracked into residences, it is assumed for FS purposes that interior cleaning would be required every two 5-year site reviews (i.e., every 10 years) for Alternative 3 to address potential risks from contaminated materials brought into residential structures and identified during site reviews. Interior cleaning is assumed to not be required for alternatives other than Alternative 3, since all identified contaminated materials are either isolated beneath covers or excavation backfill and are not left exposed at the site.

Exhibit 7-1. Secondary Assumptions Affecting Refinement and Detailed Analysis of Remedial Alternatives (continued)

Secondary Assumption Category	Secondary Assumption Description	Rationale
Interior Cleaning Assumptions (continued)	Periodic Interior Cleaning Required At Least Every 10 Years for Alternative 3 (continued)	Although residual contaminated materials may incrementally migrate to the surface over time through backfill, especially for Alternative 5a, the small quantities of these materials would not likely contaminate indoor air to levels posing risks within residential structures. Although interior cleaning is only included for alternative 3, all alternatives include monitoring of indoor air during 5-year reviews to ensure protectiveness.
Capping (Cover) Assumptions	Type and Thickness of Covers For Capping	The type of cover is assumed for FS purposes to be soil since soil covers are easily installed, borrow soil resources should be available, and borrow soil is relatively inexpensive compared to other types of cover materials, such as geosynthetic materials or concrete/asphalt. The actual types of cover placed at a particular parcel would be addressed during RD. Thickness of the cover for in-place containment and onsite consolidation and containment is assumed to be a minimum of 2 feet (18 inches of subsoil and 6 inches of topsoil for soil covers) to prevent upward migration of contaminated materials from frost heave processes. This assumption is based on the estimated average frost depth of 2 feet in the county as indicated by the Oregon Residential Specialty Code, Table R301.2(1)-Climatic and Geographic Design Criteria. This depth will be confirmed and the cover thickness revised, if necessary, within the ROD or during RD/RA using freeze depth and capping thickness recommendations for the site currently being prepared by the United States Army Cold Regions Research and Engineering Laboratory. A preliminary summary of their results is also included in Appendix A.
	Cover Construction Over Subsurface Contaminated Materials	Due to shallow depths of subsurface contaminated materials (ranging from a few inches bgs to several feet bgs), areas with subsurface contaminated materials are assumed to require capping using soil covers under Alternatives 3, 4a, and 4b.
	Permanent Soil Cover for the Existing Onsite Waste Repository	An interim soil cover was placed over the existing onsite waste repository during the removal actions conducted in 2008 and 2009. The thickness of the interim cover is variable and generally less than 2 feet. The interim cover also was not constructed with borrow demonstrated to be free from contamination. It is assumed the interim cover on the existing onsite waste repository will require modification to ensure permanence for alternatives that fully address exposure of contaminated materials (Alternatives 4, 5a, 5b, and 6). These alternatives assume placement of an additional 12 inches of clean cover material to ensure that the permanent cover has the required minimum thickness to provide protection against frost heave processes. For Alternative 3, the interim cover is assumed to not require modification since the existing waste repository would remain surrounded by exposed contaminated materials on receiver-managed parcels.

Exhibit 7-1. Secondary Assumptions Affecting Refinement and Detailed Analysis of Remedial Alternatives (continued)

Secondary Assumption Category	Secondary Assumption Description	Rationale
Excavation Assumptions	Assumed Depth of Surface and Subsurface Contamination for Excavation Assumptions	Alternatives 5a, 5b, and 6 include excavation of contaminated materials. The depth of contaminated surface materials in Alternative 5a is assumed to be the depth of contamination identified in the RI or 2 feet bgs, whichever is less. This assumption is based on the estimated average frost depth of 2 feet in the county as indicated by the Oregon Residential Specialty Code, Table R301.2(1)-Climatic and Geographic Design Criteria. This depth will be confirmed and revised, if necessary, within the ROD or during RD/RA using freeze depth and capping thickness recommendations for the site currently being prepared by the United States Army Cold Regions Research and Engineering Laboratory. A preliminary summary of their results is also included in Appendix A. The depth of excavation for Alternatives 5b and 6 is assumed to be the full depth of contamination identified in the RI. The depth for subsurface contaminated materials varies across the site based on estimated depths determined during previous investigations, and is not limited to 2 feet bgs.
	Excavation Near Onsite Structures	Excavation in some portions of the site will not be practicable, especially near the onsite residential structures (houses on both privately owned and receiver-managed parcels) due to stability issues. These areas or portions of the site are assumed to be excavated to a depth of 2 feet bgs to the extent practicable, backfilled with clean soil or covered with other barrier materials such as concrete, and the remedy protected through the use of land use controls. Use of structural support measures is also assumed for excavation of deeper subsurface contaminated materials adjacent to structures.
Borrow Material Assumptions	Uncontaminated Subsoil and Topsoil Borrow from Offsite Locations	All alternatives except Alternatives 1 and 2 would require the use of uncontaminated soil for construction (soil cover and clean backfill material). Onsite materials are not assumed because most of the area within the site boundary has the potential to be contaminated. Borrow soil could potentially be obtained from locations on either private or public property. It is assumed that the offsite soil borrow areas would be located on private property within 10 miles of the site. For cost purposes, it was assumed that 50 percent of the offsite borrow would be obtained within 1 mile of the site, and the remaining 50 percent of offsite borrow would be obtained within 10 miles of the site.
	Organic Materials for Topsoil from Offsite Areas	All alternatives except Alternative 1 would require the use of uncontaminated topsoil for construction of covers and reclamation of excavated borrow areas. Borrow soil could potentially be obtained from offsite areas on either private or public property. It is assumed that topsoil would be manufactured from the clean borrow soil brought from an offsite borrow locations using organic materials derived from composting facilities. The composting facilities are assumed to be located in Klamath Falls.

Exhibit 7-1. Secondary Assumptions Affecting Refinement and Detailed Analysis of Remedial Alternatives (continued)

Secondary Assumption Category	Secondary Assumption Description	Rationale
Disposal Assumptions	Onsite Disposal Locations	Alternatives 5a and 5b assume the construction of new onsite waste repositories to consolidate and contain the excavated contaminated materials. It is assumed that the repositories would be constructed on receiver-managed parcels that are already significantly impacted by contaminated materials, thus, reducing the volume of additional contaminated materials excavation and disposal required from the site as a whole and to avoid increasing the surface area of contamination that would require land use controls.
	Use of Offsite Permitted Disposal Facilities	Alternatives 5a and 6 assume offsite disposal of contaminated materials at permitted disposal facilities authorized by Oregon DEQ for asbestos. There are a number of permitted disposal facilities for asbestos in the State of Oregon, but few facilities could accept all the ACM wastes within contaminated materials expected to be generated for these two alternatives and acceptance of these wastes by the facilities is uncertain. Thus, it is assumed that multiple facilities would be used for offsite disposal. For cost purposes, haul distance and disposal fees for all the facilities that responded to disposal queries were averaged on a weighted basis based on the proximity to the site and the volume of waste that the facility indicated they could potentially accept.
Miscellaneous Assumptions	Water-Based Dust Suppression	Dust suppression measures would be implemented under all alternatives except Alternative 1. Water is assumed to be used as the primary option for dust suppression to provide protection of human health and the environment and meet potential ARARs (e.g., keeping ACM “adequately wet”).
	Demolition and Relocation Assumptions for Residential Structures on Receiver-Managed Parcels	Portions of the receiver-managed parcels would be left unremediated under Alternative 3 and would not be protective for residential use. Thus, the NRE receiver has indicated that those homes and other residential structures that cannot be unoccupied within receiver-managed parcels would require either demolition or relocation to avoid becoming safety hazards to nearby homes on privately owned parcels. Demolition and offsite disposal of debris from homes on receiver-managed parcels is assumed for Alternative 3 cost evaluation purposes. It is assumed under all other alternatives that reoccupancy of the homes and other residential structures would be allowed and thus demolition or relocation is not required.
	Remedial Measures for Steam Pipe Vary By Location	Buried steam pipe with asbestos insulation is present across much of the site (approximately 14,695 feet buried at an approximate depth of 4 feet bgs). Steam pipe west of Old Fort Road may have been disturbed during demolition of the former MRB. Thus it is assumed that subsurface steam pipe west of Old Fort Road would need to be addressed in a similar manner to other subsurface contaminated materials under each remedial alternative since the steam pipe is generally co-located with other subsurface contaminated materials.

Exhibit 7-1. Secondary Assumptions Affecting Refinement and Detailed Analysis of Remedial Alternatives (continued)

Secondary Assumption Category	Secondary Assumption Description	Rationale
Miscellaneous Assumptions (continued)	Remedial Measures for Steam Pipe Vary By Location (continued)	There is no indication that steam pipe east of Old Fort Road had been disturbed during demolition of the former MRB. Thus it is assumed that subsurface steam pipe east of Old Fort Road (primarily along Thicket Court) would be left in place under all remedial alternatives and addressed through a combination of land use controls (i.e. institutional controls, community awareness activities, and access controls).
	Alternatives Would Incorporate Relevant Elements of EPA Region 10's Clean & Green Policy Except Where Protectiveness is Affected	It is assumed that all alternatives would address relevant elements of EPA Region 10's Clean & Green policy (EPA 2009b) to the extent possible. Under the policy, use of the indicated elements and other green cleanup technologies are standard unless a site-specific evaluation demonstrates impracticability or favors an alternative green approach. The elements of the "Clean & Green" policy include: ■ 100 percent use of renewable energy (green power), and energy conservation and efficiency approaches including Energy Star® equipment. ■ Cleaner fuels, diesel emissions controls and retrofits, and emission reduction strategies. ■ Water conservation and efficiency approaches including WaterSense products. ■ Sustainable site design. ■ Industrial material reuse or recycling within regulatory requirements. ■ Recycling of materials generated at or removed from the site. ■ Environmentally Preferable Purchasing. ■ Greenhouse gas emission reduction technologies. ■ Concrete made with Coal Combustion Products replacing a portion of traditional cement. ■ Capture landfill gases under the Landfill Methane Outreach Program. ■ Environmental Management System practices such as reducing the use of paper by moving to fully electronic transmittal of project documents and implementation of waste reduction and recycling programs at all work sites. The Clean & Green Policy does not fundamentally change how and why cleanup decisions are made, but calls for more sustainable methods of implementing those cleanups. Some of these elements may not be relevant to the alternatives considered for the site (for instance, there is non anticipated need for collection of landfill gasses). The policy also does not preclude remedy components that are required to ensure protectiveness. For instance, using large quantities of water for dust suppression is a required element of asbestos cleanups to ensure safety. Thus, water conservation may not be possible in this situation. The use of Clean & Green practices will be considered during implementation of a selected remedy at the site.

Note: The list of secondary assumptions provided is a summary and is not all-inclusive; additional secondary assumptions are contained in Appendices C, F, and H.

7.3 Alternative 1: No Action

7.3.1 Detailed Remedy Component Descriptions

Alternative 1 is required by the NCP to provide an environmental baseline against which impacts of the various remedial alternatives can be compared. A summary of the remedial components of Alternative 1 is provided in Section 5.3.1. The following text provides additional detail about the remedial components of this alternative.

Alternative 1 would leave removal action activities previously performed in their current conditions. No new remedial action activities would be initiated at the site to address contaminated materials or otherwise mitigate the associated risks to human health and the environment.

The only actions that would be implemented for Alternative 1 are completion of 5-year site reviews as required by the NCP and monitoring (specifically non-intrusive visual inspections and ambient air sampling) only as required to support conclusions made in the 5-year site reviews. Non-intrusive visual inspections (i.e., surface inspections) and ambient air sampling for asbestos and non-asbestos COPCs would be performed in support of 5-year site reviews. Monitoring would be made on all parcels within the site boundary regardless of ownership.

Generalized descriptions of inspection and sampling methods for asbestos are provided in Section 2.5, and details concerning the proposed monitoring and inspection protocol for Alternative 1 are provided in Appendix F.

7.3.2 Overall Protection of Human Health and the Environment

Evaluation of overall protection of human health and the environment for Alternative 1 is provided in Table G-1 using the evaluation criteria along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is "none." ⓿

7.3.3 Compliance with ARARs

Evaluation of compliance with ARARs for Alternative 1 is provided in Table G-2 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. ARARs evaluated for this alternative are included in Appendix B. The overall rating on this criterion for Alternative 1 is "none." ⓿

7.3.4 Long-Term Effectiveness and Permanence

Evaluation of long-term effectiveness and permanence for Alternative 1 is provided in Table G-3 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is "none." ⓿

7.3.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Evaluation of reduction of toxicity, mobility, or volume through treatment for Alternative 1 is provided in Table G-4 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is "none." ⓿

7.3.6 Short-Term Effectiveness

Evaluation of short-term effectiveness for Alternative 1 is provided in Table G-5 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is "none." ⓿

7.3.7 Implementability

Evaluation of implementability for Alternative 1 is provided in Table G-6 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is "none." ⓿

7.3.8 Cost

Evaluation of cost for Alternative 1 is provided in Table G-7 using the evaluation criteria considerations along with the cost rating for each and the justification for the rating. Detailed cost estimates for this alternative are included in Appendix H. The overall rating on this criterion for Alternative 1 is "low." $

7.4 Alternative 3: Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

7.4.1 Detailed Remedy Component Descriptions

A description of the remedial components of Alternative 3 is provided in Section 5.3.3. The conceptual depiction of this remedial alternative is presented in Figure 7-1. The following text provides additional detail about the remedial components of this alternative.

Covers

Alternative 3 would cap (cover) all contaminated materials on privately owned parcels and a portion of the contaminated materials on receiver-managed parcels. All contaminated materials identified on privately owned parcels and a portion of contaminated materials on the receiver-managed parcels would be would be capped with at least 24 inches of clean materials (assumed to be a minimum of 18 inches of subsoil and 6 inches of topsoil). Covers would provide protection from exposure to contaminated materials and frost heave processes. Clean soils for the covers would be brought from offsite borrow areas.

For cost evaluation purposes, it is assumed that approximately 50 percent of the horizontal extent of exposed contaminated materials on receiver-managed parcels would be addressed through construction of covers.

This alternative leaves the existing onsite waste repository intact, but does not otherwise modify the interim cover over the repository since other areas of contaminated materials on receiver-managed parcels surrounding the repository would be left exposed at the surface.

Determination of allowable future land uses beyond the current zoning is outside the scope of this FS. However it is assumed that future land use of the covered portion of receiver-managed parcels could be used for non-residential or residential purposes and that the potential future uses could vary based on the extent of coverage. While uncovered portions of the receiver-managed parcels would have restricted access using access controls, they could be used in conjunction with covered areas to provide open viewing areas for specific non-residential or residential purposes on the covered portions of the parcels.

Some potential non-residential future uses of covered areas indicated by the public to EPA during the RI/FS process for this alternative included the following:

- Minimized coverage: Park or trail areas, the viewing area for a nature conservancy, or the access paths for a cemetery
- Moderate coverage: Senior citizen community centers
- Maximized coverage: Business park or light industrial complex

Health and safety precautions, including establishment of exclusion and contaminant reduction zones, dust suppression, use of personal protective equipment (PPE), and monitoring, would be performed during construction of covers to reduce risks to workers. Either water- or chemical-based dust suppression would be used during construction of the covers to prevent asbestos fibers from becoming airborne and potentially posing an inhalation exposure risk. Temporary gravel access roads would be used as necessary to limit disturbance of contaminated materials during construction of the covers.

Covers over contaminated materials would be constructed to the extent practicable. However it may not be possible to construct frost-protective soil covers over contaminated materials directly adjacent to obstructions such as homes or structures, trees, subsurface utilities, and roads. . For purposes of this FS, a thin profile of clean soil backfill or another barrier material placed adjacent to covers coupled with land use controls are assumed to address these situations. Long-term O&M would be required to maintain the integrity of the covers.

Residential Structure Demolition or Relocation

Portions of the receiver-managed parcels would be left unremediated under this alternative and would not be protective for residential use. Thus, the NRE receiver has indicated that those homes and other residential structures that cannot be unoccupied within receiver-managed parcels would require either demolition or relocation to avoid becoming safety hazards to nearby homes on privately owned parcels. Demolition and offsite disposal of debris from homes on receiver-managed parcels is assumed for cost evaluation purposes on this alternative.

Interior Cleaning

Interior cleaning would be performed on a periodic basis using vacuum extraction to remove asbestos fibers within residential structures on privately owned parcels. Residential structures on receiver-managed parcels would not be cleaned under this alternative since they would be left unoccupied and would be demolished or relocated during implementation of the remedy.

Interior cleaning would involve temporary relocation of residents, enclosure of the residence to prevent escape of asbestos fibers, aggressive disturbance of home surfaces with blowers to dislodge fibers, and vacuum extraction/pumping to remove the fibers. It is assumed for FS purposes that all structures that could be occupied (homes, apartments, and supporting structures such as garages or sheds) would be cleaned regardless of current occupant status. Interior cleanings would be performed only if results of monitoring indicates that a potential risk exists from indoor air; it is assumed that potential risks are identified every other 5-year site review (i.e., every 10 years).

Land Use Controls

Land use controls would consist of a combination of institutional controls (legal and administrative controls), access controls (physical controls such as posted warnings), and community awareness activities (informational and educational programs) to restrict access and use of contaminated areas and provide awareness of risks from exposure to contaminated materials. The types of land use controls would be tailored for each parcel, with the type and extent of contaminated materials and type of ownership in mind to provide protection of human health and maintain the integrity of the remedy put in place (covers and posted warnings) to the extent possible.

Institutional controls would consist of a combination of governmental controls, proprietary controls, and/or informational devices that would be selected on a parcel by parcel basis depending on the ownership status (privately owned parcels versus receiver-managed parcels) and the degree of contamination present on the parcel. In general, there likely will be a greater degree of difficulty implementing and enforcing institutional controls on privately owned parcels. "Layering" of institutional controls may be required to enhance the overall protectiveness of institutional controls, especially on privately owned parcels. Issuance and periodic review and update of a comprehensive institutional control plan likely would be required to keep track of the various institutional control measures taken for each parcel. Detailed descriptions of these specific legal and administrative instruments are provided in Appendix F.

Access controls (specifically posted warnings) would be implemented primarily on the uncovered portions of receiver-managed parcels to discourage access and warn people of exposed contaminated materials and the current onsite waste repository located on receiver-managed parcels.

Access controls could also be used for specific areas of contamination on any parcel in consultation with the parcel owner. For instance, warning signs could be used to demarcate the existence and alignment of buried ACM steam pipe located on privately owned parcels along the east side of Old Fort Road(such as Thicket Court). Long-term O&M would be required to maintain access controls damaged by weather or vandalism.

Community awareness activities include informational and educational programs to inform the public about site risks and the activities being performed to reduce these risks. Dissemination of this information could use electronic communication (e-mails and web site updates), printed communication (flyers, facts sheets, newspaper articles, or signs), and/or personal communication (public meetings or personal visits). Community awareness activities would be put in place throughout the remedial process, especially during implementation of remedial action and subsequent 5-year site reviews.

Monitoring

Monitoring would be performed during the construction of the remedial action remedy components (covers and access controls) and routinely after the remedy is in place to determine whether there is adequate protection of human health and the environment.

Monitoring during construction of the remedy components would consist of ambient air sampling, borrow source testing, and inspection of areas without identified contamination. Ambient air samples would be collected and analyzed from various locations of the site to assess whether there are current exposure risks to asbestos fibers and non-asbestos COPCs in ambient air during the construction activities. Borrow samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Results of the sample analysis would be used to determine that contamination is not present in proposed offsite borrow area materials before use in construction. Inspection of areas without identified contamination would be made to ensure that those areas are not adversely impacted from prior disturbance of adjacent contaminated materials.

Routine monitoring would be performed for all parcels outside of areas with exposed contaminated materials. Monitoring protocol for covered portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers; these are assumed to be performed at least annually.

Five-year site reviews would be performed as required by the NCP since contaminated materials would remain at the site. Non-intrusive visual inspections (i.e. surface inspections), indoor air sampling for asbestos, and ambient air sampling for asbestos and non-asbestos COPCs would be performed in support of 5-year site reviews. Ambient air samples would be collected and analyzed from various locations of the site to assess whether there are current exposure risks to asbestos fibers and non-asbestos COPCs in ambient air outside areas of exposed contaminated materials. Monitoring would be performed on all parcels within the site boundary regardless of ownership.

Generalized descriptions of inspection and sampling methods for asbestos are provided in Section 2.5, and specific details concerning the monitoring and inspection protocol for Alternative 3 (including proposed sample types, quantities, frequencies, and analytical methods) are provided in Appendix F.

Remedial Component Quantity Summary

Exhibit 7-2 provides a summary of the major remedial components for Alternative 3 requiring construction and the estimated quantities for these components.

Exhibit 7-2. Summary of Major Remedial Components and Associated Quantities for Alternative 3

Remedial Component	Unit	Estimated Quantity
Surface Area of Covers	**Acres**	53
Common Backfill Required to Construct Covers	**Loose Cubic Yards**	145,000
Topsoil Required to Construct Covers	**Loose Cubic Yards**	48,300
Privately Owned Parcels Potentially Requiring Periodic Interior Cleaning of Residential Structures	**Each**	24
Privately Owned Parcels Potentially Requiring Land Use Controls	**Each**	27
Receiver-Managed Parcels Potentially Requiring Land Use Controls	**Each**	29
Receiver-Managed Parcels Requiring Home Relocation or Removal	**Each**	18

Note: Quantities summarized in this exhibit are contained in Appendices C and H. Although quantities provided are detailed, they should be considered approximate for FS evaluation purposes only.

7.4.2 Overall Protection of Human Health and the Environment

Evaluation of overall protection of human health and the environment for Alternative 3 is provided in Table G-8 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3 is “low to moderate.” ❷

7.4.3 Compliance with ARARs

Evaluation of compliance with ARARs for Alternative 3 is provided in Table G-9 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. ARARs evaluated for this alternative are included in Appendix B. The overall rating on this criterion for Alternative 3 is “moderate.” ❸

7.4.4 Long-Term Effectiveness and Permanence

Evaluation of long-term effectiveness and permanence for Alternative 3 is provided in Table G-10 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3 is “low to moderate.” ❷

7.4.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Evaluation of reduction of toxicity, mobility, or volume through treatment for Alternative 3 is provided in Table G-11 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3 is “none.” ⓿

7.4.6 Short-Term Effectiveness

Evaluation of short-term effectiveness for Alternative 3 is provided in Table G-12 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3 is “moderate to high.” ❹

7.4.7 Implementability

Evaluation of implementability for Alternative 3 is provided in Table G-13 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3 is “moderate to high.” ❹

7.4.8 Cost

Evaluation of cost for Alternative 3 is provided in Table G-14 using the evaluation factors. Detailed cost estimates for this alternative are included in Appendix H. The overall rating on this criterion for Alternative 3 (present value cost) is “low to moderate.” $$

7.5 Alternative 4: Capping of Contaminated Materials and Land Use Controls with Monitoring

7.5.1 Detailed Remedy Component Descriptions

A summary of the remedial components of Alternative 4 is provided in Section 5.3.4. The conceptual depiction of this remedial alternative is presented in Figure 7-2. The following text provides additional detail about the remedial components of this alternative.

Covers

Alternative 4 would cover all contaminated materials both on privately owned parcels and the receiver-managed parcels. This alternative would also include construction of a permanent cover over the existing onsite waste repository to ensure the interim cover installed in 2009 is protective. This alternative assumes placement of an additional 12 inches of clean cover material to ensure that the permanent cover has the required minimum thickness to provide protection against frost heave processes.

Cover construction and maintenance for privately owned parcels and the receiver-managed parcels would otherwise be performed as described in Section 7.4.1 for Alternative 3.

Land Use Controls

Land use controls would consist of a combination of institutional controls (legal and administrative controls), access controls (physical controls such as posted warnings), and community awareness activities (informational and educational programs) to restrict access and use of contaminated areas and provide awareness of risks from exposure to contaminated materials. The types of land use controls would be tailored for each parcel, with the type and extent of contaminated materials and type of ownership in mind to provide protection of human health and maintain the integrity of the remedy put in place (covers and posted warnings) to the extent possible.

Institutional controls would consist of a combination of governmental controls, proprietary controls, and/or informational devices that would be selected on a parcel by parcel basis depending on the ownership status (privately owned parcels versus receiver-managed parcels) and the degree of contamination present on the parcel. In general, there likely will be a greater degree of difficulty implementing and enforcing institutional controls on privately owned parcels. "Layering" of institutional controls may be required to enhance the overall protectiveness of institutional controls, especially on privately owned parcels. Issuance and periodic review and update of a comprehensive institutional control plan likely would be required to keep track of the various institutional control measures taken for each parcel. Detailed descriptions of these specific legal and administrative instruments are provided in Appendix F.

Access controls (specifically posted warnings) would be implemented primarily at the current onsite repository located on receiver-managed parcels. Access controls could also be used for specific areas of contamination on any parcel in consultation with the parcel owner. For instance, warning signs could be used to demarcate the existence and alignment of buried ACM steam pipe located on privately owned parcels along the east side of Old Fort Road(such as Thicket Court). Long-term O&M would be required to maintain access controls damaged by weather or vandalism.

Community awareness activities include informational and educational programs to inform the public about site risks and the activities being performed to reduce these risks. Dissemination of this information could use electronic communication (e-mails and web site updates), printed communication (flyers, facts sheets, newspaper articles, or signs), and/or personal communication (public meetings or personal visits). Community awareness activities would be put in place throughout the remedial process, especially during implementation of remedial action and subsequent 5-year site reviews.

Monitoring

Monitoring would be performed during the construction of the remedial action remedy components (covers and access controls) and routinely after the remedy is in place to determine whether there is adequate protection of human health and the environment.

Monitoring during construction of the remedy components would consist of ambient air sampling, borrow source testing, and inspection of areas without identified contamination. Ambient air samples would be collected and analyzed from various locations of the site to assess whether there are current exposure risks to asbestos fibers and non-asbestos COPCs in ambient air during the construction activities. Borrow samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Results of the sample analysis would be used to determine that contamination is not present in proposed offsite borrow area materials before use in construction. Inspection of areas without identified contamination would be made to ensure that those areas are not adversely impacted from prior disturbance of contaminated materials.

Routine monitoring would be performed for all parcels with covers. Monitoring protocol for covered portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e., surface inspections) to ensure integrity of the covers; these are assumed to be performed at least annually.

Five-year site reviews would be performed as required by the NCP since contaminated materials would remain at the site. Non-intrusive visual inspections (i.e., surface inspections) would be performed in support of 5-year site reviews. Monitoring would be performed on all parcels within the site boundary regardless of ownership.

Generalized descriptions of inspection and sampling methods for asbestos are provided in Section 2.5, and specific details concerning the monitoring and inspection protocol for Alternative 4 (including proposed sample types, quantities, frequencies, and analytical methods) are provided in Appendix F.

Remedial Component Quantity Summary

Exhibit 7-3 provides a summary of the major remedial components for Alternative 4 requiring construction and the estimated quantities for these components.

Exhibit 7-3. Summary of Major Remedial Components and Associated Quantities for Alternative 4

Remedial Component	Unit	Estimated Quantity
Surface Area of Covers	**Acres**	88
Common Backfill Required to Construct Covers	**Loose Cubic Yards**	238,800
Topsoil Required to Construct Covers	**Loose Cubic Yards**	80,900
Privately Owned Parcels Potentially Requiring Land Use Controls	**Each**	27
Receiver-Managed Parcels Potentially Requiring Land Use Controls	**Each**	29

Note: Quantities summarized in this exhibit are contained in Appendices C and H. Although quantities provided are detailed, they should be considered approximate for FS evaluation purposes only.

7.5.2 Overall Protection of Human Health and the Environment

Evaluation of overall protection of human health and the environment for Alternative 4a is provided in Table G-15 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 4 is “moderate.” ❸

7.5.3 Compliance with ARARs

Evaluation of compliance with ARARs for Alternative 4 is provided in Table G-16 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. ARARs evaluated for this alternative are included in Appendix B. The overall rating on this criterion for Alternative 4 is “high.” ❺

7.5.4 Long-Term Effectiveness and Permanence

Evaluation of long-term effectiveness and permanence for Alternative 4 is provided in Table G-17 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 4 is “moderate.” ❸

7.5.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Evaluation of reduction of toxicity, mobility, or volume through treatment for Alternative 4 is provided in Table G-18 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 4 is “none.” ⓿

7.5.6 Short-Term Effectiveness

Evaluation of short-term effectiveness for Alternative 4 is provided in Table G-19 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 4 is “moderate.” ❸

7.5.7 Implementability

Evaluation of implementability for Alternative 4 is provided in Table G-20 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 4 is "moderate." ❸

7.5.8 Cost

Evaluation of cost for Alternative 4 is provided in Table G-21 using the evaluation criteria considerations along with the cost rating for each and the justification for the rating. Detailed cost estimates for this alternative are included in Appendix H. The overall rating on this criterion for Alternative 4 (present value cost) is "moderate." $$$

7.6 Alternative 5a: Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

7.6.1 Detailed Remedy Component Descriptions

A summary of the remedial components of Alternative 5a is provided in Section 5.3.5. The conceptual depiction of this remedial alternative is presented in Figure 7-3. The following text provides additional detail about the remedial components of this alternative.

Initial Excavation of Contaminated Surface Materials

All contaminated surface materials on privately owned parcels and receiver-managed parcels would be excavated. For purposes of the FS, contaminated surface materials would be fully excavated unless the identified depth of contamination exceeds 2 feet bgs. Trucks or other mechanical conveyance would be used to transport excavated contaminated materials and consolidate them at a new onsite disposal location.

Intrusive visual inspections (i.e., subsurface inspections using test pits or boreholes) coupled with confirmation sample collection and analysis would be conducted adjacent to the excavation areas after initial surface excavation is completed to confirm that contaminated materials exposed at the surface would be excavated horizontally to the extent they can be detected.

Health and safety precautions, including establishment of exclusion and contaminant reduction zones, dust suppression, use of PPE, and monitoring, would be performed during excavation of contaminated materials to reduce risks to workers. Either water- or chemical-based dust suppression would be used during excavation to prevent asbestos fibers within contaminated materials from becoming airborne and potentially posing an inhalation exposure risk. Temporary gravel access roads would be constructed as necessary to limit disturbance of contaminated materials during excavation.

Excavation of contaminated surface materials would be conducted to the extent practicable. However, it may not be possible to fully excavate contaminated surface materials underneath or adjacent to obstructions such as homes or structures, trees, subsurface utilities, and roads. Thus residual contaminated materials may be left in soil underlying or adjacent to these obstructions. For purposes of this FS, a thin profile of clean soil backfill or another barrier material placed adjacent to excavations coupled with land use controls are assumed to address these situations.

Onsite Consolidation/Disposal

The excavated contaminated surface materials would be consolidated at an authorized onsite location specifically for disposal of the contaminated materials, including ACM. This disposal location would be located on receiver-managed parcels; it is assumed for purposes of the FS that the new onsite disposal location (Consolidation Area 1) would be in the central portion of the site to coincide with parcels that are already heavily impacted by surface and subsurface contaminated materials to limit the need to remove them.

Health and safety precautions, including establishment of exclusion and contaminant reduction zones, dust suppression, use of PPE, and monitoring, would be used during placement of contaminated materials at the onsite disposal locations to reduce risks to workers.

Covers

Contaminated materials consolidated at the disposal locations would be capped with at least 24 inches of clean materials (assumed to be a minimum of 18 inches of subsoil and 6 inches of topsoil). Covers would provide protection from exposure to contaminated materials and frost heave processes. Clean soils for the covers would be brought from offsite borrow areas. Long-term O&M would be required to maintain the integrity of the final covers over the onsite disposal locations.

This alternative would also include construction of a permanent cover over the existing onsite waste repository to ensure the interim cover installed in 2009 is protective. This alternative assumes placement of an additional 12 inches of clean cover material to ensure that the permanent cover has the required minimum thickness to provide protection against frost heave processes.

Excavation Backfill

Excavations would be backfilled to existing grade under this alternative. Clean soil is assumed to be transported from offsite borrow areas tested for contamination. The backfill would be covered with topsoil and revegetated, or otherwise restored to match the surface conditions that previously existed. The backfill would provide an initial exposure barrier to residual subsurface contaminated materials and asbestos fibers, and would provide sufficient depth (2 feet) in some locations to eliminate frost heave processes. However on a parcel-by-parcel basis it would not necessarily keep residual or subsurface contaminated materials in underlying or adjacent soil from migrating to the surface in the future through frost heave processes, especially where the backfill is less than 2 feet thick.

Future Excavation

Future excavation events (i.e., surface pickup of contaminated materials such as ACM debris) would be performed on a regular basis to address subsurface contaminated materials that could potentially migrate to the surface over time in absence of frost-protective covers. Periodic inspection and mapping for the presence of contaminated materials, especially immediately after periods of freeze-thaw, would be conducted to establish the need and frequency of excavation. For purposes of this FS, it is assumed that future excavations would be performed annually.

Future Offsite Disposal at Permitted Facilities

Contaminated materials excavated during future excavation events would be transported offsite for disposal. Disposal facilities include permitted municipal-owned landfills, construction debris landfills, and/or commercially or privately owned landfills authorized by Oregon DEQ for asbestos. Offsite disposal facilities would be required to meet the general provisions for solid waste disposal (Oregon Administrative Rule [OAR] 340-093) as well as applicable requirements for either municipal solid waste landfills (OAR 340-094) or land disposal sites other than municipal solid waste landfills (OAR 340-095), depending on the type of disposal facilities selected. These types of facilities are operated and maintained according to the conditions set forth in their State of Oregon-issued permits.

Land Use Controls

Land use controls would consist of a combination of institutional controls (legal and administrative controls), access controls (physical controls such as posted warnings), and community awareness activities (informational and educational programs) to restrict access and use of contaminated areas and provide awareness of risks from exposure to contaminated materials. The types of land use controls would be tailored for each parcel, with the type and extent of contaminated materials and type of ownership in mind to maintain the integrity of the remedy put in place (excavation backfill, covers, and posted warnings) to the extent possible.

Institutional controls would consist of a combination of governmental controls, proprietary controls, and/or informational devices that would be selected on a parcel by parcel basis depending on the ownership status (privately owned parcels versus receiver-managed parcels) and the degree of contamination present on the parcel. In general, there likely will be a greater degree of difficulty implementing and enforcing institutional controls on privately owned parcels. "Layering" of institutional controls may be required to enhance the overall protectiveness of institutional controls, especially on privately owned parcels. Issuance and periodic review and update of a comprehensive institutional control plan likely would be required to keep track of the various institutional control measures taken for each parcel. Detailed descriptions of these specific legal and administrative instruments are provided in Appendix F.

Access controls (specifically posted warnings) would be implemented primarily at the onsite disposal locations to discourage access and warn people of the current and new onsite repositories on receiver-managed parcels. These access controls would include appropriate warning and informational signs. The actual type of signage would be determined during remedial design based on the future uses of the site. These access controls would be designed to meet substantive ARARs for inactive asbestos disposal facilities.

Access controls could also be used for specific areas of contamination on any parcel in consultation with the parcel owner. For instance, warning signs could be used to demarcate the existence and alignment of buried ACM steam pipe located on privately owned parcels along the east side of Old Fort Road(such as Thicket Court). Long-term O&M would be required to maintain the integrity of the access controls if damaged by weather or vandalism.

Community awareness activities include informational and educational programs to inform the public about site risks and the activities being performed to reduce these risks. Dissemination of this information could use electronic communication (e-mails and web site updates), printed communication (flyers, facts sheets, newspaper articles, or signs), and/or personal communication (public meetings or personal visits). Community awareness activities would be put in place throughout the remedial process, especially during implementation of remedial action and subsequent 5-year site reviews.

Monitoring

Monitoring would be performed during the construction of the remedial action remedy components (initial and future incremental excavation, onsite consolidation/disposal and offsite disposal, covers, excavation backfill, and access controls) and routinely after the remedy is in place to determine whether there is adequate protection of human health and the environment.

Monitoring during construction of the initial remedy components would consist of ambient air sampling, borrow source testing, excavation confirmatory sampling, and inspection of areas without identified contamination. Ambient air samples would be collected and analyzed from various locations of the site to assess whether there are current exposure risks to asbestos fibers and non-asbestos COPCs in ambient air during the construction activities. Borrow samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Results of the sample analysis would be used to determine that contamination is not present in proposed offsite borrow area materials before use in construction. Excavation confirmatory sampling would be performed to confirm that contaminated surface materials have been completely excavated to the extent they can be detected. Inspection of areas without identified contamination would be made to ensure that those areas are not adversely impacted from prior disturbance of contaminated materials.

Routine monitoring would be performed for all parcels with covers and/or excavation backfill. Monitoring protocol for covered or backfilled portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e., surface inspections) to ensure integrity of the covers and backfill; these are assumed to be performed at least annually.

For Alternative 5a, it is assumed that emergence of contaminated materials requiring future excavation would be discovered during the annual visual inspections. Additional sampling and analysis would not be performed due to the emergence of these materials. These materials would indicate a localized failure of the remedy that is not protective of human health and the environment and that would require immediate repair.

Five-year site reviews would be performed as required by the NCP since contaminated materials would remain at the site. Non-intrusive visual inspections (i.e., surface inspections) would be performed in support of 5-year site reviews. Monitoring would be performed on all parcels within the site boundary regardless of ownership.

Generalized descriptions of inspection and sampling methods for asbestos are provided in Section 2.5, and specific details concerning the monitoring and inspection protocol for Alternative 5a (including proposed sample types, quantities, frequencies, and analytical methods) are provided in Appendix F.

Remedial Component Quantity Summary

Exhibit 7-4 provides a summary of the major remedial components for Alternative 5a requiring construction and the estimated quantities for these components.

Exhibit 7-4. Summary of Major Remedial Components and Associated Quantities for Alternative 5a

Remedial Component	Unit	Estimated Quantity
Area of Contaminated Surface Materials Initially Excavated	**Acres**	81
Volume of Contaminated Surface Materials Initially Excavated	**Loose Cubic Yards**	97,000
Common Backfill Required for Excavations	**Loose Cubic Yards**	31,500
Topsoil Required for Excavations	**Loose Cubic Yards**	69,500
Receiver-Managed Parcels Potentially Impacted by Onsite Disposal Locations	**Parcel ID**	5 parcels assumed to be the following: MBK-E, AG, and Y (Existing Repository); MBK-D, and L (Consolidation Area 1)
Surface Area of Onsite Disposal Locations	**Acres**	8
Common Backfill Required to Construct Covers for Onsite Disposal Locations	**Loose Cubic Yards**	50,700
Topsoil Required to Construct Covers for Onsite Disposal Locations	**Loose Cubic Yards**	6,600
Annual Weight of Contaminated Materials During Future Excavation - Years 1 through 10	**Tons**	11
Annual Weight of Contaminated Materials Assumed During Future Excavation - Years 11 through 20	**Tons**	7
Annual Weight of Contaminated Materials Assumed During Future Excavation - Years 21 through 30	**Tons**	3
One-Way Distance to Multiple Offsite Disposal Facilities (Weighted Average)	**Miles**	110
Privately Owned Parcels Potentially Requiring Land Use Controls	**Each**	27
Receiver-Managed Parcels Potentially Requiring Land Use Controls	**Each**	29

Note: Quantities summarized in this exhibit are contained in Appendices C and H. Although the quantities provided are detailed, they should be considered approximate for FS evaluation purposes only.

7.6.2 Overall Protection of Human Health and the Environment

Evaluation of overall protection of human health and the environment for Alternative 5a is provided in Table G-22 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 5a is "low to moderate." ❷

7.6.3 Compliance with ARARs

Evaluation of compliance with ARARs for Alternative 5a is provided in Table G-23 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. ARARs evaluated for this alternative are included in Appendix B. The overall rating on this criterion for Alternative 5a is "moderate." ❸

7.6.4 Long-Term Effectiveness and Permanence

Evaluation of long-term effectiveness and permanence for Alternative 5a is provided in Table G-24 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 5a is "low to moderate." ❷

7.6.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Evaluation of reduction of toxicity, mobility, or volume through treatment for Alternative 5a is provided in Table G-25 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 5a is "none." ⓿

7.6.6 Short-Term Effectiveness

Evaluation of short-term effectiveness for Alternative 5a is provided in Table G-26 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 5a is "low to moderate." ❷

7.6.7 Implementability

Evaluation of implementability for Alternative 5a is provided in Table G-27 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 5a is "moderate." ❸

7.6.8 Cost

Evaluation of cost for Alternative 5a is provided in Table G-28 using the evaluation criteria considerations along with the cost rating for each and the justification for the rating. Detailed cost estimates for this alternative are included in Appendix H. The overall rating on this criterion for Alternative 5a (present value cost) is "moderate." $$$

7.7 Alternative 5b: Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

7.7.1 Detailed Remedy Component Descriptions

A summary of the remedial components of Alternative 5b is provided in Section 5.3.6. The conceptual depiction of this remedial alternative is presented in Figure 7-4. The following text provides additional detail about the remedial components of this alternative.

Excavation of Contaminated Materials

All contaminated materials on privately owned parcels and receiver-managed parcels would be excavated to the extent practicable. For purposes of the FS, surface and subsurface contaminated materials would be fully excavated to the identified depth of contamination. Trucks or other mechanical conveyance would be used to transport excavated contaminated materials and consolidate them at a new onsite disposal location.

Intrusive visual inspections (i.e., subsurface inspections using test pits or boreholes) coupled with confirmation sample collection and analysis would be conducted adjacent and beneath the excavation areas after initial excavation is completed to confirm that contaminated materials would be excavated horizontally and vertically to the extent they can be detected.

Excavation of contaminated surface materials would be conducted to the extent practicable. However, it may not be possible to fully excavate contaminated materials underneath or adjacent to obstructions such as homes or structures, trees, subsurface utilities, and roads. Thus residual contaminated materials may be left in soil underlying or adjacent to these obstructions. There may also be specific instances (such as near homes) where excavation of all contaminated materials is not practicable due to potential damage to the foundations. Measures such as excavation sloping/benching or structural support measures would be used to excavate contaminated materials to the extent practical. Excavation of contaminated surface materials would then be conducted in the remaining areas close to the foundation but subsurface contaminated materials may need to be left in place. For purposes of this FS, clean soil backfill placed in excavations coupled with land use controls are assumed to address these situations.

Excavation of contaminated materials would otherwise be performed as described in Section 7.6.1 for Alternative 5a.

Onsite Consolidation/Disposal

Onsite consolidation and disposal would be performed as described in Section 7.6.1 for Alternative 5a.

Covers

Covers would be constructed as described in Section 7.6.1 for Alternative 5a.

Excavation Backfill

Excavation backfill would be constructed as described in Section 7.6.1 for Alternative 5a.

Land Use Controls

Land use controls on privately owned parcels and the receiver-managed parcels would be implemented as described in Section 7.6.1 for Alternative 5a.

Monitoring

Monitoring would be performed during the construction of the remedial action remedy components (excavation, onsite consolidation/disposal, covers, and access controls) and routinely after the remedy is in place to determine whether there is adequate protection of human health and the environment.

Monitoring during construction of the remedy components would consist of ambient air sampling, borrow source testing, excavation confirmatory sampling, and inspection of areas without identified contamination. Ambient air samples would be collected and analyzed from various locations of the site to assess whether there are current exposure risks to asbestos fibers and non-asbestos COPCs in ambient air during the construction activities. Borrow samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Results of the sample analysis would be used to determine that contamination is not present in proposed offsite borrow area materials before use in construction. Excavation confirmatory sampling would be performed to confirm that contaminated materials have been completely excavated to the extent they can be detected. Inspection of areas without identified contamination would be made during construction to ensure that those areas are not adversely impacted from disturbance of contaminated materials.

Routine monitoring would be performed for all parcels with covers and/or excavation backfill. Monitoring protocol for covered or backfilled portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e., surface inspections) to ensure integrity of the covers and backfill; these are assumed to be performed at least annually.

Five-year site reviews would be performed as required by the NCP since contaminated materials would remain at the site. Non-intrusive visual inspections (i.e., surface inspections) would be performed in support of 5-year site reviews. Monitoring would be performed on all parcels within the site boundary regardless of ownership.

Generalized descriptions of inspection and sampling methods for asbestos are provided in Section 2.5, and specific details concerning the monitoring and inspection protocol for Alternative 5b (including proposed sample types, quantities, frequencies, and analytical methods) are provided in Appendix F.

Remedial Component Quantity Summary

Exhibit 7-5 provides a summary of the major remedial components for Alternative 5b requiring construction and the estimated quantities for these components.

Exhibit 7-5. Summary of Major Remedial Components and Associated Quantities for Alternative 5b

Remedial Component	Unit	Estimated Quantity
Surface Area of Excavations	**Acres**	82
Volume of Contaminated Materials Excavated	**Loose Cubic Yards**	130,300
Common Backfill Required for Excavations	**Loose Cubic Yards**	63,700
Topsoil Required for Excavations	**Loose Cubic Yards**	70,600
Receiver-Managed Parcels Impacted by Onsite Disposal Locations	**Parcel ID**	5 parcels assumed to be the following: MBK-E, AG, and Y (Existing Repository); MBK-D, and L (Consolidation Area 1)
Surface Area of Onsite Disposal Locations	**Acres**	8
Common Backfill Required to Construct Covers for Onsite Disposal Locations	**Loose Cubic Yards**	59,200
Topsoil Required to Construct Covers for Onsite Disposal Locations	**Loose Cubic Yards**	6,700
Privately Owned Parcels Potentially Requiring Land Use Controls	**Each**	27
Receiver-Managed Parcels Potentially Requiring Land Use Controls	**Each**	29

Note: Quantities summarized in this exhibit are contained in Appendices C and H. Although the quantities provided are detailed, they should be considered approximate for FS evaluation purposes only.

7.7.2 Overall Protection of Human Health and the Environment

Evaluation of overall protection of human health and the environment for Alternative 5b is provided in Table G-29 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 5b is "moderate". ❸

7.7.3 Compliance with ARARs

Evaluation of compliance with ARARs for Alternative 5b is provided in Table G-30 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. ARARs evaluated for this alternative are included in Appendix B. The overall rating on this criterion for Alternative 5b is "high." ❺

7.7.4 Long-Term Effectiveness and Permanence

Evaluation of long-term effectiveness and permanence for Alternative 5b is provided in Table G-31 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 5b is "moderate to high." ❹

7.7.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Evaluation of reduction of toxicity, mobility, or volume through treatment for Alternative 5b is provided in Table G-32 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 5b is “none.” ⓿

7.7.6 Short-Term Effectiveness

Evaluation of short-term effectiveness for Alternative 5b is provided in Table G-33 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 5b is “low to moderate.” ❷

7.7.7 Implementability

Evaluation of implementability for Alternative 5b is provided in Table G-34 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 5b is “moderate.” ❸

7.7.8 Cost

Evaluation of cost for Alternative 5b is provided in Table G-35 using the evaluation criteria considerations along with the cost rating for each and the justification for the rating. Detailed cost estimates for this alternative are included in Appendix H. The overall rating on this criterion for Alternative 5b (present value cost) is “moderate.” $$$

7.8 Alternative 6: Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

7.8.1 Detailed Remedy Component Descriptions

A summary of the remedial components of Alternative 6 is provided in Section 5.3.7. The conceptual depiction of this remedial alternative is presented in Figure 7-5. The following text provides additional detail about the remedial components of this alternative.

Excavation of Contaminated Materials

Excavation of contaminated materials for offsite disposal would be performed as described in Section 7.7.1 for Alternative 5b.

Offsite Disposal at Permitted Facilities

Excavated contaminated materials would be transported offsite for disposal. Disposal facilities include permitted municipal-owned landfills, construction debris landfills, and/or commercially or privately owned landfills authorized by Oregon DEQ for asbestos. Offsite disposal facilities would be required to meet the general provisions for solid waste disposal (OAR 340-093) as well as applicable requirements for either municipal solid waste landfills (OAR 340-094) or land disposal sites other than municipal solid waste landfills (OAR 340-095), depending on the type of disposal facilities selected. These types of facilities are operated and maintained according to the conditions set forth in their State of Oregon-issued permits.

Excavation Backfill

Excavation backfill would be performed as described in Section 7.6.1 for Alternative 5a.

Covers

This alternative would **include construction of a permanent cover over the existing onsite waste repository to ensure the interim cover installed in 2009 is protective. This alternative assumes placement of an additional 12 inches of clean cover material to ensure that the permanent cover has the required minimum thickness to provide protection against frost heave processes.**

Land Use Controls

Land use controls on privately owned parcels and the receiver-managed parcels would be implemented as described in Section 7.6.1 for Alternative 5a.

Monitoring

Monitoring would be performed during the construction of the remedial action remedy components (excavation, offsite disposal, covers, excavation backfill, and access controls) and routinely after the remedy is in place to determine whether there is adequate protection of human health and the environment.

Monitoring during construction of the remedy components would consist of ambient air sampling, borrow source testing, excavation confirmatory sampling, and inspection of areas without identified contamination. Ambient air samples would be collected and analyzed from various locations of the site to assess whether there are current exposure risks to asbestos fibers and non-asbestos COPCs in ambient air during the construction activities. Borrow samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Results of the sample analysis would be used to determine that contamination is not present in proposed offsite borrow area materials before use in construction. Excavation confirmatory sampling would be performed to confirm that contaminated surface materials have been completely excavated from the excavation areas to the extent they can be detected. Inspection of areas without identified contamination would be made during construction to ensure that those areas are not adversely impacted from disturbance of contaminated materials.

Routine monitoring would be performed for all parcels with covers and/or excavation backfill. Monitoring protocol for covered or backfilled portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e., surface inspections) to ensure integrity of the covers and backfill; these are assumed to be performed at least annually.

Five-year site reviews would be performed as required by the NCP since contaminated materials would remain at the site. Non-intrusive visual inspections (i.e., surface inspections) would be performed in support of 5-year site reviews. Monitoring would be performed on all parcels within the site boundary regardless of ownership.

Generalized descriptions of inspection and sampling methods for asbestos are provided in Section 2.5, and specific details concerning the monitoring and inspection protocol for Alternative 6 (including proposed sample types, quantities, frequencies, and analytical methods) are provided in Appendix F.

Remedial Component Quantity Summary

Exhibit 7-6 provides a summary of the major remedial components for Alternative 6 requiring construction and the estimated quantities for these components.

Exhibit 7-6. Summary of Major Remedial Components and Associated Quantities for Alternative 6

Remedial Component	Unit	Estimated Quantity
Surface Area of Excavations	**Acres**	89
Volume of Contaminated Materials Excavated	**Loose Cubic Yards**	139,600
Estimated Weight of Contaminated Materials for Offsite Disposal	**Tons**	186,700
One-Way Distance to Multiple Offsite Disposal Facilities (Weighted Average)	**Miles**	110
Common Backfill Required for Excavations	**Loose Cubic Yards**	67,200
Topsoil Required for Excavations	**Loose Cubic Yards**	76,400
Privately Owned Parcels Potentially Requiring Land Use Controls	**Each**	27
Receiver-Managed Parcels Potentially Requiring Land Use Controls	**Each**	29

Note: Quantities summarized in this exhibit are contained in Appendices C and H. Although quantities provided are detailed, they should be considered approximate for FS evaluation purposes only.

7.8.2 Overall Protection of Human Health and the Environment

Evaluation of overall protection of human health and the environment for Alternative 6 is provided in Table G-36 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 6 is “moderate to high.” ❹

7.8.3 Compliance with ARARs

Evaluation of compliance with ARARs for Alternative 6 is provided in Table G-37 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. ARARs evaluated for this alternative are included in Appendix B. The overall rating on this criterion for Alternative 6 is “high.” ❺

7.8.4 Long-Term Effectiveness and Permanence

Evaluation of long-term effectiveness and permanence for Alternative 6 is provided in Table G-38 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 6 is “moderate to high.” ❹

7.8.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Evaluation of reduction of toxicity, mobility, or volume through treatment for Alternative 6 is provided in Table G-39 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 6 is “none.” ⓿

7.8.6 Short-Term Effectiveness

Evaluation of short-term effectiveness for Alternative 6 is provided in Table G-40 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 6 is “low to moderate.” ❷

7.8.7 Implementability

Evaluation of implementability for Alternative 6 is provided in Table G-41 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 6 is “low to moderate.” ❷

7.8.8 Cost

Evaluation of cost for Alternative 6 is provided in Table G-42 using the evaluation criteria considerations along with the cost rating for each and the justification for the rating. Detailed cost estimates for this alternative are included in Appendix H. The overall rating on this criterion for Alternative 6 (present value cost) is “high.” $$$$$

7.9 State (Support Agency) Acceptance

State (support agency) acceptance is a modifying criterion under the NCP. Assessment of state acceptance will not be completed until comments on the final FS report are submitted to EPA. Thus, state acceptance is not considered in the detailed analysis of alternatives presented in the FS.

7.10 Community Acceptance

Community acceptance is also a modifying criterion under the NCP. Assessment of community acceptance will include responses to questions that any interested person in the community may have regarding any component of the remedial alternatives presented in the proposed plan. This assessment will be completed after EPA receives public comments on the proposed plan during the public commenting period. Thus, community acceptance is not considered in the detailed analysis of alternatives presented in the FS.

7.11 Comparative Analysis of Alternatives

This FS evaluated the six retained remedial alternatives discussed in this section against the two threshold criteria and five balancing criteria. The results of the detailed analysis for each remedial alterative are presented in Table 7-1 to allow a comparative analysis of the alternatives and identify the key tradeoffs between them. Comparative analysis for the remedial alternatives using the threshold and balancing criteria has been put into narrative form in the following subsections. Only significant comparative differences between alternatives are presented; the full set of rationale for the qualitative ratings is provided in Appendix G.

It should be noted that the site is complex, with not only varying degrees of contamination from parcel to parcel but also various types of ownership, levels of occupancy, and degrees of current development between parcels. It is possible that elements of several remedial alternatives will need to be compiled into a preferred remedy for the site to address all of the parcel-specific issues. This will be addressed in the proposed plan after issuance of this report.

7.11.1 Overall Protection of Human Health and the Environment

Of the six retained alternatives, only the no action alternative (i.e., Alternative 1) fails to provide protection for human health and the environment and did not address the PRAOs for contaminated materials. Thus, Alternative 1 was given a rating of "none."

Alternative 3 addresses the PRAOs primarily through partial capping of contaminated materials using covers coupled with land use controls to reduce risks from contact with covered and exposed materials. Interior cleanings would also be performed for residential structures on privately owned parcels to enhance protectiveness from contamination potentially tracked from outside. Contaminated materials remain exposed outside of capped areas pose human health and ecological risks through dispersal across the site. Contaminated materials also still remain beneath covers across a large extent of the site and could pose additional risks if the covers are compromised. Due to these factors, protection of human health and the environment is less than other alternatives. Thus this alternative was given a rating of "low to moderate."

Alternative 4 addresses the PRAOs primarily through in-place capping of contaminated materials using covers to reduce risks from contact with these materials. Capping provides an exposure barrier to the contaminated materials and prevents upward migration to the surface from frost heave processes. However contaminated materials still remain beneath covers across a large extent of the site and could pose risks if the covers are compromised. Thus this alternative was given a rating of "moderate."

Alternative 5a addresses the PRAOs primarily through excavation of contaminated surface materials and onsite consolidation and disposal. Capping at the onsite disposal locations provides an exposure barrier to the contaminated materials and prevents upward migration to the surface from frost heave processes. However contaminated materials still remain beneath covers at these disposal locations and could pose risks if the covers are compromised. Contaminated subsurface materials also remain across a large extent of the site beneath backfill placed in excavations. The backfill has a variable thickness and is not designed to prevent frost heave processes, so upward migration of subsurface contaminated materials to the surface may occur over time and pose additional risks. Future excavations may only partially address these risks they would only occur periodically. Thus this alternative was given a rating of "low to moderate."

Alternative 5b addresses the PRAOs primarily through excavation of surface and subsurface contaminated materials and onsite consolidation and disposal. Capping at the onsite disposal locations provides an exposure barrier to the contaminated materials and prevents upward migration to the surface from frost heave processes. Contaminated materials still remain beneath covers at these disposal locations and could pose risks if the covers are compromised. Residual contaminated materials such as asbestos fibers may also remain beneath backfill placed in excavations and could pose risks if the backfill is compromised. Since the majority of the contaminated materials are excavated and disposed of at onsite disposal locations protected by land use controls, long-term protection of human health and the environment is more certain across the site than alternatives that leave contaminated materials across a larger extent of the site. Thus this alternative was given a rating of "moderate."

Alternative 6 addresses the PRAOs primarily through excavation of contaminated surface and subsurface materials and offsite disposal. Residual contaminated materials such as asbestos fibers may remain beneath backfill placed in excavations. Exposure to residual contaminated materials could pose risks if the backfill is compromised. Since the majority of the contaminated materials are excavated and disposed of offsite, long-term protection of human health and the environment is more certain than Alternative 5b. Thus, this alternative was given a rating of "moderate to high."

7.11.2 Compliance with ARARs

Alternative 1 fails to be compliant with the chemical-specific ARARs identified for the site since no action is taken. Thus, this alternative was given a rating of "none."

Alternatives 3, 4, 5a, 5b, and 6 would address the location- and action-specific ARARs through adherence of the ARARs during implementation of the remedial action. However compliance with chemical-specific ARARs for these alternatives is less certain. Specifically the "Standards for Degree of Cleanup" included in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rules were identified as fundamentally controlling ARARs to establish protectiveness. These ARARs establish acceptable risk levels for human health at 1E-06 for individual carcinogens, 1E-05 for multiple carcinogens, and an HI of 1.0 for non-carcinogens. As discussed in Exhibit 5-1, the exposure pathways must be truncated to ensure compliance with these risk levels for asbestos contamination in soil.

Alternatives 3 and 5a either leave contaminated materials exposed at the site or have a higher potential of future exposure at the surface to significant quantities of contaminated materials through frost heave processes. Thus compliance with the previously mentioned ARARs is questionable and these alternatives were given a rating of "moderate."

Alternatives 4, 5b, and 6 fully address these ARARs by truncating the exposure pathways to contaminated materials through combinations of in-place capping, excavation and onsite or offsite disposal. Backfilling of excavations is also used to address residual contamination such as asbestos fibers after excavation. Thus these alternatives were all given a rating of "high."

7.11.3 Long-Term Effectiveness and Permanence

Alternative 1 fails to provide long-term effectiveness and permanence since no action is taken. Thus, this alternative was given a rating of "none."

Alternative 3 addresses contaminated materials primarily through partial capping using covers coupled with land use controls to reduce risks from contact with covered and exposed materials. Interior cleanings would also be performed for residential structures on privately owned parcels to enhance protectiveness from contamination potentially tracked from outside. Contaminated materials remain exposed outside of capped areas pose human health and ecological risks through dispersal across the site. Contaminated materials also still remain beneath covers across a large extent of the site and could pose additional risks if the covers are compromised. Due to these factors, long-term effectiveness and permanence is less than other alternatives. Thus, this alternative was given a rating of "low to moderate."

Alternative 4 addresses contaminated materials primarily through in-place capping using covers to reduce risks from contact with these materials. Capping provides an exposure barrier to the contaminated materials and prevents upward migration to the surface from frost heave processes. However, contaminated materials still remain beneath covers across a large extent of the site and could pose risks if the covers are compromised. Thus, long-term effectiveness and permanence is not as certain as for remedies that remove and consolidate contaminated materials for onsite and offsite disposal. Thus, this alternative was given a rating of "moderate."

Alternatives 5a addresses contaminated surface materials primarily through excavation of and onsite consolidation and disposal. Excavation and onsite consolidation of contaminated surface materials slightly increases the long-term effectiveness and permanence of the remedy for locations where excavation takes place. However, contaminated materials still remain under covers at onsite disposal locations. Contaminated subsurface materials also remain across a large extent of the site beneath backfill placed in excavations. These materials could pose current and future human health and ecological risks if the covers at the onsite disposal locations are compromised or contaminated materials become exposed at the surface in backfilled excavations. Thus, this alternative was given a rating of "low to moderate."

Alternative 5b and 6 addresses contaminated materials primarily through excavation of surface and subsurface materials and either onsite consolidation and disposal or offsite disposal. Excavation and onsite or offsite disposal of contaminated materials greatly increase the long-term effectiveness and permanence of the remedy for locations where excavation takes place. Contaminated materials still remain under covers at onsite disposal locations, and residual contaminated materials still remain under excavation backfill. Since the majority of the contaminated materials are excavated and disposed of at onsite or offsite disposal locations protected by land use controls, long-term protection of human health and the environment is more certain across the site than alternatives that leave contaminated materials across a larger extent of the site. Thus, these alternatives were given a rating of "moderate to high."

7.11.4 Reduction of Toxicity, Mobility, or Volume through Treatment

All of the retained alternatives fail to provide a reduction of toxicity, mobility, or volume through treatment since treatment is not a component of these alternatives. Thus, all of the retained alternatives were given a rating of "none."

7.11.5 Short-Term Effectiveness

Alternative 1 fails to provide short-term effectiveness since no action is taken. Thus, this alternative was given a rating of "none".

Alternatives 3 and 4 address short-term risks to workers, the community, and the environment. Land use controls could be quickly implemented to address potential exposure to contaminated materials. Construction of covers could be implemented shortly after the implementation of land use controls to protect the community and the environment. While construction of covers would involve surface disturbance of contaminated materials, short-term risks to workers would be mitigated through the use of safety measures such as PPE. Short-term risks to workers, the community, and the environment could be mitigated through measures such as water-based dust suppression. Trucks used to haul offsite borrow used to construct the covers slightly increase short-term risks to the community. Thus Alternative 3 was given a rating of "moderate to high." Alternative 4 involves significantly more surface disturbance during cover construction and a larger number of haul trucks than Alternative 3. Thus Alternative 4 was given a rating of "moderate."

Excavation and onsite consolidation under Alternatives 5a and 5b requires disturbance of a large amount of contaminated materials across the site, which poses increased short-term risks to workers and the community. Construction of onsite disposal locations also requires placement of large amounts of contaminated materials in a few select locations, increasing risks at those locations. Excavation of surface and/or subsurface contaminated materials and onsite consolidation also require large volumes of offsite borrow not only to backfill excavations but also to construct covers over the onsite disposal locations. These activities pose more risks to workers and the community than solely surface disturbance activities under Alternative 4. Truck traffic would be increased to haul both contaminated materials and offsite borrow, but most of the traffic would occur within or near the site and not as much offsite borrow would be required as for Alternative 4. While Alternative 5a involves initial excavation and consolidation of a smaller volume of contaminated materials than Alternative 5b, the decrease in initial short-term risks during surface excavation is offset by the short-term risks posed over a longer period of time by the future excavation of contaminated surface materials. Thus, these alternatives were both given a rating of “low to moderate.”

Excavation and offsite disposal under Alternative 6 requires disturbance of a large amount of contaminated materials across the site similar to Alternative 5b, which poses increased short-term risks to workers and the community. Offsite disposal does not require onsite consolidation and disposal and the associated risks to workers and the community. However hauling of contaminated materials for offsite disposal greatly increases truck traffic and related risks to the community away from the site. Backfilling of excavations also requires large volumes of offsite borrow which poses additional risks to workers and the community during transportation and placement, similarly to Alternative 5b. Since the majority of contaminated materials are excavated and disposed of offsite, short-term impacts to workers and especially the community are greatly increased over alternatives that do not require offsite disposal due to truck traffic to the offsite disposal facilities. Thus, this alternative was also given a rating of “low to moderate.”

7.11.6 Implementability

Alternative 1 has no action taken other than 5-year site reviews. Since no new remedial action is taken, this alternative was given a rating of “none.”

Alternative 3 involves capping of contaminated materials on privately owned parcels and portions of receiver-managed parcels through construction of covers. The construction resources and materials needed to construct the quantity of covers for this alternative should be available. While there may be additional difficulties associated with implementation of institutional controls especially on privately owned parcels, institutional controls have been implemented in a similar manner on other contaminated residential sites in Oregon. Access controls would be relatively easy to install. Maintenance of the covered areas and monitoring, especially on privately owned parcels, could provide difficulties in the future. However, monitoring has been previously implemented at the site with available labor and technical resources. Interior cleaning has not been performed at this site and would require coordination with affected residents, but has been successfully performed at similar sites with asbestos contamination. Thus, this alternative was given a rating of "moderate to high."

Alternative 4 has similar implementability issues to Alternative 3. However, Alternative 4 requires covering a larger area of the site than Alternatives 3 and requires a larger volume of suitable borrow from offsite areas. Maintenance of the additional covered areas and monitoring, especially on privately owned parcels, could provide difficulties in the future. Thus, this alternative was given a rating of "moderate."

Alternatives 5a and 5b primarily involve excavation of contaminated materials and onsite consolidation/disposal with land use controls and monitoring. Excavation and onsite consolidation of contaminated materials could be difficult in areas of underground utilities, trees, roads, and near structures. These two alternatives require less overall offsite borrow than Alternative 4, but additional logistical coordination is needed since both contaminated materials and offsite borrow will be transported simultaneously. While Alternative 5a requires less initial excavation than Alternative 5b, the increase in implementability from reducing the volume of initial excavation is offset by the difficulties in performing periodic future excavations of contaminated surface materials. Thus, both of these alternatives were given a rating of "moderate."

Alternative 6 primarily involves excavation of contaminated materials and offsite disposal with land use controls and monitoring. Excavation and offsite disposal of contaminated materials could be difficult in areas of underground utilities, trees, roads, and near structures. This alternative does not require onsite consolidation and disposal, but similar logistical coordination is needed since both contaminated materials and offsite borrow will be transported simultaneously. Offsite disposal of large volumes of excavated materials requires additional coordination with the offsite disposal facilities. The ability to obtain the necessary approvals and the logistics of transporting large volumes of contaminated materials for long distances to offsite disposal facilities decreases the implementability of this alternative. Thus, this alternative was given a rating of "low to moderate."

7.11.7 Cost

Present value costs for all alternatives were evaluated over a 31-year period (Years 0 through 30).

The present value cost for Alternative 1 was given a rating of "low." The present value cost for this alternative is approximately $186,000.

The present value cost for Alternatives 3, 4, 5a and 5b were given a rating of "moderate." The present value costs for these alternatives are approximately $10,152,000, $12,798,000, $10,467,000, and $14,028,000, respectively.

The present value cost for Alternative 6 was given a rating of "high." The present value costs for this alternatives is approximately $29,472,000.

Section 8
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Tables

Identification and Technical Implementability Screening of Potentially Applicable Remedial Technologies/Process Options
Contaminated Materials

General Response Actions	Remedial Technology	Process Option	Description of Option	Screening Comments	Retained
No Action	None	None	No action would be taken. Contaminated materials would remain in their existing conditions.	Required by NCP as baseline for comparison.	Yes
Monitoring	Physical and/or Chemical Monitoring	Non-Intrusive Visual Inspection	A non-intrusive (surficial) visual inspection of the immediate ground surface to determine the presence or absence of contaminated materials.	Potentially implementable process option.	Yes
		Intrusive Visual Inspection	An intrusive visual inspection of the subsurface (using excavations or boreholes) to determine the presence or absence of contaminated materials.	Potentially implementable process option.	Yes
		Sample Collection and Analysis	Air and/or soil samples would be collected for microscopic analysis of asbestos or chemical analysis of arsenic to determine the potential presence of asbestos fibers or arsenic. Types of samples collected include but are not limited to soil, ambient air, and ABS. Types of microscopic analyses for asbestos fibers include but are not limited to PLM, stereomicroscopy, and TEM. Chemical analysis of arsenic is typically performed using graphite furnace atomic absorption methods.	Potentially implementable process option.	Yes
Land Use Controls	Institutional Controls	Governmental Controls, Proprietary Controls, and Informational Devices	Contact with contaminated materials would be controlled through legal instruments. Examples of governmental controls include but are not limited to local zoning, permits, codes, or regulations. Examples of proprietary controls include but are not limited to instruments such as Easement and Equitable Servitude and Covenants, Conditions and Restrictions (CC&Rs). Examples of informational devices include but are not limited to Notices of Environmental Contamination.	Potentially implementable process option.	Yes
	Community Awareness Activities	Informational and Educational Programs	Community informational and educational programs would be undertaken to enhance awareness of potential hazards and remedies for contaminated materials.	Potentially implementable process option.	Yes
	Access Controls	Posted Warnings	Warning signs would be used to warn people of dangers posed by contaminated materials at the site.	Potentially implementable process option.	Yes

Table 4-1 (continued)
Identification and Technical Implementability Screening of Potentially Applicable Remedial Technologies/Process Options
Contaminated Materials

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Screening Comments*	*Retained*
Containment	Surface Source Controls	Water-Based Suppression	Contaminated materials would be kept "adequately wet" using water or a water-based dust suppressant to control airborne migration of asbestos fibers or arsenic to the surrounding environment.	Potentially implementable process option.	Yes
		Chemical-Based Suppression	Contaminated materials would be treated with a resinous or petroleum-based chemical dust suppressant to control airborne migration of asbestos fibers and/or arsenic to the surrounding environment.	Potentially implementable process option.	Yes
		Negative Pressure Enclosures	Contaminated materials would be enclosed within a temporary structure. The structure would be operated under negative pressure with filtering to control airborne migration of asbestos fibers or arsenic in dust to the surrounding environment.	Potentially implementable process option.	Yes
		In Situ Mixing	Contaminated materials and associated soils would be mixed with underlying uncontaminated soil or fill materials.	Potentially implementable process option.	Yes
		Soil or Rock Exposure Barrier/Cover	Contaminated materials would be covered with a layer of clean soil or rock with sufficient thickness to eliminate surface exposure.	Potentially implementable process option.	Yes
		Asphalt or Concrete Exposure Barrier/Cover	Contaminated materials would be covered with layers of asphalt or concrete with sufficient thickness to eliminate surface exposure.	Potentially implementable process option.	Yes
		Geosynthetic Multi-Layer Exposure Barrier/Cover	Contaminated materials would be covered with geosynthetic material (such as geomembrane or a geosynthetic clay liner [GCL]) along with protective vegetative or rock layers to eliminate surface exposure.	Potentially implementable process option.	Yes
Removal/ Transport/Disposal	Removal	Mechanical Excavation	Contaminated materials would be excavated using mechanical methods.	Potentially implementable process option.	Yes
		Pneumatic Excavation (Vacuum Extraction/ Pumping)	Contaminated materials would be excavated using vacuum hoses, vacuum trucks, or other pneumatic conveyance system.	Potentially implementable process option.	Yes
	Transport	Mechanical Transport (Hauling/Conveying)	Excavated contaminated materials would be transported by truck or other mechanical conveyance method.	Potentially implementable process option.	Yes

General Response Actions	Remedial Technology	Process Option	Description of Option	Screening Comments	Retained
Removal/ Transport/ Disposal – Continued	Transport – Continued	Hydraulic Transport (Slurrying)	Excavated contaminated materials would be transported in slurry form using a pipeline or other hydraulic conveyance system.	Potentially implementable process option.	Yes
		Pneumatic Transport (Vacuum Extraction/ Pumping)	Excavated contaminated materials would be transported using vacuum hoses, vacuum trucks, or other pneumatic conveyance system.	Potentially implementable process option.	Yes
	Disposal	Onsite Disposal	Excavated contaminated materials would be disposed of at an onsite location authorized for disposal of asbestos and arsenic contamination.	Potentially implementable process option.	Yes
		Offsite Disposal	Excavated contaminated materials would be disposed of at an offsite location authorized for disposal of asbestos and arsenic contamination.	Potentially implementable process option.	Yes
Treatment	Biological Treatment	Vermiprocess	Worms are employed to convert contaminated materials into an inert waste material.	Not technically feasible for site application because it has not been demonstrated for large-scale remediation of asbestos and arsenic in contaminated materials.	No
		Phytoremediation	Asbestos and arsenic in contaminated materials would be treated/removed using select plant species.	Not technically feasible for site application because no plant has been identified that can remove asbestos from contaminated materials through phytoremediation.	No
	Physical and/or Chemical Treatment	Physical Separation/ Segregation	Contaminated materials would be separated and segregated from uncontaminated debris and soil for disposal and/or treatment.	Potentially implementable process option.	Yes
		Size Reduction	Contaminated materials would be reduced in size using approved techniques to facilitate disposal and/or treatment.	Potentially implementable process option.	Yes
		Pozzolan- or Cement-Based Stabilization/Solidification	Contaminated materials would be mixed with a pozzolan- or cement-based binding agent before disposal.	Potentially implementable process option.	Yes
		Pozzolan- or Cement-Based In Situ Stabilization/Solidification	Contaminated materials would be mixed in situ with a pozzolan- or cement-based binding agent using a deep soil auger mixing/injection technique.	Potentially implementable process option.	Yes
		Chemical Decomposition	Contaminated materials would be decomposed to an amorphous silica suspension at relatively low temperatures (~100°C) using chemicals tailored to the waste stream. The resulting amorphous silica would then be solidified for disposal as an inert waste. ABCOV™ is a demonstrated form of this technology.	Potentially implementable process option.	Yes

General Response Actions	Remedial Technology	Process Option	Description of Option	Screening Comments	Retained
Treatment – Continued	Physical and/or Chemical Treatment – Continued	Chemical Digestion	Contaminated materials would be treated using a spray-applied foam that soaks into porous materials and converts chrysotile asbestos contained within to an inert, non-fiberous form. DMA® is a commercial form of this technology.	Not technically feasible for site application because the technology is only applicable to chrysotile asbestos-containing porous materials that can readily absorb the digestion agent and does not affect amosite asbestos or arsenic.	No
		Soil Washing	Contaminated materials would be flushed with a site-specific washing solution; flushed asbestos and arsenic would be collected for further treatment and/or disposal.	Not technically feasible for site application because it has not been identified or demonstrated for remediation of asbestos from contaminated materials.	No
		Soil Flushing	A washing solution (as with soil washing) would be circulated through contaminated materials with the use of injection and extraction wells or trenches; flushed asbestos and arsenic would be collected for further treatment and/or disposal.	Not technically feasible for site application because it has not been identified or demonstrated for remediation of asbestos from contaminated materials.	No
	Thermal Treatment	In Situ Vitrification	An electrical current would be passed between electrodes inserted into in-place contaminated materials to cause melting. The melted matrix is then allowed to cool in place into a solid vitrified glass mass.	Potentially implementable process option.	Yes
		Electric Arc Vitrification (Ex Situ)	An electrical current would be passed between electrodes in a furnace creating an electrical arc. Contaminated materials placed in the furnace form a molten bath that cools to form a vitrified glass mass. The vitrified glass mass is an inert waste.	Potentially implementable process option.	Yes
		Plasma Arc Vitrification (Ex Situ)	An electrical current would be passed between electrodes to form plasma. Contaminated materials placed in the plasma arc form a molten bath that cools to form a vitrified glass mass. The vitrified glass mass is an inert waste.	Potentially implementable process option.	Yes
		Incineration (Ex Situ)	Contaminated materials would be crushed and mixed. The mixture is subjected to incineration without chemical additives. The reaction product is an inert waste.	Not technically feasible for site application because it has not been identified or demonstrated for remediation of asbestos in contaminated materials.	No

General Response Actions	Remedial Technology	Process Option	Description of Option	Screening Comments	Retained
Treatment – Continued	Thermal/Chemical Treatment	Thermo-Caustic Dissolution	Contaminated materials would be placed into a high temperature caustic (strong basic) solution. Contaminated materials are partially to fully converted (changed to an amorphous structure) during immersion. Partially converted contaminated materials are further converted using chemical reactions to form a viscous mixture, which is later vitrified. The resulting reaction product (glass) is an amorphous inert waste.	Potentially implementable process option.	Yes
		Thermo-Chemical Treatment	Contaminated materials would be mixed with proprietary demineralizing agents within a hydrofluoric acid solution. The mixture is then heated in a rotary hearth furnace. This process is similar to vitrification but does not involve complete melting. Instead, the process results in partial sintering of the material. The resulting reaction product (rock-like material) is an inert waste. TCCT, patented by ARI, is a commercial form of this technology.	Potentially implementable process option.	Yes

Notes:

1. The screening process for technical implementability involves a qualitative assessment of the degree to which process options address evaluation criteria presented in Section 4.5.

2. Shading indicates remedial technologies/process options have been eliminated from further consideration based on lack of technical implementability. Remaining (unshaded) remedial technologies/process options have been retained for additional screening in Table 4-2.

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General Response Actions	Remedial Technology	Process Option	Description of Option		Effectiveness		Implementability	Relative Cost		Reasons for Elimination of Process Option from Consideration	Process Option Viability with Respect to Assembly of Remedial Alternatives
								Capital Cost	O&M Cost		
No Action	None	None	No action would be taken. Contaminated materials would remain in their existing conditions.	⓿	No protection of human health or the environment and no compliance with ARARs.	⓿	Easily implemented but is not acceptable to regulatory agencies and does not meet ARARs.	⓿	⓿	Retained	Required by NCP as stand-alone alternative.
Monitoring	Physical and/or Chemical Monitoring	Non-Intrusive Visual Inspection	A non-intrusive (surficial) visual inspection of the immediate ground surface to determine the presence or absence of contaminated materials.	❷	Protects people by monitoring contaminant concentrations and migration. Does not directly affect people or animals and does not physically address contaminated materials.	❺	Easily implemented using available technical labor resources.	$	⓿	Retained	Viable for short- and long-term site monitoring.
		Intrusive Visual Inspection	An intrusive visual inspection of the subsurface (using excavations or boreholes) to determine the presence or absence of contaminated materials.	❷	Protects people by monitoring contaminant concentrations and migration. Does not directly affect people or animals and does not physically address contaminated materials.	❺	Easily implemented using available technical labor resources.	$$	⓿	Retained	Viable for short- and long-term site monitoring.
		Sample Collection and Analysis	Air and/or soil samples would be collected for microscopic analysis of asbestos or chemical analysis of arsenic to determine the potential presence of asbestos fibers or arsenic. Types of samples collected include but are not limited to soil, ambient air, and ABS. Types of microscopic analyses for asbestos fibers include but are not limited to PLM, stereomicroscopy, and TEM. Chemical analysis of arsenic is typically performed using graphite furnace atomic absorption methods.	❷	Protects people by monitoring contaminant concentrations and migration. Does not directly affect people or animals and does not physically address contaminated materials.	❺	Easily implemented using available technical labor and equipment resources.	$$$	⓿	Retained	Viable for short- and long-term site monitoring.
Land Use Controls	Institutional Controls	Governmental Controls, Proprietary Controls, and Informational Devices	Contact with contaminated materials would be controlled through legal instruments. Examples of governmental controls include but are not limited to local zoning, permits, codes, or regulations. Examples of proprietary controls include but are not limited to instruments such as Easement and Equitable Servitude, and CC&Rs. Examples of informational devices include but are not limited to Notices of Environmental Contamination.	❷	Restricts future uses of the site that are not protective of human health and the environment but does not physically address contaminated materials.	❸	Implemented using legal instruments and labor resources; potential public resistance.	$$	$	Retained	Potentially viable process option for combination with access controls or containment and/or disposal technologies in which contaminated materials are left on site.
	Community Awareness Activities	Informational and Educational Programs	Community informational and educational programs would be undertaken to enhance awareness of potential hazards and remedies for contaminated materials.	❷	Protects people by enhancing awareness of potential site hazards and remedies. Does not directly affect animals and does not physically address contaminated materials.	❺	Easily implemented using available technical and community involvement labor resources.	$	$	Retained	Potentially viable process option for combination with all other technologies.
	Access Controls	Posted Warnings	Warning signs would be used to warn people of dangers posed by contaminated materials at the site.	❷	Protects people by enhancing awareness of potential site hazards and remedies through warnings, though people may choose to ignore warnings. Does not directly affect animals.	❺	Easily implemented and resources readily available.	$$	$	Retained	Potentially viable process option for combination with institutional controls or containment and/or disposal technologies in which contaminated materials are left on site.

General Response Actions	Remedial Technology	Process Option	Description of Option	Effectiveness	Implementability	Relative Cost: Capital Cost	Relative Cost: O&M Cost	Reasons for Elimination of Process Option from Consideration	Process Option Viability with Respect to Assembly of Remedial Alternatives
Containment	Surface Source Controls	Water-Based Suppression	Contaminated materials would be kept "adequately wet" using water or a water-based dust suppressant to control airborne migration of asbestos fibers or arsenic to the surrounding environment.	❸ Wetting contaminated materials for dust suppression inhibits airborne transport of asbestos fibers and/or dust, but frequent wetting may facilitate asbestos or arsenic transport through surface runoff. Does not provide long-term effectiveness without continuous re-application.	❹ Easily implemented and construction resources readily available. A suitable water supply must be located. Requires continuous re-application to ensure protectiveness.	$$	$$	Retained	Not viable as a long-term solution; however, it is a potentially viable process option for combination with removal, disposal, and/or treatment technologies.
		Chemical-Based Suppression	Contaminated materials would be treated with a resinous or petroleum-based chemical dust suppressant to control airborne migration of asbestos fibers and/or arsenic to the surrounding environment.	❸ Chemically treating contaminated materials inhibits airborne transport of dust. Does not provide long-term effectiveness without frequent re-application.	❸ Implementable and construction resources readily available. May be difficult to ensure uniform application of the chemical suppressant over the contaminated materials. Requires frequent re-application to ensure protectiveness.	$$$	$$$	Retained	Not viable as a long-term solution; however, it is a potentially viable process option for combination with removal, disposal, and/or treatment technologies.
		Negative Pressure Enclosure	Contaminated materials would be enclosed within a temporary structure. The structure would be operated under negative pressure with filtering to control airborne migration of asbestos fibers or arsenic in dust to the surrounding environment.	❹ Enclosing contaminated materials eliminates airborne transport of asbestos fibers and dust outside of the enclosure. Does not provide long-term effectiveness without continuous operation of the filtering system within the enclosure.	❸ Implementable and construction resources available. Difficult to enclose large areas of contaminated materials. Requires constant O&M to ensure protectiveness.	$$$$	$$$	Retained	Not viable as a long-term solution; however, it is a potentially viable process option for combination with removal and/or treatment technologies.
		In Situ Mixing	Contaminated materials and associated soils would be mixed with underlying uncontaminated soil or fill materials.	❶ Reduces future asbestos and arsenic releases from surface soils after implementation; however, there is potential for subsurface contaminated materials to migrate back to the surface over time through natural and/or human activities. It does not protect people and animals by itself.	❷ Implemented using available construction resources. Difficulty may be encountered in homogenizing contaminated materials with underlying soils and depth to bedrock may preclude in situ mixing at some locations. May require re-application over time if subsurface contaminated materials migrate to the surface. Must be combined with institutional and access controls.	$$$$	$$	Effectiveness, Implementability	Eliminated from consideration.
		Soil or Rock Exposure Barrier/Cover	Contaminated materials would be covered with a layer of clean soil or rock with sufficient thickness to eliminate surface exposure.	❹ Protects people and animals by eliminating surface exposure of contaminated materials. Prevents erosion and transport by air and water.	❹ Implemented using available construction resources and materials. Must be combined with institutional and access controls. Requires some maintenance for long-term protectiveness.	$$$	$$	Retained	Viable as a long-term solution.
		Asphalt or Concrete Exposure Barrier/Cover	Contaminated materials would be covered with layers of asphalt or concrete with sufficient thickness to eliminate surface exposure.	❹ Protects people and animals by eliminating surface exposure contaminated materials. Prevents erosion and transport by air and water.	❹ Implemented using available construction resources and materials. Must be combined with institutional and access controls. Requires some maintenance for long-term protectiveness.	$$$$	$$$	Retained	Viable as a long-term solution.
		Geosynthetic Multi-Layer Exposure Barrier/Cover	Contaminated materials would be covered with geosynthetic material (such as geomembrane or a GCL) along with protective vegetative or rock layers to eliminate surface exposure.	❹ Protects people and animals by eliminating surface exposure of contaminated materials. Prevents erosion and transport by air and water.	❸ Implemented using available construction resources; however, special material and labor resources are required to install the geosynthetic material. Care must be taken during installation to avoid damage to the geosynthetic. Must be combined with institutional and access controls. Requires some maintenance for long-term protectiveness.	$$$$	$$$	Retained	Viable as a long-term solution.
Removal/Transport/ Disposal	Removal	Mechanical Excavation	Contaminated materials would be excavated using mechanical methods.	❹ Protects people and animals by eliminating future exposure to contaminated materials and migration of asbestos fibers and dust after implementation. Suppression of dust required to protect receptors and the environment from release of asbestos fibers during implementation. Must be combined with containment, transport, disposal, and/or treatment technologies.	❹ Implemented using available construction resources.	$$$	⓿	Retained	Viable as a long-term solution; must be combined with transport, disposal, and/or treatment technologies.

General Response Actions	Remedial Technology	Process Option	Description of Option	Effectiveness	Implementability	Relative Cost: Capital Cost	Relative Cost: O&M Cost	Reasons for Elimination of Process Option from Consideration	Process Option Viability with Respect to Assembly of Remedial Alternatives
Removal/Transport/ Disposal - Continued	Removal - Continued	Pneumatic Excavation (Vacuum Extraction/ Pumping)	Contaminated materials would be excavated using vacuum hoses, vacuum trucks, or other pneumatic conveyance system.	❹ Protects people and animals by eliminating future exposure to contaminated materials and migration of asbestos fibers and dust after implementation. Collection of dust required to protect receptors and the environment from release of asbestos fibers during implementation. Effective in performing removal of small and fine material during excavation. Must be combined with transport, containment, disposal, and/or treatment technologies.	❸ Efficient for soils and gravel or smaller particle sizes; however, filtering and containment of air stream would be required. Only useful for onsite actions. High abrasive wear on equipment may occur depending on type of job performed. Grinding or pulverizing of large ACM and debris for pneumatic transport would be required and may conflict with ARARs. This concern can be eliminated if used for finer or smaller ACM or removal of indoor dust.	$$$	⓿	Retained	Viable as a long-term solution; must be combined with transport, disposal, and/or treatment technologies.
	Transport	Mechanical Transport (Hauling/Conveying)	Excavated contaminated materials would be transported by truck or other mechanical conveyance method.	❸ Protects people and animals by eliminating future exposure to contaminated materials and migration of asbestos fibers and dust after implementation. Suppression of dust required to protect receptors and the environment from release of asbestos fibers during implementation. Must be combined with removal, containment, disposal, and/or treatment technologies.	❹ Easily implemented using available construction resources; efficient for all sizes of materials. Useful for onsite or offsite actions.	$$$$	⓿	Retained	Viable as a long-term solution; must be combined with removal, disposal, and/or treatment technologies.
		Hydraulic Transport (Slurrying)	Excavated contaminated materials would be transported in slurry form using a pipeline or other hydraulic conveyance system.	❸ Protects people and animals by eliminating future exposure to contaminated materials and migration of asbestos fibers and dust after implementation. Suppression of dust is achieved though slurry transport. Must be combined with removal, containment, disposal, and/or treatment technologies.	❷ Efficient for soils and gravel or smaller particle sizes. Only useful for onsite actions. Difficult to transport large ACM and debris or may require higher flow velocities, which can cause more abrasive wear on equipment. Treatment of water used for transport would be required, and it is unknown whether current water supply systems can handle the additional volume requirements. Grinding or pulverizing of large ACM for hydraulic transportation would be required and may conflict with ARARs.	$$$	⓿	Implementability	Eliminated from consideration.
		Pneumatic Transport (Vacuum Extraction/ Pumping)	Excavated contaminated materials would be transported using vacuum hoses, vacuum trucks, or other pneumatic conveyance system.	❸ Protects people and animals by eliminating future exposure to contaminated materials and migration of asbestos fibers and dust after implementation. Collection of dust required to protect receptors and the environment from release of asbestos fibers during implementation. Effective in performing removal of small and fine material during excavation. Must be combined with removal, containment, disposal, and/or treatment technologies.	❸ Efficient for soils and gravel or smaller particle sizes; however, filtering and containment of air stream would be required. Only useful for onsite actions. High abrasive wear on equipment may occur depending on type of job performed. Grinding or pulverizing of large ACM for pneumatic transport would be required and may conflict with ARARs. This concern can be eliminated if used for finer or smaller ACM or removal of indoor dust.	$$$	⓿	Retained	Viable as a long-term solution; must be combined with removal, disposal, and/or treatment technologies.
	Disposal	Onsite Disposal	Excavated contaminated materials would be disposed of at an onsite location authorized for disposal of asbestos and arsenic contamination.	❹ Protects people and animals by eliminating exposure to contaminated materials and migration of asbestos fibers and dust at original location and provides containment of contaminated materials within an engineered disposal facility. Suppression of dust required to protect receptors and the environment from release of asbestos fibers during implementation. Must be combined with removal, transport, containment, and/or treatment technologies.	❸ Implemented using available construction resources. Design and approval of onsite disposal facility required. Institutional and access controls would also be required. Requires O&M for long-term protectiveness of the onsite disposal facility.	$$$$	$$$	Retained	Viable as a long-term solution; must be combined with removal and transport technologies.

General Response Actions	Remedial Technology	Process Option	Description of Option	Effectiveness		Implementability		Relative Cost: Capital Cost	Relative Cost: O&M Cost	Reasons for Elimination of Process Option from Consideration	Process Option Viability with Respect to Assembly of Remedial Alternatives
Removal/Transport/ Disposal - Continued	Disposal - Continued	Offsite Disposal	Excavated contaminated materials would be disposed of at an offsite location authorized for disposal of asbestos and arsenic contamination.	❹	Protects people and animals by eliminating exposure to contaminated materials and migration of asbestos fibers and dust at original location and provides containment of contaminated materials within an engineered disposal facility. Suppression of dust required to protect people, animals, and the environment from release of asbestos fibers during implementation. Must be combined with removal, transport, and/or treatment technologies.	❹	Implemented using an authorized commercial or governmental disposal facility that accepts contaminated materials. Requires approval of disposal facility.	$$$$	⓿	Retained	Viable as a long-term solution; must be combined with removal and transport technologies.
Treatment	Physical and/or Chemical Treatment	Physical Separation/ Segregation	Contaminated materials would be separated and segregated from uncontaminated debris and soil for disposal and/or treatment.	❷	Does not protect receptors by itself; however, separation of ACM from other contaminated materials is required for several treatment technologies. Surface source controls are required to protect people, animals, and the environment from release of asbestos fibers during implementation. Must be combined with removal and/or treatment technologies that require separation of ACM debris from soil.	❷	Implemented using available construction resources but time consuming. Effective in removing large ACM debris like CAB, VAT, AirCell, MAG, and other construction-related ACMs; however, there is no proven technology to physically separate individual asbestos fibers from a soil matrix.	$$$	⓿	Retained	Not viable as a long-term solution; however, it is a potentially viable process option for combination with other treatment technologies.
		Size Reduction	Contaminated materials would be reduced in size using approved techniques to facilitate disposal and/or treatment.	❷	Does not protect people and animals by itself; however, size reduction of larger ACM debris is required for several containment, treatment, and/or disposal technologies. Surface source controls are required to protect people, animals, and the environment from release of asbestos fibers during implementation.	❹	Implemented using available construction resources and approved techniques.	$$	⓿	Retained	Not viable as a long-term solution; however, it is a potentially viable process option for combination with containment, disposal, and/or treatment technologies.
		Pozzolan- or Cement-Based Stabilization/Solidification	Contaminated materials would be mixed with a pozzolan- or cement-based binding agent before disposal.	❸	Protects people and animals by binding contaminated materials within a solid inert matrix. Effectiveness of stabilization may decrease over time due to development of freeze-thaw cracking. Surface source controls are required to protect people, animals, and the environment from release of asbestos fibers during implementation. Must be combined with removal, transport, and disposal technologies.	❷	Implemented using available construction resources. Difficult to obtain and transport large quantities of binding agent and homogenize binding agent with heterogeneous contaminated materials.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.
		Pozzolan- or Cement-Based In Situ Stabilization/Solidification	Contaminated materials would be mixed in situ with a pozzolan- or cement-based binding agent using a deep soil auger mixing/injection technique.	❸	Protects people and animals by binding contaminated materials within a solid inert matrix. Contaminated materials would be treated in place, which minimizes exposure to people, animals, and the environment. Effectiveness of stabilization may decrease over time due to development of freeze-thaw cracking near the surface.	❶	Implemented using available construction resources. Contaminated materials are scattered over site, which include large quantities of ACM that vary in depth and extent. Difficult to obtain and transport large quantities of binding agent and homogenize binding agent with contaminated materials. Depth to bedrock may preclude in situ mixing at some locations.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*		*Effectiveness*		*Implementability*	*Relative Cost: Capital Cost*	*Relative Cost: O&M Cost*	*Reasons for Elimination of Process Option from Consideration*	*Process Option Viability with Respect to Assembly of Remedial Alternatives*
Treatment – Continued	Physical and/or Chemical Treatment – Continued	Chemical Decomposition	Contaminated materials would be decomposed to an amorphous silica suspension at relatively low temperatures (~100°C) using chemicals tailored to the waste stream. The resulting amorphous silica would then be solidified for disposal as an inert waste. ABCOV™ is a demonstrated form of this technology.	❸	Protects people and animals by converting ACM within contaminated materials to an inert form. The treatment is irreversible. Once treated, the inert materials and soil can be used for site restoration. Surface source controls are required to protect people, animals, and the environment from release of asbestos fibers during implementation. Must be combined with removal and transport technologies. Has not been shown to treat arsenic contamination.	❶	Implemented using a patented and demonstrated technology; however, commercialization of the technology is not fully developed. There is only one vendor in the U.S. offering this technology, which requires special chemicals tailored to the waste stream. The treatment process requires physical separation/segregation of contaminated materials, including ACM, into similar types and associated soils and adjustment of the chemicals for the waste streams.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.
	Thermal Treatment	In Situ Vitrification	An electrical current would be passed between electrodes inserted into in-place contaminated materials to cause melting. The melted matrix is then allowed to cool in place into a solid vitrified glass mass.	❸	Protects people and animals by converting contaminated materials to an inert form. The treatment is irreversible. Contaminated materials would be treated in place, which minimizes exposure to people, animals, and the environment during implementation. Effectiveness is highly dependent on the nature of the subsurface; heterogeneity of the contaminated materials and soils, lack of groundwater, and variable depth to bedrock would impact effectiveness. Surface source controls required to protect people, animals, and the environment from release of asbestos fibers during implementation.	❶	Implemented using a patented, demonstrated, and commercialized technology. The technology requires a significant, reliable source of electrical power. Difficult to implement since technology is mainly dependent on the electrical conductivity of the subsurface; contaminated materials are highly heterogeneous. Lack of saturated soils in the subsurface hinder the implementation of this technology. Depth to bedrock may also complicate in situ vitrification at some locations. The system requires off-gas treatment system to address air emissions.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.
		Electric Arc Vitrification (Ex Situ)	An electrical current would be passed between electrodes in a furnace creating an electrical arc. Contaminated materials placed in the furnace form a molten bath that cools to form a vitrified glass mass. The vitrified glass mass is an inert waste.	❹	Protects people and animals by converting contaminated materials to an inert form. The treatment is inert-regulated material and soil can be used for site restoration. Surface source controls are required to protect people, animals, and the environment from release of asbestos fibers during initial processing. Must be combined with removal and transport technologies.	❶	Implemented using a patented, demonstrated, and commercialized technology. However, the literature does not indicate that electric arc furnace units are widely available commercially for remediation of contaminated materials. Thus, contaminated materials would be required to be transported off site for treatment (one demonstration location identified is in New Jersey). Mobilization of a temporary onsite treatment facility is possible but has not been demonstrated in the literature and could pose numerous setup and startup difficulties. The technology requires a significant, reliable source of electrical power. Contaminated materials require size reduction before it is put in the furnace for vitrification. The system requires off-gas treatment system to address air emissions.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.

General Response Actions	Remedial Technology	Process Option	Description of Option	Effectiveness		Implementability		Relative Cost: Capital Cost	Relative Cost: O&M Cost	Reasons for Elimination of Process Option from Consideration	Process Option Viability with Respect to Assembly of Remedial Alternatives
Treatment – Continued	Thermal Treatment - Continued	Plasma Arc Vitrification (Ex Situ)	An electrical current would be passed between electrodes to form plasma. Contaminated materials placed in the plasma arc form a molten bath that cools to form a vitrified glass mass. The vitrified glass mass is an inert waste.	❹	Protects people and animals by converting contaminated materials to an inert form. The treatment is irreversible. Once treated, the inert material and soil can be used for site restoration. Surface source controls are required to protect people, animals, and the environment from release of asbestos fibers during initial processing. Must be combined with removal and transportation technologies.	❶	Implemented using a patented, demonstrated, and commercialized technology. Currently the technology is not available in the U.S. to treat large volumes of waste. The sole vendor available in the U.S. has commercial portable units, which can only treat very small volumes of waste. The technology requires a significant, reliable source of electrical power. Contaminated materials require size reduction before they are put in the furnace for vitrification. The system also requires an off-gas treatment system.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.
	Thermal/Chemical Treatment	Thermo-Caustic Dissolution	Contaminated materials would be placed into a high temperature caustic (strong basic) solution. Contaminated materials are partially to fully converted (changed to an amorphous structure) during immersion. Partially converted contaminated materials are further converted using chemical reactions to form a viscous mixture, which is later vitrified. The resulting reaction product (glass) is an amorphous inert waste.	❹	Protects people and animals by converting contaminated materials to an inert form. The treatment is irreversible. Once treated, the inert material and soil can be used for site restoration. Surface source controls are required to protect people, animals, and the environment from release of asbestos fibers during initial processing. Must be combined with removal and transport technologies.	❶	Implemented using a patented and demonstrated technology jointly developed by the U.S. Department of Energy (DOE) and their contractors for specialized use on DOE facilities. This technology is not commercially available. The high temperature caustic solution poses potential difficulties and risks to workers during the first stage of the process. The contaminated materials require size reduction before they are put into the caustic solution. The vitrification portion of the technology requires a significant, reliable source of electrical power. The system also requires an off-gas treatment system.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.
		Thermo-chemical Treatment	Contaminated materials would be mixed with proprietary demineralizing agents within a hydrofluoric acid solution. The mixture is then heated in a rotary hearth furnace. This process is similar to vitrification but does not involve complete melting. Instead, the process results in partial sintering of the material. The resulting reaction product (rock-like material) is an inert waste. TCCT, patented by ARI, is a commercial form of this technology.	❹	Protects people and animals by converting contaminated materials to an inert form. The treatment is irreversible. Once treated, the inert material and soil can be used for site restoration. Surface source controls are required to protect people, animals, and the environment from release of asbestos fibers during initial processing. Must be combined with removal and transport technologies.	❸	Implemented using a patented, demonstrated, and commercialized technology (TCCT). Currently the contaminated materials would be required to be transported off site for treatment to the closest operating TCCT facility in Washington State. Mobilization of a temporary onsite treatment facility is possible but with high cost. The contaminated materials require size reduction before they are put in the furnace for thermo-chemical conversion. The treatment process does not require physical separation/segregation of contaminated materials into similar types, nor separation from associated soils.	$$$$$	⓿	Retained	Viable as a long-term solution and meets NCP preference for innovative and demonstrated treatment technologies. Must be combined with removal and transport technologies.

Notes:

1. The screening process for effectiveness, implementability, and relative cost involves a qualitative assessment of the degree to which process options address evaluation criteria presented in Section 4.6. The numerical designations for the qualitative ratings system used in this table are not used to quantitatively assess process options (for instance, rankings for a process option are not additive).
2. Shading indicates remedial technologies/process options have been eliminated from further consideration based on lack of effectiveness, implementability, and/or disproportionate cost relative to other process options within the same GRA. Remaining (unshaded) remedial technologies/process options have been retained for assembly into remedial action alternatives as discussed in Section 5.
3. The following sources of technical information were used to identify and screen remedial technologies and process options:

The ABCOV™ Method and Technologies, <http://www.abcov.com/mainpage.html>.

ARI Technologies, Inc. 2007. Final Report Ten-Day Asbestos Destruction Demonstration Using Thermochemical Conversion Technology. December 20, 2007.

ARI's Thermochemical Conversion Technology (TCCT), <http://aritechnologies.com/index.htm>.

Asbestos Abatement/Destruction Using Plasma Arc Technology. 1998. <http://owww.cecer.army.mil/facts/sheets/UL37.html>. February.

C.M. Jantzen and J. B. Pickett, How to Recycle Asbestos Containing Materials, <http://sti.srs.gov/fulltext/ms2000194/ms2000194.html>.

D E Deegan, C D Chapman, S A Ismail, M L H Wise and H Ly. The Thermal Treatment of Hazardous Waste Materials Using Plasma Arc Technology.

David A. Counts, Bruce D. Sartwell, Steven H. Peterson, Robert Kirkland, Nicholas P. Kolak. 1999. Thermal Plasma Waste Remediation Technology: Historical Perspective and Current Trends. January.

Federal Remediation Technologies Roundtable (FRTR). 2007. Remediation Technologies Screening Matrix and Reference Guide, Version 4.0.

In Situ Vitrification, Appropriate Technologies for the Treatment of Scheduled Wastes Review Report Number 4. 1997. http://www.environment.gov.au/settlements/publications/chemicals/scheduled-waste/swtt/insitu.html>. November.

Oregon Department of Environmental Quality (Oregon DEQ), Oregon Landfills Accepting Asbestos Wastes <http://www.deq.state.or.us/aq/asbestos/docs/F-LFILLS.pdf>

R.S. Kasevich, W. Vaux, N. Ulerich, T. Nocito. 1996. Electromagnetic Mixed Waste Processing System for Asbestos Decontamination.

U. S. Environmental Protection Agency (EPA). 1994. Superfund Innovative Technology Evaluation (SITE) Technology Capsule, Geosafe Corporation, In Situ Vitrification Technology. November.

U. S. Environmental Protection Agency (EPA).. 1998. Superfund Innovative Technology Evaluation (SITE) Technology Capsule, Geotech Development Corporation Cold Top Ex-Situ Vitrification Technology. March.

Vermiprocess for Asbestos Remediation, US Patent Issued on April 6, 2004, <http://www.patentstorm.us/patents/6716618-fulltext.html>.

W.R. Grace & Co.-Conn., Grace Construction Products, Digestion Material for Asbestos (DMA®)

Waste Management, Inc. (WM®), <http://www.wmnorthwest.com>

Legend for Qualitative Ratings System: The following ratings were used for evaluation and presentation of effectiveness, implementability, and relative cost:

Effectiveness and Implementability		Relative Cost	
⓿	**None**	⓿	**None**
❶	**Low**	$	**Low**
❷	**Low to moderate**	$$	**Low to moderate**
❸	**Moderate**	$$$	**Moderate**
❹	**Moderate to high**	$$$$	**Moderate to high**
❺	**High**	$$$$$	**High**

General Response Actions	Remedial Technology	Process Option	Description of Option	Process Option Viability with Respect to Assembly of Remedial Alternatives
No Action	None	None	No action would be taken. Contaminated materials would remain in their existing conditions.	Required by NCP as stand-alone alternative.
Monitoring	Physical and/or Chemical Monitoring	Non-Intrusive Visual Inspection	A non-intrusive (surficial) visual inspection of the immediate ground surface to determine the presence or absence of contaminated materials.	Viable for short- and long-term site monitoring.
		Intrusive Visual Inspection	An intrusive visual inspection of the subsurface (using excavations or boreholes) to determine the presence or absence of contaminated materials.	Viable for short- and long-term site monitoring.
		Sample Collection and Analysis	Air and/or soil samples would be collected for microscopic analysis of asbestos or chemical analysis of arsenic to determine the potential presence of asbestos fibers or arsenic. Types of samples collected include but are not limited to soil, ambient air, and ABS. Types of microscopic analyses for asbestos fibers include but are not limited to PLM, stereomicroscopy, and TEM. Chemical analysis of arsenic is typically performed using graphite furnace atomic absorption methods.	Viable for short- and long-term site monitoring.
Land Use Controls	Institutional Controls	Governmental Controls, Proprietary Controls, and Informational Devices	Contact with contaminated materials would be controlled through legal instruments. Examples of governmental controls include but are not limited to local zoning, permits, codes, or regulations. Examples of proprietary controls include but are not limited to instruments such as Easement and Equitable Servitude, and CC&Rs. Examples of informational devices include but are not limited to Notices of Environmental Contamination.	Potentially viable process option for combination with access controls or containment and/or disposal technologies in which contaminated materials risk are left on site.
	Community Awareness Activities	Informational and Educational Programs	Community informational and educational programs would be undertaken to enhance awareness of potential hazards and remedies for contaminated materials.	Potentially viable process option for combination with all other technologies.
	Access Controls	Posted Warnings	Warning signs would be used to warn people of dangers posed by contaminated materials at the site.	Potentially viable process option for combination with institutional controls or containment and/or disposal technologies in which contaminated materials are left on site.

General Response Actions	Remedial Technology	Process Option	Description of Option	Process Option Viability with Respect to Assembly of Remedial Alternatives
Containment	Surface Source Controls	Water-Based Suppression	Contaminated materials would be kept "adequately wet" using water or a water-based dust suppressant to control airborne migration of asbestos fibers or arsenic to the surrounding environment.	Not viable as a long-term solution; however, it is a potentially viable process option for combination with removal, disposal, and/or treatment technologies.
		Chemical-Based Suppression	Contaminated materials would be treated with a resinous or petroleum-based chemical dust suppressant to control airborne migration of asbestos fibers and/or arsenic to the surrounding environment.	Not viable as a long-term solution; however, it is a potentially viable process option for combination with removal, disposal, and/or treatment technologies.
		Negative Pressure Enclosure	Contaminated materials would be enclosed within a temporary structure. The structure would be operated under negative pressure with filtering to control airborne migration of asbestos fibers or arsenic in dust to the surrounding environment.	Not viable as a long-term solution; however, it is a potentially viable process option for combination with removal and/or treatment technologies.
		Soil or Rock Exposure Barrier/Cover	Contaminated materials would be covered with a layer of clean soil or rock with sufficient thickness to eliminate surface exposure.	Viable as a long-term solution.
		Asphalt or Concrete Exposure Barrier/Cover	Contaminated materials would be covered with layers of asphalt or concrete with sufficient thickness to eliminate surface exposure.	Viable as a long-term solution.
		Geosynthetic Multi-Layer Exposure Barrier/Cover	Contaminated materials would be covered with geosynthetic material (such as geomembrane or a GCL) along with protective vegetative or rock layers to eliminate surface exposure.	Viable as a long-term solution.
Removal/Transport/ Disposal	Removal	Mechanical Excavation	Contaminated materials would be excavated using mechanical methods.	Viable as a long-term solution; must be combined with transport, disposal, and/or treatment technologies.
		Pneumatic Removal (Vacuum Extraction/ Pumping)	Contaminated materials would be excavated using vacuum hoses, vacuum trucks, or other pneumatic conveyance system.	Viable as a long-term solution; must be combined with transport, disposal, and/or treatment technologies
	Transport	Mechanical Transport (Hauling/Conveying)	Excavated contaminated materials would be transported by truck or other mechanical conveyance method.	Viable as a long-term solution; must be combined with removal, disposal, and/or treatment technologies.
		Pneumatic Transport (Vacuum Extraction/ Pumping)	Excavated contaminated materials would be transported using vacuum hoses, vacuum trucks, or other pneumatic conveyance system.	Viable as a long-term solution; must be combined with removal, disposal, and/or treatment technologies.
	Disposal	Onsite Disposal	Excavated contaminated materials would be disposed of at an onsite location authorized for disposal of asbestos and arsenic contamination.	Viable as a long-term solution; must be combined with removal and transport technologies.
		Offsite Disposal	Excavated contaminated materials would be disposed of at an offsite location authorized for disposal of asbestos and arsenic contamination.	Viable as a long-term solution; must be combined with removal and transport technologies.

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Process Option Viability with Respect to Assembly of Remedial Alternatives*
Treatment	Physical and/or Chemical Treatment	Physical Separation/ Segregation	Contaminated materials would be separated and segregated from uncontaminated debris and soil for disposal and/or treatment.	Not viable as a long-term solution; however, it is a potentially viable process option for combination with treatment technologies.
		Size Reduction	Contaminated materials would be reduced in size using approved techniques to facilitate disposal and/or treatment.	Not viable as a long-term solution; however, it is a potentially viable process option for combination with containment, disposal, and/or treatment technologies.
	Thermal/Chemical Treatment	Thermo-Chemical Treatment	Contaminated materials would be mixed with proprietary demineralizing agents within a hydrofluoric acid solution. The mixture is then heated in a rotary hearth furnace. This process is similar to vitrification but does not involve complete melting. Instead, the process results in partial sintering of the material. The resulting reaction product (rock-like material) is an inert waste. TCCT, patented by ARI, is a commercial form of this technology.	Viable as a long-term solution and meets NCP preference for innovative and demonstrated treatment technologies. Must be combined with removal and transport technologies.

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Table 5-1
Remedial Technologies/Process Options Evaluated for Assembly Into Remedial Alternatives

General Response Actions	Remedial Technology	Process Option	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5a	Alternative 5b	Alternative 6	Alternative 7
No Action	None	None	✓							
Monitoring	Physical and/or Chemical Monitoring	Non-Intrusive Visual Inspection	✓	✓	✓	✓	✓	✓	✓	✓
		Intrusive Visual Inspection		✓	✓	✓	✓	✓	✓	✓
		Sample Collection and Analysis	✓	✓	✓	✓	✓	✓	✓	✓
Land Use Controls	Institutional Controls	Governmental Controls, Proprietary Controls, and Informational Devices		✓	✓	✓	✓	✓	✓	✓
	Community Awareness Activities	Informational and Educational Programs		✓	✓	✓	✓	✓	✓	✓
	Access Controls	Posted Warnings		✓	✓		✓	✓	✓	✓
Containment	Surface Source Controls	Water-Based Suppression			✓	✓	✓	✓	✓	✓
		Chemical-Based Suppression			✓	✓	✓	✓	✓	✓
		Negative Pressure Enclosure		✓	✓					
		Soil or Rock Exposure Barrier/Cover			✓	✓	✓	✓	✓	✓
		Asphalt or Concrete Exposure Barrier/Cover			✓	✓	✓	✓	✓	✓
		Geosynthetic Multi-Layer Exposure Barrier/Cover			✓	✓	✓	✓	✓	✓
Removal/Transport/Disposal	Removal	Mechanical Excavation					✓	✓	✓	✓
		Pneumatic Excavation (Vacuum Extraction/ Pumping)		✓	✓		✓	✓	✓	✓
	Transport	Mechanical Transport (Hauling/Conveying)					✓	✓	✓	✓
		Pneumatic Transport (Vacuum Extraction/ Pumping)		✓	✓		✓	✓	✓	✓
	Disposal	Onsite Disposal					✓	✓		
		Offsite Disposal					✓		✓	
Treatment	Physical and/or Chemical Treatment	Physical Separation/ Segregation					✓		✓	
		Size Reduction					✓		✓	✓
	Thermal/Chemical Treatment	Thermo-Chemical Treatment								✓

Notes:

1. Check mark designations indicate that remedial technology/process option could be evaluated as a potential component of the indicated remedial alternative.
2. Shaded boxes indicate the process options are not considered for the remedial alternative(s) in question.
3. Where similar process options have been indicated for the same remedial alternative (such as mechanical transport versus pneumatic transport), the most representative process has been selected for evaluation and costing. However, that does not preclude use of the similar alternate processes during implementation of the selected remedy.
4. Descriptions of remedial technologies/process options are provided in Table 4-3. Descriptions of remedial alternatives are provided in Section 5.3.

Alternative 1: No Action
Alternative 2: Interior Cleaning and Land Use Controls with Monitoring
Alternative 3: Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring
Alternative 4: Capping of Contaminated Materials and Land Use Controls with Monitoring
Alternative 5a: Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring
Alternative 5b: Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring
Alternative 6: Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring
Alternative 7: Excavation and Offsite Thermo-Chemical Treatment of Contaminated Materials at Permitted Facilities, Reuse of Treated Material, and Land Use Controls with Monitoring

Remedial Alternative	Description	Threshold Criteria		Balancing Criteria					
		Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume through Treatment	Short-Term Effectiveness	Implementability	Present Value Cost (Dollars)	
1	No Action	⓿ Not protective of human health and the environment and does not meet PRAOs.	⓿ Not compliant with chemical-specific ARARs. Specifically, the risk standards in the Oregon Hazardous Substance Remedial Action Rules for asbestos are exceeded because exposure to contamination is not addressed.	⓿No additional cleanup measures are initiated and contaminated materials are left exposed.	⓿ No treatment; therefore, does not reduce toxicity, mobility, or volume of contaminants through treatment.	⓿ No additional cleanup measures are initiated and contaminated materials are left exposed. Thus there are no short-term effectiveness issues for this alternative.	⓿ No action is taken other than 5-year site reviews. Since no new remedial action is taken, this alternative has no implementability issues.	$	$186,000
3	Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring	❷ Contaminated materials that remain exposed outside of capped areas pose human health and ecological risks through dispersal across the site. Contaminated materials also still remain beneath covers across a large extent of the site and could pose additional risks if the covers are compromised.	❸ Addresses the location- and action-specific ARARs through adherence of the ARARs during implementation of the remedial action. This alternative leaves contaminated materials exposed at the site. Thus compliance with the chemical-specific ARARs is questionable.	❷ Contaminated materials that remain exposed outside of capped areas pose human health and ecological risks through dispersal across the site. Contaminated materials also still remain beneath covers across a large extent of the site and could pose additional risks if the covers are compromised.	⓿ No treatment; therefore, does not reduce toxicity, mobility, or volume of contaminants through treatment.	❹ Addresses short-term risks to workers, the community, and the environment. Trucks used to haul offsite borrow are also used to construct the covers, which slightly increases short-term risks to the community.	❹ Construction resources and materials needed to construct covers for this alternative should be available. Institutional controls have been implemented in a similar manner on other contaminated residential sites in Oregon. Interior cleaning has not been performed at this site and would require coordination with affected residents, but has been successfully performed at similar sites with asbestos contamination.	$$$	$10,152,000
4	Capping of Contaminated Materials and Land Use Controls with Monitoring	❸ Contaminated materials still remain beneath covers across a large extent of the site and could pose risks if the covers are compromised.	❺ Addresses the location- and action-specific ARARs through adherence of the ARARs during implementation of the remedial action. Addresses chemical-specific ARARs by in-place capping of contamination.	❸ Contaminated materials still remain beneath covers across a large extent of the site and could pose risks if the covers are compromised. Long-term effectiveness and permanence is not as certain as for remedies that remove and consolidate contaminated materials for onsite and offsite disposal.	⓿ No treatment; therefore, does not reduce toxicity, mobility, or volume of contaminants through treatment.	❸ Similar to Alternative 3. However Alternative 4 involves significantly more surface disturbance of contaminated materials and larger number of haul trucks than Alternative 3.	❸ Similar to Alternative 3. However Alternative 4 requires covering a larger area of the site than Alternative 3 and requires a larger volume of borrow from offsite areas. Maintenance of the additional covered areas and monitoring, especially on privately owned parcels, could provide difficulties in the future.	$$$	$12,798,000
5a	Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring	❷ Contaminated subsurface materials also remain across a large extent of the site beneath covers at disposal locations and backfill placed in excavations. These materials could pose risks if the covers or backfill are compromised. Upward migration of subsurface contaminated materials through backfill to the surface may occur over time and pose additional risks. Future excavations may only partially address these risks since they would only occur periodically.	❸This alternative has a higher potential of future exposure at the surface to significant quantities of contaminated materials through frost heave processes than other alternatives. Thus compliance with the chemical-specific ARARs is questionable.	❷ Contaminated materials still remain under covers at onsite disposal locations. Contaminated subsurface materials also remain across a large extent of the site beneath backfill placed in excavations. These materials could pose current and future human health and ecological risks if the covers at the onsite disposal locations are compromised or contaminated materials become exposed at the surface in backfilled excavations.	⓿ No treatment; therefore, does not reduce toxicity, mobility, or volume of contaminants through treatment.	❷ Requires disturbance and consolidation of a large amount of contaminated materials across the site and large volumes of offsite borrow. These activities pose increased short-term risks to workers and the community than surface disturbance activities under Alternative 4. Alternative 5a involves initial excavation and future excavation of contaminated materials over a long period of time which increases the risks.	❸ Excavation and onsite consolidation of contaminated materials could be difficult in areas of underground utilities, trees, roads, and near structures. This alternative requires less overall offsite borrow than Alternative 4, but additional logistical coordination is needed since both contaminated materials and offsite borrow will be transported simultaneously. Alternative 5a requires less initial excavation than Alternative 5b. However, there may be difficulties in performing periodic future excavations of contaminated surface materials.	$$$	$10,467,000

Remedial Alternative	Description	Threshold Criteria		Balancing Criteria					
		Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume through Treatment	Short-Term Effectiveness	Implementability	Present Value Cost (Dollars)	
5b	Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring	❸ Since the majority of the contaminated materials are excavated and disposed of at onsite disposal locations protected by land use controls, long-term protection of human health and the environment is more certain across the site than alternatives that leave contaminated materials across a larger extent of the site.	❺Addresses the location- and action-specific ARARs through adherence of the ARARs during implementation of the remedial action. Addresses chemical-specific ARARs by excavation of contaminated materials, onsite consolidation and disposal, and backfilling of excavations.	❹ Since the majority of the contaminated materials are excavated and disposed of at onsite disposal locations protected by land use controls, long-term protection of human health and the environment is more certain across the site than alternatives that leave contaminated materials across a larger extent of the site.	⓿ No treatment; therefore, does not reduce toxicity, mobility, or volume of contaminants through treatment.	❷ Similar to Alternative 5a. While Alternative 5b involves initial excavation and consolidation of a larger volume of contaminated materials than Alternative 5b, the increase in initial short-term risks during excavation is offset by not requiring future excavation of contaminated materials as under Alternative 5a.	❸ Similar to Alternative 5a. Alternative 5b requires more initial excavation than Alternative 5a, but does not have the difficulties in performing future excavations as for Alternative 5a.	$$$	$14,028,000
6	Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring	❹ Similar to Alternative 5b, except that contaminated materials are excavated and disposed of offsite rather than consolidated and disposed of onsite. Since the majority of the contaminated materials are excavated and disposed of offsite, long-term protection of human health and the environment is more certain than Alternative 5b.	❺ Addresses the location- and action-specific ARARs through adherence of the ARARs during implementation of the remedial action. Addresses chemical-specific ARARs by excavation of contaminated materials, offsite disposal, and backfilling of excavations.	❹ Similar to Alternative 5b, except offsite rather than onsite disposal of excavated contaminated materials is performed.	⓿ No treatment; therefore, does not reduce toxicity, mobility, or volume of contaminants through treatment.	❷Similar to Alternative 5b, offsite rather than onsite disposal of excavated contaminated materials is performed. Short-term impacts to workers and especially the community are greatly increased over alternatives that do not require offsite disposal due to truck traffic to the offsite disposal facilities.	❷ Similar to Alternative 5b except offsite rather than onsite disposal of excavated contaminated materials is performed. Offsite disposal of large volumes of removed materials requires additional coordination with the offsite disposal facilities. Additional difficulties exist in obtaining the necessary approvals and the logistics of transporting large volumes of contaminated materials for long distances to offsite disposal facilities.	$$$$$	$29,472,000

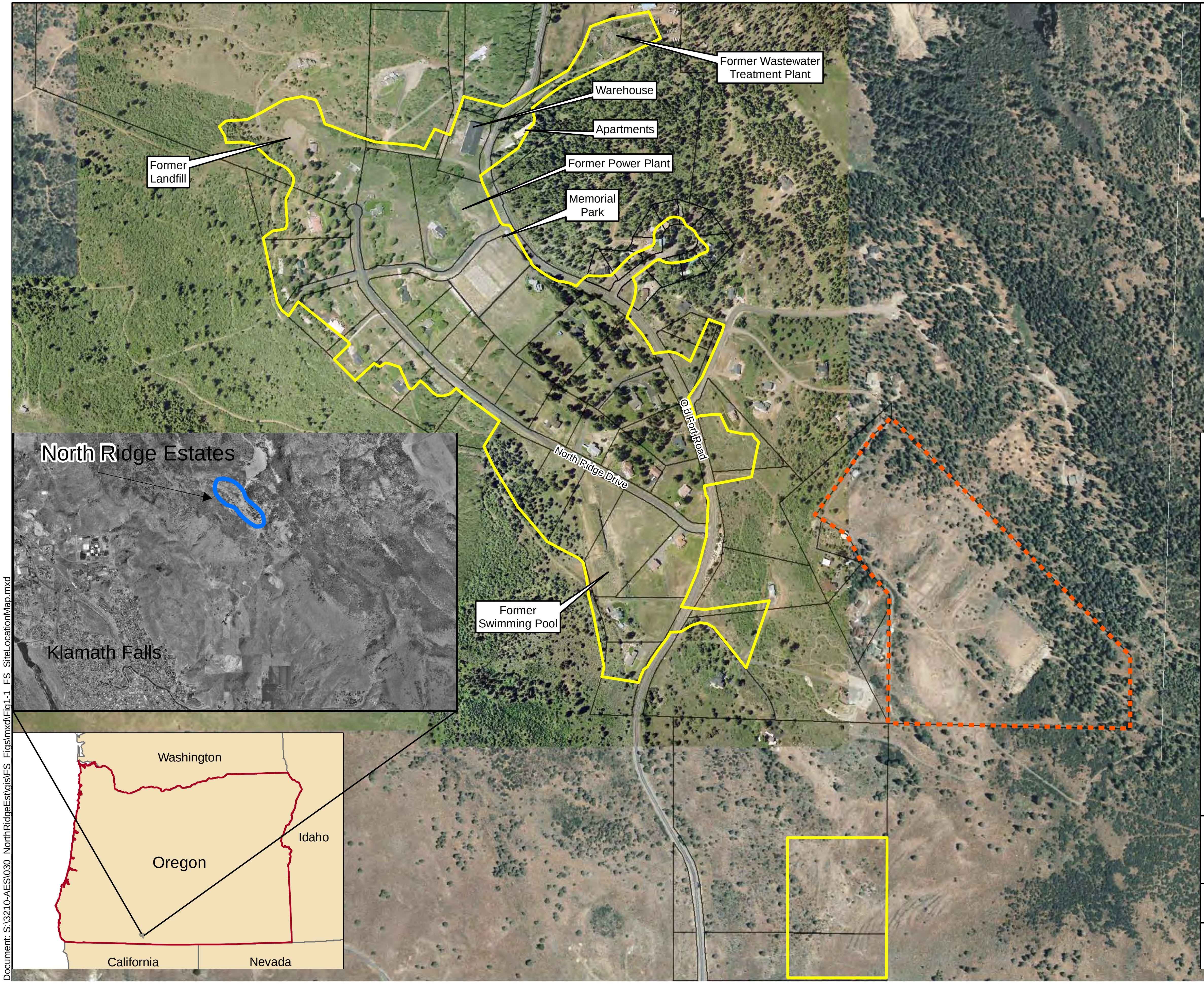
Notes:

1. The detailed analysis of retained alternatives involves a qualitative assessment of the degree to which remedial alternatives address evaluation criteria.
   The numerical designations for the qualitative ratings system used in this table are not used to quantitatively assess remedial alternatives (for instance, individual rankings for an alternative are not additive).

Legend for Qualitative Ratings System:

Threshold and Balancing Criteria (Excluding Cost)		Balancing Criteria (Present Value Cost in Dollars)	
⓿	**None**	⓿	**None ($0)**
❶	**Low**	$	**Low ($0 through $5M)**
❷	**Low to Moderate**	$$	**Low to Moderate ($5M through $10M)**
❸	**Moderate**	$$$	**Moderate ($10M through $15M)**
❹	**Moderate to High**	$$$$	**Moderate to High ($15M through $20M)**
❺	**High**	$$$$$	**High (Greater than $20M)**

Figures



Legend

- OU1 - North Ridge Estates
- OU2 - Firing Range
- Parcels

N

0 300 600 900 1,200 1,500

Feet

1 inch = 600 feet

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Oregon
South FIPS

Data Source(s):
May 2005 Aerial Photo

March 2010

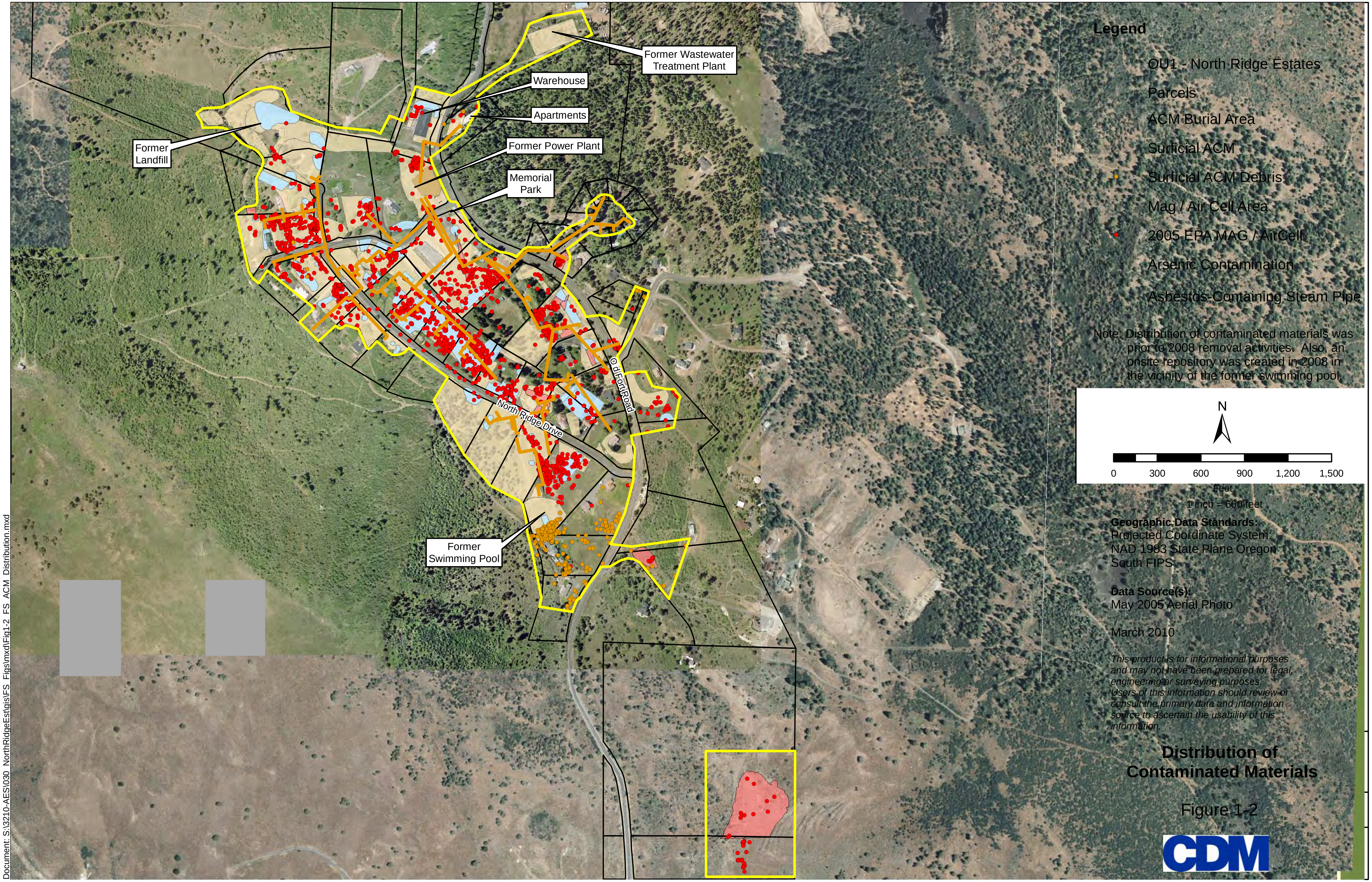
This product is for informational purposes and may not have been prepared for legal, engineering or surveying purposes. Users of this information should review or consult the primary data and information source to ascertain the usability of this information.

Site Location Map

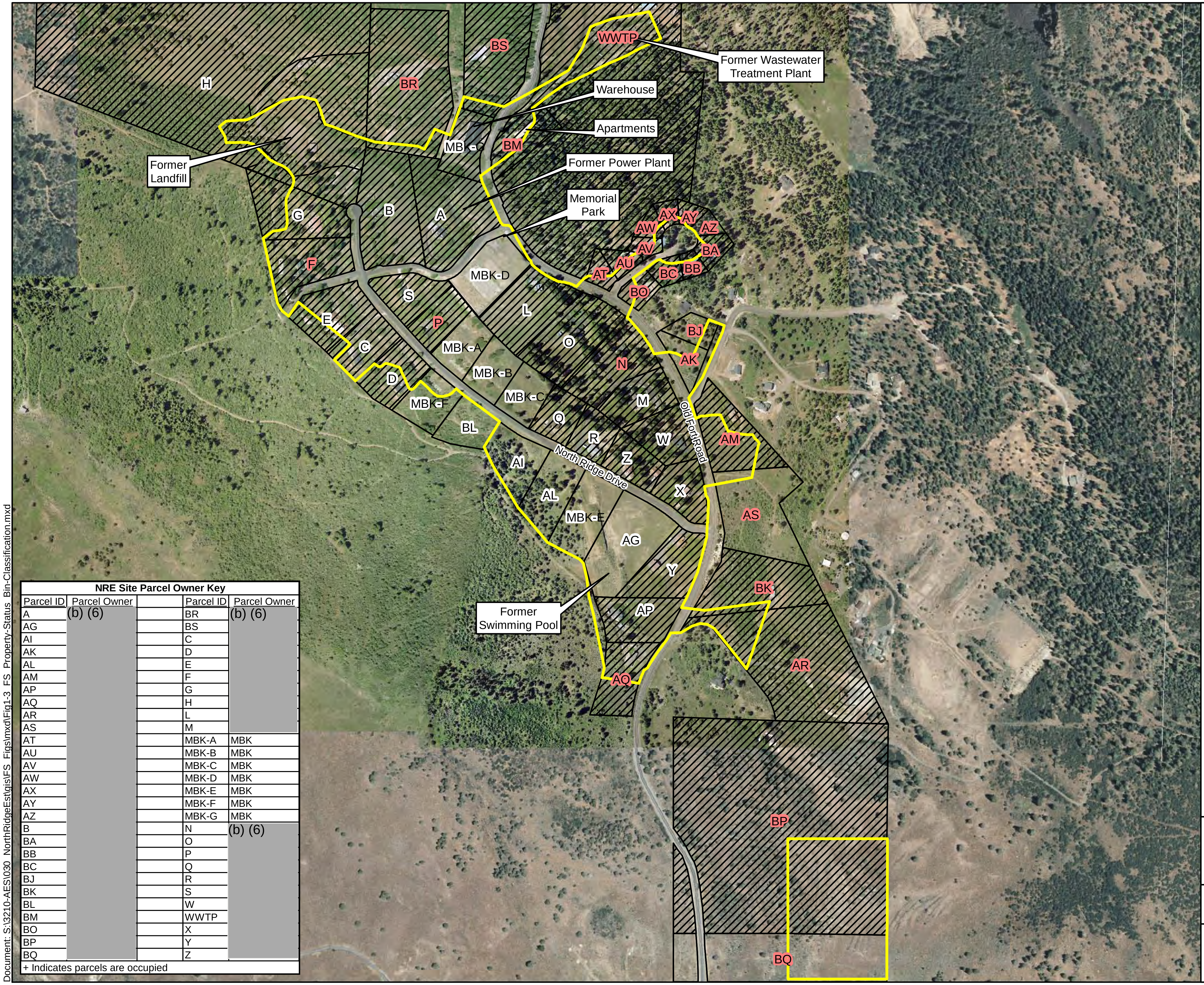
Figure 1-1

CDM

Document: S:\3210-AES\030_NorthRidgeEst\gis\FS_Figs\mxd\Fig1-1_FS_SiteLocationMap.mxd



Document: S:\3210-AES\030 NorthRidgeEst\gis\FS Figs\mxd\Fig1-2 FS ACM Distribution.mxd



NRE Site Parcel Owner Key

Parcel ID	Parcel Owner	Parcel ID	Parcel Owner
A	(b) (6)	BR	(b) (6)
AG		BS	
AI		C	
AK		D	
AL		E	
AM		F	
AP		G	
AQ		H	
AR		L	
AS		M	
AT		MBK-A	MBK
AU		MBK-B	MBK
AV		MBK-C	MBK
AW		MBK-D	MBK
AX		MBK-E	MBK
AY		MBK-F	MBK
AZ		MBK-G	MBK
B		N	(b) (6)
BA		O	
BB		P	
BC		Q	
BJ		R	
BK		S	
BL		W	
BM		WWTP	
BO		X	
BP		Y	
BQ		Z	

+ Indicates parcels are occupied

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Legend

- OU1 - North Ridge Estates
- Developed Parcels
- Undeveloped Parcels
- A Receievership - 29 parcels
- A Private Ownership - 27 parcels

N

0 300 600 900 1,200 1,500
Feet

1 inch = 600 feet

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Oregon South FIPS

Data Source(s):
May 2005 Aerial Photo

March 2010

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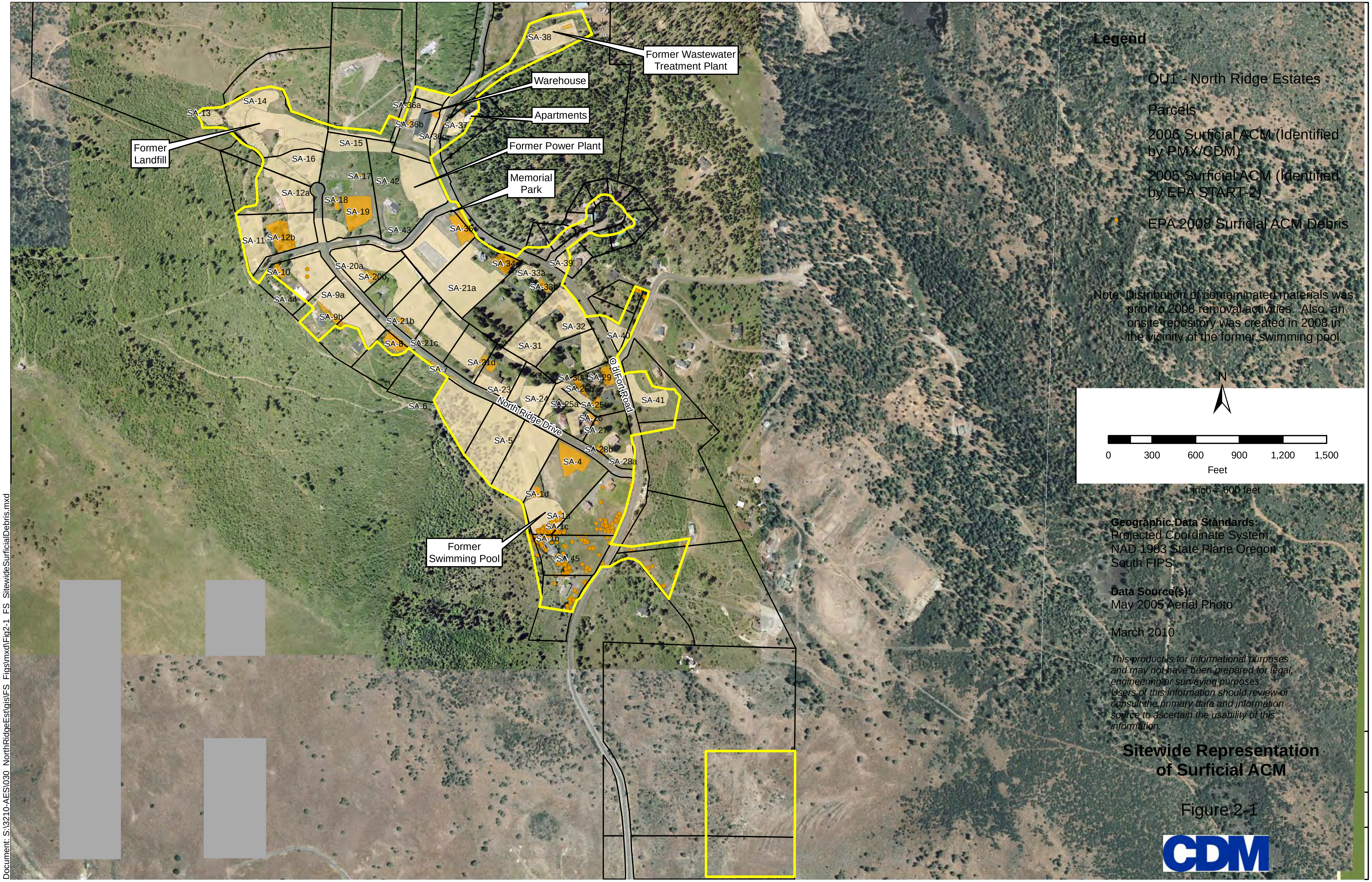
Parcel Status Map

Figure 1-3

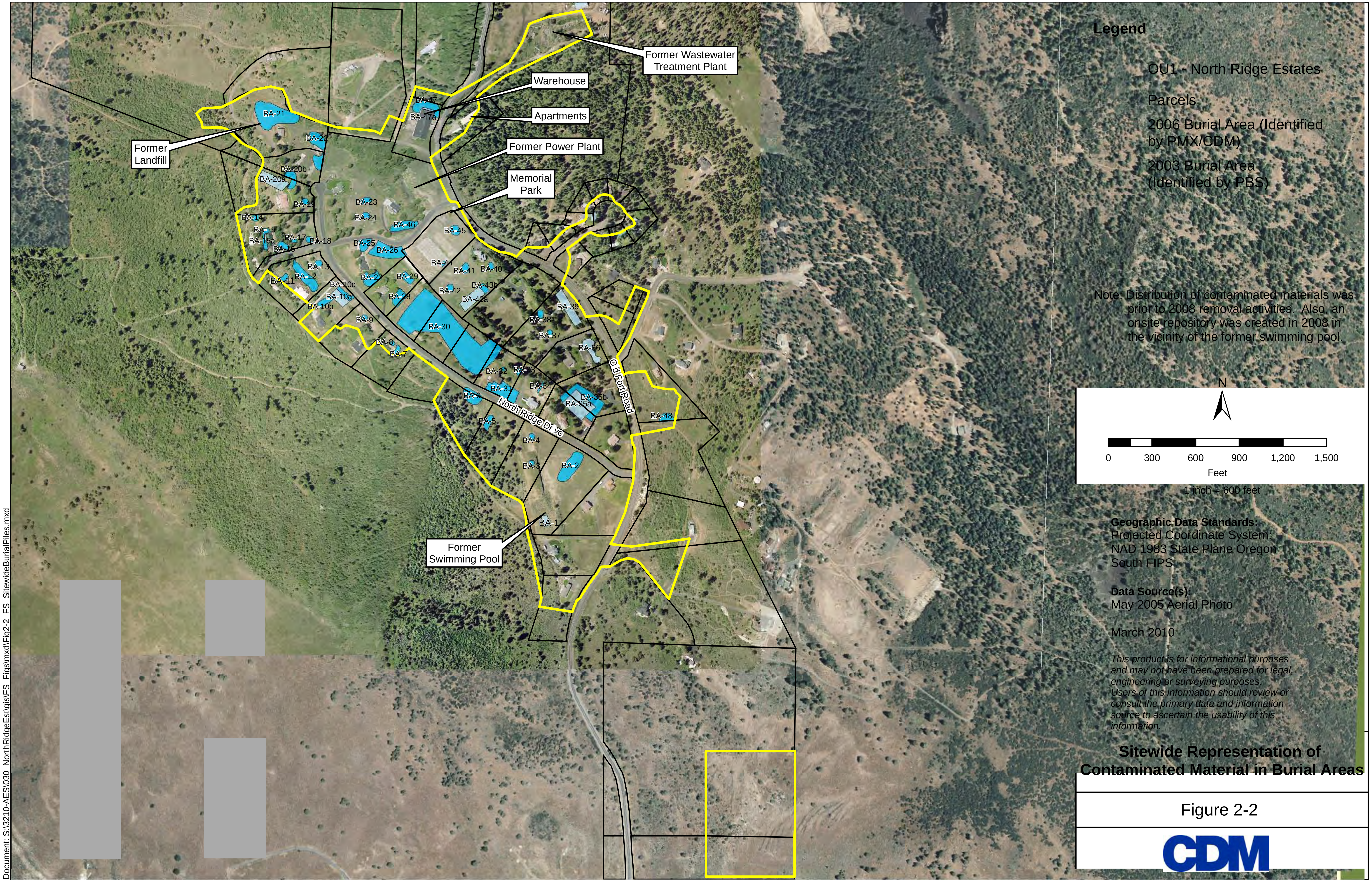
CDM



Sitewide Representation of Surficial ACM

Figure 2-1

Document: S:\3210-AES\030_NorthRidgeEst\gis\FS_Figs\mxd\Fig2-1_FS_SitewideSurficialDebris.mxd



Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Oregon
South FIPS

Data Source(s):
May 2005 Aerial Photo

March 2010

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Sitewide Representation of Contaminated Material in Burial Areas

Figure 2-2

CDM

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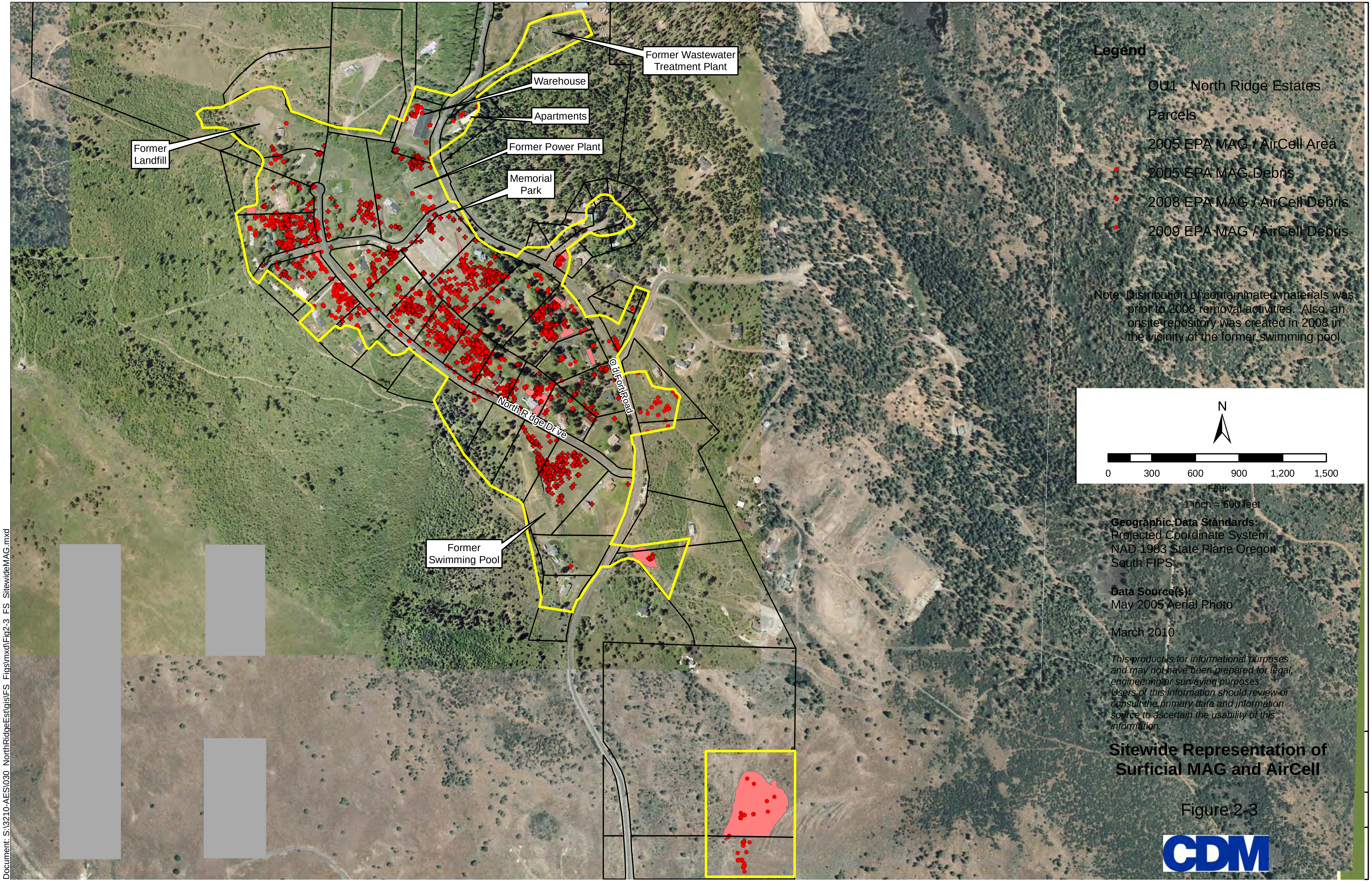

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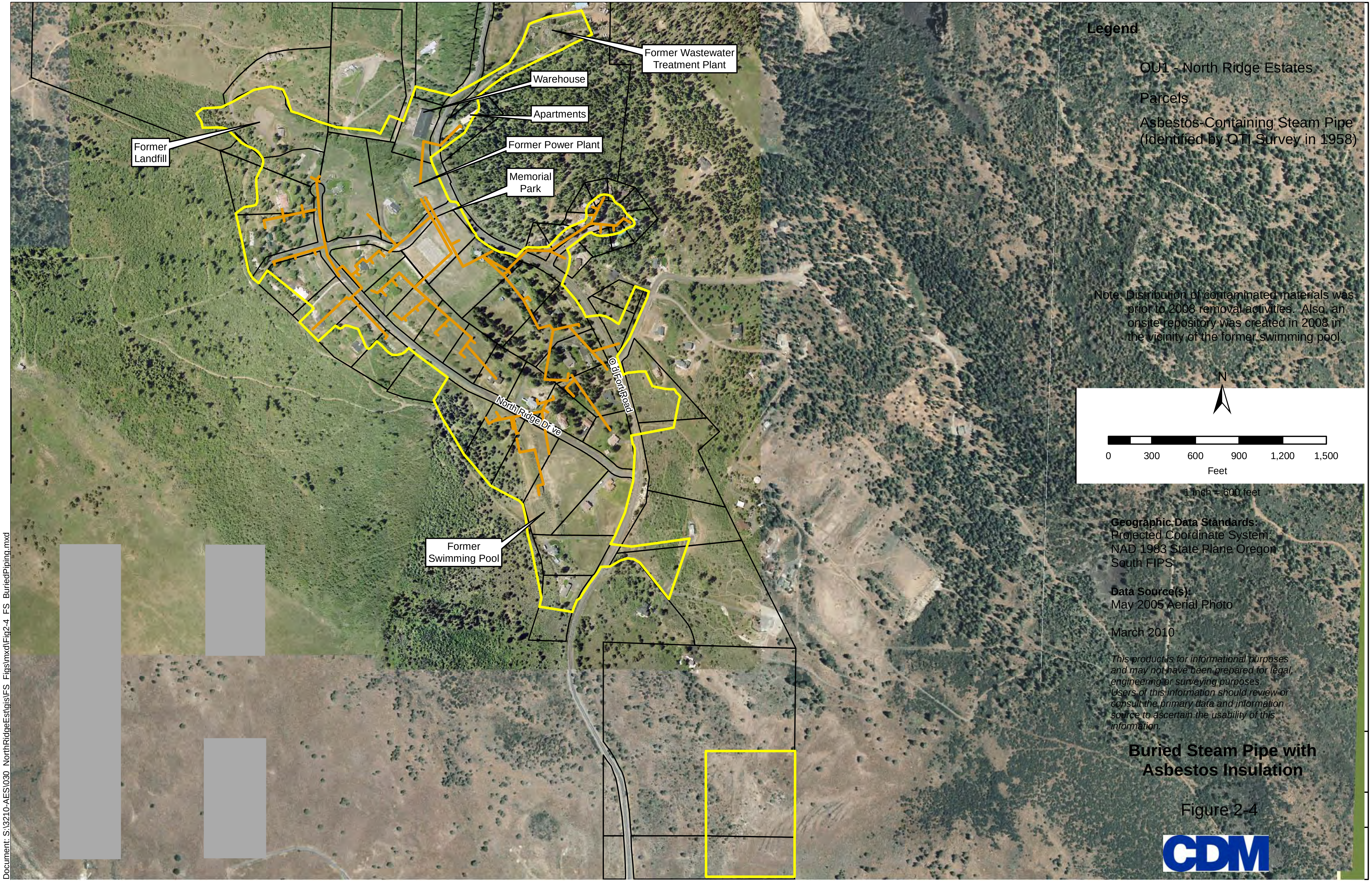

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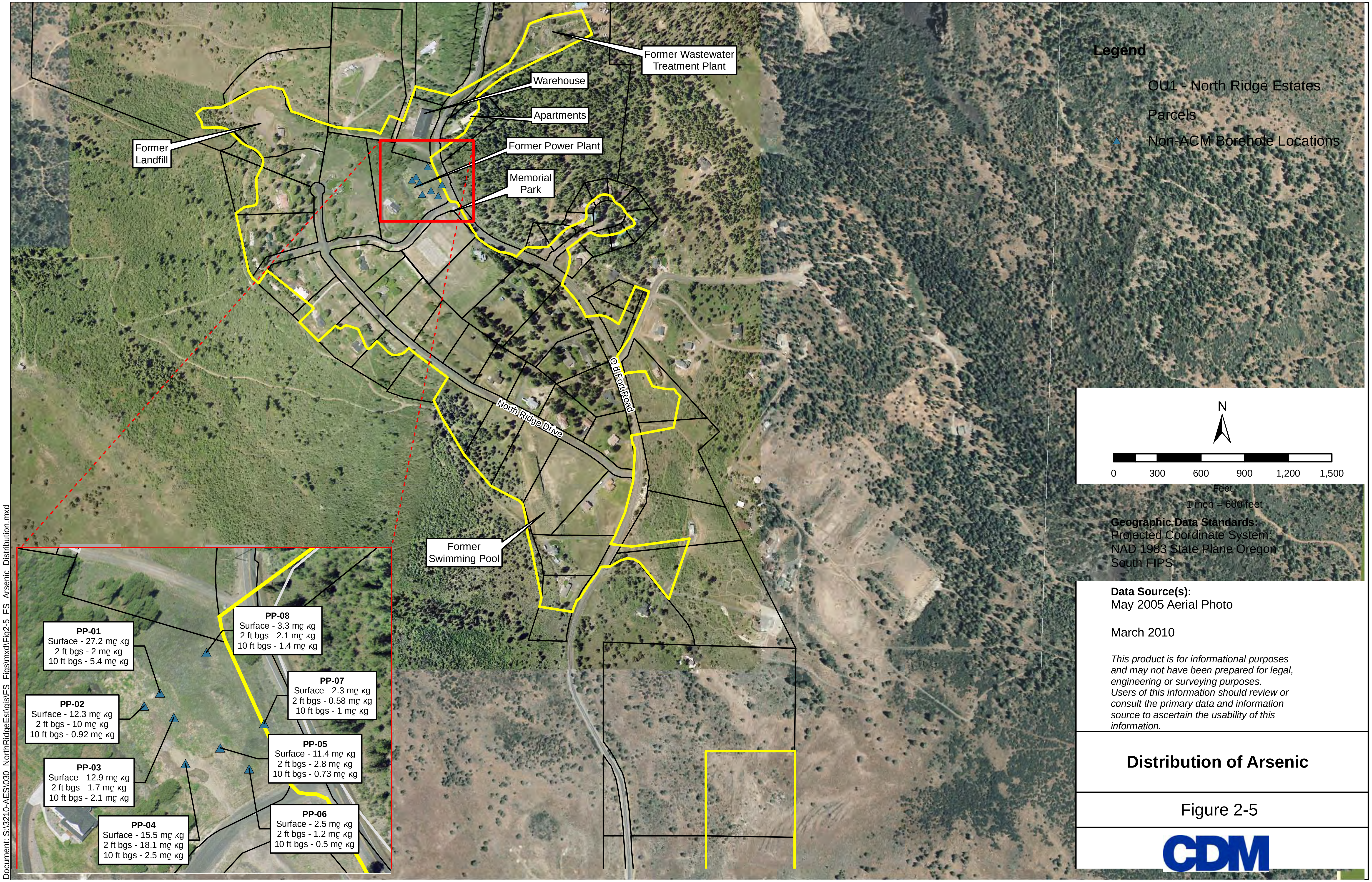

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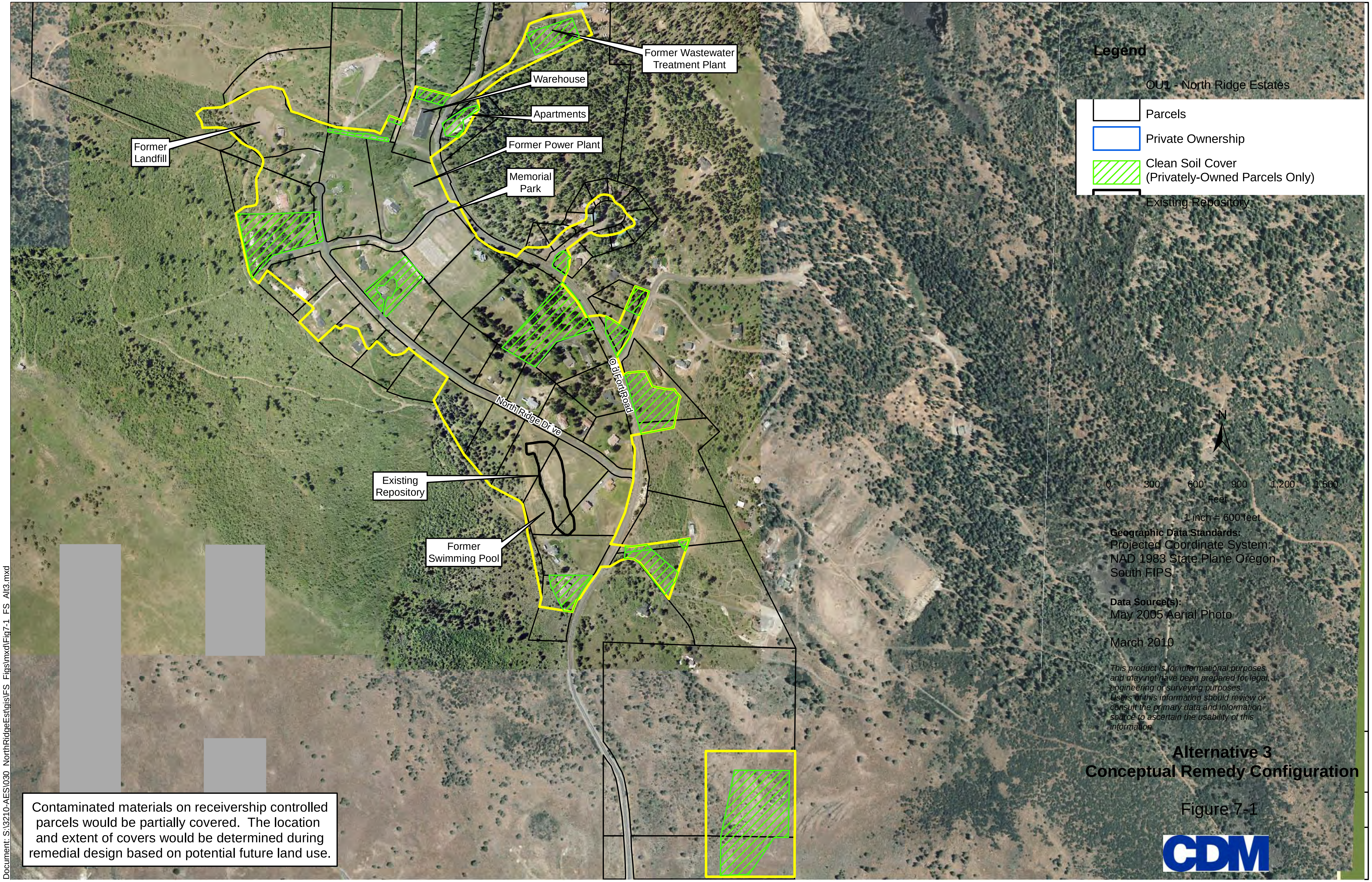

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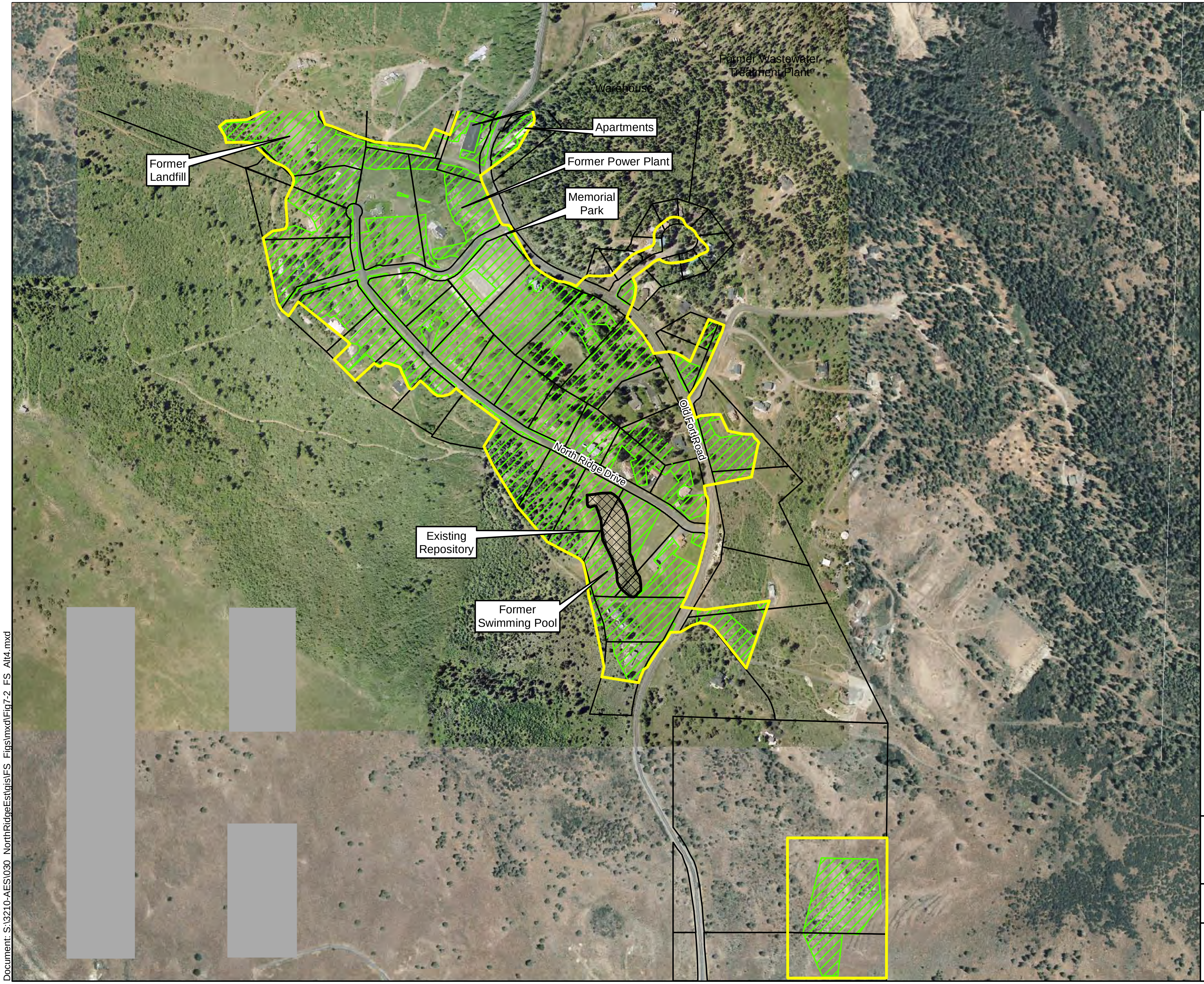

Legend

OU1 - North Ridge Estates

Parcels

Clean Soil Cover

Cover for Existing Repository

N

0 300 600 900 1,200 1,500

Feet

1 inch = 600 feet

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Oregon
South FIPS

Data Source(s):
May 2005 Aerial Photo

March 2010

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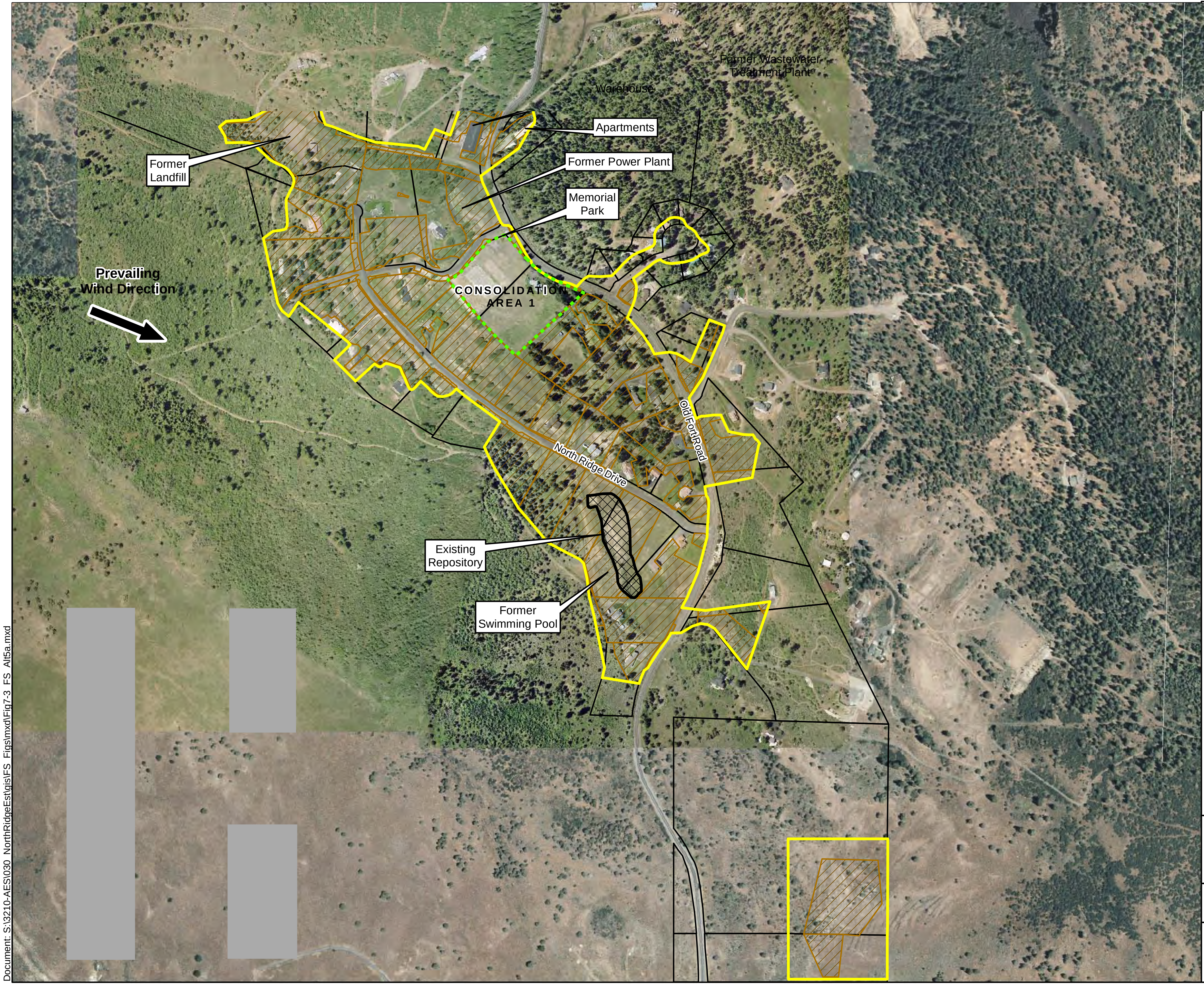
Alternative 4
Conceptual Remedy Configuration

Figure 7-2

CDM

Document: S:\3210-AES\030 NorthRidgeEst\gis\FS Figs\mxd\Fig7-2 FS Alt4.mxd



Legend

OU1 - North Ridge Estates

Parcels

Excavation/Backfill Area

Consolidation Area for Onsite Contaminated Materials Disposal

Cover for Existing Repository

N

0 300 600 900 1,200 1,500

Feet

1 inch = 600 feet

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Oregon
South FIPS

Data Source(s):
May 2005 Aerial Photo

March 2010

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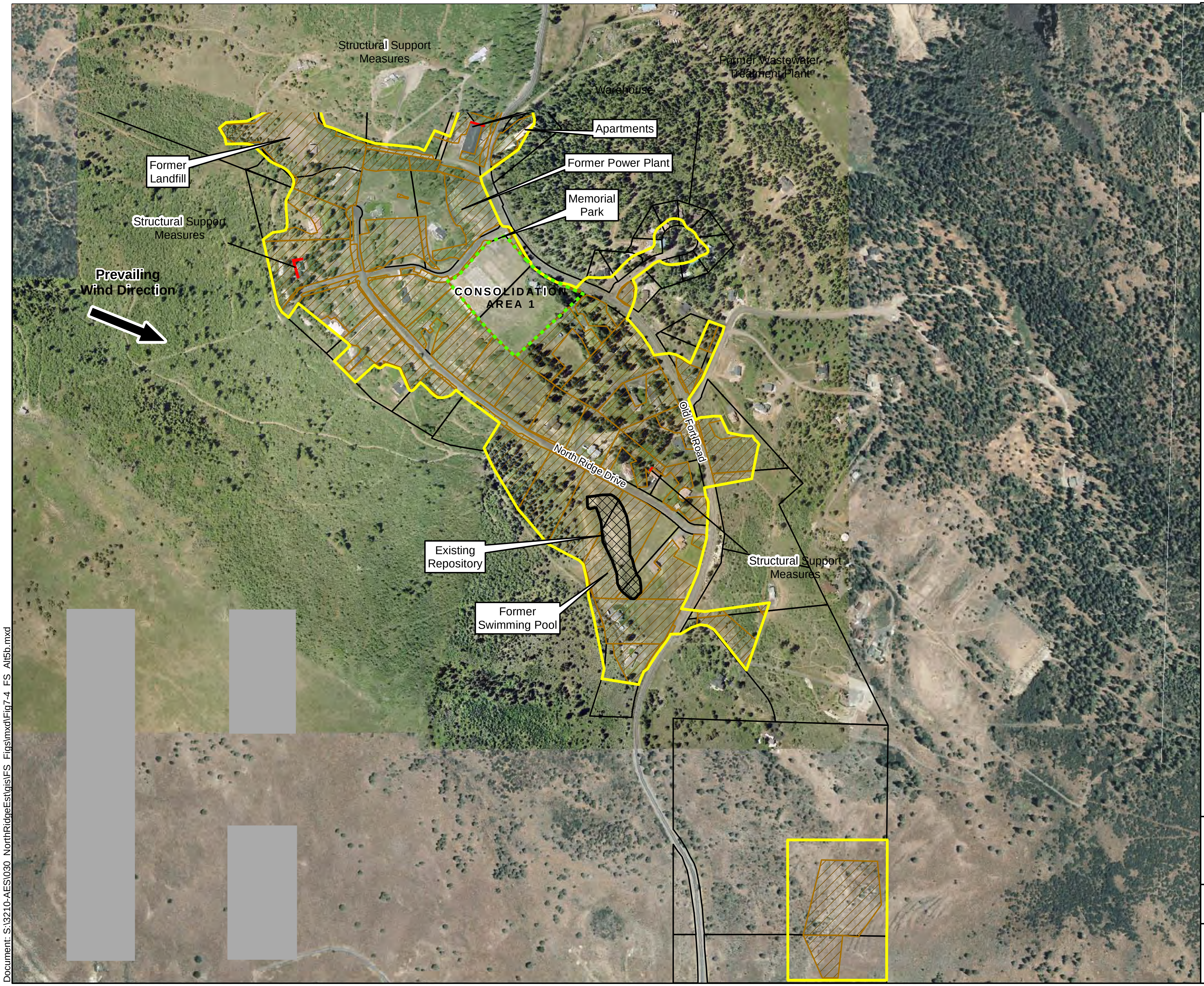
Alternative 5a
Conceptual Remedy Configuration

Figure 7-3

CDM

Document: S:\3210-AES\030_NorthRidgeEst\gis\FS_Figs\mxd\Fig7-3_FS_Alt5a.mxd



Legend

OU1 - North Ridge Estates

- Parcels
- Excavation/Backfill Area
- Consolidation Area for Onsite Contaminated Materials Disposal
- Cover for Existing Repository

N

0 300 600 900 1,200 1,500

Feet

1 inch = 600 feet

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Oregon South FIPS

Data Source(s):
May 2005 Aerial Photo

March 2010

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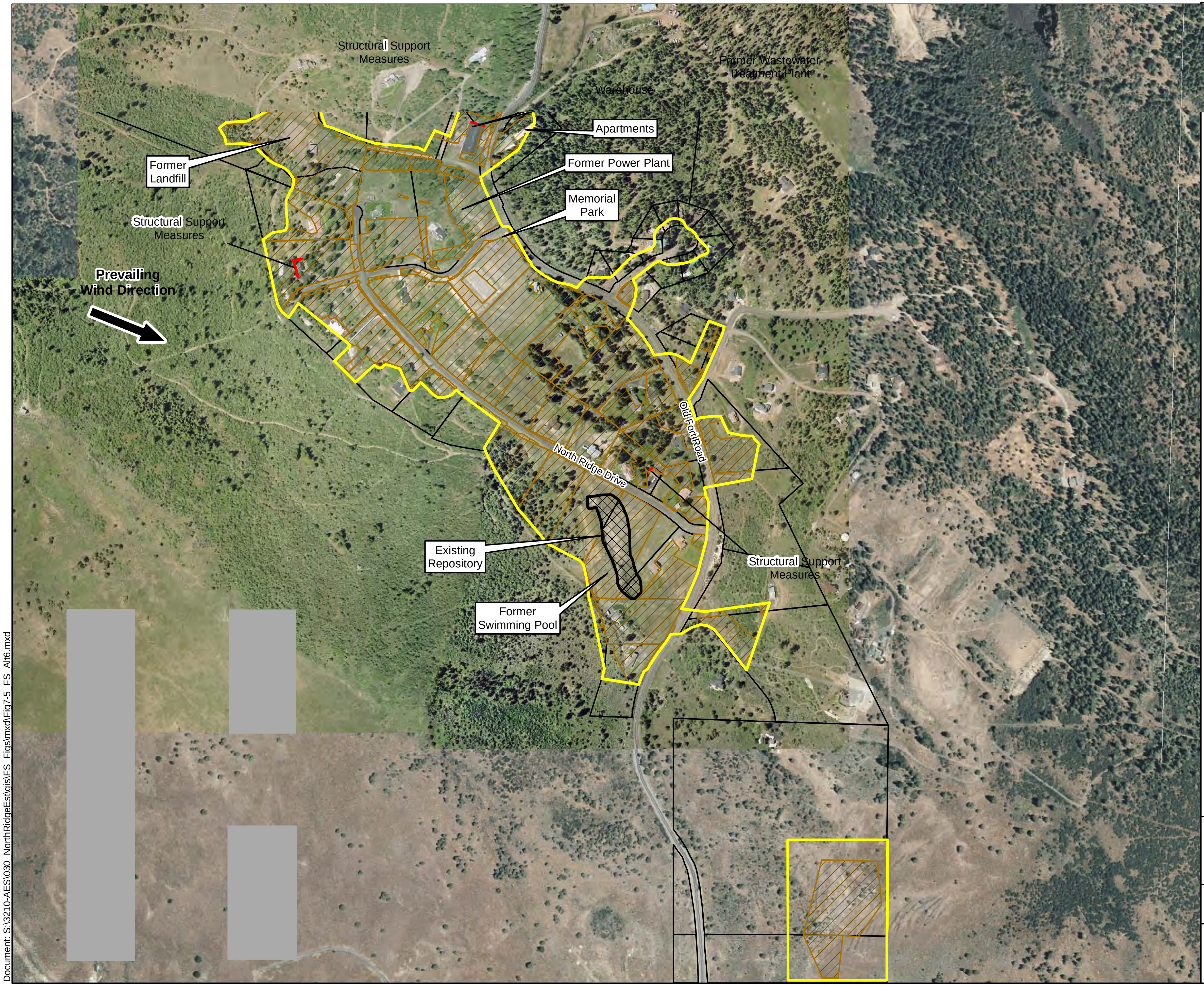
Alternative 5b
Conceptual Remedy Configuration

Figure 7-4

CDM

Document: S:\3210-AES\030 NorthRidgeEst\gis\FS Figs\mxd\Fig7-4 FS Alt5b.mxd



Legend

OU1 - North Ridge Estates

- Parcels
- Excavation/Backfill Area
- Cover for Existing Repository

N

0 300 600 900 1,200 1,500

Feet

1 inch = 600 feet

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Oregon
South FIPS

Data Source(s):
May 2005 Aerial Photo

March 2010

This product is for informational purposes and may not have been prepared for legal, engineering or surveying purposes. Users of this information should review or consult the primary data and information source to ascertain the usability of this information.

Alternative 6
Conceptual Remedy Configuration

Figure 7-5

CDM

Document: S:\3210-AES\030_NorthRidgeEst\gis\FS_Figs\mxd\Fig7-5_FS_Alt6.mxd

Appendix A

Freeze Depth and Capping Thickness Recommendation (United States Army Cold Regions Research and Engineering Laboratory)

DEPARTMENT OF THE ARMY
ENGINEER RESEARCH & DEVELOPMENT CENTER, CORPS OF ENGINEERS
COLD REGIONS RESEARCH AND ENGINEERING LABORATORY
ALASKA PROJECTS OFFICE, PO BOX 35170
FORT WAINWRIGHT, ALASKA 99703-0170

January 25, 2010

TO:

Ms. Denise Baker-Kircher - Remedial Project Manager
Environmental Cleanup Office (ECL) - U.S. EPA, Region 10
1200 Sixth Avenue, MC ECL-115
Seattle, WA 98101
Phone: (206) 553-4303
baker.denise@epa.gov

SUBJECT: Freeze depth and capping thickness recommendation for Northridge Estates.

Dear Ms. Baker-Kircher:

Attached you will find our recommendation for soil cap thickness to prevent frost action of buried materials.

We appreciate the opportunity to be of service and if you have any questions please do not hesitate to call or email.

Thank you,
Sincerely,

Kevin Bjella, MSc. P.E.
Research Civil Engineer - CRREL-Alaska

Freeze Depth and Soil Capping Thickness
Northridge Estates, Klamath Falls, Oregon

Prepared by the
Cold Regions Research and Engineering Laboratory (CRREL)

Purpose

The Environmental Cleanup Office of the U.S. EPA, Region 10 contacted CRREL to perform an analysis and determine the cover required for a soil capping project at Northridge Estates, Klamath Falls, Oregon. Building materials from demolished structures are buried at unspecified depths about the property. The primary material of concern is asbestos used to insulate steam heating pipes, and a secondary material of concern is asbestos in roofing and/or siding material. It is understood by CRREL that sufficient thickness of the soil cap is required to prevent frost action (up-freezing) on these buried materials at the above mentioned site, and CRREL has been retained to make that recommendation.

Method

Up-freezing describes the movement of materials in a soil column due to cyclical freeze and thaw of that soil. The primary mechanism is the expansion of water upon turning to ice, where the expansion exerts a force on the material from many directions. The direction that provides the least confining stress is upwards due to the low surcharge weight of the seasonal frost layer above. After many repeated cycles of freeze and thaw, the material will migrate upwards and emerge at the surface. Because up-freezing is a function of the freezing of water, any material located below the maximum depth of seasonal frost penetration is outside the influence and will not be acted upon.

Climate data was reviewed for the Klamath Falls, Oregon area. The data was obtained from the National Weather Service, Klamath Falls, Oregon, Monthly Climate Data (CF6) data series. From this data we calculated the annual freezing degree days index °F (AFDD) for the last four winter seasons (October to April). The average was 476 °F days, with a minimum of 348 and a maximum of 669. The source material that will be used is unidentified at this time, therefore the analysis was performed for three general soil types as specified in the Uniform Soil Classification System (USCS), silt (M), sand (S), and gravel (G).

We utilized the Modified Berggren equation to calculate the freeze depth where

$$x = \lambda\sqrt{\frac{48k_{avg}nFI}{L}}$$

Where: x = depth of freeze
λ = dimensionless coefficient
k_{avg} = thermal conductivity of the soil (BTU/hr ft F°)
n = conversion factor for surface cover (1.0 = neutral cover)
FI = freezing index (°F days)
L = latent heat (BTU/ft^3)

Results

Table 1 list the results for freeze depth calculated via a commercially available software program BERG2. Due to the arid nature of the Klamath Falls area, the moisture contents were assumed not to be saturated and middle value moisture contents were chosen for each soil type. The Freezing n value was reduced to 0.8 to account for some insulating effect from existing vegetation, and a snow cover that can be assumed to exist for some portion of the freezing season. 5000 °F thawing degree days was utilized.

Table 1. Freeze Depth Calculations

Soil Type	Moisture Content lb/lb	Dry Density lb/ft^3	Freeze Depth ft.	
			Average 476 °F Days	Maximum 669 °F Days
Silt	15%	90.0	1.67	2.04
Sand	10%	110.0	2.45	3.04
Gravel	7.5%	130.0	3.04	3.79

Recommendations

Because up-freezing is a function of the seasonally frozen layer only, the depth to which the bottom of the seasonal frost extends is the main concern. Soil type, soil moisture, vegetation, snow cover, and southern aspect are the main parameters that effect freeze depth. At Northridge Estates it can be expected that frost depth will be deeper on the north side of buildings and in vegetation shaded areas. Also roadways and driveways that area plowed of snow will push the frost deeper than the surrounding areas.

When the final soil capping material is determined, its soil type and moisture should be compared to Table 1 for the recommended burial depth. We consider the 669 °F days to be a high end number for this area, therefore the freeze depths listed for that value are conservative.

Mid and late winter season test borings could be conducted to ascertain actual frost depths allowing for a comparison to Table 1, and a calibration for capping design. Details of conducting test borings and how the results can be interpreted for a given freezing season are available if requested. The test borings and interpretation are not within the scope-of-work for this current report.

Kevin Bjella

Kevin L. Bjella

Research Civil Engineer
Cold Regions Research and Engineering Laboratory
Ft. Wainwright, Ak 99703
Alaska P.E. CE 11884

STATE OF ALASKA
49TH
Kevin L. Bjella
KEVIN L. BJELLA
No. CE11884
REGISTERED PROFESSIONAL ENGINEER

Appendix B

Summary of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs) – North Ridge Estates (NRE) Site

Summary of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs) North Ridge Estates (NRE) Site

Statues, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical-Specific	Location -Specific	Action-Specific
Federal ARARs and TBCs							
National Historic Preservation Act (NHPA) National Register of Historic Places Determinations of eligibility for inclusion in the National Register of Historic Places Protection of historic properties Requirements for environmental information documents and third-party agreements for EPA actions subject to NEPA	16 United States Code (U.S.C). 470 36 Code of Federal Regulations (CFR) 60 36 CFR 63, 36 CFR 800 40 CFR 6.301(b)	Applicable	This statute and implementing regulations require federal agencies to take into account the effect of this response action upon any district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places (generally, 50 years old or older).	If cultural resources on or eligible for the national register are present, it will be necessary to determine if there will be an adverse effect and, if so, how the effect may be minimized or mitigated, in consultation with the appropriate State Historic Preservation Office. The unauthorized removal of archaeological resources from public or Indian lands is prohibited without a permit and any archaeological investigations at a site must be conducted by a professional archaeologist.		✓	
Archaeological and Historic Preservation Act Requirements for environmental information documents and third-party agreements for EPA actions subject to NEPA Protection of archaeological resources	16 U.S.C. 469 40 CFR 6.301(c) 43 CFR 7	Applicable	This statute and implementing regulations establish requirements for the evaluation and preservation of historical and archaeological data, which may be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.			✓	

Statues, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical-Specific	Location-Specific	Action-Specific
Federal ARARs and TBCs							
Fish and Wildlife Coordination Act Responsible official requirements Rules implementing the Fish and Wildlife Conservation Act of 1980	16 U.S.C. 661 et seq., 40 CFR 6.302(g) 50 CFR 83	Applicable	This statute and implementing regulations require coordination with federal and state agencies for federally funded projects to ensure that any modification of any stream or other water body affected by any action authorized or funded by the federal agency provides for adequate protection of fish and wildlife resources.	If the remedial action involves activities that affect wildlife and/or non-game fish, federal agencies must first consult with the USFWS and the relevant state agency with jurisdiction over wildlife resources.		✓	
Endangered Species Act (ESA) Responsible official requirements Endangered and threatened wildlife and plants Interagency cooperation-Endangered Species Act of 1973, as amended	16 U.S.C. 1531 40 CFR 6.302(h) 50 CFR 17 50 CFR 402	Applicable	This statute and implementing regulations provide that federal activities not jeopardize the continued existence of any threatened or endangered species. ESA Section 7 requires consultation with the United States Fish and Wildlife Service (USFWS) to identify the possible presence of protected species and mitigate potential impacts on such species.	If threatened or endangered species are identified within the remedial areas, activities must be designed to conserve the species and their habitat. To date no threatened or endangered species have been identified in the area of the site.		✓	
Migratory Bird Treaty Act List of Migratory Birds	16 U.S.C. 703, et seq. 50 CFR 10.13	Relevant and Appropriate	Makes it unlawful to “hunt, take, capture, kill,” or take other various actions adversely affected a broad range of migratory birds, without the prior approval of the Department of the Interior.	The selected remedial actions will be carried out in a manner to avoid adversely affecting migratory bird species, including individual birds or their nests.		✓	
Clean Air Act National Emission Standard for Asbestos	42 U.S.C. 7401, et seq. 40 CFR 61, Subpart M	Applicable	National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Asbestos	The selected remedial actions will be carried out in a manner that will comply with all the National Emission Standard for Asbestos as required under NESHAP.	✓		✓

Statues, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical-Specific	Location-Specific	Action-Specific
Federal ARARs and TBCs							
Standard for demolition and renovation	40 CFR 61.145 (c)	Relevant and Appropriate	This requirement establishes detailed standards and specifications for demolition and renovation. The regulation provides detailed procedures for controlling asbestos release during demolition of a building containing "regulated-asbestos containing material (RACM)".	Applicable to building demolitions that will occur as part of the removal if certain threshold volumes of RACM are disturbed. The dust control portions of the regulations are relevant and appropriate for soil disturbance activities and for asbestos contaminated material that does not meet the strict definition of RACM.			✓
Standard for waste disposal for manufacturing, fabricating, demolition, renovation, and spraying operations	40 CFR 61.150	Relevant and Appropriate	Standard for waste disposal for manufacturing, fabricating, demolition, renovation, and spraying operations. This regulation provides detailed procedures for processing, handling, and transporting asbestos containing waste material generated during building demolition and renovation (among other sources).	Applicable to RACM generated by building demolitions that will occur as part of the remedial action. Relevant and appropriate for soil disturbance activities and for asbestos contaminated material that does not meet the strict definition of RACM.			✓
Standard for waste disposal for asbestos mills	40 CFR 61.149	Relevant and Appropriate	Detailed procedures and specifications for handling and disposal of asbestos containing waste material generated by an asbestos mill.	Requirements under this regulation are considered relevant and appropriate to the asbestos containing material (ACM) disposal. It is not applicable because the facilities do not meet the regulatory definition of an asbestos mill.			✓
Standard for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations	40 CFR 61.151	Relevant and Appropriate	Standard for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations. Provides requirements for covering, revegetation, and signage at facilities where RACM will be left in place.	Requirements under this regulation are considered relevant and appropriate to asbestos containing soils and/or debris left in place. It is not applicable because the facilities that are part of this remedial do not meet the facility definitions in the regulation.			✓

Statues, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical-Specific	Location-Specific	Action-Specific
Federal ARARs and TBCs							
Occupational Safety and Health Act related regulations- asbestos (construction industry) non-mandatory guidance	29 CFR 1926.1101 - Appendices B, F, and H through K	To Be Considered	Provides non-mandatory guidance on safety and health procedures as well as sampling and analysis procedures for occupational exposures to asbestos by construction workers covered by the Occupational Safety and Health Act.	No Comments.	✓		✓
United States District Court, District of Oregon. consent decree in the matter of Burns v. MBK v. United States	No. 03-30210-H0, Relating to the North Ridge Estates Site (January 20, 2006)	To Be Considered	Provides the consent decree between Burns, MB0, and the United States Department of Justice. The consent decree includes legal rulings and agreements regarding establishment of the NRE receivership.	This information may be useful in determining legal status of the NRE receivership and may provide information useful in selection of a remedy.		✓	✓
Institutional Controls: A Site Manager's Guide to Identifying, Evaluating, and Selecting Institutional Controls at Superfund and Resource Conservation and Recovery Act Corrective Action Cleanups	EPA 540-F-00-005, OSWER 9355.0-74FS-P, September 29, 2000	To Be Considered	Provides guidance for selection or approval of institutional controls as part or all of a remedy.	No Comments.		✓	✓
Memorandum to Superfund National Policy Managers, Regions 1-10- clarifying cleanup goals and identification of new assessment tools for evaluating asbestos at Superfund cleanups	Cook, Michael B. August 10, 2004, Office of Superfund Remediation and Technology Innovation, EPA	To Be Considered	This memorandum provides EPA national policy for assessing and evaluating asbestos at Superfund sites.	This information may be useful for determining appropriate monitoring and inspection techniques for asbestos at the site.	✓		✓

Statues, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical -Specific	Location -Specific	Action-Specific
State of Oregon ARARs and TBCs							
Indian Graves And Protected Objects	Oregon Revised Statutes (ORS) 97.740-97.750	Applicable	Governs Oregon Historical Preservation. Analogous to Federal Historic Preservation Act (36 CFR; Parts 60 and 61).	No Comments.		✓	
Historic Property	ORS 358.475						
Historic Preservation Plan	ORS 358.612 ORS 358.622						
Preservation Of Property Of Historic Significance	ORS 358.635						
Oregon Property Management Program For Historic Sites And Properties	ORS 358.680						
Archaeological Objects And Sites	ORS 358.905						
Archaeological Sites and Historical Material	ORS 390.235						
Historical Preservation Officer	Oregon Administrative Rules (OAR) OAR 736-050						
Archaeological Permits	OAR 736-051						

Statues, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical -Specific	Location -Specific	Action-Specific
State of Oregon ARARs and TBCs							
Air Quality General Emission Standards	ORS 468A OAR 340-226-0100	Relevant and Appropriate	This requirement states that highest and best practicable treatment and control of air contaminant emissions must in every case be provided so as to maintain overall air quality at the highest possible levels and to maintain contaminant concentrations, visibility reduction, odors, soiling and other deleterious factors at the lowest possible levels.	No Comments.		✓	
Air Quality Visible Emissions and Nuisance Requirements	ORS 468A OAR 340-208-0200 OAR 340-208 -0210	Relevant and Appropriate	This requirement establishes detailed standards and specifications which prohibit any handling, transporting, or storage of materials, or use of a road, or any equipment to be operated, without taking reasonable precautions to prevent particulate matter from becoming airborne. These are rules for "special control areas" or other areas where fugitive emissions may cause a nuisance and control measures are practicable.	No Comments.		✓	
Air Quality Noise Control Regulations	ORS 468A OAR 340-035-0035	Relevant and Appropriate	Sets noise standards for equipment, facilities, operations, or activities including the storage or disposal of waste products.	No Comments.		✓	
Air Quality Asbestos Emission Standards And Procedural Requirements	ORS 468A OAR 340-248-0270 OAR 340-248-0280 OAR 340-248-0290	Relevant and Appropriate	This requirement establishes detailed standards and specifications for any situation where a potential for exposure to asbestos fibers exists. Provides standards for asbestos abatement work and friable and non-friable asbestos disposal requirements.	Substantive requirements may be relevant and appropriate to the removal, handling, and on-site packaging, storing, transport, or disposal of friable/non-friable ACM.		✓	

Statues, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical -Specific	Location -Specific	Action-Specific
State of Oregon ARARs and TBCs							
Removal Or Remedial Action Storage, Treatment And Disposal Of Hazardous Waste And PCB Hazardous Waste Management System: General Identification And Listing Of Hazardous Waste	ORS 465.225 ORS 466.005 OAR 340-100 OAR 340-101	Relevant and Appropriate	Regulations under this act establish a regulatory structure for the generation, transportation, treatment, storage, and disposal of hazardous wastes.	At this time, it is not anticipated that material meeting the regulatory definition of hazardous waste will be disturbed or encountered.			✓
Solid Waste Management Solid Waste: General Provisions	ORS 459 OAR 340-093	Applicable	Governs the management of solid wastes, including the permitting of disposal sites.	This ARAR is applicable to the off-site management of contaminated materials. Substantive requirements would be applicable for management or disposal of any ACM which occurs on site.			✓
Solid Waste Management Solid Waste: Municipal Solid Waste Landfills	ORS 459 OAR 340-094	Applicable	Governs the management of solid wastes at municipal solid waste landfills.	This ARAR is applicable to the off-site management of contaminated materials. Substantive requirements would be relevant and appropriate for management or disposal of any ACM which occurs on site.			✓
Solid Waste Management Solid Waste: Land Disposal Sites Other Than Municipal Solid Waste Landfills	ORS 459 OAR 340-095	Applicable	Governs the management of solid wastes at land disposal sites other than municipal solid waste landfills.	This ARAR is applicable to the off-site management of contaminated materials. Substantive requirements would be applicable for management or disposal of any ACM which occurs on site.			✓

Statues, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical -Specific	Location -Specific	Action-Specific
State of Oregon ARARs and TBCs							
Removal Or Remedial Action Oil Storage Tanks	ORS 465.200-ORS 465.455 ORS 466.706 ORS 466.835	Applicable	Governs the regulation of underground storage tanks (USTs) to protect the public health, safety, welfare, and the environment.	UST possibly still buried at parcels AL and MBK-E (Former Oregon Technical Institute gas station).			✓
Hazardous Substance Remedial Action Rules	OAR 340-122						
Removal Or Remedial Action/ Oregon Environmental Cleanup Law	ORS 465.200 ORS 465.900	Applicable	Standards for degree of cleanup required. Establishes acceptable risk levels for human health at 1E-05 for individual carcinogens, 1E-05 for multiple carcinogens, and Hazard Index of 1.0 for non-carcinogens. Identifies selection of remedial action by balancing factors: effectiveness, implementability, long term reliability, short term implementation risk, and cost reasonableness. Allows waiver of state and local permits so long as substantive requirements are met.	Substantive requirements may be applicable to remedy selection.	✓		✓
Hazardous Substance Remedial Action Rules	OAR 340-122						

Statues, Regulations, Standards, or Requirements	Citations or References	ARAR Determination	Description	Comment	Chemical -Specific	Location-Specific	Action-Specific
State of Oregon ARARs							
Rules For The Administration Of The Oregon Safe Employment Act General Occupational Safety And Health Rules Construction	OAR 437-001 OAR 437-002 OAR 437-003	Applicable	Analogous to the federal Occupational Safety and Health Administration codes and contains health and safety requirement that must be met during implementation of any remedial action. These standards are intended to protect construction and utility workers at the site. Contains health and safety training requirements for on site workers and permissible exposure limits for contaminants when conducting work at a site.	Applicable for site remedial actions and for some investigative activities.			✓
Final Guidance, Consideration of Land Use In Environmental Remedial Actions	Oregon Department of Environmental Quality (Oregon DEQ), July 1998	To Be Considered	Describes how to make a land use determination for use in a risk assessment and in the remedy selection process.	No Comments.		✓	✓
Guidance for identification of Hot Spots.	Oregon DEQ, April 1998	To Be Considered	Describes procedures for delineating “hot spots” in water and other environmental media.	No Comments.		✓	✓
Final, Guidance for Use of Institutional Controls	Oregon DEQ, April 1998	To Be Considered	Guidance for selection or approval of institutional controls as part or all of a remedy.	No Comments.			✓
Klamath County Landuse Zoning (Draft Map), Township 38 S Range 09 E	Klamath County, Oregon, Planning Division and Management Information Systems Department, November 2007.	To Be Considered	Provides the current land use zoning for Klamath County.	No Comments		✓	

Acronyms

ACM	asbestos containing material
ARAR	Applicable or Relevant and Appropriate Requirements
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
MBK	Melvin Bercot Kenneth Partnership
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NRE	North Ridge Estates
OAR	Oregon Administrative Rules
Oregon DEQ	State of Oregon Department of Environmental Quality
ORS	Oregon Revised Statutes
OSWER	Office of Solid Waste and Emergency Response
PCB	polychlorinated biphenyl
RACM	regulated-asbestos containing material
TBCs	to be considered information
U.S.C	United States Code
USFWS	United States Fish and Wildlife Services
UST	underground storage tank

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Appendix C

Alternative Quantity Calculations

Alternative Screening

Table C-1
Alternative 2
Interior Cleaning and Land Use Controls with Monitoring

Remedial Component Materials Summary	
Access Controls	
Number Warning Signs	**78**
Number of Private Ownership Parcels	**27**
Number of Receivership Parcels	**29**
Interior Cleaning	
Interior Cleaning of Houses	**24**

Table C-2
Alternative 3
Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

Contaminated Materials Inventory and Remedial Component Materials Summary					
Cover Materials Area and Volume				Access Controls	
Total Area Covered (ACR)	Volume of Cover (CF)	Common Backfill (CF)	Topsoil (CF)	Fence (LF)	Warning Signs (EA)
53	4,537,600	3,403,200	1,134,400	---	78

Number of Private Ownership Parcels	**27**
Number of Receivership Parcels	**29**
Interior Cleaning of Houses	**24**

Table C-3
Alternative 4
Capping of Contaminated Materials and Land Use Controls with Monitoring

Contaminated Materials Inventory and Remedial Component Materials Summary					
Cover Materials Area and Volume				Access Controls	
Total Area Covered (ACR)	Volume of Cover (CF)	Common Backfill (CF)	Topsoil (CF)	Fence (LF)	Warning Signs (EA)
88	7,505,000	5,605,300	1,899,700	---	25

Number of Private Ownership Parcels	**27**
Number of Receivership Parcels	**29**

Table C-4
Alternative 5a
Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

Contaminated Materials Inventory and Remedial Component Materials Summary					
Contaminated Materials Volume Removed (CY)	Cover Materials Volume			Access Controls	
	Total Volume (CF)	Common Backfill (CF)	Topsoil (CF)	Fence (LF)	Warning Signs (EA)
100,000	3,715,450	1,929,600	1,785,850	---	25

Number of Private Ownership Parcels	**27**
Number of Receivership Parcels	**29**

Table C-5
Alternative 5b
Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

Contaminated Materials Inventory and Remedial Component Materials Summary								
Excavated Contaminated Materials Volume				Cover Materials Volume			Access Controls	
Total Volume (CY)	Surficial Contaminated Materials (CY)	Subsurface (Buried) Contaminated Materials (CY)	Steam Pipe (CY)	Total Volume (CF)	Common Fill (CF)	Topsoil (CF)	Fence (LF)	Warning Signs (EA)
130,305	57,245	63,370	9,690	4,698,000	2,885,300	1,812,700	---	25

Number of Private Ownership Parcels	27
Number of Receivership Parcels	29

Table C-6
Alternative 6

Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

Contaminated Materials Inventory and Remedial Component Materials Summary						
Excavated Contaminated Materials Volume				Cover Materials Volume		
Total Volume (CY)	Surficial Contaminated Materials (CY)	Subsurface (Buried) Contaminated Materials (CY)	Steam Pipe (CY)	Total Volume (CF)	Common Fill (CF)	Topsoil (CF)
139,544	62,330	66,322	10,892	3,369,900	1,577,000	1,792,900
Total Weight (TN) (1.35 TN/CY)	190,000	84,000	89,000	14,000		
Number of Private Ownership Parcels			27			
Number of Receivership Parcels			29			

Table C-7
Alternative 7

Excavation and Offsite Thermo-Chemical Treatment of Contaminated Materials at Permitted Facilities, Reuse of Treated Material, and Land Use Controls with Monitoring

Contaminated Materials Inventory and Remedial Component Materials Summary						
Excavated Contaminated Materials Volume				Cover Materials Volume		
Total Volume (CY)	Surficial Contaminated Materials (CY)	Subsurface (Buried) Contaminated Materials (CY)	Steam Pipe (CY)	Total Volume (CF)	Common Fill (CF)	Topsoil (CF)
139,544	62,330	66,322	10,892	3,369,900	1,577,000	1,792,900
Total Weight (TN) (1.35 TN/CY)	190,000	84,000	89,000	14,000		
Number of Private Ownership Parcels			27			
Number of Receivership Parcels			29			

Detailed Analysis of Alternatives

Alternative 3

Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

Alternative 3: Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring					
Parcel IDs	Total Area	Total Area Requiring Remediation	50% Reduction for In-Place Capping[3]		Total Volume of Cover
			Common Backfill[1]	Topsoil[2]	
	SF	SF	CF	CF	CF
A[4]	240,463	128,925	96,694	32,231	128,925
AG	206,876	106,563	79,923	26,641	106,563
AI	106,100	106,100	79,575	26,525	106,100
AK†	52,008	18,041	27,061	9,020	36,081
AL	117,290	117,290	87,968	29,323	117,290
AM†	164,124	76,053	114,079	38,026	152,106
AP	124,269	124,269	93,202	31,067	124,269
AQ†	117,216	44,461	66,692	22,231	88,922
AR†	507,189	48,927	73,391	24,464	97,854
AS†	240,028	15,309	22,964	7,655	30,618
AT†	28,098	---	---	---	0
AU†	28,077	---	---	---	0
AV†	21,236	---	---	---	0
AW†	21,844	---	---	---	0
AX†	19,905	---	---	---	0
AY†	19,628	---	---	---	0
AZ†	18,949	---	---	---	0
B	244,982	128,079	96,059	32,020	128,079
BA†	34,200	---	---	---	0
BB†	20,111	---	---	---	0
BC†	29,744	---	---	---	0
BJ†	44,403	11,560	17,340	5,780	23,120
BK†	224,527	8,915	13,373	4,458	17,830
BL	78,546	---	---	---	0
BM†	95,935	35,585	53,378	17,793	71,171
BO†	36,614	10,013	15,020	5,007	20,026
BP†	360,993	180,297	270,445	90,148	360,593
BQ†	168,008	44,691	67,037	22,346	89,383
BR†	434,134	12,766	19,149	6,383	25,532
BS†	279,890	16,166	24,249	8,083	32,332
C	99,399	65,700	49,275	16,425	65,700
D	103,036	41,513	31,135	10,378	41,513
E	129,710	77,952	58,464	19,488	77,952
F†	146,193	146,193	219,290	73,097	292,386
G	173,258	83,154	62,366	20,789	83,154
H	3,901,263	289,010	216,758	72,253	289,010
L	170,977	165,263	123,948	41,316	165,263
M	103,851	85,951	64,463	21,488	85,951
MBK-A	81,959	81,959	61,469	20,490	81,959
MBK-B	82,837	82,837	62,128	20,709	82,837
MBK-C	79,369	79,369	59,527	19,842	79,369
MBK-D	126,679	105,580	79,185	26,395	105,580
MBK-E	132,121	111,718	83,788	27,929	111,718
MBK-F	91,207	18,507	13,880	4,627	18,507
MBK-G	95,235	53,321	39,991	13,330	53,321
N†	158,057	158,057	237,085	79,028	316,113
O	185,518	118,230	88,673	29,558	118,230
P†	77,893	65,815	98,723	32,908	131,631
Q	75,099	75,099	56,324	18,775	75,099
R	70,175	70,175	52,631	17,544	70,175
S	92,670	92,670	69,502	23,167	92,670
W	98,880	66,354	49,766	16,589	66,354
WWTP†	1,499,333	50,001	75,001	25,000	100,002
X	91,228	47,359	35,519	11,840	47,359
Y	137,170	79,481	59,611	19,870	79,481
Z	80,588	49,381	37,035	12,345	49,381
Cover Material Extending Outside Parcel Areas					
Other		110,936	83,202	27,734	110,936
TOTALS:	**12,169,100**	**3,594,700**	**3,403,200**	**1,134,400**	**4,537,600**

Notes:
1. Common Backfill depth assumed to be (FT): **1.5**
2. Topsoil depth assumed to be (FT): **0.5**
3. Partial In-Place Capping = **50%**
4. Arsenic contamination is co-located with ACM
† - Indicates Private Ownership; In-Place Capping of ACM

Alternative 4

Capping of Contaminated Materials and Land Use Controls with Monitoring

Alternative 4: Capping of Contaminated Materials and Land Use Controls with Monitoring					
Parcel IDs	Total Parcel Area	Total Area Covered	Common Backfill[1]	Topsoil[2]	Total Volume of Cover
	SF	SF	CF	CF	CF
A[3]	240,463	128,925	193,388	64,463	257,850
AG	206,876	106,563	159,845	53,282	213,127
AI	106,100	106,100	159,150	53,050	212,200
AK†	52,008	18,041	27,061	9,020	36,081
AL	117,290	117,290	175,936	58,645	234,581
AM†	164,124	76,053	114,079	38,026	152,106
AP	124,269	124,269	186,403	62,134	248,538
AQ†	117,216	44,461	66,692	22,231	88,922
AR†	507,189	48,927	73,391	24,464	97,854
AS†	240,028	15,309	22,964	7,655	30,618
AT†	28,098	---	---	---	0
AU†	28,077	---	---	---	0
AV†	21,236	---	---	---	0
AW†	21,844	---	---	---	0
AX†	19,905	---	---	---	0
AY†	19,628	---	---	---	0
AZ†	18,949	---	---	---	0
B	244,982	128,079	192,119	64,040	256,158
BA†	34,200	---	---	---	0
BB†	20,111	---	---	---	0
BC†	29,744	---	---	---	0
BJ†	44,403	11,560	17,340	5,780	23,120
BK†	224,527	8,915	13,373	4,458	17,830
BL	78,546	---	---	---	0
BM†	95,935	35,585	53,378	17,793	71,171
BO†	36,614	10,013	15,020	5,007	20,026
BP†	360,993	180,297	270,445	90,148	360,593
BQ†	168,008	44,691	67,037	22,346	89,383
BR†	434,134	12,766	19,149	6,383	25,532
BS†	279,890	16,166	24,249	8,083	32,332
C	99,399	65,700	98,550	32,850	131,401
D	103,036	41,513	62,270	20,757	83,026
E	129,710	77,952	116,929	38,976	155,905
F†	146,193	146,193	219,290	73,097	292,386
G	173,258	83,154	124,731	41,577	166,308
H	3,901,263	289,010	433,516	144,505	578,021
L	170,977	165,263	247,895	82,632	330,527
M	103,851	85,951	128,927	42,976	171,902
MBK-A	81,959	81,959	122,939	40,980	163,918
MBK-B	82,837	82,837	124,255	41,418	165,674
MBK-C	79,369	79,369	119,054	39,685	158,738
MBK-D	126,679	105,580	158,370	52,790	211,161
MBK-E	132,121	111,718	167,576	55,859	223,435
MBK-F	91,207	18,507	27,760	9,253	37,014
MBK-G	95,235	53,321	79,981	26,660	106,642
N†	158,057	158,057	237,085	79,028	316,113
O	185,518	118,230	177,345	59,115	236,460
P†	77,893	65,815	98,723	32,908	131,631
Q	75,099	75,099	112,648	37,549	150,198
R	70,175	70,175	105,262	35,087	140,350
S	92,670	92,670	139,005	46,335	185,339
W	98,880	66,354	99,532	33,177	132,709
WWTP†	1,499,333	50,001	75,001	25,000	100,002
X	91,228	47,359	71,039	23,680	94,718
Y	137,170	79,481	119,221	39,740	158,962
Z	80,588	49,381	74,071	24,690	98,761
Current Repository[4]	---	93,750	46,875	46,875	93,750
Cover Material Extending Outside Parcel Areas					
Other		110,936	166,404	55,468	221,872
TOTALS:	**12,169,100**	**3,799,400**	**5,605,300**	**1,899,700**	**7,505,000**

Notes:

1. Common Backfill depth assumed to be (FT): **1.5**
2. Topsoil depth assumed to be (FT): **0.5**
3. Arsenic contamination is co-located with ACM
4. Existing repository will be covered with 6 inches of common backfill and 6 inches of topsoil.

† - Indicates Private Ownership

Alternative 5a

Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

Alternative 5a: Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring																
Parcel IDs	Total Parcel Area	Surficial ID	Burial ID	Total Area Excavated[4]		Excavation Depth		Excavation Volume			Total Volume Removed[4]	Backfill Volume[7]		Incremental Removal - 30-Year Projection		
				Surficial ACM Area[3]	Buried ACM Area	Surficial ACM Area	Buried ACM Area	Volume Removed During 2008	Surficial ACM Volume	Buried ACM Volume		Common Fill	Topsoil	Parcel ID Exposure Area	Exposure Area - Percentage of Site	Incremental Removal - 30 Year Projection
	SF			SF	SF	FT	FT	CF	CF	CF	CF	CF	CF	SF	%	CF
A*	240,463	SA-15	---	72,529	---	0.5	---	---	36,265	---	36,265	0	36,265	127,392	4%	262
		SA-42	---	418	---	0.5	---	---	209	---	209	0	209			
		SA-43	---	0	---	0.5	---	---	0	---	0	0	0			
		---	BA-46**	---	9,620	---	2.0	---	---	19,722	19,722	14,792	4,931			
		Add'l Areas (MAG, AirCell, etc)		18,614	---	0.5	---	---	9,307	---	9,307	0	9,307			
		Arsenic Contamination[11]		---	26,211	---	2.0	---	---	268,663	268,663	255,230	13,433			
AG*	206,876	SA-1a	---	52,654	---	0.5	---	---	26,327	---	26,327	0	26,327	105,966	3%	218
		SA-1b	---	88	---	0.5	---	---	45	---	45	0	45			
		SA-1c	---	224	---	0.5	---	---	113	---	113	0	113			
		SA-1d	---	4,652	---	0.5	---	---	2,326	---	2,326	0	2,326			
		SA-4	---	17,328	---	0.5	---	---	8,664	---	8,664	0	8,664			
		---	BA-1[1]	---	3,030	---	2.0	---	---	6,061	6,061	4,546	1,515			
		---	BA-2	---	18,518	---	2.0	---	---	37,037	37,037	27,778	9,259			
		Add'l Areas (MAG, AirCell, etc)		9,471	---	0.5	---	---	4,736	---	4,736	0	4,736			
AI*	106,100	SA-5	---	98,040	---	0.5	---	---	49,020	---	49,020	0	49,020	106,100	3%	219
		---	BA-6	---	7,124	---	2.0	---	---	14,249	14,249	10,687	3,562			
		Add'l Areas (MAG, AirCell, etc)		936	---	0.5	---	---	468	---	468	0	468			
AK†	52,008	SA-40	---	17,892	---	0.5	---	(2,539)	6,407	---	6,407	0	6,407	17,933	1%	37
		Add'l Areas (MAG, AirCell, etc)		41	---	0.5	---	---	21	---	21	0	21			
AL*	117,290	SA-5	---	108,197	---	0.5	---	---	54,099	---	54,099	0	54,099	115,637	3%	238
		---	BA-5**	---	4,081	---	2.0	---	---	8,366	8,366	6,275	2,092			
		Add'l Areas (MAG, AirCell, etc)		3,359	---	0.5	---	---	1,680	---	1,680	0	1,680			
AM†	164,124	SA-41	---	32,611	---	0.5	---	(7,984)	8,322	---	8,322	0	8,322	76,053	2%	157
		---	BA-48	---	4,630	---	0.5	(1,127)	---	1,188	1,188	0	1,188			
		Add'l Areas (MAG, AirCell, etc)		38,812	---	0.5	---	---	19,406	---	19,406	0	19,406			
AP*	124,269	SA-1a	---	2,157	---	0.5	---	---	1,079	---	1,079	0	1,079	124,269	4%	256
		SA-1b	---	1,395	---	0.5	---	---	698	---	698	0	698			
		SA-45	---	22	---	0.5	---	---	11	---	11	0	11			
		Add'l Areas (MAG, AirCell, etc)		120,695	---	0.5	---	---	60,348	---	60,348	0	60,348			
AQ†	117,216	Add'l Areas (MAG, AirCell, etc)		44,461	---	0.5	---	---	22,231	---	22,231	0	22,231	44,461	1%	92
AR†	507,189	Add'l Areas (MAG, AirCell, etc)		48,927	---	0.5	---	---	24,464	---	24,464	0	24,464	48,927	1%	101
AS†	240,028	Add'l Areas (MAG, AirCell, etc)		15,309	---	0.5	---	---	7,655	---	7,655	0	7,655	15,309	0%	32
AT†	28,098	---	---	---	---	---	---	---	---	---	0	---	---	---	---	---
		---	---	---	---	---	---	---	---	---	0	---	---			
AU†	28,077	---	---	---	---	---	---	---	---	---	0	---	---	---	---	---
		---	---	---	---	---	---	---	---	---	0	---	---			
AV†	21,236	---	---	---	---	---	---	---	---	---	0	---	---	---	---	---
		---	---	---	---	---	---	---	---	---	0	---	---			
AW†	21,844	---	---	---	---	---	---	---	---	---	0	---	---	---	---	---
AX†	19,905	---	---	---	---	---	---	---	---	---	0	---	---	---	---	---
AY†	19,628	---	---	---	---	---	---	---	---	---	0	---	---	---	---	---
AZ†	18,949	---	---	---	---	---	---	---	---	---	0	---	---	---	---	---
B*	244,982	SA-12a	---	19,410	---	0.5	---	---	9,705	---	9,705	0	9,705	127,668	4%	263
		SA-15	---	31,402	---	0.5	---	---	15,701	---	15,701	0	15,701			
		SA-17	---	873	---	0.5	---	---	437	---	437	0	437			
		SA-18	---	3,659	---	0.5	---	---	1,830	---	1,830	0	1,830			
		SA-19	---	35,606	---	0.5	---	---	17,804	---	17,804	0	17,804			
		---	BA-23	---	2,430	---	1.0	---	---	2,430	2,430	1,215	1,215			
		---	BA-24	---	1,879	---	0.8	---	---	1,503	1,503	564	939			
		Add'l Areas (MAG, AirCell, etc)		32,410	---	0.5	---	---	16,205	---	16,205	0	16,205			
BA†	34,200	---	---	---	---	---	---	---	---	---	0	---	---	---	---	---
BB†	20,111	---	---	---	---	---	---	---	---	---	0	---	---	---	---	---
		---	---	---	---	---	---	---	---	---	0	---	---			
BC†	29,744	---	---	---	---	---	---	---	---	---	0	---	---	---	---	---
BJ†	44,403	Add'l Areas (MAG, AirCell, etc)		11,560	---	0.5	---	---	5,780	---	5,780	0	5,780	11,560	0%	24
BK†	224,527	Add'l Areas (MAG, AirCell, etc)		8,915	---	0.5	---	---	4,458	---	4,458	0	4,458	8,915	0%	18
BL*	78,546	---	---	---	---	---	---	---	---	---	0	---	---	---	---	---
BM†	95,935	SA-37	---	13,743	---	0.5	---	(625)	6,247	---	6,247	0	6,247	34,976	1%	72
		Add'l Areas (MAG, AirCell, etc)		21,233	---	0.5	---	---	10,617	---	10,617	0	10,617			
BO†	36,614	SA-39	---	9,077	---	0.5	---	(2,457)	2,082	---	2,082	0	2,082	9,875	0%	20
		Add'l Areas (MAG, AirCell, etc)		798	---	0.5	---	---	399	---	399	0	399			
BP†	360,993	Add'l Areas (MAG, AirCell, etc)		180,297	---	0.5	---	---	90,149	---	90,149	0	90,149	180,297	5%	371
BQ†	168,008	Add'l Areas (MAG, AirCell, etc)		44,691	---	0.5	---	---	22,346	---	22,346	0	22,346	44,691	1%	92
BR†	434,134	Add'l Areas (MAG, AirCell, etc)		12,766	---	0.5	---	---	6,383	---	6,383	0	6,383	12,766	0%	26
BS†	279,890	SA-36a	---	16,166	---	0.5	---	---	8,084	---	8,084	0	8,084	16,166	0%	33
C*	99,399	SA-9a	---	34,770	---	0.5	---	(2,424)	14,961	---	14,961	0	14,961	64,326	2%	132
		SA-9b	---	5,147	---	0.5	---	---	2,574	---	2,574	0	2,574			
		---	BA-10a**	---	7,771	---	2.0	(2,543)	---	13,388	13,388	10,041	3,347			
		---	BA-10b	---	4,108	---	1.3	---	---	5,341	5,341	3,287	2,054			
		---	BA-10c	---	3,748	---	1.5	(5,008)	---	615	615	410	205			
		Add'l Areas (MAG, AirCell, etc)		8,781	---	0.5	---	---	4,391	---	4,391	0	4,391			
D*	103,036	SA-9a	---	38,913	---	0.5	---	---	19,457	---	19,457	0	19,457	41,432	1%	85
		SA-9b	---	1,292	---	0.5	---	---	646	---	646	0	646			
		---	BA-9	---	1,227	---	1.0	---	---	1,227	1,227	614	614			
E*	129,710	SA-9a	---	41,195	---	0.5	---	(12,337)	8,261	---	8,261	0	8,261	77,826	2%	160
		SA-10	---	4,621	---	0.5	---	---	2,311	---	2,311	0	2,311			
		SA-44	---	30	---	0.5	---	---	15	---	15	0	15			
		---	BA-11	---	1,929	---	1.0	---	---	1,930	1,930	965	965			
		---	BA-12	---	13,843	---	1.8	---	---	24,917	24,917	17,996	6,921			
		---	BA-13	---	1,947	---	1.0	(1,643)	---	304	304	152	152			
		Add'l Areas (MAG, AirCell, etc)		14,262	---	0.5	---	---	7,131	---	7,131	0	7,131			
F†	146,193	SA-11	---	53,811	---	0.5	---	(11,958)	14,948	---	14,948	0	14,948	144,915	4%	298
		SA-12a	---	37,483	---	0.5	---	(12,750)	5,992	---	5,992	0	5,992			
		SA-12b	---	25,135	---	0.5	---	(8,123)	4,445	---	4,445	0	4,445			
		---	BA-14	---	1,670	---	1.0	(647)	---	1,024	1,024	512	512			
		---	BA-15a**	---	448	---	2.0	---	---	919	919	689	230			
		---	BA-15**	---	3,722	---	2.0	(3,717)	---	3,913	3,913	2,935	978			
		---	BA-16	---	2,846	---	2.0	(4,515)	---	1,178	1,178	884	295			
		---	BA-17	---	831	---	1.0	(425)	---	407	407	204	204			
		---	BA-18	---	1,664	---	1.5	(264)	---	2,232	2,232	1,488	744			
		Add'l Areas (MAG, AirCell, etc)		17,304	---	0.5	---	---	8,652	---	8,652	0	8,652			
G*	173,258	SA-11	---	2,641	---	0.5	---	---	1,321	---	1,321	0	1,321	82,563	2%	170
		SA-12a	---	43,005	---	0.5	---	(1,593)	19,910	---	19,910	0	19,910			
		---	BA-19	---	1,600	---	0.5	---	---	801	801	0	801			
		---	BA-20a**	---	13,653	---	2.0	---	---	27,990	27,990	20,993	6,998			
		---	BA-20b**	---	2,442	---	2.0	---	---	5,007	5,007	3,755	1,252			
		Add'l Areas (MAG, AirCell, etc)		19,221	---	0.5	---	---	9,611	---	9,611	0	9,611			
H*	3,901,362	SA-12a	---	20,533	---	0.5	---	---	10,267	---	10,267	0	10,267	288,638	8%	595
		SA-13	---	12,650	---	0.5	---	---	6,325	---	6,325	0	6,325			
		SA-14	---	58,649	---	0.5	---	---	29,325	---	29,325	0	29,325			
		SA-15	---	52,756	---	0.5	---	---	26,379	---	26,379	0	26,379			
		SA-16	---	57,284	---	0.5	---	---	28,643	---	28,643	0	28,643			
		---	BA-20b**	---	3,731	---	2.0	---	---	7,649	7,649	5,737	1,912			
		---	BA-21[2]**	---	36,786	---	2.0	---	---	75,412	75,412	56,559	18,853			
		---	BA-22	---	15,251	---	2.0	---	---	30,503	30,503	22,877	7,626			
		Add'l Areas (MAG, AirCell, etc)		30,997	---	0.5	---	---	15,499	---	15,499	0	15,499			
L*	170,977	SA-21a	---	Onsite Consolidation Area 1		Onsite Consolidation Area 1		Onsite Consolidation Area 1			0	595,032	77,624	Onsite Consolidation Area 1		
		SA-34	---													
		---	BA-40													
		---	BA-41													
		---	BA-42													
		---	BA-43a													
		---	BA-43b													
M*	103,851	SA-25a	---	914	---	0.5	---	(457)	1	---	1	0	1	84,010	2%	173
		SA-30	---	474	---	0.5	---	(237)	0	---	0	0	0			
		SA-32	---	24,634	---	0.5	---	(8,927)	3,391	---	3,391	0	3,391			
		---	BA-36	---	9,044	---	1.3	(10,540)	---	1,217	1,217	749	468			
		Add'l Areas (MAG, AirCell, etc)		48,944	---	0.5	---	---	24,472	---	24,472	0	24,472			

MBK-A*	81,959	SA-21a	---	17,115	---	0.5	---	---	8,558	---	8,558	0	8,558	79,973	2%	165
		SA-21b	---	743	---	0.5	---	---	372	---	372	0	372			
		---	BA-30	---	48,641	---	1.1	---	---	53,505	53,505	29,185	24,320			
		Add'l Areas (MAG, AirCell, etc)		13,475	---	0.5	---	---	6,738	---	6,738	0	6,738			
MBK-B*	82,837	SA-21a	---	14,918	---	0.5	---	---	7,459	---	7,459	0	7,459	81,490	2%	168
		SA-21c	---	847	---	0.5	---	---	424	---	424	0	424			
		---	BA-30	---	43,764	---	1.1	---	---	48,141	48,141	26,259	21,882			
		Add'l Areas (MAG, AirCell, etc)		21,961	---	0.5	---	---	10,981	---	10,981	0	10,981			
MBK-C*	79,369	SA-21a	---	1,663	---	0.5	---	---	832	---	832	0	832	77,938	2%	161
		SA-21d	---	0	---	0.5	---	---	0	---	0	0	0			
		SA-23	---	1,667	---	0.5	---	---	834	---	834	0	834			
		---	BA-30	---	50,396	---	1.1	---	---	55,437	55,437	30,238	25,199			
		Add'l Areas (MAG, AirCell, etc)		24,212	---	0.5	---	---	12,106	---	12,106	0	12,106			
MBK-D*	126,679	SA-21a	---	Onsite Consolidation Area 1		Onsite Consolidation Area 1		Onsite Consolidation Area 1			0	595,032	77,624	Onsite Consolidation Area 1		
		SA-35	---													
		---	BA-26													
		---	BA-44**													
		---	BA-45													
MBK-E*	132,121	SA-5	---	129,312	---	0.5	---	---	64,656	---	64,656	0	64,656	110,125	3%	227
		---	BA-3	---	1,017	---	0.5	---	---	509	509	0	509			
		---	BA-4	---	1,472	---	0.5	---	---	736	736	0	736			
		Existing Repository		(21,676)	---	0.5	---	---	(10,838)	---	(10,838)	0	-10,838			
MBK-F*	91,207	SA-8	---	10,752	---	0.5	---	---	5,376	---	5,376	0	5,376	18,300	1%	38
		---	BA-7	---	2,012	---	2.0	---	---	4,024	4,024	3,018	1,006			
		---	BA-8	---	683	---	0.5	---	---	342	342	0	342			
		Add'l Areas (MAG, AirCell, etc)		4,853	---	0.5	---	---	2,427	---	2,427	0	2,427			
MBK-G*	95,235	SA-15	---	11,949	---	0.5	---	---	5,975	---	5,975	0	5,975	52,790	2%	109
		SA-36a	---	5,555	---	0.5	---	---	2,778	---	2,778	0	2,778			
		SA-36b	---	1,635	---	0.5	---	---	818	---	818	0	818			
		SA-36c	---	13,667	---	0.5	---	---	6,834	---	6,834	0	6,834			
		---	BA-47a**	---	1,010	---	2.0	---	---	2,072	2,072	1,554	518			
		---	BA-47**	---	11,257	---	2.0	---	---	23,078	23,078	17,309	5,770			
		Add'l Areas (MAG, AirCell, etc)		7,717	---	0.5	---	---	3,859	---	3,859	0	3,859			
N†	158,057	SA-31	---	60,906	---	0.5	---	(537)	29,916	---	29,916	0	29,916	156,149	5%	322
		SA-32	---	50,519	---	0.5	---	(20,063)	5,197	---	5,197	0	5,197			
		---	BA-37	---	1,077	---	0.5	(418)	---	121	121	0	121			
		---	BA-38	---	2,116	---	0.5	(1,029)	---	29	29	0	29			
		---	BA-39	---	15,269	---	2.0	(8,241)	---	22,298	22,298	16,723	5,574			
		Add'l Areas (MAG, AirCell, etc)		26,262	---	0.5	---	---	13,131	---	13,131	0	13,131			
O*	185,518	SA-32	---	959	---	0.5	---	(479)	1	---	1	0	1	117,075	3%	241
		SA-33a	---	13,703	---	0.5	---	(5,025)	1,827	---	1,827	0	1,827			
		SA-33b	---	3,751	---	0.5	---	(1,876)	0	---	0	0	0			
		Add'l Areas (MAG, AirCell, etc)		98,662	---	0.5	---	---	49,331	---	49,331	0	49,331			
P†	77,893	SA-21a	---	27,294	---	0.5	---	---	13,647	---	13,647	0	13,647	64,285	2%	132
		---	BA-28	---	7,096	---	1.3	---	---	9,225	9,225	5,677	3,548			
		---	BA-29	---	4,305	---	2.0	---	---	8,611	8,611	6,458	2,153			
		Add'l Areas (MAG, AirCell, etc)		25,590	---	0.5	---	---	12,795	---	12,795	0	12,795			
Q*	75,099	SA-22	---	3,476	---	0.5	---	---	1,739	---	1,739	0	1,739	74,709	2%	154
		SA-23	---	11,184	---	0.5	---	---	5,592	---	5,592	0	5,592			
		SA-31	---	7,645	---	0.5	---	---	3,823	---	3,823	0	3,823			
		---	BA-30	---	6,646	---	1.1	---	---	7,311	7,311	3,988	3,323			
		---	BA-31	---	14,004	---	0.8	---	---	11,204	11,204	4,202	7,003			
		---	BA-32	---	645	---	2.0	---	---	1,290	1,290	968	323			
		---	BA-33	---	1,467	---	0.5	---	---	734	734	0	734			
		Add'l Areas (MAG, AirCell, etc)		29,642	---	0.5	---	---	14,821	---	14,821	0	14,821			
R*	70,175	SA-23	---	6,724	---	0.5	---	---	3,363	---	3,363	0	3,363	69,446	2%	143
		SA-24	---	34,733	---	0.5	---	(860)	16,507	---	16,507	0	16,507			
		SA-25a	---	399	---	0.5	---	---	200	---	200	0	200			
		SA-31	---	965	---	0.5	---	---	483	---	483	0	483			
		---	BA-31	---	4,779	---	0.8	---	---	3,824	3,824	1,434	2,390			
		---	BA-34	---	1,106	---	0.5	(197)	---	357	357	0	357			
		Add'l Areas (MAG, AirCell, etc)		20,740	---	0.5	---	---	10,370	---	10,370	0	10,370			
S*	92,670	SA-20a	---	35,378	---	0.5	---	---	17,690	---	17,690	0	17,690	90,690	3%	187
		SA-20b	---	1,642	---	0.5	---	---	821	---	821	0	821			
		SA-21a	---	28,433	---	0.5	---	---	14,217	---	14,217	0	14,217			
		---	BA-25	---	2,195	---	1.0	---	---	2,195	2,195	1,098	1,098			
		---	BA-26	---	11,805	---	1.2	---	---	14,167	14,167	8,264	5,903			
		---	BA-27	---	8,670	---	2.0	---	---	17,340	17,340	13,005	4,335			
		Add'l Areas (MAG, AirCell, etc)		2,567	---	0.5	---	---	1,284	---	1,284	0	1,284			
W*	98,880	SA-25a	---	4,086	---	0.5	---	(401)	1,642	---	1,642	0	1,642	64,590	2%	133
		SA-25b	---	2,426	---	0.5	---	---	1,214	---	1,214	0	1,214			
		SA-29	---	8,829	---	0.5	---	(73)	4,342	---	4,342	0	4,342			
		SA-30	---	824	---	0.5	---	(412)	0	---	0	0	0			
		SA-32	---	835	---	0.5	---	(418)	0	---	0	0	0			
		---	BA-35a**	---	9,843	---	2.0	---	---	20,179	20,179	15,134	5,045			
		---	BA-35b	---	16,433	---	0.7	---	---	11,503	11,503	3,287	8,216			
		Add'l Areas (MAG, AirCell, etc)		21,314	---	0.5	---	---	10,657	---	10,657	0	10,657			
WWTP	1,499,333	SA-38	---	50,001	---	0.5	---	---	25,001	---	25,001	0	25,001	50,001	1%	103
X*	91,228	SA-27	---	668	---	0.5	---	---	334	---	334	0	334	46,987	1%	97
		SA-28a	---	18,663	---	0.5	---	---	9,332	---	9,332	0	9,332			
		SA-28b	---	2,553	---	0.5	---	---	1,277	---	1,277	0	1,277			
		Add'l Areas (MAG, AirCell, etc)		25,103	---	0.5	---	---	12,552	---	12,552	0	12,552			
Y*	137,170	SA-1b	---	47	---	0.5	---	---	24	---	24	0	24	79,481	2%	164
		SA-1c	---	977	---	0.5	---	---	489	---	489	0	489			
		SA-3	---	616	---	0.5	---	---	308	---	308	0	308			
		Add'l Areas (MAG, AirCell, etc)		77,841	---	0.5	---	---	38,921	---	38,921	0	38,921			
Z*	80,588	SA-24	---	8,971	---	0.5	---	---	4,486	---	4,486	0	4,486	48,622	1%	100
		SA-25a	---	15,259	---	0.5	---	(192)	7,438	---	7,438	0	7,438			
		SA-26	---	601	---	0.5	---	---	301	---	301	0	301			
		---	BA-35a**	---	14,206	---	2.0	---	---	29,123	29,123	21,842	7,281			
		---	BA-35b	---	4,663	---	0.7	---	---	3,264	3,264	933	2,331			
		Add'l Areas (MAG, AirCell, etc)		4,922	---	0.5	---	---	2,461	---	2,461	0	2,461			
Existing Repository Cover[11]		---	---	93,750	---	---	---	---	---	---	0	46,875	46,875	---	---	---
		SA-1a	---	16	---	0.5	---	---	8	---	8	0	8	103,049	3.0%	212
		SA-2	---	193	---	0.5	---	---	97	---	97	0	97			
		SA-5	---	3,939	---	0.5	---	---	1,970	---	1,970	0	1,970			
		SA-6	---	111	---	0.5	---	---	56	---	56	0	56			
		SA-7	---	2,179	---	0.5	---	---	1,090	---	1,090	0	1,090			
		SA-8	---	2,371	---	0.5	---	---	1,186	---	1,186	0	1,186			
		SA-9a	---	9,263	---	0.5	---	---	4,632	---	4,632	0	4,632			
		SA-10	---	146	---	0.5	---	---	74	---	74	0	74			
		SA-11	---	2,267	---	0.5	---	---	1,134	---	1,134	0	1,134			
		SA-12a	---	12,431	---	0.5	---	---	6,216	---	6,216	0	6,216			
		SA-12b	---	37	---	0.5	---	---	19	---	19	0	19			
		SA-15	---	9,393	---	0.5	---	---	4,697	---	4,697	0	4,697			
		SA-16	---	52	---	0.5	---	---	26	---	26	0	26			
		SA-20a	---	8,883	---	0.5	---	---	4,442	---	4,442	0	4,442			
		SA-21a	---	8,899	---	0.5	---	---	4,450	---	4,450	0	4,450			
		SA-23	---	2,634	---	0.5	---	---	1,317	---	1,317	0	1,317			
		SA-24	---	1,000	---	0.5	---	---	500	---	500	0	500			
		SA-25a	---	14	---	0.5	---	---	7	---	7	0	7			
		SA-28a	---	262	---	0.5	---	---	132	---	132	0	132			
		SA-28b	---	378	---	0.5	---	---	189	---	189	0	189			
		SA-30	---	15	---	0.5	---	(8)	0	---	0	0	0			
		SA-32	---	106	---	0.5	---	(11)	43	---	43	0	43			
		SA-34	---	1,022	---	0.5	---	---	512	---	512	0	512			
		SA-35	---	4,256	---	0.5	---	---	2,129	---	2,129	0	2,129			
		SA-36a	---	3,870	---	0.5	---	---	1,935	---	1,935	0	1,935			
		SA-36c	---	7,647	---	0.5	---	---	3,824	---	3,824	0	3,824			
		SA-39	---	967	---	0.5	---	---	484	---	484	0	484			
		SA-40	---	3,797	---	0.5	---	---	1,899	---	1,899	0	1,899			
		SA-41	---	1,884	---	0.5	---	---	943	---	943	0	943			
		---	BA-6	---	2,433	---	2.0	---	---	4,866	4,866	3,650	1,217			
		---	BA-25	---	3,127	---	1.0	---	---	3,127	3,127	1,564	1,564			
		---	BA-26	---	7,032	---	1.2	---	---	8,439	8,439	4,923	3,516			
		Add'l Areas (MAG, AirCell, etc)		2,424	---	0.5	---	---	1,212	---	1,212	0	1,212			
Total	**12,169,100**			**2,987,200**	**505,000**			**(143,100)**	**1,344,000**	**932,300**	**2,276,300**	**1,929,600**	**1,785,800**	**3,398,400**	**100%**	**7,000**

Notes:

1. Depth of buried ACM debris at BA-1 assumed to be same as at BA-2. Both BA-1 and BA-2 are under parcel AG.
2. See Section 4.1.8.2 of RI for ACM volumes at BA-21 (under parcel H).
3. Depth of Surface ACM Removal, FT: **0.5**
4. Depth of Topsoil, FT: **0.5**
6. Surface ACM Area is accounted with the Buried ACM Area when there is an overlap in excavation.
7. All volumes and areas are rounded up to the nearest whole number
10. Topsoil depth is 6 inches; Common Backfill depth varies with excavation depth.
11. Existing repository will be covered with 6 inches of common backfill and 6 inches of topsoil.

* Indicates properties no longer occupied

† Indicates that property is privately owned.

-Location of Onsite Consolidation Area - No Excavation Activity

Alternative 5a: ACM Volume Calculations for Future Excavation Events				
Total Volume of ACM - 30-Year Linear Removal Rate[1]		Assumed Reduction (50%) in Volume of ACM (ft^3)	Percent Volumes	
Year	Linear Volume Reduction (ft^3)		Percent Volume w.r.t Total Volume	Percent Volume w.r.t Yr. 1 Volume
1 Year	450	225	6.43%	
2 Year	435	217.5	6.21%	96.67%
3 Year	420	210	6.00%	93.33%
4 Year	405	202.5	5.79%	90.00%
5 Year	390	195	5.57%	86.67%
6 Year	375	187.5	5.36%	83.33%
7 Year	360	180	5.14%	80.00%
8 Year	345	172.5	4.93%	76.67%
9 Year	330	165	4.71%	73.33%
10 Year	315	157.5	4.50%	70.00%
11 Year	300	150	4.29%	66.67%
12 Year	285	142.5	4.07%	63.33%
13 Year	270	135	3.86%	60.00%
14 Year	255	127.5	3.64%	56.67%
15 Year	240	120	3.43%	53.33%
16 Year	225	112.5	3.21%	50.00%
17 Year	210	105	3.00%	46.67%
18 Year	195	97.5	2.79%	43.33%
19 Year	180	90	2.57%	40.00%
20 Year	165	82.5	2.36%	36.67%
21 Year	150	75	2.14%	33.33%
22 Year	135	67.5	1.93%	30.00%
23 Year	120	60	1.71%	26.67%
24 Year	105	52.5	1.50%	23.33%
25 Year	90	45	1.29%	20.00%
26 Year	75	37.5	1.07%	16.67%
27 Year	60	30	0.86%	13.33%
28 Year	45	22.5	0.64%	10.00%
29 Year	30	15	0.43%	6.67%
30 Year	15	7.5	0.21%	3.33%
Total	**7,000**	**3,500**	**100.00%**	

Notes;

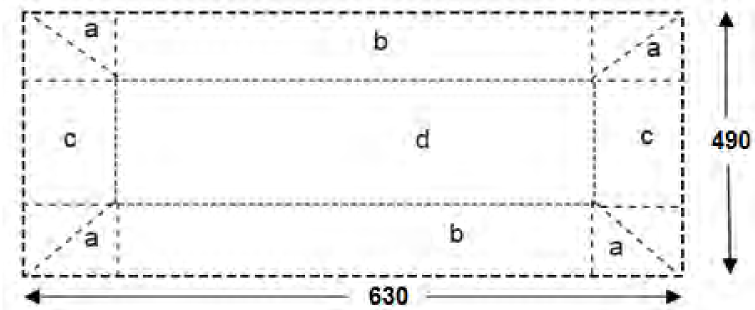
1. A starting average of 450 ft^3 total surficial ACM was calculated from historic data from 2002 to 2005.

	Average Volume (CF)	Average Volume (CY)	Average Volume (LCY)
Years through 1 to 10	191.25	8.0	10.0
Years through 11 to 20	116.25	5.0	6.0
Years through 21 to 30	41.25	2.0	3.0

Onsite Consolidation Areas

Consolidation Area 1:

1. Capacity of Each Landfill:



Landfill Capacity - Active

Given:

1. Landfill to be placed in Parcel ID: MBK-D and L

2. Footprint of the landfill will be defined by the Parcel boundaries.

Assume:

1. Maximum height of Waste Material:		14	ft
2. Maximum slope < 20%	Current:	14%	

Total Capacity

Calculations:

a. Pyramid

V=	$1/3b^2h$	b=	200	ft
V=	186,667 ft^3	h=	14	ft

b. Large Wedge X2

V=	1/2bhl * 2	b=	100	ft
V=	602,000 ft^3	h=	14	ft
		l=	430	ft

c. Small Wedge X2

V=	1/2bhl * 2	b=	100	ft
V=	406,000 ft^3	h=	14	ft
		l=	290	ft

d. Rectangular Prism

V=	bhl	b=	290	ft
V=	1,745,800 ft^3	h=	14	ft
		l=	430	ft

$V_{capacity\ 1}$ = 2,940,467 ft^3

Total $V_{capacity\ 1}$ = 2,940,467 ft^3

Volume Check = **Good**

2. Filling the Landfills:

Volume of Waste - Site				
V_{waste} = 2,276,300 ft^3	***259,498,200***	***lbs***	***129,749***	***tons***

Volume of Common Fill - (Combined Active Landfill)

The Landfill will be filled using the following assumptions:

1. Number of Years to Complete:	2	years
2. Work from April 1 until November 30:	8	months
3. 4 Days off per month in 30 days months:	26	per month
4. Number of working days:	208	days
5. Dump Trucks per day:	16	trucks/day
6. Tons per truck:	20	ton
6. Soil Bulk weight:	114	lbs/ft^3
7. Stock each day (lift) in ft:	2	ft
8. Common Fill cover per day:	*0.5*	*ft*

Tons per day:	312	tons
Lbs per day:	623,794	lbs
Ft^3 per day:	5,472	ft^3
Area Needing Fill:	2,736	ft^2
6 inches of fill each day:	1,368	ft^3
Fill 1-Year:	284,538	ft^3
Fill Completion:	569,075	ft^3

$V_{common\ fill}$ = 569,075 ft^3	$V_{capacity\ needed}$ = 2,845,375 ft^3

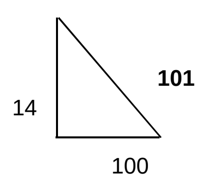
3. Covering the Landfills:

Volume of Fill - (Inactive Landfill)

Consolidation Area 1:

Inactive landfill cover - 2.0 feet common fill, 6 inches composite (for vegetation)

Surface Area (a)
Sides: 8
sh= **101**
b= 100
SA= 0.5(b*h)
40,390 ft^2



Surface Area (b)
Sides: 2
l= 430
sh= **101**
SA= h*l
86,839 ft^2

Surface Area (c)
Sides: 2
l= 290
sh= **101**
SA= h*l
58,566 ft^2

Surface Area (d)
Sides: 1
b= 290
l= 430
SA= h*l
124,700 ft^2

V_{Common} = 620,989 ft^3	*Common Fill Final Cover =*	*2*	*ft*
$V_{Topsoil}$ = 155,247 ft^3	*Topsoil Fill Final Cover =*	*0.5*	*ft*

Note:
Final elevation of the landfill including cover: 16.5 ft

Total Surface Area= 310,494 ft^2

4. Summary of Materials and Landfill Final Height

Landfill Final Height	
Consolidation Area 1	16.5 ft

Summary of Materials	
Material Summary	Volume
Total Excavated Soil:	2,276,300 ft^3
Total Common Fill (Active Landfills):	569,075 ft^3
Total Common Fill (Inactive Landfills):	620,989 ft^3
Total Common Fill:	1,190,064 ft^3
Total Topsoil/Mulch (Inactive Landfills):	155,247 ft^3

Alternative 5b

Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

Alternative 5b: Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

Parcel IDs	Total Parcel Area	Surficial ID	Burial ID	Total Area Excavated[4]			Excavation Depth			Excavation Volume				Total Volume Removed[4]	Backfill Volume[7]	
				Surficial ACM Area[3]	Buried ACM Area	Pipe Insulation ACM[5,6]	Surficial ACM Area	Buried ACM Area	Pipe Insulation ACM[5]	Volume Removed During 2008	Surficial ACM Volume	Buried ACM Volume	Pipe Insulation ACM[5]		Common Fill	Topsoil
	SF			SF	SF	SF	FT	FT	FT	CF	CF	CF	CF	CF	CF	CF
A*	240,463	SA-15	---	72,529	---	---	0.5	---	---	---	36,265	---	---	36,265	0	36,265
		SA-42	---	418	---	---	0.5	---	---	---	209	---	---	209	0	209
		SA-43	---	0	---	---	0.5	---	---	---	0	---	---	0	0	0
		---	BA-46**	---	9,620	---	---	4.8	---	---	---	46,839	---	46,839	41,909	4,930
		---	---	---	---	1,533	---	---	4.0	---	---	---	8,156	8,156	7,136	1,019
		Add'l Areas (MAG, AirCell, etc)		18,614	---	---	0.5	---	---	---	9,307	---	---	9,307	0	9,307
		Arsenic Contamination[11]		---	26,211	---	---	10.0	---	---	---	268,663	---	268,663	255,230	13,433
AG*	206,876	SA-1a	---	52,654	---	---	0.5	---	---	---	26,327	---	---	26,327	0	26,327
		SA-1b	---	88	---	---	0.5	---	---	---	45	---	---	45	0	45
		SA-1c	---	224	---	---	0.5	---	---	---	113	---	---	113	0	113
		SA-1d	---	4,652	---	---	0.5	---	---	---	2,326	---	---	2,326	0	2,326
		SA-4	---	17,328	---	---	0.5	---	---	---	8,664	---	---	8,664	0	8,664
		---	BA-1[1]	---	3,030	---	---	2.4	---	---	---	7,274	---	7,274	5,759	1,515
		---	BA-2	---	18,518	---	---	2.4	---	---	---	44,444	---	44,444	35,185	9,259
		---	---	---	---	597	---	---	4.0	---	---	---	3,176	3,176	2,779	397
		Add'l Areas (MAG, AirCell, etc)		9,471	---	---	0.5	---	---	---	4,736	---	---	4,736	0	4,736
AI*	106,100	SA-5	---	98,040	---	---	0.5	---	---	---	49,020	---	---	49,020	0	49,020
		---	BA-6	---	7,124	---	---	2.0	---	---	---	14,249	---	14,249	10,687	3,562
		Add'l Areas (MAG, AirCell, etc)		936	---	---	0.5	---	---	---	468	---	---	468	0	468
AK†	52,008	SA-40	---	17,892	---	---	0.5	---	---	(2,539)	6,407	---	---	6,407	0	6,407
		---	---	---	---	108	---	---	4.0	---	---	---	575	575	503	72
		Add'l Areas (MAG, AirCell, etc)		41	---	---	0.5	---	---	---	21	---	---	21	0	21
AL*	117,290	SA-5	---	108,197	---	---	0.5	---	---	---	54,099	---	---	54,099	0	54,099
		---	BA-5**	---	4,081	---	---	4.0	---	---	---	16,732	---	16,732	14,641	2,092
		---	---	---	---	1,653	---	---	4.0	---	---	---	8,794	8,794	7,695	1,099
		Add'l Areas (MAG, AirCell, etc)		3,359	---	---	0.5	---	---	---	1,680	---	---	1,680	0	1,680
AM†	164,124	SA-41	---	32,611	---	---	0.5	---	---	(7,984)	8,322	---	---	8,322	0	8,322
		---	BA-48	---	4,630	---	---	0.5	---	(1,127)	---	1,188	---	1,188	0	1,188
		Add'l Areas (MAG, AirCell, etc)		38,812	---	---	0.5	---	---	---	19,406	---	---	19,406	0	19,406
AP*	124,269	SA-1a	---	2,157	---	---	0.5	---	---	---	1,079	---	---	1,079	0	1,079
		SA-1b	---	1,395	---	---	0.5	---	---	---	698	---	---	698	0	698
		SA-45	---	22	---	---	0.5	---	---	---	11	---	---	11	0	11
		Add'l Areas (MAG, AirCell, etc)		120,695	---	---	0.5	---	---	---	60,348	---	---	60,348	0	60,348
AQ†	117,216	Add'l Areas (MAG, AirCell, etc)		44,461	---	---	0.5	---	---	---	22,231	---	---	22,231	0	22,231
AR†	507,189	Add'l Areas (MAG, AirCell, etc)		48,927	---	---	0.5	---	---	---	24,464	---	---	24,464	0	24,464
AS†	240,028	Add'l Areas (MAG, AirCell, etc)		15,309	---	---	0.5	---	---	---	7,655	---	---	7,655	0	7,655
AT†	28,098	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
		---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
AU†	28,077	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
		---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
AV†	21,236	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
		---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
AW†	21,844	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
AX†	19,905	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
AY†	19,628	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
AZ†	18,949	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
B*	244,982	SA-12a	---	19,410	---	---	0.5	---	---	---	9,705	---	---	9,705	0	9,705
		SA-15	---	31,402	---	---	0.5	---	---	---	15,701	---	---	15,701	0	15,701
		SA-17	---	873	---	---	0.5	---	---	---	437	---	---	437	0	437
		SA-18	---	3,659	---	---	0.5	---	---	---	1,830	---	---	1,830	0	1,830
		SA-19	---	35,606	---	---	0.5	---	---	---	17,804	---	---	17,804	0	17,804
		---	BA-23	---	2,430	---	---	1.0	---	---	---	2,430	---	2,430	1,215	1,215
		---	BA-24	---	1,879	---	---	0.8	---	---	---	1,503	---	1,503	564	939
		---	---	---	---	411.0	---	---	4.0	---	---	---	2,187	2,187	1,913	273
		Add'l Areas (MAG, AirCell, etc)		32,410	---	---	0.5	---	---	---	16,205	---	---	16,205	0	16,205
BA†	34,200	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
BB†	20,111	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
		---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
BC†	29,744	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
BJ†	44,403	Add'l Areas (MAG, AirCell, etc)		11,560	---	---	0.5	---	---	---	5,780	---	---	5,780	0	5,780
BK†	224,527	Add'l Areas (MAG, AirCell, etc)		8,915	---	---	0.5	---	---	---	4,458	---	---	4,458	0	4,458
BL*	78,546	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
BM†	95,935	SA-37	---	13,743	---	---	0.5	---	---	(625)	6,247	---	---	6,247	0	6,247
		---	---	---	---	609.0	---	---	4.0	---	---	---	3,240	3,240	2,835	405
		Add'l Areas (MAG, AirCell, etc)		21,233	---	---	0.5	---	---	---	10,617	---	---	10,617	0	10,617
BO†	36,614	SA-39	---	9,077	---	---	0.5	---	---	(2,457)	2,082	---	---	2,082	0	2,082
		---	---	---	---	138.0	---	---	4.0	---	---	---	734	734	642	92
		Add'l Areas (MAG, AirCell, etc)		798	---	---	0.5	---	---	---	399	---	---	399	0	399
BP†	360,993	Add'l Areas (MAG, AirCell, etc)		180,297	---	---	0.5	---	---	---	90,149	---	---	90,149	0	90,149
BQ†	168,008	Add'l Areas (MAG, AirCell, etc)		44,691	---	---	0.5	---	---	---	22,346	---	---	22,346	0	22,346
BR†	434,134	Add'l Areas (MAG, AirCell, etc)		12,766	---	---	0.5	---	---	---	6,383	---	---	6,383	0	6,383
BS†	279,890	SA-36a	---	16,166	---	---	0.5	---	---	---	8,084	---	---	8,084	0	8,084
C*	99,399	SA-9a	---	34,770	---	---	0.5	---	---	(2,424)	14,961	---	---	14,961	0	14,961
		SA-9b	---	5,147	---	---	0.5	---	---	---	2,574	---	---	2,574	0	2,574
		---	BA-10a**	---	7,771	---	---	8.7	---	(2,543)	---	66,484	---	66,484	62,648	3,836
		---	BA-10b	---	4,108	---	---	1.3	---	---	---	5,341	---	5,341	3,287	2,054
		---	BA-10c	---	3,748	---	---	1.5	---	(5,008)	---	615	---	615	410	205
		---	---	---	---	1,374	---	---	4.0	---	---	---	7,310	7,310	6,396	914
		Add'l Areas (MAG, AirCell, etc)		8,781	---	---	0.5	---	---	---	4,391	---	---	4,391	0	4,391
D*	103,036	SA-9a	---	38,913	---	---	0.5	---	---	---	19,457	---	---	19,457	0	19,457
		SA-9b	---	1,292	---	---	0.5	---	---	---	646	---	---	646	0	646
		---	BA-9	---	1,227	---	---	1.0	---	---	---	1,227	---	1,227	614	614
		---	---	---	---	774	---	---	4.0	---	---	---	4,118	4,118	3,603	515
E*	129,710	SA-9a	---	41,195	---	---	0.5	---	---	(12,337)	8,261	---	---	8,261	0	8,261
		SA-10	---	4,621	---	---	0.5	---	---	---	2,311	---	---	2,311	0	2,311
		SA-44	---	30	---	---	0.5	---	---	---	15	---	---	15	0	15
		---	BA-11	---	1,929	---	---	1.0	---	---	---	1,930	---	1,930	965	965
		---	BA-12	---	13,843	---	---	1.8	---	---	---	24,917	---	24,917	17,996	6,921
		---	BA-13	---	1,947	---	---	1.0	---	(1,643)	---	304	---	304	152	152
		---	---	---	---	126	---	---	4.0	---	---	---	670	670	587	84
		Add'l Areas (MAG, AirCell, etc)		14,262	---	---	0.5	---	---	---	7,131	---	---	7,131	0	7,131
F†	146,193	SA-11	---	53,811	---	---	0.5	---	---	(11,958)	14,948	---	---	14,948	0	14,948
		SA-12a	---	37,483	---	---	0.5	---	---	(12,750)	5,992	---	---	5,992	0	5,992
		SA-12b	---	25,135	---	---	0.5	---	---	(8,123)	4,445	---	---	4,445	0	4,445
		---	BA-14	---	1,670	---	---	1.0	---	(647)	---	1,024	---	1,024	512	512
		---	BA-15a**	---	448	---	---	8.0	---	---	---	3,674	---	3,674	3,444	230
		---	BA-15**	---	3,722	---	---	8.0	---	(3,717)	---	26,802	---	26,802	25,127	1,675
		---	BA-16	---	2,846	---	---	2.5	---	(4,515)	---	2,602	---	2,602	2,082	520
		---	BA-17	---	831	---	---	1.0	---	(425)	---	407	---	407	204	204
		---	BA-18	---	1,664	---	---	1.5	---	(264)	---	2,232	---	2,232	1,488	744
		---	---	---	---	1,278	---	---	4.0	---	---	---	6,799	6,799	5,949	850
		Add'l Areas (MAG, AirCell, etc)		17,304	---	---	0.5	---	---	---	8,652	---	---	8,652	0	8,652
G*	173,258	SA-11	---	2,641	---	---	0.5	---	---	---	1,321	---	---	1,321	0	1,321
		SA-12a	---	43,005	---	---	0.5	---	---	(1,593)	19,910	---	---	19,910	0	19,910
		---	BA-19	---	1,600	---	---	0.5	---	---	---	801	---	801	0	801
		---	BA-20a**	---	13,653	---	---	9.0	---	---	---	125,952	---	125,952	118,955	6,997
		---	BA-20b**	---	2,442	---	---	9.0	---	---	---	22,530	---	22,530	21,278	1,252
		---	---	---	---	591	---	---	4.0	---	---	---	3,144	3,144	2,751	393
		Add'l Areas (MAG, AirCell, etc)		19,221	---	---	0.5	---	---	---	9,611	---	---	9,611	0	9,611
H*	3,901,362	SA-12a	---	20,533	---	---	0.5	---	---	---	10,267	---	---	10,267	0	10,267
		SA-13	---	12,650	---	---	0.5	---	---	---	6,325	---	---	6,325	0	6,325
		SA-14	---	58,649	---	---	0.5	---	---	---	29,325	---	---	29,325	0	29,325
		SA-15	---	52,756	---	---	0.5	---	---	---	26,379	---	---	26,379	0	26,379
		SA-16	---	57,284	---	---	0.5	---	---	---	28,643	---	---	28,643	0	28,643
		---	BA-20b**	---	3,731	---	---	9.0	---	---	---	34,417	---	34,417	32,505	1,912
		---	BA-21[2**]	---	36,786	---	---	6.5	---	---	---	246,031	---	246,031	227,178	18,853
		---	BA-22	---	15,251	---	---	2.0	---	---	---	30,503	---	30,503	22,877	7,626
		---	---	---	---	372	---	---	4.0	---	---	---	1,979	1,979	1,732	247
		Add'l Areas (MAG, AirCell, etc)		30,997	---	---	0.5	---	---	---	15,499	---	---	15,499	0	15,499
L*	170,977	SA-21a	---	Onsite Consolidation Area 1			Onsite Consolidation Area 1			Onsite Consolidation Area 1				0	694,392	77,998
		SA-34	---													
		---	BA-40													
		---	BA-41													
		---	BA-42													
		---	BA-43a													
		---	BA-43b													

Alternative 5b: Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring																
Parcel IDs	Total Parcel Area	Surficial ID	Burial ID	Total Area Excavated[4]			Excavation Depth			Excavation Volume				Total Volume Removed[4]	Backfill Volume[7]	
				Surficial ACM Area[3]	Buried ACM Area	Pipe Insulation ACM[5,6]	Surficial ACM Area	Buried ACM Area	Pipe Insulation ACM[5]	Volume Removed During 2008	Surficial ACM Volume	Buried ACM Volume	Pipe Insulation ACM[5]		Common Fill	Topsoil
	SF			SF	SF	SF	FT	FT	FT	CF	CF	CF	CF	CF	CF	CF
M*	103,851	SA-25a	---	914	---	---	0.5	---	---	(457)	1	---	---	1	0	1
		SA-30	---	474	---	---	0.5	---	---	(237)	0	---	---	0	0	0
		SA-32	---	24,634	---	---	0.5	---	---	(8,927)	3,391	---	---	3,391	0	3,391
		---	BA-36	---	9,044	---	---	1.3	---	(10,540)	---	1,217	---	1,217	749	468
		---	---	---	---	1,941	---	---	6.0	---	---	---	15,489	15,489	14,198	1,291
		Add'l Areas (MAG, AirCell, etc)		48,944	---	---	0.5	---	---	---	24,472	---	---	24,472	0	24,472
MBK-A*	81,959	SA-21a	---	17,115	---	---	0.5	---	---	---	8,558	---	---	8,558	0	8,558
		SA-21b	---	743	---	---	0.5	---	---	---	372	---	---	372	0	372
		---	BA-30	---	48,641	---	---	1.1	---	---	---	53,505	---	53,505	29,185	24,320
		---	---	---	---	1,986	---	---	4.0	---	---	---	10,566	10,566	9,245	1,321
		Add'l Areas (MAG, AirCell, etc)		13,475	---	---	0.5	---	---	---	6,738	---	---	6,738	0	6,738
MBK-B*	82,837	SA-21a	---	14,918	---	---	0.5	---	---	---	7,459	---	---	7,459	0	7,459
		SA-21c	---	847	---	---	0.5	---	---	---	424	---	---	424	0	424
		---	BA-30	---	43,764	---	---	1.1	---	---	---	48,141	---	48,141	26,259	21,882
		---	---	---	---	1,347	---	---	4.0	---	---	---	7,166	7,166	6,270	896
		Add'l Areas (MAG, AirCell, etc)		21,961	---	---	0.5	---	---	---	10,981	---	---	10,981	0	10,981
MBK-C*	79,369	SA-21a	---	1,663	---	---	0.5	---	---	---	832	---	---	832	0	832
		SA-21d	---	0	---	---	0.5	---	---	---	0	---	---	0	0	0
		SA-23	---	1,667	---	---	0.5	---	---	---	834	---	---	834	0	834
		---	BA-30	---	50,396	---	---	1.1	---	---	---	55,437	---	55,437	30,238	25,199
		---	---	---	---	1,431	---	---	4.0	---	---	---	7,613	7,613	6,661	952
		Add'l Areas (MAG, AirCell, etc)		24,212	---	---	0.5	---	---	---	12,106	---	---	12,106	0	12,106
MBK-D*	126,679	SA-21a	---	Onsite Consolidation Area 1			Onsite Consolidation Area 1			Onsite Consolidation Area 1				0	694,392	77,998
		SA-35	---													
		---	BA-26													
		---	BA-44**													
		---	BA-45													
MBK-E*	132,121	SA-5	---	129,312	---	---	0.5	---	---	---	64,656	---	---	64,656	0	64,656
		---	BA-3	---	1,017	---	---	0.5	---	---	---	509	---	509	0	509
		---	BA-4	---	1,472	---	---	0.5	---	---	---	736	---	736	0	736
		---	---	---	---	1,593	---	---	4.0	---	---	---	8,475	8,475	7,415	1,059
		Existing Repository		(21,676)	---	---	0.5	---	---	---	(10,838)	---	---	(10,838)	0	-10,838
MBK-F*	91,207	SA-8	---	10,752	---	---	0.5	---	---	---	5,376	---	---	5,376	0	5,376
		---	BA-7	---	2,012	---	---	3.5	---	---	---	7,042	---	7,042	6,036	1,006
		---	BA-8	---	683	---	---	0.5	---	---	---	342	---	342	0	342
		---	---	---	---	207	---	---	4.0	---	---	---	1,101	1,101	964	138
		Add'l Areas (MAG, AirCell, etc)		4,853	---	---	0.5	---	---	---	2,427	---	---	2,427	0	2,427
MBK-G*	95,235	SA-15	---	11,949	---	---	0.5	---	---	---	5,975	---	---	5,975	0	5,975
		SA-36a	---	5,555	---	---	0.5	---	---	---	2,778	---	---	2,778	0	2,778
		SA-36b	---	1,635	---	---	0.5	---	---	---	818	---	---	818	0	818
		SA-36c	---	13,667	---	---	0.5	---	---	---	6,834	---	---	6,834	0	6,834
		---	BA-47a**	---	1,010	---	---	10.0	---	---	---	10,357	---	10,357	9,839	518
		---	BA-47**	---	11,257	---	---	6.0	---	---	---	69,232	---	69,232	63,463	5,769
		---	---	---	---	531	---	---	4.0	---	---	---	2,825	2,825	2,472	353
		Add'l Areas (MAG, AirCell, etc)		7,717	---	---	0.5	---	---	---	3,859	---	---	3,859	0	3,859
N[†]	158,057	SA-31	---	60,906	---	---	0.5	---	---	(537)	29,916	---	---	29,916	0	29,916
		SA-32	---	50,519	---	---	0.5	---	---	(20,063)	5,197	---	---	5,197	0	5,197
		---	BA-37	---	1,077	---	---	0.5	---	(418)	---	121	---	121	0	121
		---	BA-38	---	2,116	---	---	0.5	---	(1,029)	---	29	---	29	0	29
		---	BA-39	---	15,269	---	---	2.0	---	(8,241)	---	22,298	---	22,298	16,723	5,574
		---	---	---	---	1,908	---	---	4.0	---	---	---	10,151	10,151	8,882	1,269
		Add'l Areas (MAG, AirCell, etc)		26,262	---	---	0.5	---	---	---	13,131	---	---	13,131	0	13,131
O*	185,518	SA-32	---	959	---	---	0.5	---	---	(479)	1	---	---	1	0	1
		SA-33a	---	13,703	---	---	0.5	---	---	(5,025)	1,827	---	---	1,827	0	1,827
		SA-33b	---	3,751	---	---	0.5	---	---	(1,876)	0	---	---	0	0	0
		---	---	---	---	1,155	---	---	6.0	---	---	---	9,217	9,217	8,449	768
		Add'l Areas (MAG, AirCell, etc)		98,662	---	---	0.5	---	---	---	49,331	---	---	49,331	0	49,331
P[†]	77,893	SA-21a	---	27,294	---	---	0.5	---	---	---	13,647	---	---	13,647	0	13,647
		---	BA-28	---	7,096	---	---	1.3	---	---	---	9,225	---	9,225	5,677	3,548
		---	BA-29	---	4,305	---	---	2.0	---	---	---	8,611	---	8,611	6,458	2,153
		---	---	---	---	1,530	---	---	4.0	---	---	---	8,140	8,140	7,122	1,017
		Add'l Areas (MAG, AirCell, etc)		25,590	---	---	0.5	---	---	---	12,795	---	---	12,795	0	12,795
Q*	75,099	SA-22	---	3,476	---	---	0.5	---	---	---	1,739	---	---	1,739	0	1,739
		SA-23	---	11,184	---	---	0.5	---	---	---	5,592	---	---	5,592	0	5,592
		SA-31	---	7,645	---	---	0.5	---	---	---	3,823	---	---	3,823	0	3,823
		---	BA-30	---	6,646	---	---	1.1	---	---	---	7,311	---	7,311	3,988	3,323
		---	BA-31	---	14,004	---	---	0.8	---	---	---	11,204	---	11,204	4,202	7,003
		---	BA-32	---	645	---	---	2.0	---	---	---	1,290	---	1,290	968	323
		---	BA-33	---	1,467	---	---	0.5	---	---	---	734	---	734	0	734
		---	---	---	---	390	---	---	4.0	---	---	---	2,075	2,075	1,815	259
		Add'l Areas (MAG, AirCell, etc)		29,642	---	---	0.5	---	---	---	14,821	---	---	14,821	0	14,821
R*	70,175	SA-23	---	6,724	---	---	0.5	---	---	---	3,363	---	---	3,363	0	3,363
		SA-24	---	34,733	---	---	0.5	---	---	(860)	16,507	---	---	16,507	0	16,507
		SA-25a	---	399	---	---	0.5	---	---	---	200	---	---	200	0	200
		SA-31	---	965	---	---	0.5	---	---	---	483	---	---	483	0	483
		---	BA-31	---	4,779	---	---	0.8	---	---	---	3,824	---	3,824	1,434	2,390
		---	BA-34	---	1,106	---	---	0.5	---	(197)	---	357	---	357	0	357
		---	---	---	---	729	---	---	4.0	---	---	---	3,878	3,878	3,393	485
		Add'l Areas (MAG, AirCell, etc)		20,740	---	---	0.5	---	---	---	10,370	---	---	10,370	0	10,370
S*	92,670	SA-20a	---	35,378	---	---	0.5	---	---	---	17,690	---	---	17,690	0	17,690
		SA-20b	---	1,642	---	---	0.5	---	---	---	821	---	---	821	0	821
		SA-21a	---	28,433	---	---	0.5	---	---	---	14,217	---	---	14,217	0	14,217
		---	BA-25	---	2,195	---	---	1.0	---	---	---	2,195	---	2,195	1,098	1,098
		---	BA-26	---	11,805	---	---	1.2	---	---	---	14,167	---	14,167	8,264	5,903
		---	BA-27	---	8,670	---	---	2.2	---	---	---	18,785	---	18,785	14,450	4,335
		---	---	---	---	1,980	---	---	4.0	---	---	---	10,534	10,534	9,217	1,317
		Add'l Areas (MAG, AirCell, etc)		2,567	---	---	0.5	---	---	---	1,284	---	---	1,284	0	1,284
W*	98,880	SA-25a	---	4,086	---	---	0.5	---	---	(401)	1,642	---	---	1,642	0	1,642
		SA-25b	---	2,426	---	---	0.5	---	---	---	1,214	---	---	1,214	0	1,214
		SA-29	---	8,829	---	---	0.5	---	---	(73)	4,342	---	---	4,342	0	4,342
		SA-30	---	824	---	---	0.5	---	---	(412)	0	---	---	0	0	0
		SA-32	---	835	---	---	0.5	---	---	(418)	0	---	---	0	0	0
		---	BA-35a**	---	9,843	---	---	4.4	---	---	---	44,513	---	44,513	39,468	5,045
		---	BA-35b	---	16,433	---	---	0.7	---	---	---	11,503	---	11,503	3,287	8,216
		---	---	---	---	1,764	---	---	4.0	---	---	---	9,384	9,384	8,211	1,173
		Add'l Areas (MAG, AirCell, etc)		21,314	---	---	0.5	---	---	---	10,657	---	---	10,657	0	10,657
WWTP	1,499,333	SA-38	---	50,001	---	---	0.5	---	---	---	25,001	---	---	25,001	0	25,001
X*	91,228	SA-27	---	668	---	---	0.5	---	---	---	334	---	---	334	0	334
		SA-28a	---	18,663	---	---	0.5	---	---	---	9,332	---	---	9,332	0	9,332
		SA-28b	---	2,553	---	---	0.5	---	---	---	1,277	---	---	1,277	0	1,277
		---	---	---	---	372	---	---	6.0	---	---	---	2,969	2,969	2,721	247
		Add'l Areas (MAG, AirCell, etc)		25,103	---	---	0.5	---	---	---	12,552	---	---	12,552	0	12,552
Y*	137,170	SA-1b	---	47	---	---	0.5	---	---	---	24	---	---	24	0	24
		SA-1c	---	977	---	---	0.5	---	---	---	489	---	---	489	0	489
		SA-3	---	616	---	---	0.5	---	---	---	308	---	---	308	0	308
		Add'l Areas (MAG, AirCell, etc)		77,841	---	---	0.5	---	---	---	38,921	---	---	38,921	0	38,921
Z*	80,588	SA-24	---	8,971	---	---	0.5	---	---	---	4,486	---	---	4,486	0	4,486
		SA-25a	---	15,259	---	---	0.5	---	---	(192)	7,438	---	---	7,438	0	7,438
		SA-26	---	601	---	---	0.5	---	---	---	301	---	---	301	0	301
		---	BA-35a**	---	14,206	---	---	4.4	---	---	---	64,245	---	64,245	56,964	7,281
		---	BA-35b	---	4,663	---	---	0.7	---	---	---	3,264	---	3,264	933	2,331
		---	---	---	---	759	---	---	4.0	---	---	---	4,038	4,038	3,533	505
		Add'l Areas (MAG, AirCell, etc)		4,922	---	---	0.5	---	---	---	2,461	---	---	2,461	0	2,461
Existing Repository Cover[11]		---	---	93,750	---	---	---	---	---	---	---	---	---	0	46,875	46,875

Alternative 5b: Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring																
Parcel IDs	Total Parcel Area	Surficial ID	Burial ID	Total Area Excavated[4]			Excavation Depth			Excavation Volume				Total Volume Removed[4]	Backfill Volume[7]	
				Surficial ACM Area[3]	Buried ACM Area	Pipe Insulation ACM[5,6]	Surficial ACM Area	Buried ACM Area	Pipe Insulation ACM[5]	Volume Removed During 2008	Surficial ACM Volume	Buried ACM Volume	Pipe Insulation ACM[5]		Common Fill	Topsoil
	SF			SF	SF	SF	FT	FT	FT	CF	CF	CF	CF	CF	CF	CF
		SA-1a	---	16	---	---	0.5	---	---	---	8	---	---	8	0	8
		SA-2	---	193	---	---	0.5	---	---	---	97	---	---	97	0	97
		SA-5	---	3,939	---	---	0.5	---	---	---	1,970	---	---	1,970	0	1,970
		SA-6	---	111	---	---	0.5	---	---	---	56	---	---	56	0	56
		SA-7	---	2,179	---	---	0.5	---	---	---	1,090	---	---	1,090	0	1,090
		SA-8	---	2,371	---	---	0.5	---	---	---	1,186	---	---	1,186	0	1,186
		SA-9a	---	9,263	---	---	0.5	---	---	---	4,632	---	---	4,632	0	4,632
		SA-10	---	146	---	---	0.5	---	---	---	74	---	---	74	0	74
		SA-11	---	2,267	---	---	0.5	---	---	---	1,134	---	---	1,134	0	1,134
		SA-12a	---	12,431	---	---	0.5	---	---	---	6,216	---	---	6,216	0	6,216
		SA-12b	---	37	---	---	0.5	---	---	---	19	---	---	19	0	19
		SA-15	---	9,393	---	---	0.5	---	---	---	4,697	---	---	4,697	0	4,697
		SA-16	---	52	---	---	0.5	---	---	---	26	---	---	26	0	26
		SA-20a	---	8,883	---	---	0.5	---	---	---	4,442	---	---	4,442	0	4,442
		SA-21a	---	8,899	---	---	0.5	---	---	---	4,450	---	---	4,450	0	4,450
		SA-23	---	2,634	---	---	0.5	---	---	---	1,317	---	---	1,317	0	1,317
		SA-24	---	1,000	---	---	0.5	---	---	---	500	---	---	500	0	500
		SA-25a	---	14	---	---	0.5	---	---	---	7	---	---	7	0	7
		SA-28a	---	262	---	---	0.5	---	---	---	132	---	---	132	0	132
		SA-28b	---	378	---	---	0.5	---	---	---	189	---	---	189	0	189
		SA-30	---	15	---	---	0.5	---	---	(8)	0	---	---	0	0	0
		SA-32	---	106	---	---	0.5	---	---	(11)	43	---	---	43	0	43
		SA-34	---	1,022	---	---	0.5	---	---	---	512	---	---	512	0	512
		SA-35	---	4,256	---	---	0.5	---	---	---	2,129	---	---	2,129	0	2,129
		SA-36a	---	3,870	---	---	0.5	---	---	---	1,935	---	---	1,935	0	1,935
		SA-36c	---	7,647	---	---	0.5	---	---	---	3,824	---	---	3,824	0	3,824
		SA-39	---	967	---	---	0.5	---	---	---	484	---	---	484	0	484
		SA-40	---	3,797	---	---	0.5	---	---	---	1,899	---	---	1,899	0	1,899
		SA-41	---	1,884	---	---	0.5	---	---	---	943	---	---	943	0	943
		---	BA-6	---	2,433	---	---	2.0	---	---	---	4,866	---	4,866	3,650	1,217
		---	BA-25	---	3,127	---	---	1.0	---	---	---	3,127	---	3,127	1,564	1,564
		---	BA-26	---	7,032	---	---	1.2	---	---	---	8,439	---	8,439	4,923	3,516
		---	---	---	---	7,887	---	---	6.0	---	---	---	62,938	62,938	57,693	5,245
		Add'l Areas (MAG, AirCell, etc)		2,424	---	---	0.5	---	---	---	1,212	---	---	1,212	0	1,212
Total	**12,169,100**			**2,987,200**	**505,000**	**37,100**				**(143,100)**	**1,344,000**	**1,487,800**	**227,500**	**3,059,200**	**2,885,200**	**1,812,600**

Notes:

1. Depth of buried ACM debris at BA-1 assumed to be same as at BA-2. Both BA-1 and BA-2 are under parcel AG.
2. See Section 4.1.8.2 of RI for ACM volumes at BA-21 (under parcel H).
3. Depth of Surface ACM Removal, FT: **0.5**
4. Depth of Topsoil, FT: **0.5**
5. Width of Excavation Trench for Pipe, FT: **3**
6. Surface ACM Area is accounted with the Buried ACM Area when there is an overlap in excavation.
7. All volumes and areas are rounded up to the nearest whole number
8. Steam pipe was observed at depths ranging from 2 to 6 feet bgs and assume 3 feet wide excavation
9. Excavation of steam pipe within Surficial ACM and Buried ACM areas considered negligible.
10. Topsoil depth is 6 inches; common backfill depth varies with excavation depth.
11. Existing repository will be covered with 6 inches of common backfill and 6 inches of topsoil.

* Indicates properties no longer occupied

** Burial area depth is greater than 4 feet - assume a 2.5% increase in soil excavation for sloping.

*** All pipe excavation - assume a 33% increase in soil excavation for sloping.

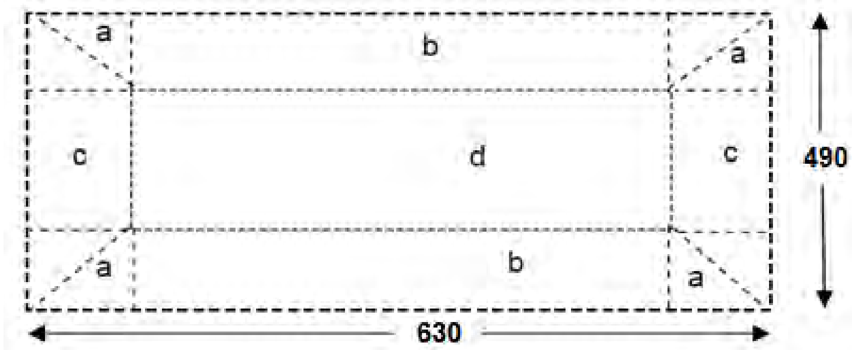
† Indicates that property is privately owned.

-Location of Onsite Consolidation Area - No Excavation Activity

Onsite Consolidation Areas

Consolidation Area 1:

1. Capacity of Each Landfill:



Landfill Capacity - Active

Given:

1. Landfill to be placed in Parcel ID: MBK-D and L

2. Footprint of the landfill will be defined by the Parcel boundaries.

Assume:

1. Maximum height of Waste Material:		19	ft
2. Maximum slope < 20%	Current:	19%	

Total Capacity

Calculations:

a. Pyramid

V=	$1/3b^2h$	b=	200	ft
V=	253,333 ft^3	h=	19	ft

b. Large Wedge X2

V=	1/2bhl * 2	b=	100	ft
V=	817,000 ft^3	h=	19	ft
		l=	430	ft

c. Small Wedge X2

V=	1/2bhl * 2	b=	100	ft
V=	551,000 ft^3	h=	19	ft
		l=	290	ft

d. Rectangular Prism

V=	bhl	b=	290	ft
V=	2,369,300 ft^3	h=	19	ft
		l=	430	ft

$V_{CapacityCon1}$= 3,990,633 ft^3

V_{Con1} = 3,990,633 ft^3

Volume Check = **Good**

2. Filling the Landfills:

Volume of Waste - Site				
***V*$_{waste}$ = 3,059,200 ft^3**	***348,748,800***	***lbs***	***174,374***	***tons***

Volume of Common Fill - (Combined Active Landfill)

The Landfill will be filled using the following assumptions:

1. Number of Years to Complete:	3.0	years
2. Work from April 1 until November 30:	8	months
3. 4 Days off per month in 30 days months:	26	per month
4. Number of working days:	208	days
5. Dump Trucks per day:	14	trucks/day
6. Tons per truck:	20	ton
6. Soil Bulk weight:	114	lbs/ft^3
7. Stock each day (lift) in ft:	2	ft
8. Common Fill cover per day:	*0.5*	*ft*

Tons waste per day:	279	tons
Lbs waste per day:	558,892	lbs
Ft^3 waste per day:	4,903	ft^3
Area Waste Needing Fill:	2,451	ft^2
6 inches of fill each day:	1,226	ft^3
Fill 1-Year:	254,933	ft^3
Fill Completion:	764,800	ft^3

***V*$_{common\ fill}$= 764,800 ft^3**	V$_{capacity\ needed}$ = 3,824,000 ft^3

3. Covering the Landfills:

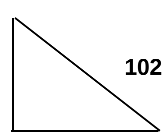
Volume of Fill - (Inactive Landfill)

Consolidation Area 1:

Inactive landfill cover - 2.0 feet common fill, 6 inches composite (for vegetation)

Surface Area (a)

Sides: 8
sh= **102**
b= 100
SA= 0.5(b*h)
40,716 ft^2



Surface Area (b)

Sides: 2
l= 430
sh= **102**
SA= h*l
87,539 ft^2

Surface Area (c)

Sides: 2
l= 290
sh= **102**
SA= h*l
59,038 ft^2

Surface Area (d)

Sides: 1
b= 290
l= 430
SA= h*l
124,700 ft^2

***V*$_{Common}$ = 623,984 ft^3**	*Common Fill Final Cover = 2 ft*
***V*$_{Topsoil}$ = 155,996 ft^3**	*Topsoil Fill Final Cover = 0.5 ft*

Note:

Final elevation of the landfill including cover: 21.5 ft

Total Surface Area= 311,992 ft^2

5. Summary of Materials

Landfill Final Height	
Consolidation Area 1	21.5 ft

Summary of Materials		
Material Summary	Volume	
Total Excavated Soil:	3,059,200	ft^3
Total Common Fill (Active Landfills):	764,800	ft^3
Total Common Fill (Inactive Landfills):	623,984	ft^3
Total Common Fill:	1,388,784	ft^3
Total Topsoil/Mulch (Inactive Landfills):	155,996	ft^3

Alternative 6

Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

Alternative 6: Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring																
Parcel IDs	Total Parcel Area	Surficial ID	Burial ID	Total Area Excavated[4]			Excavation Depth			Excavation Volume				Total Volume Removed[4]	Backfill Volume[7]	
				Surficial ACM Area[3]	Buried ACM Area	Pipe Insulation ACM[5,6]	Surficial ACM Area	Buried ACM Area	Pipe Insulation ACM[5]	Volume Removed During 2008	Surficial ACM Volume	Buried ACM Volume	Pipe Insulation ACM[5]		Common Fill	Topsoil
	SF			SF	SF	SF	FT	FT	FT	CF	CF	CF	CF	CF	CF	CF
A*	240,463	SA-15	---	72,529	---	---	0.5	---	---	---	36,265	---	---	36,265	0	36,265
		SA-42	---	418	---	---	0.5	---	---	---	209	---	---	209	0	209
		SA-43	---	0	---	---	0.5	---	---	---	0	---	---	0	0	0
		---	BA-46**	---	9,620	---	---	4.8	---	---	---	46,839	---	46,839	41,909	4,930
		---	---	---	---	1,533	---	---	4.0	---	---	---	8,156	8,156	7,136	1,019
		Add'l Areas (MAG, AirCell, etc)		18,614	---	---	0.5	---	---	---	9,307	---	---	9,307	0	9,307
		Arsenic Contamination[11]		---	26,211	---	---	10.0	---	---	---	268,663	---	268,663	255,230	13,433
AG*	206,876	SA-1a	---	52,654	---	---	0.5	---	---	---	26,327	---	---	26,327	0	26,327
		SA-1b	---	88	---	---	0.5	---	---	---	45	---	---	45	0	45
		SA-1c	---	224	---	---	0.5	---	---	---	113	---	---	113	0	113
		SA-1d	---	4,652		---	0.5	---	---	---	2,326	---	---	2,326	0	2,326
		SA-4	---	17,328	---	---	0.5	---	---	---	8,664	---	---	8,664	0	8,664
		---	BA-1[1]	---	3,030	---	---	2.4	---	---	---	7,274	---	7,274	5,759	1,515
		---	BA-2	---	18,518	---	---	2.4	---	---	---	44,444	---	44,444	35,185	9,259
		---	---	---	---	597	---	---	4.0	---	---	---	3,176	3,176	2,779	397
		Add'l Areas (MAG, AirCell, etc)		9,471	---	---	0.5	---	---	---	4,736	---	---	4,736	0	4,736
AI*	106,100	SA-5	---	98,040	---	---	0.5	---	---	---	49,020	---	---	49,020	0	49,020
		---	BA-6	---	7,124	---	---	2.0	---	---	---	14,249	---	14,249	10,687	3,562
		Add'l Areas (MAG, AirCell, etc)		936	---	---	0.5	---	---	---	468	---	---	468	0	468
AK†	52,008	SA-40	---	17,892	---	---	0.5	---	---	(2,539)	6,407	---	---	6,407	0	6,407
		---	---	---	---	108	---	---	4.0	---	---	---	575	575	503	72
		Add'l Areas (MAG, AirCell, etc)		41	---	---	0.5	---	---	---	21	---	---	21	0	21
AL*	117,290	SA-5	---	108,197	---	---	0.5	---	---	---	54,099	---	---	54,099	0	54,099
		---	BA-5**	---	4,081	---	---	4.0	---	---	---	16,732	---	16,732	14,641	2,092
		---	---	---	---	1,653	---	---	4.0	---	---	---	8,794	8,794	7,695	1,099
		Add'l Areas (MAG, AirCell, etc)		3,359	---	---	0.5	---	---	---	1,680	---	---	1,680	0	1,680
AM†	164,124	SA-41	---	32,611	---	---	0.5	---	---	(7,984)	8,322	---	---	8,322	0	8,322
		---	BA-48	---	4,630	---	---	0.5	---	(1,127)	---	1,188	---	1,188	0	1,188
		Add'l Areas (MAG, AirCell, etc)		38,812	---	---	0.5	---	---	---	19,406	---	---	19,406	0	19,406
AP*	124,269	SA-1a	---	2,157	---	---	0.5	---	---	---	1,079	---	---	1,079	0	1,079
		SA-1b	---	1,395	---	---	0.5	---	---	---	698	---	---	698	0	698
		SA-45	---	22	---	---	0.5	---	---	---	11	---	---	11	0	11
		Add'l Areas (MAG, AirCell, etc)		120,695	---	---	0.5	---	---	---	60,348	---	---	60,348	0	60,348
AQ†	117,216	Add'l Areas (MAG, AirCell, etc)		44,461	---	---	0.5	---	---	---	22,231	---	---	22,231	0	22,231
AR†	507,189	Add'l Areas (MAG, AirCell, etc)		48,927	---	---	0.5	---	---	---	24,464	---	---	24,464	0	24,464
AS†	240,028	Add'l Areas (MAG, AirCell, etc)		15,309	---	---	0.5	---	---	---	7,655	---	---	7,655	0	7,655
AT†	28,098	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
		---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
AU†	28,077	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
		---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
AV†	21,236	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
		---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
AW†	21,844	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
AX†	19,905	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
AY†	19,628	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
AZ†	18,949	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
B*	244,982	SA-12a	---	19,410	---	---	0.5	---	---	---	9,705	---	---	9,705	0	9,705
		SA-15	---	31,402	---	---	0.5	---	---	---	15,701	---	---	15,701	0	15,701
		SA-17	---	873	---	---	0.5	---	---	---	437	---	---	437	0	437
		SA-18	---	3,659	---	---	0.5	---	---	---	1,830	---	---	1,830	0	1,830
		SA-19	---	35,606	---	---	0.5	---	---	---	17,804	---	---	17,804	0	17,804
		---	BA-23	---	2,430	---	---	1.0	---	---	---	2,430	---	2,430	1,215	1,215
		---	BA-24	---	1,879	---	---	0.8	---	---	---	1,503	---	1,503	564	939
		---	---	---	---	411.0	---	---	4.0	---	---	---	2,187	2,187	1,913	273
		Add'l Areas (MAG, AirCell, etc)		32,410	---	---	0.5	---	---	---	16,205	---	---	16,205	0	16,205
BA†	34,200	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
BB†	20,111	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
		---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
BC†	29,744	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
BJ†	44,403	Add'l Areas (MAG, AirCell, etc)		11,560	---	---	0.5	---	---	---	5,780	---	---	5,780	0	5,780
BK†	224,527	Add'l Areas (MAG, AirCell, etc)		8,915	---	---	0.5	---	---	---	4,458	---	---	4,458	0	4,458
BL*	78,546	---	---	---	---	---	---	---	---	---	---	---	---	0	---	---
BM†	95,935	SA-37	---	13,743	---	---	0.5	---	---	(625)	6,247	---	---	6,247	0	6,247
		---	---	---	---	609.0	---	---	4.0	---	---	---	3,240	3,240	2,835	405
		Add'l Areas (MAG, AirCell, etc)		21,233	---	---	0.5	---	---	---	10,617	---	---	10,617	0	10,617
BO†	36,614	SA-39	---	9,077	---	---	0.5	---	---	(2,457)	2,082	---	---	2,082	0	2,082
		---	---	---	---	138.0	---	---	4.0	---	---	---	734	734	642	92
		Add'l Areas (MAG, AirCell, etc)		798	---	---	0.5	---	---	---	399	---	---	399	0	399
BP†	360,993	Add'l Areas (MAG, AirCell, etc)		180,297	---	---	0.5	---	---	---	90,149	---	---	90,149	0	90,149
BQ†	168,008	Add'l Areas (MAG, AirCell, etc)		44,691	---	---	0.5	---	---	---	22,346	---	---	22,346	0	22,346
BR†	434,134	Add'l Areas (MAG, AirCell, etc)		12,766	---	---	0.5	---	---	---	6,383	---	---	6,383	0	6,383
BS†	279,890	SA-36a	---	16,166	---	---	0.5	---	---	---	8,084	---	---	8,084	0	8,084
C*	99,399	SA-9a	---	34,770	---	---	0.5	---	---	(2,424)	14,961	---	---	14,961	0	14,961
		SA-9b	---	5,147	---	---	0.5	---	---	---	2,574	---	---	2,574	0	2,574
		---	BA-10a**	---	7,771	---	---	8.7	---	(2,543)	---	66,484	---	66,484	62,648	3,836
		---	BA-10b	---	4,108	---	---	1.3	---	---	---	5,341	---	5,341	3,287	2,054
		---	BA-10c	---	3,748	---	---	1.5	---	(5,008)	---	615	---	615	410	205
		---	---	---	---	1,374	---	---	4.0	---	---	---	7,310	7,310	6,396	914
		Add'l Areas (MAG, AirCell, etc)		8,781	---	---	0.5	---	---	---	4,391	---	---	4,391	0	4,391
D*	103,036	SA-9a	---	38,913	---	---	0.5	---	---	---	19,457	---	---	19,457	0	19,457
		SA-9b	---	1,292	---	---	0.5	---	---	---	646	---	---	646	0	646
		---	BA-9	---	1,227	---	---	1.0	---	---	---	1,227	---	1,227	614	614
		---	---	---	---	774	---	---	4.0	---	---	---	4,118	4,118	3,603	515
E*	129,710	SA-9a	---	41,195	---	---	0.5	---	---	(12,337)	8,261	---	---	8,261	0	8,261
		SA-10	---	4,621	---	---	0.5	---	---	---	2,311	---	---	2,311	0	2,311
		SA-44	---	30	---	---	0.5	---	---	---	15	---	---	15	0	15
		---	BA-11	---	1,929	---	---	1.0	---	---	---	1,930	---	1,930	965	965
		---	BA-12	---	13,843	---	---	1.8	---	---	---	24,917	---	24,917	17,996	6,921
		---	BA-13	---	1,947	---	---	1.0	---	(1,643)	---	304	---	304	152	152
		---	---	---	---	126	---	---	4.0	---	---	---	670	670	587	84
		Add'l Areas (MAG, AirCell, etc)		14,262	---	---	0.5	---	---	---	7,131	---	---	7,131	0	7,131
F†	146,193	SA-11	---	53,811	---	---	0.5	---	---	(11,958)	14,948	---	---	14,948	0	14,948
		SA-12a	---	37,483	---	---	0.5	---	---	(12,750)	5,992	---	---	5,992	0	5,992
		SA-12b	---	25,135	---	---	0.5	---	---	(8,123)	4,445	---	---	4,445	0	4,445
		---	BA-14	---	1,670	---	---	1.0	---	(647)	---	1,024	---	1,024	512	512
		---	BA-15a**	---	448	---	---	8.0	---	---	---	3,674	---	3,674	3,444	230
		---	BA-15**	---	3,722	---	---	8.0	---	(3,717)	---	26,802	---	26,802	25,127	1,675
		---	BA-16	---	2,846	---	---	2.5	---	(4,515)	---	2,602	---	2,602	2,082	520
		---	BA-17	---	831	---	---	1.0	---	(425)	---	407	---	407	204	204
		---	BA-18	---	1,664	---	---	1.5	---	(264)	---	2,232	---	2,232	1,488	744
		---	---	---	---	1,278	---	---	4.0	---	---	---	6,799	6,799	5,949	850
		Add'l Areas (MAG, AirCell, etc)		17,304	---	---	0.5	---	---	---	8,652	---	---	8,652	0	8,652
G*	173,258	SA-11	---	2,641	---	---	0.5	---	---	---	1,321	---	---	1,321	0	1,321
		SA-12a	---	43,005	---	---	0.5	---	---	(1,593)	19,910	---	---	19,910	0	19,910
		---	BA-19	---	1,600	---	---	0.5	---	---	---	801	---	801	0	801
		---	BA-20a**	---	13,653	---	---	9.0	---	---	---	125,952	---	125,952	118,955	6,997
		---	BA-20b**	---	2,442	---	---	9.0	---	---	---	22,530	---	22,530	21,278	1,252
		---	---	---	---	591	---	---	4.0	---	---	---	3,144	3,144	2,751	393
		Add'l Areas (MAG, AirCell, etc)		19,221	---	---	0.5	---	---	---	9,611	---	---	9,611	0	9,611
H*	3,901,362	SA-12a	---	20,533	---	---	0.5	---	---	---	10,267	---	---	10,267	0	10,267
		SA-13	---	12,650	---	---	0.5	---	---	---	6,325	---	---	6,325	0	6,325
		SA-14	---	58,649	---	---	0.5	---	---	---	29,325	---	---	29,325	0	29,325
		SA-15	---	52,756	---	---	0.5	---	---	---	26,379	---	---	26,379	0	26,379
		SA-16	---	57,284	---	---	0.5	---	---	---	28,643	---	---	28,643	0	28,643
		---	BA-20b**	---	3,731	---	---	9.0	---	---	---	34,417	---	34,417	32,505	1,912
		---	BA-21[2]**	---	36,786	---	---	6.5	---	---	---	246,031	---	246,031	227,178	18,853
		---	BA-22	---	15,251	---	---	2.0	---	---	---	30,503	---	30,503	22,877	7,626
		---	---	---	---	372	---	---	4.0	---	---	---	1,979	1,979	1,732	247
		Add'l Areas (MAG, AirCell, etc)		30,997	---	---	0.5	---	---	---	15,499	---	---	15,499	0	15,499
L*	170,977	SA-21a	---	105,859	---	---	0.5	---	---	---	52,930	---	---	52,930	0	52,930
		SA-34	---	14,776	---	---	0.5	---	---	---	7,388	---	---	7,388	0	7,388
		---	BA-40	---	1,685	---	---	0.5	---	---	---	843	---	843	0	843
		---	BA-41	---	2,686	---	---	0.5	---	---	---	1,344	---	1,344	0	1,344
		---	BA-42	---	2,244	---	---	1.0	---	---	---	2,245	---	2,245	1,123	1,123
		---	BA-43a	---	12,475	---	---	3.5	---	---	---	43,662	---	43,662	37,425	6,237
		---	BA-43b	---	2,662	---	---	3.5	---	---	---	9,316	---	9,316	7,985	1,331
		---	---	---	---	2,673	---	---	4.0	---	---	---	14,220	14,220	12,443	1,778
		Add'l Areas (MAG, AirCell, etc)		20,203	---	---	0.5	---	---	---	10,102	---	---	10,102	0	10,102

Alternative 6: Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring																
Parcel IDs	Total Parcel Area	Surficial ID	Burial ID	Total Area Excavated[4]			Excavation Depth			Excavation Volume				Total Volume Removed[4]	Backfill Volume[7]	
				Surficial ACM Area[3]	Buried ACM Area	Pipe Insulation ACM[5,6]	Surficial ACM Area	Buried ACM Area	Pipe Insulation ACM[5]	Volume Removed During 2008	Surficial ACM Volume	Buried ACM Volume	Pipe Insulation ACM[5]		Common Fill	Topsoil
	SF			SF	SF	SF	FT	FT	FT	CF	CF	CF	CF	CF	CF	CF
M*	103,851	SA-25a	---	914	---	---	0.5	---	---	(457)	1	---	---	1	0	1
		SA-30	---	474	---	---	0.5	---	---	(237)	0	---	---	0	0	0
		SA-32	---	24,634	---	---	0.5	---	---	(8,927)	3,391	---	---	3,391	0	3,391
		---	BA-36	---	9,044	---	---	1.3	---	(10,540)	---	1,217	---	1,217	749	468
		---	---	---	---	1,941	---	---	6.0	---	---	---	15,489	15,489	14,198	1,291
		Add'l Areas (MAG, AirCell, etc)		48,944	---	---	0.5	---	---	---	24,472	---	---	24,472	0	24,472
MBK-A*	81,959	SA-21a	---	17,115	---	---	0.5	---	---	---	8,558	---	---	8,558	0	8,558
		SA-21b	---	743	---	---	0.5	---	---	---	372	---	---	372	0	372
		---	BA-30	---	48,641	---	---	1.1	---	---	---	53,505	---	53,505	29,185	24,320
		---	---	---	---	1,986	---	---	4.0	---	---	---	10,566	10,566	9,245	1,321
		Add'l Areas (MAG, AirCell, etc)		13,475	---	---	0.5	---	---	---	6,738	---	---	6,738	0	6,738
MBK-B*	82,837	SA-21a	---	14,918	---	---	0.5	---	---	---	7,459	---	---	7,459	0	7,459
		SA-21c	---	847	---	---	0.5	---	---	---	424	---	---	424	0	424
		---	BA-30	---	43,764	---	---	1.1	---	---	---	48,141	---	48,141	26,259	21,882
		---	---	---	---	1,347	---	---	4.0	---	---	---	7,166	7,166	6,270	896
		Add'l Areas (MAG, AirCell, etc)		21,961	---	---	0.5	---	---	---	10,981	---	---	10,981	0	10,981
MBK-C*	79,369	SA-21a	---	1,663	---	---	0.5	---	---	---	832	---	---	832	0	832
		SA-21d	---	0	---	---	0.5	---	---	---	0	---	---	0	0	0
		SA-23	---	1,667	---	---	0.5	---	---	---	834	---	---	834	0	834
		---	BA-30	---	50,396	---	---	1.1	---	---	---	55,437	---	55,437	30,238	25,199
		---	---	---	---	1,431	---	---	4.0	---	---	---	7,613	7,613	6,661	952
		Add'l Areas (MAG, AirCell, etc)		24,212	---	---	0.5	---	---	---	12,106	---	---	12,106	0	12,106
MBK-D*	126,679	SA-21a	---	62,322	---	---	0.5	---	---	---	31,161	---	---	31,161	0	31,161
		SA-35	---	15,667	---	---	0.5	---	---	---	7,834	---	---	7,834	0	7,834
		---	BA-26	---	581	---	---	1.2	---	---	---	697	---	697	407	290
		---	BA-44**	---	814	---	---	9.0	---	---	---	7,510	---	7,510	7,093	417
		---	BA-45	---	3,644	---	---	1.0	---	---	---	3,644	---	3,644	1,822	1,822
		---	---	---	---	2,628	---	---	4.0	---	---	---	13,981	13,981	12,233	1,748
		Add'l Areas (MAG, AirCell, etc)		19,925	---	---	0.5	---	---	---	9,963	---	---	9,963	0	9,963
MBK-E*	132,121	SA-5	---	129,312	---	---	0.5	---	---	---	64,656	---	---	64,656	0	64,656
		---	BA-3	---	1,017	---	---	0.5	---	---	---	509	---	509	0	509
		---	BA-4	---	1,472	---	---	0.5	---	---	---	736	---	736	0	736
		---	---	---	---	1,593	---	---	4.0	---	---	---	8,475	8,475	7,415	1,059
		Repository Area		(21,676)	---	---	0.5	---	---	---	(10,838)	---	---	(10,838)	0	-10,838
MBK-F*	91,207	SA-8	---	10,752	---	---	0.5	---	---	---	5,376	---	---	5,376	0	5,376
		---	BA-7	---	2,012	---	---	3.5	---	---	---	7,042	---	7,042	6,036	1,006
		---	BA-8	---	683	---	---	0.5	---	---	---	342	---	342	0	342
		---	---	---	---	207	---	---	4.0	---	---	---	1,101	1,101	964	138
		Add'l Areas (MAG, AirCell, etc)		4,853	---	---	0.5	---	---	---	2,427	---	---	2,427	0	2,427
MBK-G*	95,235	SA-15	---	11,949	---	---	0.5	---	---	---	5,975	---	---	5,975	0	5,975
		SA-36a	---	5,555	---	---	0.5	---	---	---	2,778	---	---	2,778	0	2,778
		SA-36b	---	1,635	---	---	0.5	---	---	---	818	---	---	818	0	818
		SA-36c	---	13,667	---	---	0.5	---	---	---	6,834	---	---	6,834	0	6,834
		---	BA-47a**	---	1,010	---	---	10.0	---	---	---	10,357	---	10,357	9,839	518
		---	BA-47**	---	11,257	---	---	6.0	---	---	---	69,232	---	69,232	63,463	5,769
		---	---	---	---	531	---	---	4.0	---	---	---	2,825	2,825	2,472	353
		Add'l Areas (MAG, AirCell, etc)		7,717	---	---	0.5	---	---	---	3,859	---	---	3,859	0	3,859
N[†]	158,057	SA-31	---	60,906	---	---	0.5	---	---	(537)	29,916	---	---	29,916	0	29,916
		SA-32	---	50,519	---	---	0.5	---	---	(20,063)	5,197	---	---	5,197	0	5,197
		---	BA-37	---	1,077	---	---	0.5	---	(418)	---	121	---	121	0	121
		---	BA-38	---	2,116	---	---	0.5	---	(1,029)	---	29	---	29	0	29
		---	BA-39	---	15,269	---	---	2.0	---	(8,241)	---	22,298	---	22,298	16,723	5,574
		---	---	---	---	1,908	---	---	4.0	---	---	---	10,151	10,151	8,882	1,269
		Add'l Areas (MAG, AirCell, etc)		26,262	---	---	0.5	---	---	---	13,131	---	---	13,131	0	13,131
O*	185,518	SA-32	---	959	---	---	0.5	---	---	(479)	1	---	---	1	0	1
		SA-33a	---	13,703	---	---	0.5	---	---	(5,025)	1,827	---	---	1,827	0	1,827
		SA-33b	---	3,751	---	---	0.5	---	---	(1,876)	0	---	---	0	0	0
		---	---	---	---	1,155	---	---	6.0	---	---	---	9,217	9,217	8,449	768
		Add'l Areas (MAG, AirCell, etc)		98,662	---	---	0.5	---	---	---	49,331	---	---	49,331	0	49,331
P[†]	77,893	SA-21a	---	27,294	---	---	0.5	---	---	---	13,647	---	---	13,647	0	13,647
		---	BA-28	---	7,096	---	---	1.3	---	---	---	9,225	---	9,225	5,677	3,548
		---	BA-29	---	4,305	---	---	2.0	---	---	---	8,611	---	8,611	6,458	2,153
		---	---	---	---	1,530	---	---	4.0	---	---	---	8,140	8,140	7,122	1,017
		Add'l Areas (MAG, AirCell, etc)		25,590	---	---	0.5	---	---	---	12,795	---	---	12,795	0	12,795
Q*	75,099	SA-22	---	3,476	---	---	0.5	---	---	---	1,739	---	---	1,739	0	1,739
		SA-23	---	11,184	---	---	0.5	---	---	---	5,592	---	---	5,592	0	5,592
		SA-31	---	7,645	---	---	0.5	---	---	---	3,823	---	---	3,823	0	3,823
		---	BA-30	---	6,646	---	---	1.1	---	---	---	7,311	---	7,311	3,988	3,323
		---	BA-31	---	14,004	---	---	0.8	---	---	---	11,204	---	11,204	4,202	7,003
		---	BA-32	---	645	---	---	2.0	---	---	---	1,290	---	1,290	968	323
		---	BA-33	---	1,467	---	---	0.5	---	---	---	734	---	734	0	734
		---	---	---	---	390	---	---	4.0	---	---	---	2,075	2,075	1,815	259
		Add'l Areas (MAG, AirCell, etc)		29,642	---	---	0.5	---	---	---	14,821	---	---	14,821	0	14,821
R*	70,175	SA-23	---	6,724	---	---	0.5	---	---	---	3,363	---	---	3,363	0	3,363
		SA-24	---	34,733	---	---	0.5	---	---	(860)	16,507	---	---	16,507	0	16,507
		SA-25a	---	399	---	---	0.5	---	---	---	200	---	---	200	0	200
		SA-31	---	965	---	---	0.5	---	---	---	483	---	---	483	0	483
		---	BA-31	---	4,779	---	---	0.8	---	---	---	3,824	---	3,824	1,434	2,390
		---	BA-34	---	1,106	---	---	0.5	---	(197)	---	357	---	357	0	357
		---	---	---	---	729	---	---	4.0	---	---	---	3,878	3,878	3,393	485
		Add'l Areas (MAG, AirCell, etc)		20,740	---	---	0.5	---	---	---	10,370	---	---	10,370	0	10,370
S*	92,670	SA-20a	---	35,378	---	---	0.5	---	---	---	17,690	---	---	17,690	0	17,690
		SA-20b	---	1,642	---	---	0.5	---	---	---	821	---	---	821	0	821
		SA-21a	---	28,433	---	---	0.5	---	---	---	14,217	---	---	14,217	0	14,217
		---	BA-25	---	2,195	---	---	1.0	---	---	---	2,195	---	2,195	1,098	1,098
		---	BA-26	---	11,805	---	---	1.2	---	---	---	14,167	---	14,167	8,264	5,903
		---	BA-27	---	8,670	---	---	2.2	---	---	---	18,785	---	18,785	14,450	4,335
		---	---	---	---	1,980	---	---	4.0	---	---	---	10,534	10,534	9,217	1,317
		Add'l Areas (MAG, AirCell, etc)		2,567	---	---	0.5	---	---	---	1,284	---	---	1,284	0	1,284
W*	98,880	SA-25a	---	4,086	---	---	0.5	---	---	(401)	1,642	---	---	1,642	0	1,642
		SA-25b	---	2,426	---	---	0.5	---	---	---	1,214	---	---	1,214	0	1,214
		SA-29	---	8,829	---	---	0.5	---	---	(73)	4,342	---	---	4,342	0	4,342
		SA-30	---	824	---	---	0.5	---	---	(412)	0	---	---	0	0	0
		SA-32	---	835	---	---	0.5	---	---	(418)	0	---	---	0	0	0
		---	BA-35a**	---	9,843	---	---	4.4	---	---	---	44,513	---	44,513	39,468	5,045
		---	BA-35b	---	16,433	---	---	0.7	---	---	---	11,503	---	11,503	3,287	8,216
		---	---	---	---	1,764	---	---	4.0	---	---	---	9,384	9,384	8,211	1,173
		Add'l Areas (MAG, AirCell, etc)		21,314	---	---	0.5	---	---	---	10,657	---	---	10,657	0	10,657
WWTP	1,499,333	SA-38	---	50,001	---	---	0.5	---	---	---	25,001	---	---	25,001	0	25,001
X*	91,228	SA-27	---	668	---	---	0.5	---	---	---	334	---	---	334	0	334
		SA-28a	---	18,663	---	---	0.5	---	---	---	9,332	---	---	9,332	0	9,332
		SA-28b	---	2,553	---	---	0.5	---	---	---	1,277	---	---	1,277	0	1,277
		---	---	---	---	372	---	---	6.0	---	---	---	2,969	2,969	2,721	247
		Add'l Areas (MAG, AirCell, etc)		25,103	---	---	0.5	---	---	---	12,552	---	---	12,552	0	12,552
Y*	137,170	SA-1b	---	47	---	---	0.5	---	---	---	24	---	---	24	0	24
		SA-1c	---	977	---	---	0.5	---	---	---	489	---	---	489	0	489
		SA-3	---	616	---	---	0.5	---	---	---	308	---	---	308	0	308
		Add'l Areas (MAG, AirCell, etc)		77,841	---	---	0.5	---	---	---	38,921	---	---	38,921	0	38,921
Z*	80,588	SA-24	---	8,971	---	---	0.5	---	---	---	4,486	---	---	4,486	0	4,486
		SA-25a	---	15,259	---	---	0.5	---	---	(192)	7,438	---	---	7,438	0	7,438
		SA-26	---	601	---	---	0.5	---	---	---	301	---	---	301	0	301
		---	BA-35a**	---	14,206	---	---	4.4	---	---	---	64,245	---	64,245	56,964	7,281
		---	BA-35b	---	4,663	---	---	0.7	---	---	---	3,264	---	3,264	933	2,331
		---	---	---	---	759	---	---	4.0	---	---	---	4,038	4,038	3,533	505
		Add'l Areas (MAG, AirCell, etc)		4,922	---	---	0.5	---	---	---	2,461	---	---	2,461	0	2,461
Existing Repository Cover[12]		---	---	93,750	---	---	---	---	---	---	---	---	---	0	46,875	46,875

Alternative 6: Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring																
Parcel IDs	Total Parcel Area	Surficial ID	Burial ID	Total Area Excavated[4]			Excavation Depth			Excavation Volume				Total Volume Removed[4]	Backfill Volume[7]	
				Surficial ACM Area[3]	Buried ACM Area	Pipe Insulation ACM[5,6]	Surficial ACM Area	Buried ACM Area	Pipe Insulation ACM[5]	Volume Removed During 2008	Surficial ACM Volume	Buried ACM Volume	Pipe Insulation ACM[5]		Common Fill	Topsoil
	SF			SF	SF	SF	FT	FT	FT	CF	CF	CF	CF	CF	CF	CF
		SA-1a	---	16	---	---	0.5	---	---	---	8	---	---	8	0	8
		SA-2	---	193	---	---	0.5	---	---	---	97	---	---	97	0	97
		SA-5	---	3,939	---	---	0.5	---	---	---	1,970	---	---	1,970	0	1,970
		SA-6	---	111	---	---	0.5	---	---	---	56	---	---	56	0	56
		SA-7	---	2,179	---	---	0.5	---	---	---	1,090	---	---	1,090	0	1,090
		SA-8	---	2,371	---	---	0.5	---	---	---	1,186	---	---	1,186	0	1,186
		SA-9a	---	9,263	---	---	0.5	---	---	---	4,632	---	---	4,632	0	4,632
		SA-10	---	146	---	---	0.5	---	---	---	74	---	---	74	0	74
		SA-11	---	2,267	---	---	0.5	---	---	---	1,134	---	---	1,134	0	1,134
		SA-12a	---	12,431	---	---	0.5	---	---	---	6,216	---	---	6,216	0	6,216
		SA-12b	---	37	---	---	0.5	---	---	---	19	---	---	19	0	19
		SA-15	---	9,393	---	---	0.5	---	---	---	4,697	---	---	4,697	0	4,697
		SA-16	---	52	---	---	0.5	---	---	---	26	---	---	26	0	26
		SA-20a	---	8,883	---	---	0.5	---	---	---	4,442	---	---	4,442	0	4,442
		SA-21a	---	8,899	---	---	0.5	---	---	---	4,450	---	---	4,450	0	4,450
		SA-23	---	2,634	---	---	0.5	---	---	---	1,317	---	---	1,317	0	1,317
		SA-24	---	1,000	---	---	0.5	---	---	---	500	---	---	500	0	500
		SA-25a	---	14	---	---	0.5	---	---	---	7	---	---	7	0	7
		SA-28a	---	262	---	---	0.5	---	---	---	132	---	---	132	0	132
		SA-28b	---	378	---	---	0.5	---	---	---	189	---	---	189	0	189
		SA-30	---	15	---	---	0.5	---	---	(8)	0	---	---	0	0	0
		SA-32	---	106	---	---	0.5	---	---	(11)	43	---	---	43	0	43
		SA-34	---	1,022	---	---	0.5	---	---	---	512	---	---	512	0	512
		SA-35	---	4,256	---	---	0.5	---	---	---	2,129	---	---	2,129	0	2,129
		SA-36a	---	3,870	---	---	0.5	---	---	---	1,935	---	---	1,935	0	1,935
		SA-36c	---	7,647	---	---	0.5	---	---	---	3,824	---	---	3,824	0	3,824
		SA-39	---	967	---	---	0.5	---	---	---	484	---	---	484	0	484
		SA-40	---	3,797	---	---	0.5	---	---	---	1,899	---	---	1,899	0	1,899
		SA-41	---	1,884	---	---	0.5	---	---	---	943	---	---	943	0	943
		---	BA-6	---	2,433	---	---	2.0	---	---	---	4,866	---	4,866	3,650	1,217
		---	BA-25	---	3,127	---	---	1.0	---	---	---	3,127	---	3,127	1,564	1,564
		---	BA-26	---	7,032	---	---	1.2	---	---	---	8,439	---	8,439	4,923	3,516
		---	---	---	---	7,887	---	---	6.0	---	---	---	62,938	62,938	57,693	5,245
		Add'l Areas (MAG, AirCell, etc)		2,424	---	---	0.5	---	---	---	1,212	---	---	1,212	0	1,212
Total	**12,169,100**			**3,226,000**	**531,800**	**42,400**				**(143,100)**	**1,463,400**	**1,557,100**	**255,700**	**3,276,100**	**1,577,000**	**1,792,900**

Notes:

1. Depth of buried ACM debris at BA-1 assumed to be same as at BA-2. Both BA-1 and BA-2 are under parcel AG.
2. See Section 4.1.8.2 of RI for ACM volumes at BA-21 (under parcel H).
3. Depth of Surface ACM Removal, FT: **0.5**
4. Depth of Topsoil, FT: **0.5**
5. Width of Excavation Trench for Pipe, FT: **3**
6. Surface ACM Area is accounted with the Buried ACM Area when there is an overlap in excavation.
7. All volumes and areas are rounded up to the nearest whole number
8. Steam pipe was observed at depths ranging from 2 to 6 feet bgs and assume 3 feet wide excavation
9. Excavation of steam pipe within Surficial ACM and Buried ACM areas considered negligible.
10. Topsoil depth is 6 inches; common backfill depth varies with excavation depth.
11. Arsenic contamination is co-located with surface ACM up to 0.5 feet.
12. Existing repository will be covered with 6 inches of common backfill and 6 inches of topsoil.

* Indicates properties no longer occupied

** Burial area depth is greater than 4 feet - assume a 2.5% increase in soil excavation for sloping.

*** All pipe excavation - assume a 33% increase in soil excavation for sloping.

† Indicates that property is privately owned.

Appendix D

Screening of Alternatives

The evaluations of each alternative using the three screening criteria are presented in the following Appendix D. The common justifications have been indicated using gray text to allow the reader to focus on the differences between alternatives.

Alternative 1

No Action

Exhibit D-1. Effectiveness Screening - Alternative 1

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ Source areas of contaminated materials would be left unaddressed. ■ Unaddressed contaminated materials would allow continued release and migration of asbestos fibers and non-asbestos COPCs to unimpacted media (primarily soil and air) if disturbed. ■ Contaminated materials migrating to the surface and liberating asbestos fibers and non-asbestos COPCs after disturbance would potentially represent an inhalation and ingestion exposure risk to humans and ecological receptors.
Compliance with ARARs	■ No further remedial action would be taken to address contaminated materials and contaminated air exceeding chemical-specific ARARs; thus this criterion is not met.
Short-term effectiveness (during the remedial construction and implementation period)	■ No further remedial action would be undertaken to address contaminated materials sources; thus, none of these criteria are met.
Long-term effectiveness and permanence (following remedial construction)	
Reduction of toxicity, mobility, or volume through treatment	
Overall Rating	⓿

Table D-2. Implementability Screening - Alternative 1

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Contaminated materials would be left unaddressed. No new remedial actions would be undertaken to address contaminated materials; thus, these criteria are not applicable.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	
Ability to obtain approvals from other agencies	
Availability and capacity of treatment, storage, and disposal services	
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	
Overall Rating	⓿

Table D-3. Cost Screening – Alternative 1

Evaluation Factors for Cost	Overall Rating	Approximate Cost (Present Value Dollars)
Present value cost	$	$190,000

Alternative 2

Interior Cleaning and Land Use Controls with Monitoring

Table D-4. Effectiveness Screening - Alternative 2

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ Contaminated materials would be addressed through institutional and access controls on receiver-managed parcels, which restrict access and use to these parcels since these parcels are unoccupied. ■ Contaminated materials would be addressed through institutional and access controls on privately owned parcels. However access controls would not be widely implemented on privately owned parcels since many of those parcels are currently developed and occupied. ■ Interior cleaning would be periodically performed as needed to ensure that indoor air is protective of human health. ■ Land use controls would be used to restrict access and use of the existing onsite disposal location. ■ Contaminated materials could potentially allow continued release and migration of asbestos fibers and non-asbestos COPCs if disturbed, especially on privately owned parcels without access controls. ■ Disturbed fibers would potentially represent an inhalation exposure risk to humans and ecological receptors. ■ Monitoring would be performed to determine protectiveness of the remedy.
Compliance with ARARs	■ Land use controls would not physically address contaminated materials and contaminated air exceeding chemical-specific ARARs. ■ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and implementation period)	■ Surface disturbance of contaminated materials could pose short-term risks to workers performing interior cleaning and installing access controls. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Access controls would restrict use and access and hence quickly protect the community for receiver-managed parcels. However they do not address short-term exposure to contaminated materials on privately owned parcels. ■ Temporary relocation of residents from privately owned parcels may be required during interior cleaning.
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness is not entirely ensured since contaminated materials potentially posing a risk are left exposed on site and would continue to degrade and migrate. ■ Exposure to contaminants may occur on privately owned parcels since limited or no access controls would be put in place to restrict access to contaminated materials. ■ Contaminated materials could allow continued release and migration of asbestos fibers and on-asbestos COPCs to unimpacted media (primarily soil and air) if disturbed. ■ Interior cleaning and monitoring are the primary remedial components for ensuring protection of human health on privately owned parcels. However interior cleaning does not ensure protectiveness within the interior of residential structures since contaminated materials would continue to be exposed and degrade, and could be tracked into the structures. ■ Long-term effectiveness and permanence for covered areas of the existing onsite waste repository would be dependent on continued integrity of the covers and adherence to institutional and access controls. ■ Long-term effectiveness of institutional controls and access controls would not be ensured since humans and ecological receptors could ignore them, especially on privately owned parcels.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative would not treat contaminated materials impacted by asbestos fibers and non-asbestos COPCs.
Overall Rating	❶

Table D-5. Implementability Screening - Alternative 2

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Implementation of access controls and monitoring is relatively straightforward. ■ Implementation of interior cleaning could be difficult because it would involve temporary relocation of residents. ■ Institutional controls may be more difficult to implement and reliably operate, especially for privately owned parcels, due to various degrees of contamination, types of ownership, and levels of occupancy.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of the cover systems on the existing waste repository are relatively easy to implement. ■ Inspection, maintenance, and replacement of access controls and implementation of monitoring would be easy to implement. ■ Implementation of periodic interior cleaning could be difficult because it would involve temporary relocation of residents. ■ Maintenance of institutional controls may be more difficult, especially for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy.
Ability to obtain approvals from other agencies	■ Regulatory approvals for access controls, interior cleaning, and monitoring should be obtainable. ■ Regulatory approvals for institutional controls should be obtainable for privately owned parcels. However some difficulties may be encountered with regard to types of restrictions implemented.
Availability and capacity of treatment, storage, and disposal services	■ This alternative does not call for any treatment, storage, and disposal services. Thus this criterion is not applicable.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ The property for implementing the remedial action has already been obtained for receiver-managed parcels. ■ Access permission at privately owned parcels for implementing the remedial action may not be currently available, but could be obtained. ■ Materials, equipment, and labor resources used for land use controls and monitoring are easily obtainable. ■ Technical equipment and specialists are available for implementation of institutional controls and monitoring.
Overall Rating	❹

Table D-6. Cost Screening – Alternative 2

Evaluation Factors for Cost	Overall Rating	Approximate Cost (Present Value Dollars)
Present value cost	$	$2,280,000

Alternative 3

Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

Table D-7. Effectiveness Screening - Alternative 3

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ A portion of contaminated materials on receiver-managed parcels would be addressed through institutional and access controls, which restrict access and use to these parcels since these parcels are unoccupied. ■ A portion of contaminated materials on receiver-managed parcels and all contaminated materials on privately owned parcels would be addressed through in-place capping (covers) coupled with institutional and access controls to protect the covers. ■ Interior cleaning would be periodically performed to ensure that indoor air is protective of human health. ■ Land use controls would be used to restrict access and use of the existing onsite waste repository. ■ If disturbed, uncovered contaminated materials on receiver-managed parcels could potentially allow continued release and migration of asbestos fibers and non-asbestos COPCs. ■ Disturbed fibers would potentially represent an inhalation exposure risk to humans and ecological receptors. ■ Monitoring would be performed to determine protectiveness of the remedy.
Compliance with ARARs	■ Contaminated materials capped in-place with covers would physically address exposure to contaminants and discharges to air, thus meeting chemical-specific ARARs. ■ Uncovered areas of contaminated materials on receiver-managed parcels would not physically address contaminants; thus contaminated air may not comply with chemical-specific ARARs. Adherence to access controls would be required to address exposure to contaminants on receiver-managed parcels. ■ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and imple-mentation period)	■ Surface disturbance of contaminated materials could pose short-term risks to workers installing covers, performing interior cleaning, and installing access controls. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Access controls would restrict access and hence quickly protect the community for receiver-managed parcels. ■ Transport of clean borrow materials for construction of covers would increase traffic. ■ Temporary relocation of residents from privately owned parcels may be required during construction of covers and interior cleaning.

Table D-7. Effectiveness Screening - Alternative 3 (continued)

Effectiveness Criteria	Evaluation Summary
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness is not entirely ensured since contaminated materials potentially posing a risk are left exposed on site and can continue to degrade and migrate. ■ If disturbed, contaminated materials could allow continued release and migration of asbestos fibers and non-asbestos COPCs to unimpacted media (primarily soil and air). ■ Long-term effectiveness and permanence for covered areas would be dependent on continued integrity of the covers and adherence to institutional and access controls. This is less certain on privately owned parcels. ■ Interior cleaning would not ensure long-term effectiveness within interior of residential structures since contaminated materials would continue to be exposed and degrade and migrate from receiver-managed parcels and could be tracked into the structures. ■ Long-term effectiveness of institutional controls and access controls would not be ensured since humans and ecological receptors could ignore them, especially on privately owned parcels. ■ O&M activities would be periodically required to repair damage or erosion to the covers and access controls. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative would not treat contaminated materials impacted by asbestos fibers and non-asbestos COPCs.
Overall Rating	❷

Table D-8. Implementability Screening - Alternative 3

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Construction of covers and access controls and implementation of monitoring is relatively straightforward. ■ Cover construction around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Implementation of interior cleaning could be difficult because it would involve temporary relocation of residents. ■ Institutional controls may be more difficult to implement and reliably operate, especially for privately owned parcels, due to various degrees of contamination, types of ownership, and levels of occupancy.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of the cover systems on receiver-managed parcels are relatively easy to implement. However they may be more difficult for privately owned parcels. ■ Inspection, maintenance, and replacement of access controls and implementation of monitoring would be easy to implement. ■ Implementation of periodic interior cleaning could be difficult because it would involve temporary relocation of residents. ■ Maintenance of institutional controls may be more difficult, especially for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy.
Ability to obtain approvals from other agencies	■ Regulatory approval for in-place capping of contaminated materials using covers should be obtainable. ■ Development of offsite borrow sources for cover materials would require coordination and approval from the affected agency. ■ Regulatory approvals for institutional and access controls should be obtainable. However some difficulties may be encountered with regard to types of restrictions, especially on privately owned parcels.

Table D-8. Implementability Screening - Alternative 3 (continued)

Implementability Criteria	Evaluation Summary
Availability and capacity of treatment, storage, and disposal services	■ This alternative does not call for any treatment, storage, and disposal services. Thus this criterion is not applicable.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ The property for implementing the remedial action has already been obtained for receiver managed parcels. ■ Access permission at privately owned parcels for implementing the remedial action may not be currently available, but could be obtained. ■ Labor, equipment, and materials for cover construction are available. ■ Suitable cover construction materials would be required from offsite sources. ■ Materials, equipment, and labor resources used for land use controls and monitoring are easily obtainable. ■ Technical equipment and specialists are available for implementation of institutional controls and monitoring.
Overall Rating	❹

Table D-9. Cost Screening – Alternative 3

Evaluation Factors for Cost	Overall Rating	Approximate Cost (Present Value Dollars)
Present value cost	$$$	$10,130,000

Alternative 4

Capping of Contaminated Materials and Land Use Controls with Monitoring

Table D-10. Effectiveness Screening - Alternative 4

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ All contaminated materials on receiver-managed and privately owned parcels would be addressed through in-place capping (covers) coupled with institutional and access controls to protect the covers. ■ Land use controls would be used to restrict access and use of the existing onsite waste repository. ■ Monitoring would be performed to determine protectiveness of the remedy.
Compliance with ARARs	■ Contaminated materials capped in-place with covers would physically address exposure to contaminants and discharges to air, thus meeting chemical-specific ARARs. ■ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and imple-mentation period)	■ Surface disturbance of contaminated materials could pose short-term risks to workers installing covers. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Transport of clean borrow materials for construction of covers would increase traffic. ■ Temporary relocation of residents from privately owned parcels may be required during construction of covers.
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness and permanence for covered areas is dependent on continued integrity of the covers and adherence to institutional and access controls. This is less certain on privately owned parcels. ■ Long-term effectiveness of institutional controls and access controls would not be ensured since humans and ecological receptors could ignore them, especially on privately owned parcels. ■ O&M activities would be periodically required to repair damage or erosion to the covers and access controls. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative would not treat contaminated materials.
Overall Rating	❸

Table D-11. Implementability Screening - Alternative 4

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Construction of covers and access controls and implementation of monitoring is relatively straightforward. However, the larger area of cover construction and the related increase in cover materials required than for Alternative 3 could be problematic. ■ Cover construction around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Institutional controls may be more difficult to implement and reliably operate, especially for privately owned parcels, due to various degrees of contamination, types of ownership, and levels of occupancy.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of the cover systems on receiver-managed parcels are relatively easy to implement. However, they may be more difficult for privately owned parcels. ■ Inspection, maintenance, and replacement of access controls and implementation of monitoring would be easy to implement. ■ Maintenance of institutional controls may be more difficult, especially for privately owned parcels due to various degrees of contamination, types of ownership and levels of occupancy
Ability to obtain approvals from other agencies	■ Regulatory approval for in-place capping of contaminated materials using covers should be obtainable. ■ Development of offsite borrow sources for cover materials would require coordination and approval from the affected agency. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional and access controls should be obtainable. However, some difficulties may be encountered with regard to types of restrictions, especially on privately owned parcels.
Availability and capacity of treatment, storage, and disposal services	■ This alternative does not call for any treatment, storage and disposal services. Thus this criterion is not applicable.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ The property for implementing the remedial action has already been obtained for receiver-managed parcels. ■ Access permission at privately owned parcels for implementing the remedial action may not be currently available, but could be obtained. ■ Labor, equipment, and materials for cover construction are available. ■ Suitable cover construction materials would be required from offsite sources. ■ Materials, equipment, and labor resources used for land use controls and monitoring are easily obtainable. ■ Technical equipment and specialists are available for implementation of institutional controls and monitoring.
Overall Rating	❸

Table D-12. Cost Screening - Alternative 4

Evaluation Factors for Cost	Overall Rating	Approximate Cost (Present Value Dollars)
Present value cost	$$$	$14,060,000

Alternative 5a

Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

Table D-13. Effectiveness Screening - Alternative 5a

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ All contaminated surface materials on receiver-managed parcels and privately owned parcels would be initially addressed through surface excavation and consolidation at onsite disposal locations. ■ Contaminated materials exposed in the future due to freeze-thaw cycles would be periodically excavated (through future surface inspections and pickup) and would be disposed of off site at permitted disposal facilities authorized for asbestos. ■ Covers constructed over onsite disposal locations would address exposure to contaminated materials and prevent migration through frost heave processes. ■ Land use controls would be used to restrict access and use of the existing and new onsite disposal locations. ■ Backfill placed over excavations would initially address exposure to subsurface contaminated materials. However, frost heave processes may cause subsurface contaminated materials to become exposed at the surface. ■ Contaminated materials could continue to migrate during freeze-thaw cycles and exposures could occur prior to periodic future excavations being completed. ■ Monitoring would be performed to determine protectiveness of the remedy.
Compliance with ARARs	■ Contaminated materials excavated and disposed of off site would physically address exposure to contaminants and discharges to air, thus meeting chemical-specific ARARs. ■ Contaminated materials capped with covers would physically address exposure to contaminants and discharges to air, thus meeting chemical-specific ARARs. ■ Backfill covering subsurface contaminated materials would initially address exposure to contaminants and discharges to air, thus meeting chemical-specific ARARs. However, long-term compliance is less certain due to frost heave processes. ■ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and imple-mentation period)	■ Excavation and relocation of contaminated materials could pose short-term risks to workers. ■ Surface disturbance of contaminated materials could pose short-term risks to workers installing covers over consolidated materials and backfill in excavations. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Transport of clean borrow materials for construction of covers and backfilling excavations would increase traffic. ■ Temporary relocation of residents from privately owned parcels may be required during construction.

Table D-13. Effectiveness Screening - Alternative 5a (continued)

Effectiveness Criteria	Evaluation Summary
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness and permanence for parcels containing subsurface contaminated materials is addressed through initial surface excavation with onsite consolidation, disposal, and backfilling with clean soil followed by periodic future excavation and offsite disposal of contaminated materials that migrate to the surface during freeze-thaw cycles. ■ Long-term effectiveness and permanence for covered and backfilled areas would be dependent on continued integrity of the covers and backfill and adherence to institutional and access controls. This is less certain on privately owned parcels. ■ Long-term effectiveness of institutional controls and access controls is not ensured since humans and ecological receptors could ignore them, especially on privately owned parcels. ■ Long-term effectiveness is not entirely ensured since subsurface contaminated materials potentially posing a risk would be left in backfilled excavations. ■ Contaminated materials would continue to migrate to the surface during freeze-thaw cycles, although the volume of contaminated materials should decrease over time. ■ O&M activities would be periodically required to repair damage or erosion to the covers and access controls. ■ Long-term effectiveness of institutional controls is not ensured, especially on privately owned parcels. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative would not treat contaminated materials.
Overall Rating	❷

Table D-14. Implementability Screening - Alternative 5a

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Excavation and consolidation of all contaminated surface materials at authorized onsite disposal locations and backfilling excavations with clean soil is relatively straightforward. ■ Excavation and backfilling around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Construction of the onsite disposal facilities would require coordination during the excavation of contaminated materials from parcels. ■ Future excavation events would likely be needed for a long period of time. ■ Future excavation events should be straightforward, although difficulties may exist for implementation on privately owned parcels. ■ Offsite disposal of contaminated materials during periodic future excavation events at permitted disposal facilities is relatively straightforward. ■ Excavated contaminated materials require transportation to offsite disposal facilities in specialized enclosed trucks. ■ Special management procedures may be required for disposal at the permitted facilities. ■ Construction of access controls around onsite disposal locations and implementation of monitoring is relatively straightforward. ■ Institutional controls may be more difficult to implement and reliably operate, especially for privately owned parcels, due to various degrees of contamination, types of ownership, and levels of occupancy.

Table D-14. Implementability Screening - Alternative 5a (continued)

Implementability Criteria	Evaluation Summary
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Periodic monitoring and future excavation of contaminated materials across the site would be a continuous process. ■ Inspection, maintenance, and replacement of the cover systems over the onsite disposal facilities would be relatively easy to implement. ■ Inspection, maintenance, and replacement of access controls and implementation of monitoring would be easy to implement. ■ Maintenance of institutional controls may be more difficult, especially for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy.
Ability to obtain approvals from other agencies	■ Regulatory approval needed for excavations and to construct onsite disposal facilities should be obtainable. ■ Development of offsite borrow sources for backfill would require coordination and approval from the affected agency. ■ Regulatory approvals for future excavation events should be obtainable, although difficulties may exist with the privately owned parcels. ■ Regulatory and facility approval for offsite disposal at permitted disposal facilities should be obtainable. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional and access controls should be obtainable. However, some difficulties may be encountered with regard to types of restrictions, especially on privately owned parcels.
Availability and capacity of treatment, storage, and disposal services	■ Permitted disposal facilities authorized for asbestos are available within the State of Oregon. However, most facilities are somewhat distant from the site. ■ The offsite permitted disposal facilities should have sufficient capacity to accept contaminated materials for disposal; the volume of contaminated materials for offsite disposal in this alternative should be relatively small.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ The property for implementing the remedial action has already been obtained for receiver-managed parcels. ■ Access permission at privately owned parcels for implementing the remedial action may not be currently available, but could be obtained. ■ Labor, equipment, and materials for contaminated materials excavation, cover construction, and clean soil backfilling are available. ■ Suitable cover and backfill materials would be required from offsite sources. ■ Materials, equipment, and labor resources used for land use controls and monitoring are easily obtainable ■ Technical equipment and specialists are available for implementation of institutional controls and monitoring.
Overall Rating	❸

Table D-15. Cost Screening - Alternative 5a

Evaluation Factors for Cost	Overall Rating	Approximate Cost (Present Value Dollars)
Present value cost	$$$	$10,460,000

Alternative 5b

Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

Table D-16. Effectiveness Screening - Alternative 5b

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ All contaminated materials on receiver-managed parcels and privately owned parcels would be addressed through excavation and consolidation at onsite disposal locations. ■ Covers constructed over onsite disposal locations would address exposure to contaminated materials and prevent migration through frost heave processes. ■ Land use controls would be used to restrict access and use of the existing and new onsite disposal locations. ■ Backfill placed over excavations would address exposure to asbestos fibers. However, frost heave processes may cause residual contaminated materials to become exposed at the surface. ■ Residual contaminated materials could continue to migrate during freeze-thaw cycles and exposures could occur. ■ Monitoring would be performed to determine protectiveness of the remedy.
Compliance with ARARs	■ Contaminated materials capped with covers would physically address exposure to contaminants and discharges to air, thus meeting chemical-specific ARARs. ■ Backfill covering residual contaminated materials would initially address exposure to contaminants and discharges to air, thus meeting chemical-specific ARARs. However, long-term compliance is less certain due to frost heave processes. ■ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and imple-mentation period)	■ Excavation and relocation of contaminated materials could pose short-term risks to workers. ■ Surface disturbance of contaminated materials could pose short-term risks to workers installing covers over consolidated materials and backfill in excavations. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Transport of clean borrow materials for construction of covers and backfilling excavations would increase traffic. ■ Temporary relocation of residents from privately owned parcels may be required during construction.
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness and permanence for parcels containing contaminated materials is addressed through excavation of contaminated materials with onsite consolidation and disposal and backfilling with clean soil. ■ Long-term effectiveness and permanence for covered and backfilled areas would be dependent on continued integrity of the covers and backfill and adherence to institutional and access controls. This is less certain on privately-owned parcels. ■ Long-term effectiveness of institutional controls and access controls is not ensured since humans and ecological receptors could ignore them, especially on privately owned parcels. ■ Long-term effectiveness is not entirely ensured since residual contaminated materials potentially posing a risk are left in backfilled excavations. ■ Residual contaminated materials could continue to migrate to the surface during freeze-thaw cycles, although the volume of contaminated materials should decrease over time. ■ O&M activities would be periodically required to repair damage or erosion to the covers and access controls. ■ Long-term effectiveness of institutional controls is not ensured, especially on privately owned parcels. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative would not treat contaminated materials.
Overall Rating	❸

Table D-17. Implementability Screening - Alternative 5b

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Excavation and consolidation of all contaminated materials at authorized onsite disposal locations and backfilling excavations with clean soil is relatively straightforward. ■ Excavation and backfilling around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Construction of the onsite disposal facilities would require coordination during the excavation of contaminated materials from parcels. ■ Construction of access controls around onsite disposal locations and implementation of monitoring is relatively straightforward. ■ Institutional controls may be more difficult to implement and reliably operate, especially for privately owned parcels, due to various degrees of contamination, types of ownership, and levels of occupancy.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of the cover systems over the onsite disposal facilities would be relatively easy to implement. ■ Inspection, maintenance, and replacement of access controls and implementation of monitoring would be easy to implement. ■ Maintenance of institutional controls may be more difficult, especially for privately owned parcels, due to various degrees of contamination, types of ownership, and levels of occupancy
Ability to obtain approvals from other agencies	■ Regulatory approval needed for excavations and to construct onsite disposal facilities should be obtainable. ■ Development of offsite borrow sources for backfill would require coordination and approval from the affected agency. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional and access controls should be obtainable. However, some difficulties may be encountered with regard to types of restrictions, especially on privately owned parcels.
Availability and capacity of treatment, storage, and disposal services	■ This alternative does not call for any treatment, storage and disposal services. Thus this criterion is not applicable.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ The property for implementing the remedial action has already been obtained for receiver-managed parcels. ■ Access permission at privately owned parcels for implementing the remedial action may not be currently available, but could be obtained. ■ Labor, equipment, and materials for contaminated materials excavation, cover construction, and clean soil backfilling are available. ■ Suitable cover and backfill materials would be required from offsite sources. ■ Materials, equipment, and labor resources used for land use controls and monitoring are easily obtainable. ■ Technical equipment and specialists are available for implementation of institutional controls and monitoring.
Overall Rating	❸

Table D-18. Cost Screening - Alternative 5b

Evaluation Factors for Cost	Overall Rating	Approximate Cost (Present Value Dollars)
Present value cost	$$$	$14,070,000

Alternative 6

Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

Table D-19. Effectiveness Screening - Alternative 6

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ All contaminated materials (surface and subsurface) on receiver-managed parcels and privately owned parcels would be addressed through excavation and offsite disposal at permitted facilities authorized for asbestos. ■ Covers constructed over the existing waste repository would address exposure to contaminated materials and prevent migration through frost heave processes. ■ Land use controls would be used to restrict access and use of the existing onsite waste repository. ■ Backfill placed over excavations would address exposure to asbestos fibers. However, frost heave processes may cause residual contaminated materials to become exposed at the surface. ■ Residual contaminated materials could continue to migrate during freeze-thaw cycles and exposures could occur. ■ Monitoring would be performed to determine protectiveness of the remedy.
Compliance with ARARs	■ Contaminated materials excavated and disposed of off site would physically address exposure to contaminants and discharges to air, thus meeting chemical-specific ARARs. ■ Contaminated materials capped with covers would physically address exposure to contaminants and discharges to air, thus meeting chemical-specific ARARs. ■ Backfill covering residual contaminated materials would initially address exposure to contaminants and discharges to air, thus meeting chemical-specific ARARs. However, long-term compliance is less certain due to frost heave processes. ■ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and implementation period)	■ Excavation and offsite disposal of contaminated materials could pose short-term risks to workers. ■ Surface disturbance of contaminated materials could pose short-term risks to workers installing covers over consolidated materials and backfill in excavations. ■ There would be significant impacts to the community under this alternative, as additional truck traffic would be required for complete offsite disposal of contaminated materials as well as transport of backfill soils. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Temporary relocation of residents from privately owned parcels may be required during construction.

Table D-19. Effectiveness Screening - Alternative 6 (continued)

Effectiveness Criteria	Evaluation Summary
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness and permanence for parcels containing contaminated materials is addressed through excavation of contaminated materials with offsite disposal at permitted facilities and backfilling with clean soil. ■ Long-term effectiveness and permanence for covered and backfilled areas would be dependent on continued integrity of the covers and backfill and adherence to institutional and access controls. This is less certain on privately owned parcels. ■ Long-term effectiveness of institutional controls and access controls would not be ensured since humans and ecological receptors could ignore them, especially on privately owned parcels. ■ Long-term effectiveness would not be entirely ensured since residual contaminated materials potentially posing a risk would be left in backfilled excavations. ■ Residual contaminated materials could continue to migrate to the surface during freeze-thaw cycles, although the volume of contaminated materials should decrease over time. ■ O&M activities would be periodically required to repair damage or erosion to the covers and access controls. ■ Long-term effectiveness of institutional controls would not be ensured, especially on privately owned parcels. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative would not treat contaminated materials.
Overall Rating	❹

Table D-20. Implementability Screening - Alternative 6

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Excavation and offsite disposal of all contaminated materials at permitted disposal facilities and backfilling excavations with clean soil is relatively straightforward. However the larger volume of materials removed than for Alternative 5b and the need to coordinate traffic for both offsite disposal and borrow soil delivery could be problematic. ■ Excavated contaminated materials require transportation to offsite disposal facilities in specialized enclosed trucks. ■ Special management procedures may be required for disposal at the permitted facilities. ■ Excavation and backfilling around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Construction of access controls around the onsite waste repository and implementation of monitoring is relatively straightforward. ■ Institutional controls may be more difficult to implement and reliably operate, especially for privately owned parcels, due to various degrees of contamination, types of ownership, and levels of occupancy.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of the cover systems on the existing waste repository would be relatively easy to implement. ■ Inspection, maintenance, and replacement of access controls and implementation of monitoring would be easy to implement. ■ Maintenance of institutional controls may be more difficult, especially for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy.

Table D-20. Implementability Screening - Alternative 6 (continued)

Implementability Criteria	Evaluation Summary
Ability to obtain approvals from other agencies	■ Regulatory approval needed to excavate and transport contaminated materials should be obtainable. ■ Regulatory and facility approval for offsite disposal at permitted disposal facilities should be obtainable. ■ Development of offsite borrow sources for covers and backfill would require coordination and approval from the affected agency. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional and access controls should be obtainable. However, some difficulties may be encountered with regard to types of restrictions, especially on privately owned parcels.
Availability and capacity of treatment, storage, and disposal services	■ Permitted disposal facilities authorized for asbestos are available within the State of Oregon. However, most facilities are somewhat distant from the site. ■ Many of the permitted disposal facilities may not have sufficient capacity to accept all of the contaminated materials for disposal. Use of multiple permitted disposal facilities may be required.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ The property for implementing the remedial action has already been obtained for receiver-managed parcels. ■ Access permission at privately owned parcels for implementing the remedial action may not be currently available, but could be obtained. ■ Labor, equipment, and materials for contaminated materials excavation, cover construction, and clean soil backfilling are available. ■ Suitable cover and backfill materials would be required from offsite sources. However, significant volumes of clean borrow may be required compared to other alternatives. ■ Materials, equipment, and labor resources used for land use controls and monitoring are easily obtainable. ■ Technical equipment and specialists are available for implementation of institutional controls and monitoring.
Overall Rating	❷

Table D-21. Cost Screening - Alternative 6

Evaluation Factors for Cost	Overall Rating	Approximate Cost (Present Value Dollars)
Present value cost	$$$$$	$29,890,000

Alternative 7

Excavation and Offsite Thermo-Chemical Treatment of Contaminated Materials at Permitted Facilities, Reuse of Treated Material, and Land Use Controls with Monitoring

Table D-22. Effectiveness Screening - Alternative 7

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ All contaminated materials (surface and subsurface) on receiver-managed parcels and privately owned parcels would be addressed through excavation and offsite treatment at a permitted thermo-chemical treatment facility. ■ Asbestos within contaminated materials would be converted to an inert form that does not pose human health risks. ■ Covers constructed over the existing waste repository would address exposure to contaminated materials and prevent migration through frost heave processes. ■ Land use controls would be used to restrict access and use of the existing waste repository. ■ Backfill placed over excavations would address exposure to asbestos fibers. However, frost heave processes may cause residual contaminated materials to become exposed at the surface. ■ Residual contaminated materials could continue to migrate during freeze-thaw cycles and exposures could occur. ■ Monitoring would be performed to determine protectiveness of the remedy.
Compliance with ARARs	■ Contaminated materials removed and treated off site would physically address exposure to contaminants and discharges to air, thus meeting chemical-specific ARARs. ■ Contaminated materials capped with covers would physically address exposure to contaminants and discharges to air, thus meeting chemical-specific ARARs. ■ Backfill covering residual contaminated materials would initially address exposure to contaminants and discharges to air, thus meeting chemical-specific ARARs. However, long-term compliance is less certain due to frost heave processes. ■ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and imple-mentation period)	■ Excavation and offsite disposal of contaminated materials could pose short-term risks to workers. ■ Surface disturbance of contaminated materials could pose short-term risks to workers installing covers over consolidated materials and backfill in excavations. ■ There would be significant impacts to the community under this alternative, as additional truck traffic would be required for complete offsite treatment of contaminated materials as well as transport of treated material and backfill soils. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Temporary relocation of residents from privately owned parcels may be required during construction.

Table D-22. Effectiveness Screening - Alternative 7(continued)

Effectiveness Criteria	Evaluation Summary
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness and permanence for parcels containing contaminated materials would be addressed through excavation of contaminated materials with offsite treatment at a permitted thermo-chemical treatment facility and backfilling with inert treated material and clean soil. ■ While studies provided by ARI indicate that the treatment process completely converts ACM to an inert form, the treatment process is relatively new and there are not extensive data indicating whether the treatment process has long-term effectiveness and permanence. ■ The treatment process may not be capable of treating non-asbestos COPCs. ■ Long-term effectiveness and permanence for covered and backfilled areas would be dependent on continued integrity of the covers and backfill and adherence to institutional and access controls. This is less certain on privately owned parcels. ■ Long-term effectiveness of institutional controls and access controls would not be ensured since human and ecological receptors could ignore them, especially on privately owned parcels. ■ Long-term effectiveness would not be entirely ensured since residual contaminated materials potentially posing a risk are left in backfilled excavations. ■ Residual contaminated materials could continue to migrate to the surface during freeze-thaw cycles, although the volume of contaminated materials should decrease over time. ■ O&M activities would be periodically required to repair damage or erosion to the covers and access controls. ■ Long-term effectiveness of institutional controls would not be ensured, especially on privately owned parcels. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative involves treatment, which transforms ACM to an amorphous inert form. Thus toxicity and mobility of asbestos fibers would be eliminated. ■ Significant volume reduction of ACM would be achieved through treatment, while volume reduction of associated soils would be limited.
Overall Rating	❹

Table D-23. Implementability Screening - Alternative 7

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Excavation and offsite treatment of contaminated materials at a permitted thermo-chemical treatment facility and backfilling excavations with inert treated material and clean soil would be relatively straightforward. However, the larger volume of materials removed than for Alternative 5b and the need to coordinate traffic for both offsite treatment and borrow soil/treated material delivery could be problematic. ■ Excavated contaminated materials require transportation to the offsite treatment facility in specialized enclosed trucks. ■ The treatment process (TCCT) is a patented technology and is commercially available but not widespread. ■ The treatment process may require size reduction of larger ACM. ■ The treatment process may not be capable of treating non-asbestos COPCs. ■ Excavation and backfilling around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Construction of access controls around the onsite waste repository and implementation of monitoring is relatively straightforward. ■ Institutional controls may be more difficult to implement and reliably operate, especially for privately owned parcels, due to various degrees of contamination, types of ownership, and levels of occupancy.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of the cover systems on the existing waste repository are relatively easy to implement. ■ Inspection, maintenance, and replacement of access controls and implementation of monitoring are easy to implement. ■ Maintenance of institutional controls may be more difficult, especially for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy.
Ability to obtain approvals from other agencies	■ This technology is permitted and regulated in Washington State, so the required regulatory approval should be obtainable. ■ Regulatory approval needed to excavate and transport contaminated materials should be obtainable. ■ Regulatory approval for use of treated material as backfill material my be problematic, depending on Oregon DEQ classification of the treated material. ■ Development of offsite borrow sources for covers and backfill would require coordination and approval from the affected agency. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional and access controls should be obtainable. However, some difficulties may be encountered with regard to types of restrictions, especially on privately owned parcels.
Availability and capacity of treatment, storage, and disposal services	■ The treatment process (TCCT) is a patented technology and is commercially available but not widespread. ■ The treatment capacity of depends upon the size of the offsite treatment facility; in general the capacity is relatively small compared to the volume of contaminated materials that would be generated from the site.

Table D-23. Implementability Screening - Alternative 7 (continued)

Implementability Criteria	Evaluation Summary
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ The property for implementing the remedial action has already been obtained for receiver-managed parcels. ■ Access permission at privately- owned parcels for implementing the remedial action may not be currently available, but could be obtained. ■ Labor, equipment, and materials for contaminated materials excavation. Cover construction, and clean soil backfilling are available. ■ Suitable cover and backfill materials would be required from offsite sources. ■ Materials, equipment, and labor resources used for land use controls and monitoring are easily obtainable. ■ Technical equipment and specialists for implementation of thermo-chemical treatment are fairly limited in the United States. ■ Technical equipment and specialists are available for implementation of institutional controls and monitoring.
Overall Rating	❶

Table D-24. Cost Screening - Alternative 7

Evaluation Factors for Cost	Overall Rating	Approximate Cost (Present Value Dollars)
Present value cost	$$$$$	$129,270,000

Appendix E

Alternative Screening Cost Information

The cost spreadsheets included in this appendix were developed in accordance with EPA 540-R-00-002 (OSWER 9355.0-75) July 2000.

These costs should be used to compare alternative relative costs. Costs for project management, remedial design, and construction management were determined as percentages of capital cost per the guidance. Costs for these work items may not reflect costs for implementation. These costs are determined based on specific client requirements during implementation.

Present Value Analyses

TABLE SPV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site:	**North Ridge Estates**
Location:	**Klamath County, Oregon**
Phase:	**Final Feasibility Study**
Base Year:	**2010**

Discount Rate (Percent): **7.0**

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130	31	0.1228
6	0.6663	32	0.1147
7	0.6227	33	0.1072
8	0.5820	34	0.1002
9	0.5439	35	0.0937
10	0.5083	36	0.0875
11	0.4751	37	0.0818
12	0.4440	38	0.0765
13	0.4150	39	0.0715
14	0.3878	40	0.0668
15	0.3624	41	0.0624
16	0.3387	42	0.0583
17	0.3166	43	0.0545
18	0.2959	44	0.0509
19	0.2765	45	0.0476
20	0.2584	46	0.0445
21	0.2415	47	0.0416
22	0.2257	48	0.0389
23	0.2109	49	0.0363
24	0.1971	50	0.0339
25	0.1842		

Notes:

1 Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 o "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

2 The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE SPV-1

PRESENT VALUE ANALYSIS

Alternative **1**
No Action

Site:	**North Ridge Estates**
Location:	**Klamath County, Oregon**
Phase:	**Final Feasibility Study**
Base Year:	**2010**

Year[1]	Capital Costs[2]	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	1.0000	$0
1	$0	$0	$0	0.9346	$0
2	$0	$0	$0	0.8734	$0
3	$0	$0	$0	0.8163	$0
4	$0	$0	$0	0.7629	$0
5	$0	$90,000	$90,000	0.7130	$64,170
6	$0	$0	$0	0.6663	$0
7	$0	$0	$0	0.6227	$0
8	$0	$0	$0	0.5820	$0
9	$0	$0	$0	0.5439	$0
10	$0	$90,000	$90,000	0.5083	$45,747
11	$0	$0	$0	0.4751	$0
12	$0	$0	$0	0.4440	$0
13	$0	$0	$0	0.4150	$0
14	$0	$0	$0	0.3878	$0
15	$0	$90,000	$90,000	0.3624	$32,616
16	$0	$0	$0	0.3387	$0
17	$0	$0	$0	0.3166	$0
18	$0	$0	$0	0.2959	$0
19	$0	$0	$0	0.2765	$0
20	$0	$90,000	$90,000	0.2584	$23,256
21	$0	$0	$0	0.2415	$0
22	$0	$0	$0	0.2257	$0
23	$0	$0	$0	0.2109	$0
24	$0	$0	$0	0.1971	$0
25	$0	$90,000	$90,000	0.1842	$16,578
26	$0	$0	$0	0.1722	$0
27	$0	$0	$0	0.1609	$0
28	$0	$0	$0	0.1504	$0
29	$0	$0	$0	0.1406	$0
30	$0	$90,000	$90,000	0.1314	$11,826
TOTALS:	$0	$540,000	$540,000		$194,193
TOTAL PRESENT VALUE OF ALTERNATIVE 1[5]					**$190,000**

Notes:
[1] Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.
[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-1.
[3] Total annual expenditure is the total cost per year with no discounting.
[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for c
[5] Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present va

TABLE SPV-2

PRESENT VALUE ANALYSIS

Alternative 2
Interior Cleaning and Land Use Controls with Monitorin

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Year[1]	Capital Costs (Land Use Controls)[2]	Annual O&M Costs (Access Controls)	Periodic Costs (Interior House Cleanings and Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	1.0000	$0
1	$1,066,000	$15,000	$0	$1,081,000	0.9346	$1,010,303
2	$0	$15,000	$0	$15,000	0.8734	$13,101
3	$0	$15,000	$0	$15,000	0.8163	$12,245
4	$0	$15,000	$0	$15,000	0.7629	$11,444
5	$0	$15,000	$150,000	$165,000	0.7130	$117,645
6	$0	$15,000	$0	$15,000	0.6663	$9,995
7	$0	$15,000	$0	$15,000	0.6227	$9,341
8	$0	$15,000	$0	$15,000	0.5820	$8,730
9	$0	$15,000	$0	$15,000	0.5439	$8,159
10	$0	$15,000	$1,014,000	$1,029,000	0.5083	$523,041
11	$0	$15,000	$0	$15,000	0.4751	$7,127
12	$0	$15,000	$0	$15,000	0.4440	$6,660
13	$0	$15,000	$0	$15,000	0.4150	$6,225
14	$0	$15,000	$0	$15,000	0.3878	$5,817
15	$0	$15,000	$150,000	$165,000	0.3624	$59,796
16	$0	$15,000	$0	$15,000	0.3387	$5,081
17	$0	$15,000	$0	$15,000	0.3166	$4,749
18	$0	$15,000	$0	$15,000	0.2959	$4,439
19	$0	$15,000	$0	$15,000	0.2765	$4,148
20	$0	$15,000	$1,014,000	$1,029,000	0.2584	$265,894
21	$0	$15,000	$0	$15,000	0.2415	$3,623
22	$0	$15,000	$0	$15,000	0.2257	$3,386
23	$0	$15,000	$0	$15,000	0.2109	$3,164
24	$0	$15,000	$0	$15,000	0.1971	$2,957
25	$0	$15,000	$150,000	$165,000	0.1842	$30,393
26	$0	$15,000	$0	$15,000	0.1722	$2,583
27	$0	$15,000	$0	$15,000	0.1609	$2,414
28	$0	$15,000	$0	$15,000	0.1504	$2,256
29	$0	$15,000	$0	$15,000	0.1406	$2,109
30	$0	$15,000	$1,014,000	$1,029,000	0.1314	$135,211
TOTALS:	$1,066,000	$450,000	$3,492,000	**$5,008,000**		$2,282,036
TOTAL PRESENT VALUE OF ALTERNATIVE 2[5]						**$2,280,000**

Notes:
[1] Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.
[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-2.
[3] Total annual expenditure is the total cost per year with no discounting.
[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.
[5] Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

TABLE SPV-3

PRESENT VALUE ANALYSIS

Alternative 3

Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Year[1]	Capital Costs (Land Use Controls)[2]	Capital Costs (Construction)[2]	Annual O&M Costs (Cover and Access Controls)	Periodic Costs (Interior House Cleanings and Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$1,066,000	$4,261,000	$27,000	$0	$5,354,000	0.9346	$5,003,848
2	$0	$4,261,000	$27,000	$0	$4,288,000	0.8734	$3,745,139
3	$0	$0	$27,000	$0	$27,000	0.8163	$22,040
4	$0	$0	$27,000	$0	$27,000	0.7629	$20,598
5	$0	$0	$27,000	$150,000	$177,000	0.7130	$126,201
6	$0	$0	$27,000	$0	$27,000	0.6663	$17,990
7	$0	$0	$27,000	$0	$27,000	0.6227	$16,813
8	$0	$0	$27,000	$0	$27,000	0.5820	$15,714
9	$0	$0	$27,000	$0	$27,000	0.5439	$14,685
10	$0	$0	$27,000	$1,014,000	$1,041,000	0.5083	$529,140
11	$0	$0	$27,000	$0	$27,000	0.4751	$12,828
12	$0	$0	$27,000	$0	$27,000	0.4440	$11,988
13	$0	$0	$27,000	$0	$27,000	0.4150	$11,205
14	$0	$0	$27,000	$0	$27,000	0.3878	$10,471
15	$0	$0	$27,000	$150,000	$177,000	0.3624	$64,145
16	$0	$0	$27,000	$0	$27,000	0.3387	$9,145
17	$0	$0	$27,000	$0	$27,000	0.3166	$8,548
18	$0	$0	$27,000	$0	$27,000	0.2959	$7,989
19	$0	$0	$27,000	$0	$27,000	0.2765	$7,466
20	$0	$0	$27,000	$1,014,000	$1,041,000	0.2584	$268,994
21	$0	$0	$27,000	$0	$27,000	0.2415	$6,521
22	$0	$0	$27,000	$0	$27,000	0.2257	$6,094
23	$0	$0	$27,000	$0	$27,000	0.2109	$5,694
24	$0	$0	$27,000	$0	$27,000	0.1971	$5,322
25	$0	$0	$27,000	$150,000	$177,000	0.1842	$32,603
26	$0	$0	$27,000	$0	$27,000	0.1722	$4,649
27	$0	$0	$27,000	$0	$27,000	0.1609	$4,344
28	$0	$0	$27,000	$0	$27,000	0.1504	$4,061
29	$0	$0	$27,000	$0	$27,000	0.1406	$3,796
30	$0	$0	$27,000	$1,014,000	$1,041,000	0.1314	$136,787
TOTALS:	$1,066,000	$8,522,000	$810,000	$3,492,000	$13,890,000		$10,134,818
TOTAL PRESENT VALUE OF ALTERNATIVE 3[5]							**$10,130,000**

Notes:

1 Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.
2 Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-3.
3 Total annual expenditure is the total cost per year with no discounting.
4 Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.
5 Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

TABLE SPV-4

PRESENT VALUE ANALYSIS

Alternative 4

Capping of Contaminated Materials and Land Use Controls with Monitoring

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Year[1]	Capital Costs (Land Use Controls)[2]	Capital Costs (Construction)[2]	Annual O&M Costs (Cover and Access Controls)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$1,042,000	$6,969,500	$27,000	$0	$8,038,500	0.9346	$7,512,782
2	$0	$6,969,500	$27,000	$0	$6,996,500	0.8734	$6,110,743
3	$0	$0	$27,000	$0	$27,000	0.8163	$22,040
4	$0	$0	$27,000	$0	$27,000	0.7629	$20,598
5	$0	$0	$27,000	$68,000	$95,000	0.7130	$67,735
6	$0	$0	$27,000	$0	$27,000	0.6663	$17,990
7	$0	$0	$27,000	$0	$27,000	0.6227	$16,813
8	$0	$0	$27,000	$0	$27,000	0.5820	$15,714
9	$0	$0	$27,000	$0	$27,000	0.5439	$14,685
10	$0	$0	$27,000	$68,000	$95,000	0.5083	$48,289
11	$0	$0	$27,000	$0	$27,000	0.4751	$12,828
12	$0	$0	$27,000	$0	$27,000	0.4440	$11,988
13	$0	$0	$27,000	$0	$27,000	0.4150	$11,205
14	$0	$0	$27,000	$0	$27,000	0.3878	$10,471
15	$0	$0	$27,000	$68,000	$95,000	0.3624	$34,428
16	$0	$0	$27,000	$0	$27,000	0.3387	$9,145
17	$0	$0	$27,000	$0	$27,000	0.3166	$8,548
18	$0	$0	$27,000	$0	$27,000	0.2959	$7,989
19	$0	$0	$27,000	$0	$27,000	0.2765	$7,466
20	$0	$0	$27,000	$68,000	$95,000	0.2584	$24,548
21	$0	$0	$27,000	$0	$27,000	0.2415	$6,521
22	$0	$0	$27,000	$0	$27,000	0.2257	$6,094
23	$0	$0	$27,000	$0	$27,000	0.2109	$5,694
24	$0	$0	$27,000	$0	$27,000	0.1971	$5,322
25	$0	$0	$27,000	$68,000	$95,000	0.1842	$17,499
26	$0	$0	$27,000	$0	$27,000	0.1722	$4,649
27	$0	$0	$27,000	$0	$27,000	0.1609	$4,344
28	$0	$0	$27,000	$0	$27,000	0.1504	$4,061
29	$0	$0	$27,000	$0	$27,000	0.1406	$3,796
30	$0	$0	$27,000	$68,000	$95,000	0.1314	$12,483
TOTALS:	$1,042,000	$13,939,000	$810,000	$408,000	$16,199,000		$14,056,468
TOTAL PRESENT VALUE OF ALTERNATIVE 4[5]							**$14,060,000**

Notes:

1 Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.
2 Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-4.
3 Total annual expenditure is the total cost per year with no discounting.
4 Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.
5 Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

TABLE SPV-5a

PRESENT VALUE ANALYSIS

Alternative 5a

Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Year[1]	Capital Costs (Land Use Controls)[2]	Capital Costs (Construction and Future Excavation)[2]	Annual O&M Costs (Cover and Access Controls)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$1,050,000	$4,503,000	$27,000	$0	$5,580,000	0.9346	$5,215,068
2	$0	$4,503,000	$27,000	$0	$4,530,000	0.8734	$3,956,502
3	$0	$81,000	$27,000	$0	$108,000	0.8163	$88,160
4	$0	$81,000	$27,000	$0	$108,000	0.7629	$82,393
5	$0	$81,000	$27,000	$68,000	$176,000	0.7130	$125,488
6	$0	$81,000	$27,000	$0	$108,000	0.6663	$71,960
7	$0	$81,000	$27,000	$0	$108,000	0.6227	$67,252
8	$0	$81,000	$27,000	$0	$108,000	0.5820	$62,856
9	$0	$81,000	$27,000	$0	$108,000	0.5439	$58,741
10	$0	$81,000	$27,000	$68,000	$176,000	0.5083	$89,461
11	$0	$81,000	$27,000	$0	$108,000	0.4751	$51,311
12	$0	$81,000	$27,000	$0	$108,000	0.4440	$47,952
13	$0	$81,000	$27,000	$0	$108,000	0.4150	$44,820
14	$0	$81,000	$27,000	$0	$108,000	0.3878	$41,882
15	$0	$81,000	$27,000	$68,000	$176,000	0.3624	$63,782
16	$0	$81,000	$27,000	$0	$108,000	0.3387	$36,580
17	$0	$81,000	$27,000	$0	$108,000	0.3166	$34,193
18	$0	$81,000	$27,000	$0	$108,000	0.2959	$31,957
19	$0	$81,000	$27,000	$0	$108,000	0.2765	$29,862
20	$0	$81,000	$27,000	$68,000	$176,000	0.2584	$45,478
21	$0	$81,000	$27,000	$0	$108,000	0.2415	$26,082
22	$0	$81,000	$27,000	$0	$108,000	0.2257	$24,376
23	$0	$81,000	$27,000	$0	$108,000	0.2109	$22,777
24	$0	$81,000	$27,000	$0	$108,000	0.1971	$21,287
25	$0	$81,000	$27,000	$68,000	$176,000	0.1842	$32,419
26	$0	$81,000	$27,000	$0	$108,000	0.1722	$18,598
27	$0	$81,000	$27,000	$0	$108,000	0.1609	$17,377
28	$0	$81,000	$27,000	$0	$108,000	0.1504	$16,243
29	$0	$81,000	$27,000	$0	$108,000	0.1406	$15,185
30	$0	$81,000	$27,000	$68,000	$176,000	0.1314	$23,126
TOTALS:	$1,050,000	$11,274,000	$810,000	$408,000	$13,542,000		$10,463,168
TOTAL PRESENT VALUE OF ALTERNATIVE 5a[5]							**$10,460,000**

Notes:

1 Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.

2 Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-5a.

3 Total annual expenditure is the total cost per year with no discounting.

4 Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.

5 Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

TABLE SPV-5b

PRESENT VALUE ANALYSIS

Alternative 5b

Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

Site:	**North Ridge Estates**
Location:	**Klamath County, Oregon**
Phase:	**Final Feasibility Study**
Base Year:	**2010**

Year[1]	Capital Costs (Land Use Controls)[2]	Capital Costs (Construction)[2]	Annual O&M Costs (Cover and Access Controls)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$1,050,000	$4,804,667	$27,000	$0	$5,881,667	0.9346	$5,497,006
2	$0	$4,804,667	$27,000	$0	$4,831,667	0.8734	$4,219,978
3	$0	$4,804,667	$27,000	$0	$4,831,667	0.8163	$3,944,090
4	$0	$0	$27,000	$0	$27,000	0.7629	$20,598
5	$0	$0	$27,000	$68,000	$95,000	0.7130	$67,735
6	$0	$0	$27,000	$0	$27,000	0.6663	$17,990
7	$0	$0	$27,000	$0	$27,000	0.6227	$16,813
8	$0	$0	$27,000	$0	$27,000	0.5820	$15,714
9	$0	$0	$27,000	$0	$27,000	0.5439	$14,685
10	$0	$0	$27,000	$68,000	$95,000	0.5083	$48,289
11	$0	$0	$27,000	$0	$27,000	0.4751	$12,828
12	$0	$0	$27,000	$0	$27,000	0.4440	$11,988
13	$0	$0	$27,000	$0	$27,000	0.4150	$11,205
14	$0	$0	$27,000	$0	$27,000	0.3878	$10,471
15	$0	$0	$27,000	$68,000	$95,000	0.3624	$34,428
16	$0	$0	$27,000	$0	$27,000	0.3387	$9,145
17	$0	$0	$27,000	$0	$27,000	0.3166	$8,548
18	$0	$0	$27,000	$0	$27,000	0.2959	$7,989
19	$0	$0	$27,000	$0	$27,000	0.2765	$7,466
20	$0	$0	$27,000	$68,000	$95,000	0.2584	$24,548
21	$0	$0	$27,000	$0	$27,000	0.2415	$6,521
22	$0	$0	$27,000	$0	$27,000	0.2257	$6,094
23	$0	$0	$27,000	$0	$27,000	0.2109	$5,694
24	$0	$0	$27,000	$0	$27,000	0.1971	$5,322
25	$0	$0	$27,000	$68,000	$95,000	0.1842	$17,499
26	$0	$0	$27,000	$0	$27,000	0.1722	$4,649
27	$0	$0	$27,000	$0	$27,000	0.1609	$4,344
28	$0	$0	$27,000	$0	$27,000	0.1504	$4,061
29	$0	$0	$27,000	$0	$27,000	0.1406	$3,796
30	$0	$0	$27,000	$68,000	$95,000	0.1314	$12,483
TOTALS:	$1,050,000	$14,414,000	$810,000	$408,000	$16,682,000		$14,071,977
TOTAL PRESENT VALUE OF ALTERNATIVE 5b[5]							**$14,070,000**

Notes:

1 Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.

2 Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-5b.

3 Total annual expenditure is the total cost per year with no discounting.

4 Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.

5 Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

TABLE SPV-6

PRESENT VALUE ANALYSIS

Alternative 6

Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Year[1]	Capital Costs (Land Use Controls)[2]	Capital Costs (Construction)[2]	Annual O&M Costs (Cover and Access Controls)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$1,042,000	$8,395,250	$27,000	$0	$9,464,250	0.9346	$8,845,288
2	$0	$8,395,250	$27,000	$0	$8,422,250	0.8734	$7,355,993
3	$0	$8,395,250	$27,000	$0	$8,422,250	0.8163	$6,875,083
4	$0	$8,395,250	$27,000	$0	$8,422,250	0.7629	$6,425,335
5	$0	$0	$27,000	$68,000	$95,000	0.7130	$67,735
6	$0	$0	$27,000	$0	$27,000	0.6663	$17,990
7	$0	$0	$27,000	$0	$27,000	0.6227	$16,813
8	$0	$0	$27,000	$0	$27,000	0.5820	$15,714
9	$0	$0	$27,000	$0	$27,000	0.5439	$14,685
10	$0	$0	$27,000	$68,000	$95,000	0.5083	$48,289
11	$0	$0	$27,000	$0	$27,000	0.4751	$12,828
12	$0	$0	$27,000	$0	$27,000	0.4440	$11,988
13	$0	$0	$27,000	$0	$27,000	0.4150	$11,205
14	$0	$0	$27,000	$0	$27,000	0.3878	$10,471
15	$0	$0	$27,000	$68,000	$95,000	0.3624	$34,428
16	$0	$0	$27,000	$0	$27,000	0.3387	$9,145
17	$0	$0	$27,000	$0	$27,000	0.3166	$8,548
18	$0	$0	$27,000	$0	$27,000	0.2959	$7,989
19	$0	$0	$27,000	$0	$27,000	0.2765	$7,466
20	$0	$0	$27,000	$68,000	$95,000	0.2584	$24,548
21	$0	$0	$27,000	$0	$27,000	0.2415	$6,521
22	$0	$0	$27,000	$0	$27,000	0.2257	$6,094
23	$0	$0	$27,000	$0	$27,000	0.2109	$5,694
24	$0	$0	$27,000	$0	$27,000	0.1971	$5,322
25	$0	$0	$27,000	$68,000	$95,000	0.1842	$17,499
26	$0	$0	$27,000	$0	$27,000	0.1722	$4,649
27	$0	$0	$27,000	$0	$27,000	0.1609	$4,344
28	$0	$0	$27,000	$0	$27,000	0.1504	$4,061
29	$0	$0	$27,000	$0	$27,000	0.1406	$3,796
30	$0	$0	$27,000	$68,000	$95,000	0.1314	$12,483
TOTALS:	$1,042,000	$33,581,000	$810,000	$408,000	$35,841,000		$29,892,004
TOTAL PRESENT VALUE OF ALTERNATIVE 6[5]							**$29,890,000**

Notes:

[1] Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.

[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-6.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.

[5] Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

TABLE SPV-7

PRESENT VALUE ANALYSIS

Alternative 7

Excavation and Offsite Thermo-Chemical Treatment of Contaminated Materials at Permitted Facilities, Reuse of Treated Material, and Land Use Controls with Monitoring

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Year[1]	Capital Costs (Land Use Controls)[2]	Capital Costs (Construction)[2]	Annual O&M Costs (Cover and Access Controls)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$1,042,000	$31,173,200	$27,000	$0	$32,242,200	0.9346	$30,133,560
2	$0	$31,173,200	$27,000	$0	$31,200,200	0.8734	$27,250,255
3	$0	$31,173,200	$27,000	$0	$31,200,200	0.8163	$25,468,723
4	$0	$31,173,200	$27,000	$0	$31,200,200	0.7629	$23,802,633
5	$0	$31,173,200	$27,000	$68,000	$31,268,200	0.7130	$22,294,227
6	$0	$0	$27,000	$0	$27,000	0.6663	$17,990
7	$0	$0	$27,000	$0	$27,000	0.6227	$16,813
8	$0	$0	$27,000	$0	$27,000	0.5820	$15,714
9	$0	$0	$27,000	$0	$27,000	0.5439	$14,685
10	$0	$0	$27,000	$68,000	$95,000	0.5083	$48,289
11	$0	$0	$27,000	$0	$27,000	0.4751	$12,828
12	$0	$0	$27,000	$0	$27,000	0.4440	$11,988
13	$0	$0	$27,000	$0	$27,000	0.4150	$11,205
14	$0	$0	$27,000	$0	$27,000	0.3878	$10,471
15	$0	$0	$27,000	$68,000	$95,000	0.3624	$34,428
16	$0	$0	$27,000	$0	$27,000	0.3387	$9,145
17	$0	$0	$27,000	$0	$27,000	0.3166	$8,548
18	$0	$0	$27,000	$0	$27,000	0.2959	$7,989
19	$0	$0	$27,000	$0	$27,000	0.2765	$7,466
20	$0	$0	$27,000	$68,000	$95,000	0.2584	$24,548
21	$0	$0	$27,000	$0	$27,000	0.2415	$6,521
22	$0	$0	$27,000	$0	$27,000	0.2257	$6,094
23	$0	$0	$27,000	$0	$27,000	0.2109	$5,694
24	$0	$0	$27,000	$0	$27,000	0.1971	$5,322
25	$0	$0	$27,000	$68,000	$95,000	0.1842	$17,499
26	$0	$0	$27,000	$0	$27,000	0.1722	$4,649
27	$0	$0	$27,000	$0	$27,000	0.1609	$4,344
28	$0	$0	$27,000	$0	$27,000	0.1504	$4,061
29	$0	$0	$27,000	$0	$27,000	0.1406	$3,796
30	$0	$0	$27,000	$68,000	$95,000	0.1314	$12,483
TOTALS:	$1,042,000	$155,866,000	$810,000	$408,000	$158,126,000		$129,271,968
TOTAL PRESENT VALUE OF ALTERNATIVE 7[5]							**$129,270,000**

Notes:

1 Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.
2 Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-7.
3 Total annual expenditure is the total cost per year with no discounting.
4 Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.
5 Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

Screening Cost Estimate Summaries

TABLE SCS-1

Alternative **1**
No Action

SCREENING COST ESTIMATE SUMMARY

Site:	North Ridge Estates
Location:	Klamath County, Oregon
Phase:	Final Feasibility Study
Base Year:	2010
Date:	March 24, 2010

Alternative 1 would leave removal action activities previously performed in their current conditions. No new remedial action activities would be initiated at the site to address contaminated materials or otherwise mitigate the associated risks to human health and the environment. A no action alternative is required by the NCP to provide an environmental baseline against which impacts of the various remedial alternatives can be compared. Five-year site reviews would be performed as required by the NCP to evaluate whether adequate protection of human health and the environment is provided since contaminated materials would remain at the site. Monitoring (consisting of non-intrusive visual inspections and sample collection with laboratory analysis) would be performed as necessary to complete the 5-year site reviews.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$60,000	$60,000	Includes 5-year site review inspection and report.
SUBTOTAL				$60,000	
Contingency (Scope and Bid)	20%			$12,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$72,000	
Project Management	10%			$7,200	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$10,800	Middle value of the recommended range was used.
TOTAL				$90,000	
TOTAL PERIODIC COST				**$90,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Refer to Table SCS-Notes for cost sources and explanation for various unit costs.
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:

EA	Each
LS	Lump Sum
QTY	Quantity

TABLE SCS-2

Alternative **2**
Interior Cleaning and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 2 uses a remedial strategy that emphasizes periodic interior cleaning of homes and residential structures on private parcels. Residential structures on receiver-managed parcels would be relocated or demolished. This alternative leaves the existing onsite waste repository intact, but does not otherwise modify the interim cover over the repository. Interior cleaning would be performed on a periodic basis using vacuum extraction to remove asbestos fibers within residential structures on privately owned parcels. Residential structures on receiver-managed parcels would not be cleaned under this alternative since they would be left unoccupied and would be demolished or relocated during implementation of the remedy. Land use controls would be implemented to restrict access and use of contaminated areas and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that interior cleanings and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

LAND USE CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	56	EA	$11,000	$616,000	Institutional controls for private and receivership parcels, 45 parcels.
Access Controls	78	EA	$180	$14,040	Includes access controls (signage) around the site boundary.
SUBTOTAL				$630,040	
Contingency (Scope and Bid)	20%			$126,008	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$756,048	
Project Management	6%			$45,363	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	12%			$90,726	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	8%			$60,484	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$113,407	Middle value of the recommended range was used.
TOTAL				$1,066,028	
TOTAL CAPITAL COST				**$1,066,000**	Total capital cost is rounded to the nearest $1,000.

INTERIOR HOUSE CLEANING (Years 10, 20, and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Interior Cleaning of Houses	24	EA	$24,000	$576,000	
SUBTOTAL				$576,000	
Contingency (Scope and Bid)	20%			$115,200	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$691,200	
Project Management	10%			$69,120	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$103,680	Middle value of the recommended range was used.
TOTAL				$864,000	
TOTAL PERIODIC COST				**$864,000**	Total capital cost is rounded to the nearest $1,000.

ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 1 through 30

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Operations and Maintenance	1	LS	$10,000	$10,000	Includes access controls maintenance and inspections.
SUBTOTAL				$10,000	
Contingency (Scope and Bid)	20%			$2,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$12,000	
Project Management	10%			$1,200	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$1,800	Middle value of the recommended range was used.
TOTAL				$15,000	
TOTAL PERIODIC COST				**$15,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-2

Alternative 2
Interior Cleaning and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 2 uses a remedial strategy that emphasizes periodic interior cleaning of homes and residential structures on private parcels. Residential structures on receiver-managed parcels would be relocated or demolished. This alternative leaves the existing onsite waste repository intact, but does not otherwise modify the interim cover over the repository. Interior cleaning would be performed on a periodic basis using vacuum extraction to remove asbestos fibers within residential structures on privately owned parcels. Residential structures on receiver-managed parcels would not be cleaned under this alternative since they would be left unoccupied and would be demolished or relocated during implementation of the remedy. Land use controls would be implemented to restrict access and use of contaminated areas and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that interior cleanings and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$100,000	$100,000	Includes 5-year site review inspection and report.
SUBTOTAL				$100,000	
Contingency (Scope and Bid)	20%			$20,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$120,000	
Project Management	10%			$12,000	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$18,000	Middle value of the recommended range was used.
TOTAL				$150,000	
TOTAL PERIODIC COST				**$150,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Refer to Table SCS-Notes for cost sources and explanation for various unit costs.
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:
ABS Activity Based Sampling
EA Each
FT Feet
LS Lump Sum
QTY Quantity

TABLE SCS-3

Alternative **3**

Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 3 includes in-place capping (covering) of contaminated materials identified on privately owned parcels and a portion of the contaminated materials on receiver managed parcels (assumed to be 50% of identified contaminated materials for cost purposes). Covers used to cap contaminated materials are assumed to be constructed from clean soil transported from offsite borrow areas to ensure that contamination is not present. Current residential structures on receiver managed parcels would be relocated or demolished (assumed to be demolished for cost purposes). Interior cleaning would be performed on a periodic basis using vacuum extraction to remove asbestos fibers within residential structures on privately owned parcels. Land use controls would be used to protect covered areas as well as restrict access and use of contaminated areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, interior cleanings, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

INSTITUTIONAL AND ACCESS CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	56	EA	$11,000	$616,000	Institutional controls for private and receivership parcels, 45 parcels.
Access Controls	78	EA	$180	$14,040	Includes access controls (signage) around the site boundary, assumed to be 50% of the total boundary length.
SUBTOTAL				$630,040	
Contingency (Scope and Bid)	20%			$126,008	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$756,048	
Project Management	6%			$45,363	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	12%			$90,726	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	8%			$60,484	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$113,407	Middle value of the recommended range was used.
TOTAL				$1,066,028	
TOTAL CAPITAL COST				**$1,066,000**	Total capital cost is rounded to the nearest $1,000.

CONSTRUCTION CAPITAL COSTS: (Assumed to be Incurred During Year 1

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Contaminated Materials Capping	53	ACR	$100,000	$5,300,000	Includes site clearing, mob/demob, in-place capping, revegetation, inspection and monitoring.
SUBTOTAL				$5,300,000	
Contingency (Scope and Bid)	20%			$1,060,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$6,360,000	
Project Management	5%			$318,000	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	8%			$508,800	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	6%			$381,600	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$954,000	Middle value of the recommended range was used.
TOTAL				$8,522,400	
TOTAL CAPITAL COST				**$8,522,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-3

Alternative **3**

Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 3 includes in-place capping (covering) of contaminated materials identified on privately owned parcels and a portion of the contaminated materials on receiver managed parcels (assumed to be 50% of identified contaminated materials for cost purposes). Covers used to cap contaminated materials are assumed to be constructed from clean soil transported from offsite borrow areas to ensure that contamination is not present. Current residential structures on receiver managed parcels would be relocated or demolished (assumed to be demolished for cost purposes). Interior cleaning would be performed on a periodic basis using vacuum extraction to remove asbestos fibers within residential structures on privately owned parcels. Land use controls would be used to protect covered areas as well as restrict access and use of contaminated areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, interior cleanings, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

INTERIOR HOUSE CLEANING PERIODIC COSTS (Years 10, 20, and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Interior Cleaning of Houses	24	EA	$24,000	$576,000	
SUBTOTAL				$576,000	
Contingency (Scope and Bid)	20%			$115,200	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$691,200	
Project Management	10%			$69,120	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$103,680	Middle value of the recommended range was used.
TOTAL				$864,000	
TOTAL PERIODIC COST				**$864,000**	Total capital cost is rounded to the nearest $1,000.

ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 1 through 30

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Operations and Maintenance	1	LS	$18,000	$18,000	Includes cover and signage maintenance, and inspections.
SUBTOTAL				$18,000	
Contingency (Scope and Bid)	20%			$3,600	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$21,600	
Project Management	10%			$2,160	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$3,240	Middle value of the recommended range was used.
TOTAL				$27,000	
TOTAL PERIODIC COST				**$27,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-3

Alternative **3**
Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 3 includes in-place capping (covering) of contaminated materials identified on privately owned parcels and a portion of the contaminated materials on receiver managed parcels (assumed to be 50% of identified contaminated materials for cost purposes). Covers used to cap contaminated materials are assumed to be constructed from clean soil transported from offsite borrow areas to ensure that contamination is not present. Current residential structures on receiver managed parcels would be relocated or demolished (assumed to be demolished for cost purposes). Interior cleaning would be performed on a periodic basis using vacuum extraction to remove asbestos fibers within residential structures on privately owned parcels. Land use controls would be used to protect covered areas as well as restrict access and use of contaminated areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, interior cleanings, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25, and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$100,000	$100,000	Includes 5-year site review inspection and report.
SUBTOTAL				$100,000	
Contingency (Scope and Bid)	20%			$20,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$120,000	
Project Management	10%			$12,000	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$18,000	Middle value of the recommended range was used.
TOTAL				$150,000	
TOTAL PERIODIC COST				**$150,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Refer to Table SCS-Notes for cost sources and explanation for various unit costs.
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:
ABS Activity Based Sampling
ACR Acre
EA Each
FT Feet
LS Lump Sum
QTY Quantity

TABLE SCS-4

Alternative 4
Capping of Contaminated Materials and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 4 uses a remedial strategy that emphasizes in-place capping (covering) of contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Covers used to contain contaminated materials are assumed to be constructed from clean soil transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

LAND USE CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	56	EA	$11,000	$616,000	Institutional controls for private and receivership parcels, 45 parcels.
SUBTOTAL				$616,000	
Contingency (Scope and Bid)	20%			$123,200	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$739,200	
Project Management	6%			$44,352	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	12%			$88,704	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	8%			$59,136	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$110,880	Middle value of the recommended range was used.
TOTAL				$1,042,272	
TOTAL CAPITAL COST				**$1,042,000**	Total capital cost is rounded to the nearest $1,000.

CONSTRUCTION CAPITAL COSTS: (Assumed to be Incurred During Year 1 and 2

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Contaminated Materials Capping	88	ACR	$100,000	$8,800,000	Includes site clearing, mob/demob, in-place capping, revegetation, inspection and monitoring.
SUBTOTAL				$8,800,000	
Contingency (Scope and Bid)	20%			$1,760,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$10,560,000	
Project Management	5%			$528,000	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	6%			$633,600	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	6%			$633,600	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$1,584,000	Middle value of the recommended range was used.
TOTAL				$13,939,200	
TOTAL CAPITAL COST				**$13,939,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-4

Alternative 4

Capping of Contaminated Materials and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 4 uses a remedial strategy that emphasizes in-place capping (covering) of contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Covers used to contain contaminated materials are assumed to be constructed from clean soil transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 1 through 30

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Operations and Maintenance	1	LS	$18,000	$18,000	Includes cover maintenance and inspections.
SUBTOTAL				$18,000	
Contingency (Scope and Bid)	20%			$3,600	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$21,600	
Project Management	10%			$2,160	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$3,240	Middle value of the recommended range was used.
TOTAL				$27,000	
TOTAL PERIODIC COST				**$27,000**	Total capital cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25, and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$45,000	$45,000	Includes 5-year site review inspection and report.
SUBTOTAL				$45,000	
Contingency (Scope and Bid)	20%			$9,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$54,000	
Project Management	10%			$5,400	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$8,100	Middle value of the recommended range was used.
TOTAL				$67,500	
TOTAL PERIODIC COST				**$68,000**	Total capital cost is rounded to the nearest $1,000.

Notes:

Refer to Table SCS-Notes for cost sources and explanation for various unit costs.

Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:

ABS Activity Based Sampling
ACR Acre
EA Each
FT Feet
LS Lump Sum
QTY Quantity

TABLE SCS-5a

Alternative **5a**

Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 5a uses a remedial strategy that emphasizes excavation of contaminated surface materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be consolidated at an onsite disposal location. Clean soil would be used to backfill removal areas and is assumed to be transported from offsite borrow areas tested for contamination. Future excavation events (i.e. surface excavation/pickup of contaminated materials) would be performed on a regular basis and would be disposed of at a permitted offsite disposal facility specifically authorized by Oregon DEQ to receive asbestos and other non-asbestos COPCs. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

LAND USE CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	56	EA	$11,000	$616,000	Institutional controls for private and receivership parcels, 45 parcels.
Access Controls	25	EA	$180	$4,500	Includes access controls (signage).
SUBTOTAL				$620,500	
Contingency (Scope and Bid)	20%			$124,100	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$744,600	
Project Management	6%			$44,676	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	12%			$89,352	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	8%			$59,568	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$111,690	Middle value of the recommended range was used.
TOTAL				$1,049,886	
TOTAL CAPITAL COST				**$1,050,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-5a

Alternative **5a**

Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 5a uses a remedial strategy that emphasizes excavation of contaminated surface materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be consolidated at an onsite disposal location. Clean soil would be used to backfill removal areas and is assumed to be transported from offsite borrow areas tested for contamination. Future excavation events (i.e. surface excavation/pickup of contaminated materials) would be performed on a regular basis and would be disposed of at a permitted offsite disposal facility specifically authorized by Oregon DEQ to receive asbestos and other non-asbestos COPCs. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

CONSTRUCTION CAPITAL COSTS: (Assumed to be Incurred During Year 1 and 2)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Contaminated Surface Materials Excavation, Transport and Disposal (Onsite)	100,000	CY	$55	$5,500,000	Includes site clearing, mob/demob, contaminated surface materials excavation and onsite consolidation/disposal, backfilling and revegetation, inspection and monitoring.
SUBTOTAL				$5,500,000	
Contingency (Scope and Bid)	20%			$1,100,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$6,600,000	
Project Management	5%			$330,000	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	8%			$528,000	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	6%			$396,000	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$990,000	Middle value of the recommended range was used.
TOTAL				$8,844,000	
TOTAL CAPITAL COST				**$8,844,000**	Total capital cost is rounded to the nearest $1,000.

FUTURE EXCAVATION CAPITAL COSTS: (Assumed to be Incurred Every Year

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Future Contaminated Surface Materials Excavation, Transport and Disposal (Offsite)	1	YR	$42,000	$42,000	Includes future excavation/pickup of contaminated surface materials and disposal.
SUBTOTAL				$42,000	
Contingency (Scope and Bid)	20%			$8,400	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$50,400	
Project Management	10%			$5,040	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	20%			$10,080	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	15%			$7,560	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$7,560	Middle value of the recommended range was used.
TOTAL				$80,640	
TOTAL CAPITAL COST				**$81,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-5a

Alternative **5a**

Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 5a uses a remedial strategy that emphasizes excavation of contaminated surface materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be consolidated at an onsite disposal location. Clean soil would be used to backfill removal areas and is assumed to be transported from offsite borrow areas tested for contamination. Future excavation events (i.e. surface excavation/pickup of contaminated materials) would be performed on a regular basis and would be disposed of at a permitted offsite disposal facility specifically authorized by Oregon DEQ to receive asbestos and other non-asbestos COPCs. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 1 through 30

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Operations and Maintenance	1	LS	$18,000	$18,000	Includes cover and signage maintenance, and inspections.
SUBTOTAL				$18,000	
Contingency (Scope and Bid)	20%			$3,600	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$21,600	
Project Management	10%			$2,160	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$3,240	Middle value of the recommended range was used.
TOTAL				$27,000	
TOTAL PERIODIC COST				**$27,000**	Total capital cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25, and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$45,000	$45,000	Includes 5-year site review inspection and report.
SUBTOTAL				$45,000	
Contingency (Scope and Bid)	20%			$9,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$54,000	
Project Management	10%			$5,400	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$8,100	Middle value of the recommended range was used.
TOTAL				$67,500	
TOTAL PERIODIC COST				**$68,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Refer to Table SCS-Notes for cost sources and explanation for various unit costs.
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:

ABS	Activity Based Sampling
ACR	Acre
CY	Cubic Yard
EA	Each
FT	Feet
LS	Lump Sum
QTY	Quantity

TABLE SCS-5b

Alternative **5b**

SCREENING COST ESTIMATE SUMMARY

Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 5b uses a remedial strategy that emphasizes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be consolidated at onsite disposal locations specifically constructed to accept the excavated wastes. Clean soil would be used to backfill excavation areas and would be transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

LAND USE CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	56	EA	$11,000	$616,000	Institutional controls for private and receivership parcels, 45 parcels.
Access Controls	25	EA	$180	$4,500	Includes access controls (signage).
SUBTOTAL				$620,500	
Contingency (Scope and Bid)	20%			$124,100	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$744,600	
Project Management	6%			$44,676	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	12%			$89,352	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	8%			$59,568	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$111,690	Middle value of the recommended range was used.
TOTAL				$1,049,886	
TOTAL CAPITAL COST				**$1,050,000**	Total capital cost is rounded to the nearest $1,000.

CONSTRUCTION CAPITAL COSTS: (Assumed to be Incurred During Year 1, 2, and 3

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Contaminated Materials Excavation, Transport and Disposal (Onsite)	130,000	CY	$70	$9,100,000	Includes site clearing, mob/demob, contaminated materials excavation and onsite consolidation/disposal, backfilling and revegetation, inspection and monitoring.
SUBTOTAL				$9,100,000	
Contingency (Scope and Bid)	20%			$1,820,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$10,920,000	
Project Management	5%			$546,000	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	6%			$655,200	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	6%			$655,200	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$1,638,000	Middle value of the recommended range was used.
TOTAL				$14,414,400	
TOTAL CAPITAL COST				**$14,414,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-5b

Alternative **5b**

Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 5b uses a remedial strategy that emphasizes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be consolidated at onsite disposal locations specifically constructed to accept the excavated wastes. Clean soil would be used to backfill excavation areas and would be transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 1 through 30

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Operations and Maintenance	1	LS	$18,000	$18,000	Includes cover and signage maintenance, and inspections.
SUBTOTAL				$18,000	
Contingency (Scope and Bid)	20%			$3,600	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$21,600	
Project Management	10%			$2,160	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$3,240	Middle value of the recommended range was used.
TOTAL				$27,000	
TOTAL PERIODIC COST				**$27,000**	Total capital cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25, and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$45,000	$45,000	Includes 5-year site review inspection and report.
SUBTOTAL				$45,000	
Contingency (Scope and Bid)	20%			$9,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$54,000	
Project Management	10%			$5,400	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$8,100	Middle value of the recommended range was used.
TOTAL				$67,500	
TOTAL PERIODIC COST				**$68,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Refer to Table SCS-Notes for cost sources and explanation for various unit costs.
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:

ABS	Activity Based Sampling
ACR	Acre
CY	Cubic Yard
EA	Each
FT	Feet
LS	Lump Sum
QTY	Quantity

TABLE SCS-6

Alternative 6
Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 6 uses a remedial strategy that emphasizes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be transported offsite and placed within one or more permitted offsite disposal facilities specifically authorized by Oregon DEQ to receive asbestos and other non-asbestos COPCs. Clean soil would be used to backfill removal areas. Clean soil is assumed to be transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

LAND USE CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	56	EA	$11,000	$616,000	Institutional controls for private and receivership parcels, 45 parcels.
SUBTOTAL				$616,000	
Contingency (Scope and Bid)	20%			$123,200	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$739,200	
Project Management	6%			$44,352	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	12%			$88,704	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	8%			$59,136	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$110,880	Middle value of the recommended range was used.
TOTAL				$1,042,272	
TOTAL CAPITAL COST				**$1,042,000**	Total capital cost is rounded to the nearest $1,000.

CONSTRUCTION CAPITAL COSTS: (Assumed to be Incurred During Year 1, 2, 3, and 4

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Contaminated Materials Excavation and Transport	140,000	CY	$70	$9,800,000	Includes site clearing, mob/demob, contaminated materials excavation and transportation, backfilling and revegetation, inspection and monitoring.
Contaminated Materials Disposal (Offsite)	190,000	TN	$60	$11,400,000	Includes waste disposal at offsite permitted disposal facility.
SUBTOTAL				$21,200,000	
Contingency (Scope and Bid)	20%			$4,240,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$25,440,000	
Project Management	5%			$1,272,000	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	6%			$1,526,400	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	6%			$1,526,400	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$3,816,000	Middle value of the recommended range was used.
TOTAL				$33,580,800	
TOTAL CAPITAL COST				**$33,581,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-6

Alternative 6
Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 6 uses a remedial strategy that emphasizes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be transported offsite and placed within one or more permitted offsite disposal facilities specifically authorized by Oregon DEQ to receive asbestos and other non-asbestos COPCs. Clean soil would be used to backfill removal areas. Clean soil is assumed to be transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 1 through 30

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Operations and Maintenance	1	LS	$18,000	$18,000	Includes cover and signage maintenance, and inspections.
SUBTOTAL				$18,000	
Contingency (Scope and Bid)	20%			$3,600	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$21,600	
Project Management	10%			$2,160	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$3,240	Middle value of the recommended range was used.
TOTAL				$27,000	
TOTAL PERIODIC COST				**$27,000**	Total capital cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25, and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$45,000	$45,000	Includes 5-year site review inspection and report.
SUBTOTAL				$45,000	
Contingency (Scope and Bid)	20%			$9,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$54,000	
Project Management	10%			$5,400	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$8,100	Middle value of the recommended range was used.
TOTAL				$67,500	
TOTAL PERIODIC COST				**$68,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Refer to Table SCS-Notes for cost sources and explanation for various unit costs.
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:

ABS	Activity Based Sampling
ACR	Acre
CY	Cubic Yard
EA	Each
FT	Feet
LS	Lump Sum
QTY	Quantity
TN	Ton

TABLE SCS-7

Alternative 7
Excavation and Offsite Thermo-Chemical Treatment of Contaminated Materials at Permitted Facilities, Reuse of Treated Material, and Land Use Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Alternative 7 uses a remedial strategy that emphasizes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned parcels or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be transported offsite for treatment at a permitted offsite facility that demineralizes asbestos fibers using thermo-chemical conversion. TCCT, patented by ARI, is a commercial form of this technology. This technology has not been demonstrated to treat non-asbestos COPCs such as arsenic. The treated inert material would then be transported back to the site and used as backfill along with clean soil. Clean soil is assumed to be transported from offsite borrow areas tested for contamination. Land use controls would be implemented to restrict access and use of contaminated areas and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

LAND USE CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	56	EA	$11,000	$616,000	Institutional controls for private and receivership parcels, 45 parcels.
SUBTOTAL				$616,000	
Contingency (Scope and Bid)	20%			$123,200	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$739,200	
Project Management	6%			$44,352	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	12%			$88,704	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	8%			$59,136	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$110,880	Middle value of the recommended range was used.
TOTAL				$1,042,272	
TOTAL CAPITAL COST				**$1,042,000**	Total capital cost is rounded to the nearest $1,000.

CONSTRUCTION CAPITAL COSTS: (Assumed to be Incurred During Year 1, 2, 3, 4, and 5

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Contaminated Materials Excavation and Transport	140,000	CY	$65	$9,100,000	Includes site clearing, mob/demob, contaminated materials excavation and transportation, backfilling and revegetation, inspection and monitoring.
Contaminated Materials Treatment	190,000	TN	$470	$89,300,000	Includes treatment of contaminated materials by thermo-chemical processes (TCCT).
SUBTOTAL				$98,400,000	
Contingency (Scope and Bid)	20%			$19,680,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$118,080,000	
Project Management	5%			$5,904,000	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	6%			$7,084,800	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	6%			$7,084,800	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$17,712,000	Middle value of the recommended range was used.
TOTAL				$155,865,600	
TOTAL CAPITAL COST				**$155,866,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-7	
Alternative 7 **Excavation and Offsite Thermo-Chemical Treatment of Contaminated Materials at Permitted Facilities, Reuse of Treated Material, and Land Use Controls with Monitoring**	**SCREENING COST ESTIMATE SUMMARY**

Site:	North Ridge Estates	Alternative 7 uses a remedial strategy that emphasizes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned parcels or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be transported offsite for treatment at a permitted offsite facility that demineralizes asbestos fibers using thermo-chemical conversion. TCCT, patented by ARI, is a commercial form of this technology. This technology has not been demonstrated to treat non-asbestos COPCs such as arsenic. The treated inert material would then be transported back to the site and used as backfill along with clean soil. Clean soil is assumed to be transported from offsite borrow areas tested for contamination. Land use controls would be implemented to restrict access and use of contaminated areas and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.
Location:	Klamath County, Oregon	
Phase:	Final Feasibility Study	
Base Year:	2010	
Date:	March 24, 2010	

ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 1 through 30

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Operations and Maintenance	1	LS	$18,000	$18,000	Includes cover maintenance and inspections.
SUBTOTAL				$18,000	
Contingency (Scope and Bid)	20%			$3,600	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$21,600	
Project Management	10%			$2,160	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$3,240	Middle value of the recommended range was used.
TOTAL				$27,000	
TOTAL PERIODIC COST				**$27,000**	Total capital cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25, and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$45,000	$45,000	Includes 5-year site review inspection and report.
SUBTOTAL				$45,000	
Contingency (Scope and Bid)	20%			$9,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$54,000	
Project Management	10%			$5,400	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$8,100	Middle value of the recommended range was used.
TOTAL				$67,500	
TOTAL PERIODIC COST				**$68,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Refer to Table SCS-Notes for cost sources and explanation for various unit costs.
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:

ABS	Activity Based Sampling
ACR	Acre
CY	Cubic Yard
EA	Each
FT	Feet
LS	Lump Sum
QTY	Quantity
TN	Ton

TABLE SCS - NOTES

SCREENING COST ESTIMATE SUMMARY

Unit Cost Basis for Various Work Elements/Activities Under Alternative 1, 2, 3, 4, 5a, 5b, 6, and 7

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

WORK ELEMENT DESCRIPTION	GENERAL RESPONSE ACTION(S) REPRESNTED	ALTERNATIVE(S)	UNIT COST	UNIT(S)	COST SOURCE	NOTES
5-Year Site Review	Monitoring	1	$60,000	LS	Detailed Estimate	Refer to Appendix H, Table CS-1
5-Year Site Review	Monitoring	2 & 3	$100,000	LS	Detailed Estimate	Refer to Appendix H, Table CW3-3A, -3B, -3C, -3D, and -3E
5-Year Site Review	Monitoring	4, 5a, 5b, 6, & 7	$45,000	LS	Detailed Estimate	Refer to Appendix H, Table CW4-3A, -3B, and -14
Institutional Controls	Land Use Controls	2, 3, 4, 5a, 5b, 6, & 8	$11,000	EA	Detailed Estimate	Refer to Appendix H, Table CW3-1
Access Controls	Land Use Controls	2, 3, 5a, & 5b	$180	EA	Detailed Estimate	Refer to Appendix H, Table CW3-2
Interior Cleaning of Houses	Removal/Transport/Disposal	2 & 3	$24,000	EA	Detailed Estimate	Refer to Appendix H, Table CW3-16
Annual Operations and Maintenance	Monitoring, Land Use Controls, Containment	2	$10,000	LS	Detailed Estimate	Detailed estimate prepared for Alternative 2 (not included)
Annual Operations and Maintenance	Monitoring, Land Use Controls, Containment	3, 4, 5a, 5b, 6, & 7	$18,000	LS	Detailed Estimate	Refer to Appendix H, Table CW3-4B and -5B
Contaminated Materials Capping	Containment	3 & 4	$100,000	ACR	Detailed Estimate	Refer to Appendix H, Table CW3-4, -8, -9, -10, -13, and -15
Contaminated Surface Materials Excavation, Transport and Disposal (Onsite)	Removal/Transport/Disposal	5a	$55	CY	Detailed Estimate	Refer to Appendix H, Table CW5a-4, -6, -8, -9, -10, -12, -13, and -14
Future Contaminated Surface Materials Excavation, Transport and Disposal (Offsite)	Removal/Transport/Disposal	5a	$42,000	YR	Detailed Estimate	Refer to Appendix H, Table CW5a-7a and -7b
Contaminated Materials Excavation, Transport and Disposal (Onsite)	Removal/Transport/Disposal	5b	$70	CY	Detailed Estimate	Refer to Appendix H, Table CW5b-3. -4, -8, -9, -10, -11, -12, -14, -15, and -16
Contaminated Materials Excavation and Transport	Removal/Transport/Disposal	6	$70	CY	Detailed Estimate	Refer to Appendix H, Table CW6-4, -5, -6, -7, -8A, -9, -10, -11, -13, and -14
Contaminated Materials Disposal (Offsite)	Removal/Transport/Disposal	6	$60	TN	Detailed Estimate	Refer to Appendix H, Table CW6-8B
Contaminated Materials Excavation and Transport	Removal/Transport/Disposal	7	$65	CY	Detailed Estimate	
Contaminated Materials Treatment	Treatment	7	$470	TN	Vendor Quote - ARI Technologies	Thermo-Chemical Treatment (TCCT), patented by ARI, is a commercial form of thermo-chemical treatment technologies.

Notes: Unit costs in this table are rounded to the nearest $1,000 (large unit costs) or nearest $10 or $1 (small unit costs)

Abbreviations:

ACR Acre
CY Cubic Yard
EA Each
LS Lump Sum
TN Tons
YR Year

Appendix F

Remedy Component Information for Retained Alternatives

Part I

Summary of Institutional Controls Applicable to the North Ridge Estates Site

Appendix F
Summary of Institutional Controls Applicable to the North Ridge Estates Site

Institutional controls for the site would consist primarily of governmental controls and proprietary controls, and potentially informational notices. The following paragraphs provide detailed descriptions for these specific legal and administrative instruments that could be used in implementation of an alternative for the site that requires the use of institutional controls to ensure protectiveness.

Governmental controls impose land or resource restrictions under the authority of an existing unit of government. Such controls may include use or changes in local zoning, permits, codes, or regulations. The site is located in Klamath County, Oregon. Klamath County has demonstrated legal authority to pass ordinances respecting the use and development of land. Such authority might also be used to pass ordinances requiring the safe handling or management of soils from the site that are or may be contaminated with ACM. Consistent with Oregon law (ORS Chapter 195), the Klamath County Board of Commissioners maintains jurisdiction over specific local land use decisions with legal authority to approve proposed changes in zoning that may be necessary to accommodate remedial alternatives and ensure the protectiveness of any selected remedy. EPA and Oregon DEQ representatives have already met with the county commissioners and discussed the potential need for changes in zoning to support or protect potential remedies, and have a reasonable basis to believe that specific and reasonable proposals to the county commissioners would be approved. This reasonable belief is supported by recent experience of the NRE receiver in seeking and obtaining a desired land use decision from the county commissioners.

Proprietary controls are various legal instruments based on state law, such as easements or covenants, to prohibit activities that could pose an unacceptable risk or compromise the effectiveness of a remedy. Consistent with State of Oregon property law, land use restrictions may be effected by the use of an Easement and Equitable Servitude. Creation of such legal instruments can be facilitated through use of a standard form developed for such purpose by Oregon DEQ. Through such instruments, an owner of property (grantor) may convey to another party (grantee) an easement for access. In the past, Oregon DEQ has agreed to serve as a grantee for purposes of effectuating an Equitable Servitude. Grantors may also, simultaneously, accept placement of equitable servitudes upon the property. Such equitable servitudes may include restrictions on land use, such as prohibitions of residential or agricultural use. Equitable servitudes may also prohibit grantors from conduct, such as excavation, that would impair the protectiveness of a constructed remedy, such as a soil cover. An executed Easement and Equitable Servitude will be filed with the county records and is intended to run with the land, so that any future owners will also take the property subject to the conditions of the instrument. Through such instruments, grantees, including Oregon DEQ, may hold perpetual rights to enforce the conditions and restrictions of such instrument.

For the site, much of the contaminated property is held by the NRE receiver designated by Consent Decree No. 03-3021-H0 (U.S. District Court, District of Oregon 2006). Under the Consent Decree, the NRE receiver is required to manage the properties "in a manner consistent with response actions taken, to be taken, or otherwise required by EPA…." (Consent Decree 11.a). Consistent with that direction, should a developer or other party desire to acquire the receivership controlled parcels at any time, EPA may require the NRE receiver to convey the NRE receiver's parcels subject to land use restrictions that are included within response actions selected for the site. As indicated above, such restrictions may be placed upon the NRE receiver's parcels through use of an Easement and Equitable Servitude and may prohibit future owners of such properties from disturbing covers over contaminated materials buried in place, contaminated materials consolidated and placed within an onsite disposal facility, or otherwise within the area of real property subject to the instrument.

Land use restrictions may also be effected within the site through use of private "Covenants, Conditions, and Restrictions" (CC&Rs) that are recorded with the property deed. CC&Rs are commonly established for new residential subdivisions, and have already been established for residential parcels within the site, setting such requirements as minimum lot size. At the request of EPA, under authority of the Consent Decree, the NRE receiver could propose to amend the CC&Rs for the NRE subdivision to incorporate selected land use restrictions necessary to protect human health from exposure to remaining asbestos-containing materials. Proposed amendments to the CC&Rs may be facilitated through the NRE receiver's majority ownership of parcels within the subdivision. Once in place, CC&Rs are typically enforced by homeowners acting through a homeowners' association. Activities of homeowners' association are typically funded through assessment of maintenance fees upon homeowners subject to the CC&Rs. This self-enforcing mechanism may provide enhanced reliability.

Informational notices may also be utilized in order to provide notice of contamination on the property and to discourage uses that could lead to unacceptable exposures to such contamination. In the State of Oregon, informational notices may take the form of a Notice of Environmental Contamination which Oregon DEQ may issue unilaterally, consistent with ORS 465.200 et seq. Consistent with ORS 205.130(2), such notices may be presented by Oregon DEQ to the county clerk for recording in the county records. With respect to certain parcels within the site, such notices have already been recorded to provide notice of asbestos contamination. Future notices for parcels within the site would be coordinated with Agency for Toxic Substances and Disease Registry (ATSDR) and the Oregon Environmental Health Assessment Program (EHAP).

Institutional controls may be selected and employed individually, or used in concert with other land use controls consistent with the concept of "layering" promoted by EPA (EPA 2000b). Institutional controls may be implemented on a parcel by parcel basis, depending on the risks posed to human health and the environment from contaminated materials within the particular parcel.

Part II

Monitoring and Inspection Protocol for Retained Alternatives

Alternative: 1

Description: **No Action**

Detailed Description

Parcel Ownership		*Contaminated Materials Status*	*Active General Response Action Components*											*Monitoring and Inspection Requirements*							
				Land Use Controls			*Containment*	*Removal, Transport, and Disposal*						*Remedial Action (RA) Construction/ Operations and Maintenance (O&M)*					*5-Year Site Reviews*		
			No Action	*Institutional Controls*	*Access Controls*	*Community Awareness Activities*	*Cover*	*Excavation and Backfill*	*Future Surface Excavation*	*Onsite Transport and Disposal*	*Offsite Transport and Disposal*	*Interior Cleaning*	*Structure Relocation or Demolition*	*Borrow Source Testing (Intrusive Visual Inspection, ABS, and Non-Asbestos COPC Analysis)*	*Cover and/or Backfill Inspection (Non-Intrusive Visual Inspection)*	*Excavation Confirmatory Sampling (Intrusive Visual Inspection and ABS)*	*Ambient Air Sampling*	*Inspection of Areas without Identified Contamination (Intrusive Visual Inspection and ABS)* [1]	*Non-Intrusive Visual Inspection*	*Ambient Air Sampling*	*Indoor Air Sampling*
Private	Developed	Identified Surface/Subsurface Contaminated Materials	✓																✓	✓	
		Identified Steam Pipe	✓																		
		No Identified Contaminated Materials at Surface/Subsurface	✓																		
	Undeveloped	Identified Surface/Subsurface Contaminated Materials	✓																		
		Identified Steam Pipe	✓																		
		No Identified Contaminated Materials at Surface/Subsurface	✓																		
Receivership	Developed	Identified Surface/Subsurface Contaminated Materials	✓																✓	✓	
		Identified Steam Pipe	✓																		
		No Identified Contaminated Materials at Surface/Subsurface	✓																		
	Undeveloped	Identified Surface/Subsurface Contaminated Materials	✓																		
		Identified Steam Pipe	✓																		
		No Identified Contaminated Materials at Surface/Subsurface	✓																		

Note:

A. Rows or columns shaded in grey indicate item is not a component of the remedy for the corresponding parcel ownership and contaminated materials status categories.

B. Description of the various analytical methods for asbestos are presented in Section 2.5 of the FS.

C. The "Monitoring and Inspection Requirements" are for feasibility study evaluation purposes only. The specific monitoring and inspection requirements for the selected remedy would be determined during the remedial design(RD)/remedial action(RA) phase.

[1] These areas have no historic or current indication or evidence of asbestos or non-asbestos COPCs.

No Action

- This alternative would leave removal action activities in their current condition and no new remedial actions would be initiated at the site to address contaminated materials or otherwise mitigate the associated risks to human health and the environment.

5-Year Site Reviews

Non-Intrusive Visual Inspection

- Non-intrusive visual inspections (i.e. surface inspections) performed in support of 5-year site reviews would be made on all parcels within the site boundary regardless of ownership.

Ambient Air Sampling

- Ambient air samples would be collected and analyzed from various locations of the site to assess whether there are current exposure risks to asbestos fibers and non-asbestos COPCs in ambient air. Five locations (TBD) would be selected for sampling and samples would be analyzed by TEM Method. Weather data would be collected to correlate weather conditions with measured releases of asbestos fibers. Non-asbestos COPCs that would also be sampled and analyzed include arsenic.

Alternative: 3

Description: **Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring**

Detailed Description

Parcel Ownership		Contaminated Materials Status	Active General Response Action Components											Monitoring and Inspection Requirements							
				Land Use Controls			Containment	Removal, Transport, and Disposal						Remedial Action (RA) Construction/ Operations and Maintenance (O&M)					5-Year Site Reviews		
			No Action	Institutional Controls	Access Controls	Community Awareness Activities	Cover	Excavation and Backfill	Future Surface Excavation	Onsite Transport and Disposal	Offsite Transport and Disposal	Interior Cleaning	Structure Relocation or Demolition	Borrow Source Testing (Intrusive Visual Inspection, ABS, and Non-Asbestos COPC Analysis)	Cover and/or Backfill Inspection (Non-Intrusive Visual Inspection)	Excavation Confirmatory Sampling (Intrusive Visual Inspection and ABS)	Ambient Air Sampling	Inspection of Areas without Identified Contamination (Intrusive Visual Inspection and ABS)[1]	Non-Intrusive Visual Inspection	Ambient Air Sampling	Indoor Air Sampling
Private	Developed	Identified Surface/Subsurface Contaminated Materials					✓							✓	✓						
		Identified Steam Pipe			✓[2]		✓					✓		✓	✓				✓[4]		✓
		No Identified Contaminated Materials at Surface/Subsurface		✓		✓											✓	✓		✓	
	Undeveloped	Identified Surface/Subsurface Contaminated Materials					✓							✓	✓						
		Identified Steam Pipe			✓[2]		✓							✓	✓				✓[4]		
		No Identified Contaminated Materials at Surface/Subsurface																✓			
Receivership	Developed	Identified Surface/Subsurface Contaminated Materials					✓[3]							✓	✓						
		Identified Steam Pipe					✓[3]						✓	✓	✓				✓[4]		
		No Identified Contaminated Materials at Surface/Subsurface		✓	✓	✓											✓			✓	
	Undeveloped	Identified Surface/Subsurface Contaminated Materials					✓[3]							✓	✓						
		Identified Steam Pipe					✓[3]							✓	✓				✓[4]		
		No Identified Contaminated Materials at Surface/Subsurface																			

Note:
A. Rows or columns shaded in grey indicate item is not a component of the remedy for the corresponding parcel ownership and contaminated materials status categories.
B. Description of the various monitoring activities for asbestos are presented in Section 2.5 of the FS.
C. The "Monitoring and Inspection Requirements" are for feasibility study evaluation purposes only. The specific monitoring and inspection requirements for the selected remedy would be determined during the remedial design(RD)/remedial action(RA) phase.

[1] These areas have no historic or current indication or evidence of asbestos or non-asbestos COPCs.
[2] Subsurface ACM steam pipe beneath privately-owned parcels on Thicket Court and other locations east of Old Fort Road would be demarcated using posted warnings.
[3] Partial in-place capping of identified contaminated materials on receiver-managed parcels.
[4] Further actions would be implemented following visual inspection if remedy components were deemed to be compromised or were determined to not be protective of human health or the environment.

Land Use Controls

Institutional Controls — ■ Institutional controls would consist of a combination of governmental controls, proprietary controls, and/or informational devices that would be selected on a parcel by parcel basis depending on the ownership status (privately owned parcels versus receiver-managed parcels) and the degree of contamination present on the parcel.

Access Controls — ■ Access controls (specifically posted warnings) would be implemented primarily on the uncovered portions of receiver-managed parcels to discourage access and warn people of exposed contaminated materials and the current onsite repository existing on receiver-managed parcels.

Community Awareness Activities — ■ Community awareness activities include informational and educational programs to inform the public about site risks and the activities being performed to reduce these risks.

Containment

Cover — ■ All contaminated materials identified on privately owned parcels and a portion of contaminated materials on the receiver-managed parcels would be capped in-place with <u>at least 24 inches of cover materials</u> (assumed to be a minimum of <u>18 inches of subsoil</u> and 6<u> inches of topsoil</u>) to provide a barrier from exposure to contaminated materials and protection from frost heave processes.

Removal, Transport and Disposal

Interior Cleaning — ■ Interior cleaning would be performed on a periodic basis using vacuum extraction to remove asbestos fibers within residential structures on privately owned parcels. It is assumed that interior cleaning would involve temporarily relocating residents, enclosing the residence to prevent escape of asbestos fibers, aggressive disturbance of home surfaces with blowers to dislodge fibers, and vacuum extraction/pumping to remove the fibers. <u>A total of five clearance samples would be collected per house</u> and would be analyzed by <u>TEM Method</u>. This process would be repeated until no asbestos fibers are detected.

Structure Relocation or Demolition — ■ Unoccupied homes within receiver-managed parcels would require removal (either relocation or demolition) to avoid becoming safety hazards to nearby homes on privately owned parcels.

RA Construction/O&M Monitoring

Borrow Source Testing (Intrusive Visual Inspection, ABS, and Non-Asbestos COPC Analysis) — ■ Samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Visual inspection and ABS activities would be conducted to determine asbestos contamination. The most conservative <u>ABS scenario (e.g. raking) would be conducted once every 10,000 cy of fill</u> and the sample area would be <u>integrated to include the potential borrow area</u>. The ABS samples would be analyzed by <u>TEM Method</u>. Non-asbestos contamination would include <u>organic/inorganic analysis for VOCs, SVOCs, PCBs, TPH, herbicides, pesticides, and target analyte list metals</u>.

Cover and/or Backfill Inspection (Non-Intrusive Visual Inspection) — ■ Monitoring protocol for covered portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers.

Ambient Air Sampling — ■ Ambient air samples would be collected and analyzed from various locations of the site to assess whether there are current exposure risks to asbestos fibers and non-asbestos COPCs in ambient air during the construction activities. Five locations (TBD) would be selected for sampling and samples would be analyzed by TEM Method. Weather data would be collected to correlate weather conditions with measured releases of asbestos fibers. Non-asbestos COPCs that would also be sampled and analyzed include arsenic.

Inspection of Areas without Identified Contamination (Intrusive Visual Inspection and ABS)[1] — ■ Monitoring for areas of the site with no historical or current contamination would be performed after construction is complete. The monitoring would be performed using a tiered approach with visual inspection, followed by ABS to provide a point-in-time determination whether these areas were adversely impacted by dispersion of contamination during construction activities on adjacent areas. The most conservative <u>ABS scenario (e.g. raking) would be conducted for areas no greater than 40,000 square feet</u> and samples would be analyzed by <u>TEM Method</u>.

5-Year Site Reviews

Non-Intrusive Visual Inspection — ■ Monitoring protocol for covered portions of privately owned and receiver-managed parcels would include <u>routine non-intrusive visual inspections</u> (i.e. surface inspections) to ensure integrity of the covers and protectiveness of the remedy. See Note 4.

Ambient Air Sampling — ■ Ambient air samples would be collected and analyzed from various locations of the site to assess whether there are current exposure risks to asbestos fibers and non-asbestos COPCs in ambient air. <u>Five locations (TBD)</u> would be selected for sampling and samples would be analyzed by TEM Method. Weather data would be collected to correlate weather conditions with measured releases of asbestos fibers. Non-asbestos COPCs that would also be sampled and analyzed include arsenic.

Indoor Air Sampling — ■ Indoor air sampling would be conducted <u>at each 5-year review</u>. <u>A total of five samples would be collected per house</u> and would be analyzed by <u>TEM Method</u>. If samples contain asbestos fibers, interior cleaning would be performed within the house.

Alternative: 4

Description: Capping of Contaminated Materials and Land Use Controls with Monitoring

Detailed Description

Parcel Ownership		Contaminated Materials Status	No Action	Active General Response Action Components: Land Use Controls: Institutional Controls	Access Controls	Community Awareness Activities	Containment: Cover	Removal, Transport, and Disposal: Excavation and Backfill	Future Surface Excavation	Onsite Transport and Disposal	Offsite Transport and Disposal	Interior Cleaning	Structure Relocation or Demolition	Monitoring and Inspection Requirements: Remedial Action (RA) Construction/ Operations and Maintenance (O&M): Borrow Source Testing (Intrusive Visual Inspection, ABS, and Non-Asbestos COPC Analysis)	Cover and/or Backfill Inspection (Non-Intrusive Visual Inspection)	Excavation Confirmatory Sampling (Intrusive Visual Inspection and ABS)	Ambient Air Sampling	Inspection of Areas without Identified Contamination (Intrusive Visual Inspection and ABS)[1]	5-Year Site Reviews: Non-Intrusive Visual Inspection	Ambient Air Sampling	Indoor Air Sampling
Private	Developed	Identified Surface/Subsurface Contaminated Materials												✓	✓						
		Identified Steam Pipe			✓[2]									✓	✓				✓[4]		
		No Identified Contaminated Materials at Surface/Subsurface		✓		✓	✓										✓	✓			
	Undeveloped	Identified Surface/Subsurface Contaminated Materials												✓	✓						
		Identified Steam Pipe			✓[2]									✓	✓				✓[4]		
		No Identified Contaminated Materials at Surface/Subsurface																✓			
Receivership	Developed	Identified Surface/Subsurface Contaminated Materials												✓	✓						
		Identified Steam Pipe												✓	✓				✓[4]		
		No Identified Contaminated Materials at Surface/Subsurface		✓	✓	✓	✓[3]										✓	✓			
	Undeveloped	Identified Surface/Subsurface Contaminated Materials												✓	✓						
		Identified Steam Pipe												✓	✓				✓[4]		
		No Identified Contaminated Materials at Surface/Subsurface																✓			

Note:

A. Rows or columns shaded in grey indicate item is not a component of the remedy for the corresponding parcel ownership and contaminated materials status categories.

B. Description of the various monitoring activities for asbestos are presented in Section 2.5 of the FS.

C. The "Monitoring and Inspection Requirements" are for feasibility study evaluation purposes only. The specific monitoring and inspection requirements for the selected remedy would be determined during the remedial design(RD)/remedial action(RA) phase.

[1] These areas have no historic or current indication or evidence of asbestos or non-asbestos COPCs.

[2] Subsurface ACM steam pipe beneath privately owned parcels on Thicket Court and other locations east of Old Fort Road would be demarcated using posted warnings.

[3] Assumes placement of an additional 12 inches of clean cover material on the existing repository to ensure that the permanent cover has the required minimum thickness to provide protection against frost heave processes.

[4] Further actions would be implemented following visual inspection if remedy components were deemed to be compromised or were determined to not be protective of human health or the environment.

Land Use Controls

Institutional Controls
■ Institutional controls would consist of a combination of governmental controls, proprietary controls, and/or informational devices that would be selected on a parcel by parcel basis depending on the ownership status (privately owned parcels versus receiver-managed parcels) and the degree of contamination present on the parcel.

Access Controls
■ Access controls (specifically posted warnings) would be implemented primarily at the exisitng onsite disposal location to discourage access and people of the current repository on receiver-managed parcels.

Community Awareness Activities
■ Community awareness activities include informational and educational programs to inform the public about site risks and the activities being performed to reduce these risks.

Containment

Cover
■ All contaminated materials identified on privately owned parcels and receiver-managed parcels would be capped in-place with at least 24 inches of cover materials (assumed to be a minimum of 18 inches of subsoil and 6 inches of topsoil) to provide a barrier from exposure to contaminated materials and protection from frost heave processes. Also, see Note 3.

RA Construction/O&M Monitoring

Borrow Source Testing (Intrusive Visual Inspection, ABS, and Non-Asbestos COPC Analysis)
■ Samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Visual inspection and ABS activities would be conducted to determine asbestos contamination. The most conservative ABS scenario (e.g. raking) would be conducted once every 10,000 cy of fill and the sample area would be integrated to include the potential borrow area. The ABS samples would be analyzed by TEM Method. Non-asbestos contamination would include organic/inorganic analysis for VOCs, SVOCs, PCBs, TPH, herbicides, pesticides, and target analyte list metals.

Cover and/or Backfill Inspection (Non-Intrusive Visual Inspection)
■ Monitoring protocol for covered portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers.

Ambient Air Sampling
■ Ambient air samples would be collected and analyzed from various locations of the site to assess whether there are current exposure risks to asbestos fibers and non-asbestos COPCs in ambient air during the construction activities. Five locations (TBD) would be selected for sampling and samples would be analyzed by TEM Method. Weather data would be collected to correlate weather conditions with measured releases of asbestos fibers. Non-asbestos COPCs that would also be sampled and analyzed include arsenic.

Inspection of Areas without Identified Contamination (Intrusive Visual Inspection and ABS)[1]
■ Monitoring for areas of the site with no historical or current contamination would be performed after construction is complete. The monitoring would be performed using a tiered approach with visual inspection, followed by ABS to provide a point-in-time determination whether these areas were adversely impacted by dispersion of contamination during construction activities on adjacent areas. The most conservative ABS scenario (e.g. raking) would be conducted for areas no greater than 40,000 square feet and samples would be analyzed by TEM Method.

5-Year Site Reviews

Non-Intrusive Visual Inspection
■ Monitoring protocol for covered portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers and protectiveness of the remedy. See Note 4.

Alternative: 5a

Description: Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

Detailed Description

Parcel Ownership		Contaminated Materials Status	Active General Response Action Components											Monitoring and Inspection Requirements							
			No Action	Land Use Controls			Containment	Removal, Transport, and Disposal						Remedial Action (RA) Construction/ Operations and Maintenance (O&M)					5-Year Site Reviews		
				Institutional Controls	Access Controls	Community Awareness Activities	Cover	Excavation and Backfill	Future Surface Excavation	Onsite Transport and Disposal	Offsite Transport and Disposal	Interior Cleaning	Structure Relocation or Demolition	Borrow Source Testing (Intrusive Visual Inspection, ABS, and Non-Asbestos COPC Analysis)	Cover and/or Backfill Inspection (Non-Intrusive Visual Inspection)	Excavation Confirmatory Sampling (Intrusive Visual Inspection and ABS)	Ambient Air Sampling	Inspection of Areas without Identified Contamination (Intrusive Visual Inspection and ABS)[1]	Non-Intrusive Visual Inspection	Ambient Air Sampling	Indoor Air Sampling
Private	Developed	Identified Surface/Subsurface Contaminated Materials		✓		✓		✓	✓	✓	✓			✓	✓	✓	✓		✓[5]		
		Identified Steam Pipe			✓[2]			✓	✓	✓	✓			✓	✓	✓					
		No Identified Contaminated Materials at Surface/Subsurface																✓			
	Undeveloped	Identified Surface/Subsurface Contaminated Materials						✓	✓	✓	✓			✓	✓	✓			✓[5]		
		Identified Steam Pipe			✓[2]			✓	✓	✓	✓			✓	✓	✓					
		No Identified Contaminated Materials at Surface/Subsurface																✓			
Receivership	Developed	Identified Surface/Subsurface Contaminated Materials		✓	✓	✓		✓	✓	✓	✓			✓	✓	✓	✓		✓[5]		
		Identified Steam Pipe						✓	✓	✓	✓			✓	✓	✓					
		No Identified Contaminated Materials at Surface/Subsurface																✓			
	Undeveloped	Identified Surface/Subsurface Contaminated Materials					✓[3, 4]	✓	✓	✓	✓			✓	✓	✓			✓[5]		
		Identified Steam Pipe						✓	✓	✓	✓			✓	✓	✓					
		No Identified Contaminated Materials at Surface/Subsurface																✓			

Note:

A. Rows or columns shaded in grey indicate item is not a component of the remedy for the corresponding parcel ownership and contaminated materials status categories.

B. Description of the various monitoring activities for asbestos are presented in Section 2.5 of the FS.

C. The "Monitoring and Inspection Requirements" are for feasibility study evaluation purposes only. The specific monitoring and inspection requirements for the selected remedy would be determined during the remedial design(RD)/remedial action(RA) phase.

[1] These areas have no historic or current indication or evidence of asbestos or non-asbestos COPCs.
[2] Subsurface ACM steam pipe beneath privately owned parcels on Thicket Court and other locations east of Old Fort Road would be demarcated using posted warnings.
[3] Assumes placement of an additional 12 inches of clean cover material on the existing repository to ensure that the permanent cover has the required minimum thickness to provide protection against frost heave processes.
[4] Contaminated materials placed at the disposal locations would be consolidated and capped with at least 24 inches of cover materials (assumed to be a minimum of 18 inches of subsoil and 6 inches of topsoil) to provide a barrier from exposure to contaminated materials and protection from frost heave processes.
[5] Further actions would be implemented following visual inspection if remedy components were deemed to be compromised or were determined to not be protective of human health or the environment.

Land Use Controls

Institutional Controls
■ Institutional controls would consist of a combination of governmental controls, proprietary controls, and/or informational devices that would be selected on a parcel by parcel basis depending on the ownership status (privately owned parcels versus receiver-managed parcels) and the degree of contamination present on the parcel.

Access Controls
■ Access controls (specifically posted warnings) would be implemented primarily at the onsite disposal locations to discourage access and people of the current and new onsite repositories on receiver-managed parcels.

Community Awareness Activities
■ Community awareness activities include informational and educational programs to inform the public about site risks and the activities being performed to reduce these risks.

Containment

Cover
■ See Note 3.

Removal, Transport and Disposal

Excavation and Backfill
■ Contaminated surface materials would be fully removed unless the identified depth of contamination exceeds 2 feet bgs on privately owned parcels and receiver-managed parcels. Clean soil would be used for backfill up to 6 inches bgs and the remaining 6 inches would be covered with topsoil. Clean soil is assumed to be transported from offsite borrow areas tested for contamination.

Future Surface Excavation
■ Future excavation events (i.e. incremental surface pickup of contaminated materials such as ACM debris) would be performed on a regular basis since subsurface contaminated materials would not be removed and could potentially migrate to the surface over time in absence of frost-protective covers.

Onsite Transport and Disposal[4]
■ The excavated contaminated surface materials would be consolidated at authorized onsite locations specifically for disposal of the contaminated materials, including ACM. The disposal locations will be consolidated and capped with at least 24 inches of cover materials (assumed to be a minimum of 18 inches of subsoil and 6 inches of topsoil) to provide a barrier from exposure to contaminated materials and protection from frost heave processes.

Offsite Transport and Disposal
■ Excavated contaminated materials from future surface excavation events would be transported offsite for disposal. Disposal facilities include permitted municipal-owned landfills, construction debris landfills, and/or commercially or privately owned landfills authorized by Oregon DEQ for asbestos.

RA Construction/O&M Monitoring

Borrow Source Testing (Intrusive Visual Inspection, ABS, and Non-Asbestos COPC Analysis)
■ Samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Visual inspection and ABS activities would be conducted to determine asbestos contamination. The most conservative ABS scenario (e.g. raking) would be conducted once every 10,000 cy of fill and the sample area would be integrated to include the potential borrow area. The ABS samples would be analyzed by TEM Method. Non-asbestos contamination would include organic/inorganic analysis for VOCs, SVOCs, PCBs, TPH, herbicides, pesticides, and target analyte list metals.

Cover and/or Backfill Inspection (Non-Intrusive Visual Inspection)
■ Monitoring protocol for covered portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers.

Excavation Confirmatory Sampling (Intrusive Visual Inspection and ABS)
■ A tiered approach using intrusive visual inspections coupled with ABS analysis would be conducted to confirm that contaminated materials have been completely excavated from the area to the extent they can be detected. The most conservative ABS scenario (e.g. raking) would be conducted for areas no greater than 40,000 square feet and would be analyzed by TEM Method. ABS activities would not be conducted where visual contamination would remain in place (e.g. at 2 feet bgs) and the extent of contamination left in place would be documented. Arsenic sampling would be conducted at a frequency of one sample per 2,500 square feet along the bottom and side-walls of the excavation area of the former power plant.

Ambient Air Sampling
■ Ambient air samples would be collected and analyzed from various locations of the site to assess whether there are current exposure risks to asbestos fibers and non-asbestos COPCs in ambient air during the construction activities. Five locations (TBD) would be selected for sampling and samples would be analyzed by TEM Method. Weather data would be collected to correlate weather conditions with measured releases of asbestos fibers. Non-asbestos COPCs that would also be sampled and analyzed include arsenic.

Inspection of Areas without Identified Contamination (Intrusive Visual Inspection and ABS)[1]
■ Monitoring for areas of the site with no historical or current contamination would be performed after construction is complete. The monitoring would be performed using a tiered approach with visual inspection, followed by ABS to provide a point-in-time determination whether these areas were adversely impacted by dispersion of contamination during construction activities on adjacent areas. The most conservative ABS scenario (e.g. raking) would be conducted for areas no greater than 40,000 square feet and samples would be analyzed by TEM Method.

5-Year Site Reviews

Non-Intrusive Visual Inspection
■ Monitoring protocol for covered portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers and backfills, and protectiveness of the remedy. See Note 5.

Alternative: 5b

Description: Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

Detailed Description

Parcel Ownership		Contaminated Materials Status	Active General Response Action Components											Monitoring and Inspection Requirements							
			No Action	Land Use Controls			Containment	Removal, Transport, and Disposal						Remedial Action (RA) Construction/ Operations and Maintenance (O&M)					5-Year Site Reviews		
				Institutional Controls	Access Controls	Community Awareness Activities	Cover	Excavation and Backfill	Future Surface Excavation	Onsite Transport and Disposal	Offsite Transport and Disposal	Interior Cleaning	Structure Relocation or Demolition	Borrow Source Testing (Intrusive Visual Inspection, ABS, and Non-Asbestos COPC Analysis)	Cover and/or Backfill Inspection (Non-Intrusive Visual Inspection)	Excavation Confirmatory Sampling (Intrusive Visual Inspection and ABS)	Ambient Air Sampling	Inspection of Areas without Identified Contamination (Intrusive Visual Inspection and ABS)[1]	Non-Intrusive Visual Inspection	Ambient Air Sampling	Indoor Air Sampling
Private	Developed	Identified Surface/Subsurface Contaminated Materials		✓		✓		✓		✓				✓	✓	✓	✓		✓[5]		
		Identified Steam Pipe			✓[2]			✓		✓				✓	✓	✓					
		No Identified Contaminated Materials at Surface/Subsurface																✓			
	Undeveloped	Identified Surface/Subsurface Contaminated Materials						✓		✓				✓	✓	✓			✓[5]		
		Identified Steam Pipe			✓[2]			✓		✓				✓	✓	✓					
		No Identified Contaminated Materials at Surface/Subsurface																✓			
Receivership	Developed	Identified Surface/Subsurface Contaminated Materials		✓	✓	✓		✓		✓				✓	✓	✓	✓		✓[5]		
		Identified Steam Pipe						✓		✓				✓	✓	✓					
		No Identified Contaminated Materials at Surface/Subsurface																✓			
	Undeveloped	Identified Surface/Subsurface Contaminated Materials					✓[3, 4]	✓		✓				✓	✓	✓			✓[5]		
		Identified Steam Pipe						✓		✓				✓	✓	✓					
		No Identified Contaminated Materials at Surface/Subsurface																✓			

Note:

A. Rows or columns shaded in grey indicate item is not a component of the remedy for the corresponding parcel ownership and contaminated materials status categories.

B. Description of the various monitoring activities for asbestos are presented in Section 2.5 of the FS.

C. The "Monitoring and Inspection Requirements" are for feasibility study evaluation purposes only. The specific monitoring and inspection requirements for the selected remedy would be determined during the remedial design(RD)/remedial action(RA) phase.

[1] These areas have no historic or current indication or evidence of asbestos or non-asbestos COPCs.

[2] Subsurface ACM steam pipe beneath privately owned parcels on Thicket Court and other locations east of Old Fort Road would be demarcated using posted warnings.

[3] Assumes placement of an additional 12 inches of clean cover material on the existing repository to ensure that the permanent cover has the required minimum thickness to provide protection against frost heave processes.

[4] Contaminated materials placed at the disposal locations would be consolidated and capped with at least 24 inches of cover materials (assumed to be a minimum of 18 inches of subsoil and 6 inches of topsoil) to provide a barrier from exposure to contaminated materials and protection from frost heave processes.

[5] Further actions would be implemented following visual inspection if remedy components were deemed to be compromised or were determined to not be protective of human health or the environment.

Land Use Controls

Institutional Controls — ■ Institutional controls would consist of a combination of governmental controls, proprietary controls, and/or informational devices that would be selected on a parcel by parcel basis depending on the ownership status (privately owned parcels versus receiver-managed parcels) and the degree of contamination present on the parcel.

Access Controls — ■ Access controls (specifically posted warnings) would be implemented primarily at the onsite disposal locations to discourage access and warn people of the current and new onsite repositories on receiver-managed parcels.

Community Awareness Activities — ■ Community awareness activities include informational and educational programs to inform the public about site risks and the activities being performed to reduce these risks.

Containment

Cover — ■ See Note 3.

Removal, Transport and Disposal

Excavation and Backfill — ■ Surface and subsurface contaminated materials would be fully excavated to the identified depth of contamination on privately owned parcels and receiver-managed parcels. Clean soil would be used for backfill up to 6 inches bgs and the remaining 6 inches would be covered with topsoil. Clean soil is assumed to be transported from offsite borrow areas tested for contamination.

Onsite Transport and Disposal[4] — ■ The excavated contaminated surface materials would be consolidated at an authorized onsite locations specifically for disposal of the contaminated materials, including ACM. The disposal locations will be consolidated and capped with at least 24 inches of cover materials (assumed to be a minimum of 18 inches of subsoil and 6 inches of topsoil) to provide a barrier from exposure to contaminated materials and protection from frost heave processes.

RA Construction/O&M Monitoring

Borrow Source Testing (Intrusive Visual Inspection, ABS, and Non-Asbestos COPC Analysis) — ■ Samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Visual inspection and ABS activities would be conducted to determine asbestos contamination. The most conservative ABS scenario (e.g. raking) would be conducted once every 10,000 cy of fill and the sample area would be integrated to include the potential borrow source area. The ABS samples would be analyzed by TEM Method. Non-asbestos contamination would include organic/inorganic analysis for VOCs, SVOCs, PCBs, TPH, herbicides, pesticides, and target analyte list metals.

Cover and/or Backfill Inspection (Non-Intrusive Visual Inspection) — ■ Monitoring protocol for covered and/or backfilled portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers and/or backfilled excavations during construction activities.

Excavation Confirmatory Sampling (Intrusive Visual Inspection and ABS) — ■ A tiered approach using intrusive visual inspections coupled with ABS analysis would be conducted to confirm that contaminated materials have been completely excavated from the area to the extent they can be detected. The most conservative ABS scenario (e.g. raking) would be conducted for areas no greater than 40,000 square feet and would be analyzed by TEM Method. ABS activities would not be conducted where visual contamination would remain in place (e.g. at 2 feet bgs) and the extent of contamination left in place would be documented. Arsenic sampling would be conducted at a frequency of one sample per 2,500 square feet along the bottom and side-walls of the excavation area of the former power plant.

Ambient Air Sampling — ■ Ambient air samples would be collected and analyzed from various locations of the site to assess whether there are current exposure risks to asbestos fibers and non-asbestos COPCs in ambient air during the construction activities. Five locations (TBD) would be selected for sampling and samples would be analyzed by TEM Method. Weather data would be collected to correlate weather conditions with measured releases of asbestos fibers. Non-asbestos COPCs that would also be sampled and analyzed include arsenic.

Inspection of Areas without Identified Contamination (Intrusive Visual Inspection and ABS)[1] — ■ Monitoring for areas of the site with no historical or current contamination would be performed after construction is complete. The monitoring would be performed using a tiered approach with intrusive visual inspection, followed by ABS to provide a point-in-time determination whether these areas were adversely impacted by dispersion of contamination during construction activities on adjacent areas. The most conservative ABS scenario (e.g. raking) would be conducted for areas no greater than 40,000 square feet and samples would be analyzed by TEM Method.

5-Year Site Reviews

Non-Intrusive Visual Inspection — ■ Monitoring protocol for covered portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers and backfill, and protectiveness of the remedy. See Note 5.

Alternative: 6

Description: **Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring**

Detailed Description

Parcel Ownership		Contaminated Materials Status	Active General Response Action Components											Monitoring and Inspection Requirements							
				Land Use Controls			Containment	Removal, Transport, and Disposal						Remedial Action (RA) Construction/ Operations and Maintenance (O&M)					5-Year Site Reviews		
			No Action	Institutional Controls	Access Controls	Community Awareness Activities	Cover	Excavation and Backfill	Future Surface Excavation	Onsite Transport and Disposal	Offsite Transport and Disposal	Interior Cleaning	Structure Relocation or Demolition	Borrow Source Testing (Intrusive Visual Inspection, ABS, and Non-Asbestos COPC Analysis)	Cover and/or Backfill Inspection (Non-Intrusive Visual Inspection)	Excavation Confirmatory Sampling (Intrusive Visual Inspection and ABS)	Ambient Air Sampling	Inspection of Areas without Identified Contamination (Intrusive Visual Inspection and ABS)[1]	Non-Intrusive Visual Inspection	Ambient Air Sampling	Indoor Air Sampling
Private	Developed	Identified Surface/Subsurface Contaminated Materials		✓		✓		✓			✓			✓	✓	✓	✓				
		Identified Steam Pipe			✓[2]			✓			✓			✓	✓	✓			✓[4]		
		No Identified Contaminated Materials at Surface/Subsurface																✓			
	Undeveloped	Identified Surface/Subsurface Contaminated Materials						✓			✓			✓	✓	✓					
		Identified Steam Pipe			✓[2]			✓			✓			✓	✓	✓			✓[4]		
		No Identified Contaminated Materials at Surface/Subsurface																✓			
Receivership	Developed	Identified Surface/Subsurface Contaminated Materials		✓	✓	✓		✓			✓			✓	✓	✓	✓				
		Identified Steam Pipe						✓			✓			✓	✓	✓			✓[4]		
		No Identified Contaminated Materials at Surface/Subsurface																✓			
	Undeveloped	Identified Surface/Subsurface Contaminated Materials					✓[3]	✓			✓			✓	✓	✓					
		Identified Steam Pipe						✓			✓			✓	✓	✓			✓[4]		
		No Identified Contaminated Materials at Surface/Subsurface																✓			

Note:
A. Rows or columns shaded in grey indicate item is not a component of the remedy for the corresponding parcel ownership and contaminated materials status categories.
B. Description of the various monitoring activities for asbestos are presented in Section 2.5 of the FS.
C. The "Monitoring and Inspection Requirements" are for feasibility study evaluation purposes only. The specific monitoring and inspection requirements for the selected remedy would be determined during the remedial design(RD)/remedial action(RA) phase.

[1] These areas have no historic or current indication or evidence of asbestos or non-asbestos COPCs.
[2] Subsurface ACM steam pipe beneath privately owned parcels on Thicket Court and other locations east of Old Fort Road would be demarcated using posted warnings.
[3] Assumes placement of an additional 12 inches of clean cover material on the existing repository to ensure that the permanent cover has the required minimum thickness to provide protection against frost heave processes.
[4] Further actions would be implemented following visual inspection if remedy components were deemed to be compromised or were determined to not be protective of human health or the environment.

Land Use Controls

Institutional Controls ■ Institutional controls would consist of a combination of governmental controls, proprietary controls, and/or informational devices that would be selected on a parcel by parcel basis depending on the ownership status (privately owned parcels versus receiver-managed parcels) and the degree of contamination present on the parcel.

Access Controls ■ Access controls (specifically posted warnings) would be implemented primarily at the onsite disposal locations to discourage access and warn people of the current and new onsite repositories on receiver-managed parcels.

Community Awareness Activities ■ Community awareness activities include informational and educational programs to inform the public about site risks and the activities being performed to reduce these risks.

Containment

Cover ■ See Note 3.

Removal, Transport and Disposal

Excavation and Backfill ■ Surface and subsurface contaminated materials would be fully excavated to the identified depth of contamination on privately owned parcels and receiver-managed parcels. Clean soil would be used for backfill up to 6 inches bgs and the remaining 6 inches would be covered with topsoil. Clean soil is assumed to be transported from offsite borrow areas tested for contamination.

Offsite Transport and Disposal ■ Excavated contaminated materials would be transported offsite for disposal. Disposal facilities include permitted municipal-owned landfills, construction debris landfills, and/or commercially or privately owned landfills authorized by Oregon DEQ for asbestos.

RA Construction/O&M Monitoring

Borrow Source Testing (Intrusive Visual inspection, ABS, and Non-Asbestos COPC Sampling) ■ Samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Visual inspection and ABS activities would be conducted to determine asbestos contamination. The most conservative ABS scenario (e.g. raking) would be conducted once every 10,000 cy of fill and the sample area would be integrated to include the potential borrow source area. The ABS samples would be analyzed by TEM Method. Non-asbestos contamination would include organic/inorganic analysis for VOCs, SVOCs, PCBs, TPH, herbicides, pesticides, and target analyte list metals.

Cover and/or Backfill Inspection (Non-Intrusive Visual Inspection) ■ Monitoring protocol for covered and/or backfilled portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers and/or backfilled excavations during construction activities.

Excavation Confirmatory Sampling (Intrusive Visual Inspection and ABS) ■ A tiered approach using intrusive visual inspections coupled with ABS analysis would be conducted to confirm that contaminated materials have been completely excavated from the area to the extent they can be detected. The most conservative ABS scenario (e.g. raking) would be conducted for areas no greater than 40,000 square feet and would be analyzed by TEM Method. ABS activities would not be conducted where visual contamination would remain in place (e.g. at 2 feet bgs) and the extent of contamination left in place would be documented. Arsenic sampling would be conducted at a frequency of one sample per 2,500 square feet along the bottom and side-walls of the excavation area of the former power plant.

Ambient Air Sampling ■ Ambient air samples would be collected and analyzed from various locations of the site to assess whether there are current exposure risks to asbestos fibers and non-asbestos COPCs in ambient air during the construction activities. Five locations (TBD) would be selected for sampling and samples would be analyzed by TEM Method. Weather data would be collected to correlate weather conditions with measured releases of asbestos fibers. Non-asbestos COPCs that would also be sampled and analyzed include arsenic.

Inspection of Areas without Identified Contamination (Intrusive Visual Inspection and ABS)[1] ■ Monitoring for areas of the site with no historical or current contamination would be performed after construction is complete. The monitoring would be performed using a tiered approach with visual inspection, followed by ABS to provide a point-in-time determination whether these areas were adversely impacted by dispersion of contamination during construction activities on adjacent areas. The most conservative ABS scenario (e.g. raking) would be conducted for areas no greater than 40,000 square feet and samples would be analyzed by TEM Method.

5-Year Site Reviews

Non-Intrusive Visual Inspection ■ Monitoring protocol for covered portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers and backfill, and protectiveness of the remedy. See Note 4.

Appendix G

Detailed Analysis of Retained Alternatives

The detailed evaluation and analysis of each alternative is assessed using the two threshold criteria and five balancing criteria are presented in the following Appendix G. The common justifications have been indicated using gray text to allow the reader to focus on the differences between alternatives.

Alternative 1
No Action

Table G-1. Evaluation Summary for Overall Protection of Human Health and the Environment – Alternative 1

Evaluation Factors for Overall Protection of Human Health and the Environment	Evaluation Summary
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	■ Source areas of contaminated materials would be left unaddressed. ■ Unaddressed contaminated materials would allow continued release and migration of asbestos fibers and non-asbestos COPCs to unimpacted media (primarily soil and air) if disturbed. ■ Contaminated materials migrating to the surface and liberating asbestos fibers and non-asbestos COPCs after disturbance could represent an inhalation and ingestion exposure risk to humans and/or ecological receptors. ■ PRAOs would be unaddressed.

Table G-2. Evaluation Summary for Compliance with ARARs – Alternative 1

Evaluation Factors for Compliance with ARARs	Evaluation Summary
Compliance with chemical-specific ARARs	■ No action would be taken to address contaminated materials and contaminated air that would likely exceed acceptable risk standards specified in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rules. Thus this criterion is not met.
Compliance with location-specific ARARs	■ Location-specific ARARs would not be triggered since no new remedial measures would be undertaken.
Compliance with action-specific ARARs	■ Action-specific ARARs would not be triggered since no new remedial measures would be undertaken.

Table G-3. Evaluation Summary for Long-Term Effectiveness and Permanence – Alternative 1

Evaluation Factors for Long-Term Effectiveness and Permanence	Evaluation Summary
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	■ No new remedial actions would be undertaken to address contaminated materials. Contaminated materials and contaminated air would likely exceed acceptable risk standards specified in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rules. ■ Contaminated materials would be left exposed to humans and ecological receptors.
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	■ No controls are put in place under the no action alternative. Thus contaminated materials would be left uncontrolled. ■ Contaminated materials could migrate to other media and could pose unacceptable risks to humans and ecological receptors.

Table G-4. Evaluation Summary for Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 1

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluation Summary
The treatment processes, the alternative uses, and materials they will treat	■ This alternative would not treat contaminated materials. Thus there would be no reduction of toxicity, mobility, or volume of contamination through treatment. ■ The statutory preference for treatment as a principal element of the remedial action would not be met.
The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed	
The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment	
The degree to which the treatment is irreversible	
The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents	
Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action	

Table G-5. Short-Term Effectiveness Evaluation Summary – Alternative 1

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Short-term risks that might be posed to the community during implementation of an alternative	■ Contaminated materials could pose potential short-term risks at the site, which are unaddressed under this alternative. ■ Continued release and migration of contaminated materials to unimpacted media (primarily soil and air) could pose a risk to humans and ecological receptors.
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	■ Workers performing site inspections during 5-year site reviews would potentially be exposed to contaminated materials that pose unacceptable risks. ■ These risks could be mitigated through the use of monitoring and personal protective equipment.
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	■ No further remedial action would be undertaken. Thus there would be no potential adverse impacts resulting from the alternative.
Time until protection is achieved	■ No further remedial action would be undertaken to address contaminated materials. Thus protection would not be achieved under this alternative.

Table G-6. Implementability Evaluation Summary – Alternative 1

Evaluation Factors for Implementability		Evaluation Summary
Technical feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	■ Contaminated materials would be left unaddressed. No new remedial actions would be undertaken to address contaminated materials. Thus these criteria are not applicable. ■ Non-intrusive visual inspections, which are part of Alternative 1 would be performed during 5-year reviews and could be easily implemented with available labor, material, and technical resources.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	
	Ease of undertaking additional remedial actions including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	
	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure	
Administrative feasibility	Activities needed to coordinate with other offices and agencies	■ Contaminated materials would be left unaddressed. ■ No remedial actions would be undertaken to address the site. Thus there would be no need to obtain approvals from other regulatory agencies.
	The ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)	■ No offsite remedial activities would be conducted under this alternative.
Availability of services and materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services	■ No new remedial actions would be undertaken. Thus this criterion is not applicable.
	Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources	■ Technical equipment and specialists are available for conducting inspections during 5-year site reviews.
	Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies	
	Availability of prospective technologies	

Table G-7. Cost Evaluation Summary – Alternative 1

Evaluation Factors for Cost	Approximate Cost (Dollars)
Total capital cost	None
Total annual O&M cost	None
Total periodic cost	$516,000
Total cost (excluding present value discounting)	$516,000
Total present value cost	$186,000

Note: Total costs are for the assumed period of evaluation (Years 0 through 30). Costs are rounded to the nearest $1,000.

Alternative 3

Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

Table G-8. Evaluation Summary for Overall Protection of Human Health and the Environment – Alternative 3

Evaluation Factors for Overall Protection of Human Health and the Environment	Evaluation Summary
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	■ A portion of contaminated materials on receiver-managed parcels would be addressed through institutional and access controls, which restrict access and use since these parcels are unoccupied. ■ A portion of contaminated materials on receiver-managed parcels and all contaminated materials on privately owned parcels would be addressed through in-place capping (covers) coupled with institutional and access controls to protect the covers. ■ Capping (covering) of all identified surface and subsurface contaminated materials would eliminate continued release and migration of asbestos fibers and non-asbestos COPCs to unimpacted media (primarily soil and air). ■ Only covered areas/portions of the site where capping of contaminated materials is implemented would be fully protective of future non-residential or residential uses. ■ Interior cleaning would be periodically performed, as needed, to ensure that indoor air is protective of human health. ■ Land use controls would be used to restrict access and use of the existing onsite waste repository. ■ If disturbed, uncovered contaminated materials on receiver-managed parcels could allow continued release and migration of asbestos fibers and non-asbestos COPCs. Institutional and access controls would limit activities that could cause disturbances. ■ Disturbed fibers would potentially represent an inhalation exposure risk to humans and ecological receptors. ■ Monitoring would be performed to determine protectiveness of the remedy. ■ PRAOs would be partially addressed through land use controls where contaminated materials are left exposed. PRAOs would be met where in-place capping is implemented.

Table G-9. Evaluation Summary for Compliance with ARARs – Alternative 3

Evaluation Factors for Compliance with ARARs	Evaluation Summary
Compliance with chemical-specific ARARs	■ Soil covers placed over contaminated materials would physically truncate the exposure pathways to humans and most ecological receptors and eliminate discharges to air, thus meeting acceptable risk standards specified in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rules. ■ Uncovered areas of contamination on receiver-managed parcels would not be physically addressed. Contaminated materials and contaminated air would likely exceed acceptable risk standards specified in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rules.
Compliance with location-specific ARARs	■ Location-specific ARARs for the remedy would be addressed during implementation of the remedial action.
Compliance with action-specific ARARs	■ Action-specific ARARs for the remedy would be addressed during implementation of the remedial action.

Table G-10. Evaluation Summary for Long-Term Effectiveness and Permanence – Alternative 3

Evaluation Factors for Long-Term Effectiveness and Permanence	Evaluation Summary
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	■ Long-term effectiveness would not be entirely ensured since contaminated materials potentially posing a risk would be left exposed on site and could continue to degrade and migrate. ■ If disturbed, contaminated materials could allow continued release and migration of asbestos fibers and non-asbestos COPCs to unimpacted media (primarily soil and air). ■ Much of the contaminated materials would be left unaddressed. Total surface area of contaminated materials left unaddressed would be approximately 53 acres (assumed to be 50 percent of exposed contaminated materials on receiver-managed parcels). ■ Interior cleaning would not ensure protectiveness within the interior of residential structures since contaminated materials would continue to be exposed and degrade and migrate from receiver-managed parcels and could be tracked into the structures. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	■ Long-term effectiveness and permanence for covered areas would be dependent on continued integrity of the covers and adherence to institutional and access controls. This is less certain on privately owned parcels. ■ Interior cleaning would not ensure protectiveness within interiors of residential structures since contaminated materials would continue to be exposed and degrade and migrate from receiver-managed parcels and could be tracked into the structures. ■ Long-term effectiveness of institutional controls and access controls would not be ensured since humans and ecological receptors could ignore them, especially on privately owned parcels. Legal enforcement of institutional controls may be necessary. ■ O&M activities would be periodically required to repair damage or erosion to the covers and access controls. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.

Table G-11. Evaluation Summary for Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 3

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluation Summary
The treatment processes, the alternative uses, and materials they will treat	■ This alternative would not treat contaminated materials. Thus there would be no reduction of toxicity, mobility, or volume of contamination through treatment. ■ The statutory preference for treatment as a principal element of the remedial action would not be met.
The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed	
The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment	
The degree to which the treatment is irreversible	
The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents	
Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action	

Table G-12. Short-Term Effectiveness Evaluation Summary – Alternative 3

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Short-term risks that might be posed to the community during implementation of an alternative	■ The alternative would involve surface disturbance of contaminated materials which could pose short-term risks to the community living close to the site boundary from inhalation of asbestos fibers or dust. Protective measures, such as dust suppression (water- or chemical-based) would be used to address those risks. ■ Work area restrictions (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to the community. ■ Transport of clean borrow materials for construction of covers would pose short-term risks to the community from increased traffic. ■ Residents of privately owned parcels could be exposed to contaminated materials during implementation of the remedial action. Temporary relocation of residents from privately owned parcels may be required during construction of covers and interior cleaning. ■ Access controls would restrict access and hence quickly protect the community for receiver-managed parcels. However, they do not address short-term exposure to contaminated materials on privately owned parcels. ■ Short-term risks posed to the community during implementation of the alternative for receiver-managed parcels mainly relate to trespassers.

Table G-12. Short-Term Effectiveness Evaluation Summary – Alternative 3 (continued)

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	■ Surface disturbance of contaminated materials could pose short-term risks to workers installing covers, performing interior cleaning, and installing access controls. ■ Protective measures, such as dust suppression (water- or chemical-based) and PPE would be used to address those risks. ■ Work area restrictions (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to workers. ■ Transport of clean borrow materials for construction of covers would pose short-term risks to workers from increased traffic. ■ Other potential impacts could be from safety hazards during remedial implementation, such as falls, electrical hazards, and mechanical hazards.
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	■ The alternative involves surface disturbance of contaminated materials which could pose potential adverse impacts through dispersion of asbestos fibers or dust. ■ There could also be some impacts to the environment during implementation of the remedial action due to use of heavy construction and hauling equipment. Use of fuel efficient and low emission equipment could mitigate these impacts. ■ Development of offsite borrow areas could adversely impact the environment. Mitigation measures could include selection of easily accessible borrow locations and reclamation of borrow areas after use. ■ Water- or chemical- based suppression would be used for controlling contaminated materials and dust during construction.
Time until protection is achieved	■ The proposed remedial action and land use controls could be implemented in less than 1 year, especially for privately owned parcels. ■ The duration may be extended if a greater extent of cover construction would be selected for receiver-managed parcels.

Table G-13. Implementability Evaluation Summary – Alternative 3

Evaluation Factors for Implementability		Evaluation Summary
Technical feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	■ Cover construction around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Implementation of interior cleaning could be difficult because it would involve temporary relocation of residents. ■ Institutional controls may be more difficult to implement and reliably operate, especially for privately owned parcels, due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Sampling and analysis for low concentration asbestos contamination in soil would be difficult with current technologies.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	■ Partial in-place capping (covers) over contaminated materials on receiver-managed parcels and on privately owned parcels is reliable and could be easily constructed. ■ Suitable uncontaminated materials for soil cover system construction are not available on site. Soil cover construction materials would be required from offsite sources which might delay the schedule.

Table G-13. Implementability Evaluation Summary – Alternative 3 (continued)

Evaluation Factors for Implementability		Evaluation Summary
Technical feasibility (continued)	Reliability of the technology, focusing on technical problems that will lead to schedule delays (continued)	■ Interior cleaning would require temporary relocation of residents which could lead to schedule delays. ■ Monitoring, implementation, and enforcement of institutional controls may be more difficult, especially for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Access permission at privately owned parcels for implementing the remedial alternative is not currently available, but could be obtained. This could cause some delays in the schedule.
	Ease of undertaking additional remedial actions, including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	■ Placing additional soil cover could be implemented with relative ease if required in the future, especially on receiver-managed parcels. ■ Interior cleanings could be performed on a more regular basis, if needed. ■ Additional remedial action may be more difficult to implement on privately owned parcels.
	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure	■ A comprehensive inspection, monitoring, and maintenance program would be implemented to maintain the integrity of covers and effectiveness of land use controls. ■ Monitoring and maintenance of covers and institutional controls may be more difficult for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Frequent/periodic monitoring and sampling would be conducted to ensure overall protection of human health and environment, including effectiveness of interior cleanings.
Administrative feasibility	Activities needed to coordinate with other offices and agencies	■ Regulatory approval for in-place capping of contaminated materials using covers and interior cleanings should be obtainable. ■ Regulatory approvals for institutional and access controls should be obtainable. However, some difficulties may be encountered with regard to types of restrictions, especially on privately owned parcels.
	The ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)	■ Development of offsite borrow sources for cover materials would require coordination and approval from the affected agency.

Table G-13. Implementability Evaluation Summary – Alternative 3 (continued)

Evaluation Factors for Implementability		Evaluation Summary
Availability of services and materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services	■ This remedial alternative would not require treatment, storage and disposal services. Thus this criterion is not applicable.
	Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources	■ The property for implementing the remedial action has already been obtained for receiver-managed parcels. ■ Access permission at privately owned parcels for implementing the remedial action may not be currently available, but could be obtained. ■ Labor, equipment, and materials for cover construction are available. Suitable cover construction materials would be required from offsite sources. ■ Total volume of suitable soil cover material required is approximately 193,300 cy. ■ Approximately 6,900 truck loads of suitable soil would be required to haul in from offsite borrow sources. ■ Materials, equipment, and labor resources used for land use controls and monitoring are easily obtainable. ■ Technical equipment and specialists are available for implementation of institutional controls and monitoring.
	Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies	
Availability of services and materials (continued)	Availability of prospective technologies	

Table G-14. Cost Evaluation Summary – Alternative 3

Evaluation Factors for Cost	Approximate Cost (Dollars)
Total capital cost	$9,592,000
Total annual O&M cost	$892,000
Total periodic cost	$3,426,000
Total cost (excluding present value discounting)	$13,910,000
Total present value cost	$10,152,000

Note: Total costs are for the assumed period of evaluation (Years 0 through 30). Costs are rounded to the nearest $1,000.

Alternative 4

Capping of Contaminated Materials and Land Use Controls with Monitoring

Table G-15. Evaluation Summary for Overall Protection of Human Health and the Environment – Alternative 4

Evaluation Factors for Overall Protection of Human Health and the Environment	Evaluation Summary
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	■ All contaminated materials on receiver-managed and privately owned parcels would be addressed through in-place capping (covers) coupled with institutional and access controls to protect the covers. ■ Capping (covering) of all identified surface and subsurface contaminated materials would eliminate continued release and migration of asbestos fibers and non-asbestos COPCs to unimpacted media (primarily soil and air). ■ Properly constructed soil covers over contaminated materials would eliminate exposure risks from asbestos and non-asbestos COPCs to human and ecological receptors. ■ Land use controls would be used to protect and restrict use of covered areas, and provide awareness of risks from potential exposure to contaminated materials. ■ Land use controls would be used to restrict access and use of the existing onsite waste repository. ■ Monitoring would be performed to determine protectiveness of the remedy. ■ PRAOs would be addressed where in-place capping is implemented.

Table G-16. Evaluation Summary for Compliance with ARARs – Alternative 4

Evaluation Factors for Compliance with ARARs	Evaluation Summary
Compliance with chemical-specific ARARs	■ Soil covers placed over contaminated materials would physically truncate the exposure pathway to humans and most ecological receptors and eliminate discharges to air, thus meeting acceptable risk standards specified in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rules.
Compliance with location-specific ARARs	■ Location-specific ARARs for the remedy would be addressed during implementation of the remedial action.
Compliance with action-specific ARARs	■ Action-specific ARARs for the remedy would be addressed during implementation of the remedial action.

Table G-17. Evaluation Summary for Long-Term Effectiveness and Permanence – Alternative 4

Evaluation Factors for Long-Term Effectiveness and Permanence	Evaluation Summary
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	■ All of the identified contaminated materials would be covered in place (81 acres). ■ Long-term effectiveness would not be entirely ensured since contaminated materials potentially posing a risk are left on site (although covered). Protection to human health and the environment is partially dependent on legal enforcement and people's adherence to institutional controls. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	■ Long-term effectiveness and permanence for covered areas would be dependent on continued integrity of the covers and adherence to institutional and access controls. This is less certain on privately owned parcels. ■ Long-term effectiveness of institutional controls and access controls would not be ensured since human and ecological receptors could ignore them, especially on privately owned parcels. Legal enforcement of institutional controls may be necessary. ■ O&M activities would be periodically required to repair damage or erosion to the covers and access controls. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.

Table G-18. Evaluation Summary for Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 4

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluation Summary
The treatment processes, the alternative uses, and materials they will treat	■ This alternative would not treat contaminated materials. Thus there would be no reduction of toxicity, mobility, or volume of contamination through treatment. ■ The statutory preference for treatment as a principal element of the remedial action would not be met.
The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed	
The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment	
The degree to which the treatment is irreversible	
The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents	
Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action	

Table G-19. Short-Term Effectiveness Evaluation Summary – Alternative 4

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Short-term risks that might be posed to the community during implementation of an alternative	■ The alternative would involve surface disturbance of contaminated materials which could pose short-term risks to the community living close to the site boundary from inhalation of asbestos fibers or dust. Protective measures, such as dust suppression (water- or chemical-based) would be used to address those risks. ■ Work area restrictions (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to the community. ■ Transport of clean borrow materials for construction of covers would pose short-term risks to the community from increased traffic. ■ Residents of privately owned parcels could be exposed to contaminated materials during implementation of the remedial action. Temporary relocation of residents from privately owned parcels may be required during construction of covers. ■ Access controls would restrict access and hence quickly protect the community for receiver-managed parcels; however, they do not address short-term exposure to contaminated materials on privately owned parcels. ■ Short-term risks posed to the community during implementation of the alternative for receiver-managed parcels mainly relate to trespassers.
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	■ Surface disturbance of contaminated materials could pose short-term risks to workers installing covers and access controls. ■ Protective measures, such as dust suppression (water- or chemical-based) and PPE would be used to address those risks. ■ Work area restrictions (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to workers. ■ Transport of clean borrow materials for construction of covers would pose short-term risks to workers from increased traffic. ■ Other potential impacts could be from safety hazards during remedial implementation, such as falls, electrical hazards, and mechanical hazards.
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	■ The alternative would involve surface disturbance of contaminated materials which could pose potential adverse impacts through dispersion of asbestos fibers or dust. ■ There could also be some impacts to the environment during implementation of the remedial action due to use of heavy construction and hauling equipment. Use of fuel efficient and low emission equipment could mitigate these impacts. ■ Development of offsite borrow areas could adversely impact the environment. Mitigation measures could include selection of easily accessible borrow locations and reclamation of borrow areas after use. ■ Water- or chemical- based suppression would be used for controlling contaminated materials and dust during construction.
Time until protection is achieved	■ The proposed remedial action and land use controls could be implemented in approximately 2 years. ■ The proposed remedial action and land use controls could be implemented in less than 1 year for privately owned parcels.

Table G-20. Implementability Evaluation Summary – Alternative 4

Evaluation Factors for Implementability		Evaluation Summary
Technical feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	■ Cover construction around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Logistics for working with large number of heavy equipment and trucks at the site would be difficult to manage. ■ Institutional controls may be more difficult to implement and reliably operate, especially for privately owned parcels, due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Sampling and analysis for low concentration asbestos contamination in soils would be difficult with current technologies.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	■ In-place capping (covering) of contaminated materials on receiver-managed parcels and privately owned parcels is reliable and could be easily constructed. ■ Suitable uncontaminated materials for soil cover system construction are not available on site. Soil cover construction materials would be required from offsite sources which might delay the schedule. ■ Monitoring, implementation, and enforcement of institutional controls may be more difficult, especially for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Access permission at privately owned parcels for implementing the remedial alternative is not currently available, but could be obtained. This could cause some delays in the schedule.
	Ease of undertaking additional remedial actions, including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	■ Placing additional soil cover could be implemented with relative ease if required in the future, especially on receiver-managed parcels. ■ Additional remedial action may be more difficult to implement on privately owned parcels.
	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure	■ A comprehensive inspection, monitoring, and maintenance program would be implemented to maintain the integrity of covers and effectiveness of land use controls. ■ Monitoring and maintenance of covers and institutional controls may be more difficult for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Frequent/periodic monitoring and sampling would be conducted to ensure overall protection of human health and environment.

Table G-20. Implementability Evaluation Summary – Alternative 4 (continued)

Evaluation Factors for Implementability		Evaluation Summary
Administrative feasibility	Activities needed to coordinate with other offices and agencies	■ Regulatory approval for in-place capping of contaminated materials using covers should be obtainable. ■ Regulatory approvals for institutional and access controls should be obtainable. However, some difficulties may be encountered with regard to types of restrictions, especially on privately owned parcels.
	The ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)	■ Development of offsite borrow sources for cover materials would require coordination and approval from the affected agency.
Availability of services and materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services	■ This remedial action would not require treatment, storage and disposal services. Thus this criterion is not applicable.
	Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources	■ The property for implementing the remedial action has already been obtained for receiver-managed parcels. ■ Access permission at privately owned parcels for implementing the remedial action may not be currently available, but could be obtained. ■ Labor, equipment, and materials for cover construction are available. ■ Suitable cover construction materials would be required from offsite sources. ■ Total volume of suitable soil cover material required would be approximately 319,700 cy. ■ Approximately 11,400 truck loads of suitable soil would be required to haul in from offsite borrow sources. ■ Materials, equipment, and labor resources used for land use controls and monitoring are easily obtainable. ■ Technical equipment and specialists are available for implementation of institutional controls and monitoring.
	Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies	
	Availability of prospective technologies	

Table G-21. Cost Evaluation Summary – Alternative 4

Evaluation Factors for Cost	Approximate Cost (Dollars)
Total capital cost	$13,500,000
Total annual O&M cost	$1,064,000
Total periodic cost	$360,000
Total cost (excluding present value discounting)	$14,924,000
Total present value cost	$12,798,000

Note: Total costs are for the assumed period of evaluation (Years 0 through 30). Costs are rounded to the nearest $1,000.

Alternative 5a

Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

Table G-22. Evaluation Summary for Overall Protection of Human Health and the Environment – Alternative 5a

Evaluation Factors for Overall Protection of Human Health and the Environment	Evaluation Summary
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	■ All contaminated surface materials on receiver-managed parcels and privately owned parcels would be initially addressed through excavation and consolidation at onsite disposal locations. ■ Contaminated materials could be exposed in the future due to freeze-thaw cycles would be periodically excavated (through future surface inspections and pickup) and would be disposed of off site at permitted disposal facilities authorized for asbestos. ■ Offsite transportation and disposal of contaminated materials would pose short-term risks to the community and the environment. These risks would be mitigated through dust suppression (water- or chemical-based) and proper packaging and transportation procedures during implementation. ■ Covers constructed over onsite disposal locations would address exposure to contaminated materials and prevent migration through frost heave processes. ■ Land use controls would be used to restrict access and use of the existing and new onsite disposal locations. ■ Backfill placed over excavations would initially address exposure to subsurface contaminated materials. However, frost heave processes may cause subsurface contaminated materials to become exposed at the surface. ■ Contaminated materials could continue to migrate during freeze-thaw cycles and exposures could occur prior to periodic future excavations being completed. ■ Monitoring would be performed to determine protectiveness of the remedy. ■ PRAOs would be partially addressed through containment of contaminated materials using covers or excavation backfill. However, subsurface contaminated materials could become exposed in the future by upward migration through backfill and pose human health and ecological risks.

Table G-23. Evaluation Summary for Compliance with ARARs – Alternative 5a

Evaluation Factors for Compliance with ARARs	Evaluation Summary
Compliance with chemical-specific ARARs	■ Soil covers placed over consolidated contaminated materials would physically truncate the exposure pathways to human and most ecological receptors and eliminate discharges to air. These approaches would meet acceptable risk standards specified in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rules. ■ Backfill placed over subsurface contaminated materials would initially truncate the exposure pathways to human and most ecological receptors and eliminate discharges to air. However, long-term compliance with acceptable risk standards specified in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rule is less certain due to frost heave processes.
Compliance with location-specific ARARs	■ Location-specific ARARs for the remedy would be addressed during implementation of the remedial action.
Compliance with action-specific ARARs	■ Action-specific ARARs for the remedy would be addressed during implementation of the remedial action.

Table G-24. Evaluation Summary for Long-Term Effectiveness and Permanence – Alternative 5a

Evaluation Factors for Long-Term Effectiveness and Permanence	Evaluation Summary
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	■ All of the contaminated surface materials would be excavated and consolidated on site. The total area excavated under this alternative would be approximately 81 acres. ■ Contaminated materials could continue to migrate during freeze-thaw cycles and exposures could occur prior to periodic future excavations being completed. However, the volume of contaminated materials exposed at the surface should decrease over time. ■ Long-term effectiveness is not entirely ensured since contaminated materials potentially posing a risk are left on site (although consolidated and covered). Protection to human health and the environment would partially dependent on legal enforcement and people's adherence to institutional controls. ■ Long-term effectiveness would not be entirely ensured since subsurface contaminated materials potentially posing a risk are left in backfilled excavations. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	■ Future excavation of contaminated materials would be a periodic action requiring monitoring of the source areas for new migration of subsurface contaminated materials, especially during colder periods due to freeze-thaw cycles. However, the volume of contaminated materials exposed at the surface should decrease over time. ■ Long-term effectiveness and permanence for parcels containing subsurface contaminated materials would be addressed through initial surface excavation with onsite consolidation, disposal, and backfilling with clean soil. Periodic future excavation and offsite disposal of contaminated materials that migrate to the surface during freeze-thaw cycles would be performed as necessary to ensure protectiveness. ■ Long-term effectiveness and permanence for covered and backfilled areas would be dependent on continued integrity of the covers and backfill. This is less certain on privately owned parcels. ■ Long-term effectiveness of institutional controls and access controls would not be ensured since humans and ecological receptors could ignore them, especially on privately owned parcels. Legal enforcement of institutional controls may be necessary. ■ O&M activities would be periodically required to repair damage or erosion to the covers and access controls. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.

Table G-25. Evaluation Summary for Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 5a

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluation Summary
The treatment processes, the alternative uses, and materials they will treat	■ This alternative would not treat contaminated materials. Thus there would be no reduction of toxicity, mobility, or volume of contamination through treatment. ■ The statutory preference for treatment as a principal element of the remedial action would not be met.
The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed	
The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment	
The degree to which the treatment is irreversible	
The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents	
Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action	

Table G-26. Short-Term Effectiveness Evaluation Summary – Alternative 5a

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Short-term risks that might be posed to the community during implementation of an alternative	■ The alternative would involve excavation of contaminated surface materials which could pose short-term risks to the community living close to the site boundary from inhalation of asbestos fibers or dust. Protective measures, such as dust suppression (water- or chemical-based) would be used to address those risks. ■ Work area restrictions (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to the community. ■ Transport of clean borrow materials for construction of covers and backfilling excavations would pose short-term risks to the community from increased traffic. ■ Residents of privately owned parcels could be exposed to contaminated materials during implementation of the remedial action. Temporary relocation of residents from privately owned parcels may be required during excavation of contaminated materials. ■ Access controls would restrict access and hence quickly protect the community for receiver-managed parcels. However, they do not address short-term exposure to contaminated materials on privately owned parcels. ■ Short-term risks posed to the community during implementation of the alternative for receiver-managed parcels mainly relate to trespassers.

Table G-26. Short-Term Effectiveness Evaluation Summary – Alternative 5a (continued)

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	■ The alternative involves excavation and relocation of contaminated materials which could pose short-term risks to workers from inhalation of asbestos fibers and non-asbestos COPCs. Protective measures, such as dust suppression (water- or chemical-based) and personal PPE would be used to address those risks. ■ Work area restrictions (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to the community. ■ Transport of clean borrow materials for construction of covers and backfilling excavations would pose short-term risks to the community from increased traffic. ■ Residents of privately owned parcels could be exposed to contaminated materials during implementation of the remedial action. Temporary relocation of residents from privately owned parcels may be required during excavation of contaminated materials. ■ Access controls would restrict access and hence quickly protect the community for receiver-managed parcels. However, they do not address short-term exposure to contaminated materials on privately owned parcels. ■ Short-term risks posed to the community during implementation of the alternative for receiver-managed parcels mainly relate to trespassers.
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	■ The alternative would involve excavation of contaminated materials which could pose potential adverse impacts through dispersion of asbestos fibers or dust. ■ There could also be some impacts to the environment during implementation of the remedial action due to use of heavy construction and hauling equipment. Use of fuel efficient and low emission equipment could mitigate these impacts. ■ Development of offsite borrow areas could adversely impact the environment. Mitigation measures could include selection of easily accessible borrow locations and reclamation of borrow areas after use. ■ Water- or chemical- based suppression would be used for controlling contaminated materials and dust during construction.
Time until protection is achieved	■ The proposed remedial action and land use controls could be implemented in approximately 2 years. ■ The proposed remedial action and land use controls could be implemented in less than 1 year for privately owned parcels. ■ The subsequent future excavations (i.e., periodic incremental excavations) would be a continuous process which should lessen over a long period of time.

Table G-27. Implementability Evaluation Summary – Alternative 5a

Evaluation Factors for Implementability		Evaluation Summary
Technical feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	■ Excavation and backfilling around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Logistics for working with large number of heavy equipment and trucks at site would be difficult to manage. ■ Surface contaminated materials initially excavated would be consolidated at authorized onsite locations. Contaminated surface materials excavated during future excavation events would be disposed of at a permitted offsite facility. ■ Construction of the onsite disposal facilities would require coordination during the excavation of contaminated materials from parcels. ■ Future excavation events would likely be needed for a long period of time, although the volume of contaminated materials should decrease over time. This would require continuous monitoring of the contaminated materials migrating through the surface due to freeze-thaw cycles. ■ Periodic inspection and future excavation of contaminated materials across the site would be conducted annually or more frequently requiring mobilizations of materials, equipment, and labor. Future excavations should be straightforward, although difficulties may exist for implementation on privately owned parcels. ■ Special management procedures may be required for disposal at the permitted facilities. ■ Institutional controls may be more difficult to implement and reliably operate, especially for privately owned parcels, due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Sampling and analysis for low concentration asbestos contamination in soils would be difficult with current technologies.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	■ Excavation and backfilling around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Construction of the onsite disposal facilities would require coordination during the excavation of contaminated materials from parcels. ■ Future excavation events are likely to be needed for a long period of time, although the volume of contaminated materials should decrease over time. This would require continuous monitoring of the contaminated materials migrating through the surface due to freeze-thaw cycles. ■ Offsite disposal of contaminated materials during periodic future excavation events at permitted disposal facilities would be relatively straightforward. ■ Excavated contaminated materials would require transportation to offsite disposal facilities in specialized enclosed trucks. ■ Special management procedures may be required for disposal at the permitted facilities. ■ Suitable uncontaminated materials for soil cover system construction at the authorized onsite disposal location and backfilling excavation areas are not available on site. Soil cover construction and backfill materials would be required from off site which might delay the schedule. ■ Monitoring, implementation, and enforcement of institutional controls may be more difficult, especially for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Access permission at privately owned parcels for implementing the remedial alternative is not currently available, but could be obtained. This could cause some delays in the schedule.

Table G-27. Implementability Evaluation Summary – Alternative 5a (continued)

Evaluation Factors for Implementability		Evaluation Summary
Technical feasibility (continued)	Ease of undertaking additional remedial actions, including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	■ Excavation and consolidation of all contaminated surface materials from receiver-managed parcels and privately owned parcels at authorized onsite locations could be easily constructed. ■ Periodic monitoring and future excavation of contaminated materials across the site would be a continuous process. ■ Additional remedial action may be more difficult to implement on privately owned parcels.
	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure	■ A comprehensive inspection, monitoring, and maintenance program would be implemented to maintain the integrity of covers, backfilled excavations, and effectiveness of land use controls. ■ Monitoring and maintenance of covers, backfilled areas, and institutional controls may be more difficult for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Frequent/periodic monitoring and sampling would be conducted to ensure overall protection of human health and environment.
Administrative feasibility	Activities needed to coordinate with other offices and agencies	■ Regulatory approval needed for excavations and to construct onsite disposal facilities should be obtainable. ■ Regulatory approvals for future excavation events should be obtainable, although difficulties may exist with the privately owned parcels. ■ Development of offsite borrow sources for covers and backfill would require coordination and approval from the affected agency. ■ Regulatory and facility approval for offsite disposal at permitted disposal facilities should be obtainable. ■ Regulatory approvals for institutional and access controls should be obtainable. However, some difficulties may be encountered with regard to types of restrictions, especially on privately owned parcels. ■ Regulatory approvals for monitoring should be obtainable.
	The ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)	■ Development of offsite borrow sources for soil covers over the onsite disposal facilities and backfill would require coordination and approval from the affected agency. ■ Regulatory and facility approval for offsite disposal at permitted disposal facilities should be obtainable.
Availability of services and materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services	■ Permitted disposal facilities authorized for asbestos are available within the State of Oregon. However, most facilities are somewhat distant from the site. ■ The offsite permitted disposal facilities should have sufficient capacity to accept contaminated materials for disposal; the volume of contaminated materials for offsite disposal in this alternative should be relatively small. ■ Total volume of contaminated materials for offsite disposal from future excavation events would be approximately 190 cy. ■ Minimally sized truck loads would be required to haul contaminated materials to offsite disposal facilities.

Table G-27. Implementability Evaluation Summary – Alternative 5a (continued)

Evaluation Factors for Implementability		Evaluation Summary
Availability of services and materials (continued)	Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources	■ The property for implementing the remedial action has already been obtained for receiver-managed parcels. ■ Access permission at privately owned parcels for implementing the remedial action may not be currently available, but could be obtained. ■ Labor, equipment, and materials for cover construction are available. ■ Suitable cover construction materials would be required from offsite sources. ■ Labor, equipment, and materials for contaminated surface materials excavation and clean soil backfilling are available. ■ Suitable backfill materials would be required from offsite sources. ■ Total volume of suitable soil cover and backfill material required would be approximately 158,300 cy. ■ Approximately 5,650 truck loads would be required to haul in the suitable material. ■ Materials, equipment, and labor resources used for land use controls and monitoring are easily obtainable. ■ Technical equipment and specialists are available for implementation of institutional controls and monitoring.
	Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies	
	Availability of prospective technologies	

Table G-28. Cost Evaluation Summary – Alternative 5a

Evaluation Factors for Cost	Approximate Cost (Dollars)
Total capital cost	$9,977,000
Total annual O&M cost	$3,304,000
Total periodic cost	$360,000
Total cost (excluding present value discounting)	$13,641,000
Total present value cost	$10,467,000

Note: Total costs are for the assumed period of evaluation (Years 0 through 30). Costs are rounded to the nearest $1,000.

Alternative 5b

Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

Table G-29. Evaluation Summary for Overall Protection of Human Health and the Environment – Alternative 5b

Evaluation Factors for Overall Protection of Human Health and the Environment	Evaluation Summary
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	■ All contaminated materials on receiver-managed parcels and privately owned parcels are addressed through excavation and consolidation at onsite disposal locations. ■ Covers constructed over onsite disposal locations would address exposure to contaminated materials and prevent migration through frost heave processes. ■ Land use controls would be used to restrict access and use of the existing and new onsite disposal locations. ■ Backfill placed over excavations would initially address exposure to residual subsurface contaminated materials. However, frost heave processes may cause residual subsurface contaminated materials to become exposed at the surface. ■ Monitoring would be performed to determine protectiveness of the remedy. ■ PRAOs would be addressed through containment of contaminated materials using covers or excavation backfill. However, residual contaminated materials could become exposed in the future by upward migration through backfill and pose human health and ecological risks.

Table G-30. Evaluation Summary for Compliance with ARARs – Alternative 5b

Evaluation Factors for Compliance with ARARs	Evaluation Summary
Compliance with chemical-specific ARARs	■ Soil covers placed over consolidated contaminated materials would physically truncate the exposure pathway to human and most ecological receptors and eliminate discharges to air. These approaches would meet acceptable risk standards specified in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rules. ■ Backfill placed over residual subsurface contaminated materials would initially truncate the exposure pathway to human and most ecological receptors and eliminate discharges to air. However, long-term compliance with acceptable risk standards specified in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rule is less certain due to frost heave processes.
Compliance with location-specific ARARs	■ Location-specific ARARs for the remedy would be addressed during implementation of the remedial action.
Compliance with action-specific ARARs	■ Action-specific ARARs for the remedy would be addressed during implementation of the remedial action.

Table G-31. Evaluation Summary for Long-Term Effectiveness and Permanence – Alternative 5b

Evaluation Factors for Long-Term Effectiveness and Permanence	Evaluation Summary
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	■ All of the contaminated surface materials would be excavated and consolidated onsite. The total area excavated under this alternative would be approximately 82 acres. ■ Residual contaminated materials could continue to migrate during freeze-thaw cycles and exposures could occur. However, the volume of residual contaminated materials exposed at the surface should be minimal. ■ Long-term effectiveness would not be entirely ensured since contaminated materials potentially posing a risk are left onsite (although consolidated and covered). Protection to human health and the environment is partially dependent on legal enforcement and people's adherence to institutional controls. ■ Long-term effectiveness would not be entirely ensured since residual subsurface contaminated materials potentially posing a risk would be left in backfilled excavations. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy. ■ Large portions of the site would be remediated to allow residential use with limited land use controls.
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site.	■ Long-term effectiveness and permanence for parcels containing contaminated materials would be addressed through excavation with onsite consolidation, disposal, and backfilling with clean soil. ■ Long-term effectiveness and permanence for covered and backfilled areas would be dependent on continued integrity of the covers and backfill. This is less certain on privately owned parcels. ■ Long-term effectiveness of institutional controls and access controls would not be ensured since human and ecological receptors could ignore them, especially on privately owned parcels. Legal enforcement of institutional controls may be necessary. ■ O&M activities would be periodically required to repair damage or erosion to the covers and access controls. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.

Table G-32. Evaluation Summary for Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 5b

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluation Summary
The treatment processes, the alternative uses, and materials they will treat	■ This alternative would not treat contaminated materials. Thus there would be no reduction of toxicity, mobility, or volume of contamination through treatment. ■ The statutory preference for treatment as a principal element of the remedial action would not be met.
The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed	
The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment	
The degree to which the treatment is irreversible	
The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents	
Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action	

Table G-33. Short-Term Effectiveness Evaluation Summary – Alternative 5b

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Short-term risks that might be posed to the community during implementation of an alternative	■ The alternative involves excavation of contaminated materials which could pose short-term risks to the community living close to the site boundary from inhalation of asbestos fibers or dust. Protective measures, such as dust suppression (water- or chemical-based) would be used to address those risks. ■ Work area restrictions (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to the community. ■ Transport of clean borrow materials for construction of covers and backfilling excavations would pose short-term risks to the community from increased traffic. ■ Residents of privately owned parcels could be exposed to contaminated materials during implementation of the remedial action. Temporary relocation of residents from privately owned parcels may be required during excavation of contaminated materials. ■ Access controls would restrict access and hence quickly protect the community for receiver-managed parcels. However, they do not address short-term exposure to contaminated materials on privately owned parcels. ■ Short-term risks posed to the community during implementation of the alternative for receiver-managed parcels mainly relate to trespassers.

Table G-33. Short-Term Effectiveness Evaluation Summary – Alternative 5b (continued)

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	■ The alternative involves excavation and relocation of contaminated materials which could pose short-term risks to workers from inhalation of asbestos fibers and non-asbestos COPCs. Protective measures, such as dust suppression (water- or chemical-based) and PPE would be used to address those risks. ■ Work area restrictions (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to the community. ■ Transport of clean borrow materials for construction of covers and backfilling excavations would pose short-term risks to the community from increased traffic. ■ Residents of privately owned parcels could be exposed to contaminated materials during implementation of the remedial action. Temporary relocation of residents from privately owned parcels may be required during excavation of contaminated materials. ■ Access controls would restrict access and hence quickly protect the community for receiver-managed parcels. However, they do not address short-term exposure to contaminated materials on privately owned parcels. ■ Short-term risks posed to the community during implementation of the alternative for receiver-managed parcels mainly relate to trespassers.
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	■ The alternative involves excavation of contaminated materials which could pose potential adverse impacts through dispersion of asbestos fibers or dust. ■ There could also be some impacts to the environment during implementation of the remedial action due to use of heavy construction and hauling equipment. Use of fuel efficient and low emission equipment could mitigate these impacts. ■ Development of offsite borrow areas could adversely impact the environment. Mitigation measures could include selection of easily accessible borrow locations and reclamation of borrow areas after use. ■ Water- or chemical- based suppression would be used for controlling contaminated materials and dust during construction.
Time until protection is achieved	■ The proposed remedial action and land use controls could be implemented in approximately 3 years. ■ The proposed remedial action and land use controls could be implemented in 1 year for privately owned parcels.

Table G-34. Implementability Evaluation Summary – Alternative 5b

Evaluation Factors for Implementability		Evaluation Summary
Technical feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	■ Excavation and backfilling around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Logistics for working with large number of heavy equipment and trucks at site would be difficult to manage. ■ Excavated contaminated materials would be consolidated at authorized onsite locations. ■ Construction of the onsite disposal facilities would require coordination during the excavation of contaminated materials from parcels. ■ Institutional controls may be more difficult to implement and reliably operate, especially for privately owned parcels, due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Sampling and analysis for low concentration asbestos contamination in soils would be difficult with current technologies.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	■ Excavation and backfilling around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Construction of the onsite disposal facilities would require coordination during the excavation of contaminated materials from parcels. ■ Suitable uncontaminated materials for soil cover system construction at the authorized onsite disposal location and backfilling excavation areas are not available on site. Soil cover construction and backfill materials would be required from off site which might delay the schedule. ■ Monitoring, implementation, and enforcement of institutional controls may be more difficult, especially for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Access permission at privately owned parcels for implementing the remedial alternative is not currently available, but could be obtained. This could cause some delays in the schedule.
	Ease of undertaking additional remedial actions, including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	■ Excavation and consolidation of all contaminated materials from receiver-managed parcels and privately owned parcels at authorized onsite locations could be easily constructed. ■ Additional remedial action may be more difficult to implement on privately owned parcels.
	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure	■ A comprehensive inspection, monitoring, and maintenance program would be implemented to maintain the integrity of covers, backfilled excavations, and effectiveness of land use controls. ■ Monitoring and maintenance of covers, backfilled areas, and institutional controls may be more difficult for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Frequent/periodic monitoring and sampling would be conducted to ensure overall protection of human health and environment.

Table G-34. Implementability Evaluation Summary – Alternative 5b (continued)

Evaluation Factors for Implementability		Evaluation Summary
Administrative feasibility	Activities needed to coordinate with other offices and agencies	■ Regulatory approval needed for excavations and to construct onsite disposal facilities should be obtainable. ■ Development of offsite borrow sources for covers and backfill would require coordination and approval from the affected agency. ■ Regulatory approvals for institutional and access controls should be obtainable. However, some difficulties may be encountered with regard to types of restrictions, especially on privately owned parcels. ■ Regulatory approvals for monitoring should be obtainable.
	The ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)	■ Development of offsite borrow sources for soil covers over the onsite disposal facilities and backfill would require coordination and approval from the affected agency.
Availability of services and materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services	■ This remedial action would not call for any offsite treatment, storage, and disposal services. Thus this criterion is not applicable.
	Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies Availability of prospective technologies	■ The property for implementing the remedial action has already been obtained for receiver-managed parcels. ■ Access permission at privately owned parcels for implementing the remedial action may not be currently available, but could be obtained. ■ Labor, equipment, and materials for cover construction are available. ■ Suitable cover construction materials would be required from offsite sources. ■ Labor, equipment, and materials for contaminated materials excavation and clean soil backfilling are available. ■ Suitable backfill materials would be required from offsite sources. ■ Total volume of suitable soil cover and backfill material required would be approximately 200,200 cy. ■ Approximately 7,150 truck loads would be required to haul in the suitable material. ■ Materials, equipment, and labor resources used for land use controls and monitoring are easily obtainable. ■ Technical equipment and specialists are available for implementation of institutional controls and monitoring.

Table G-35. Cost Evaluation Summary – Alternative 5b

Evaluation Factors for Cost	Approximate Cost (Dollars)
Total capital cost	$15,335,000
Total annual O&M cost	$1,050,000
Total periodic cost	$360,000
Total cost (excluding present value discounting)	$16,745,000
Total present value cost	$14,028,000

Note: Total costs are for the assumed period of evaluation (Years 0 through 30). Costs are rounded to the nearest $1,000.

Alternative 6

Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

Table G-36. Evaluation Summary for Overall Protection of Human Health and the Environment – Alternative 6

Evaluation Factors for Overall Protection of Human Health and the Environment	Evaluation Summary
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	■ All contaminated surface materials on receiver-managed parcels and privately owned parcels would be addressed through excavation and offsite disposal at permitted facilities authorized for asbestos. ■ Offsite disposal would eliminate continued release and migration of asbestos fibers and non-asbestos COPCs to unimpacted media (primarily soil and air). ■ Offsite transportation and disposal of contaminated materials would pose short-term risks to the community and the environment. These risks would be mitigated through dust suppression (water- or chemical-based) and proper packaging and transportation procedures during implementation. ■ Covers constructed over the existing onsite waste repository would address exposure to contaminated materials and prevent migration through frost heave processes. ■ Land use controls would be used to restrict access and use of the existing onsite disposal location. ■ Backfill placed over excavations would address exposure to residual subsurface contaminated materials. However, frost heave processes may cause residual subsurface contaminated materials to become exposed at the surface. ■ Monitoring would be performed to determine protectiveness of the remedy. ■ PRAOs would be addressed through containment of contaminated materials using covers or excavation backfill. However, residual contaminated materials could become exposed in the future and pose human health and ecological risks.

Table G-37. Evaluation Summary for Compliance with ARARs – Alternative 6

Evaluation Factors for Compliance with ARARs	Evaluation Summary
Compliance with chemical-specific ARARs	■ Offsite disposal of contaminated materials would physically truncate the exposure pathway to human and most ecological receptors and eliminate discharges to air. These approaches would meet acceptable risk standards specified in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rules. ■ Soil cover placed over the existing onsite waste repository would physically truncate the exposure pathway to human and most ecological receptors and eliminate discharges to air. These approaches would meet acceptable risk standards specified in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rules. ■ Backfill placed over residual subsurface contaminated materials would initially truncate the exposure pathway to human and most ecological receptors and eliminate discharges to air. However, long-term compliance with acceptable risk standards specified in Oregon Environmental Cleanup Law and Oregon Hazardous Substance Remedial Action Rule is less certain due to frost heave processes.
Compliance with location-specific ARARs	■ Location-specific ARARs for the remedy would be addressed during implementation of the remedial action.
Compliance with action-specific ARARs	■ Action-specific ARARs for the remedy would be addressed during implementation of the remedial action.

Table G-38. Evaluation Summary for Long-Term Effectiveness and Permanence – Alternative 6

Evaluation Factors for Long-Term Effectiveness and Permanence	Evaluation Summary
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	■ All of the contaminated materials would be excavated and disposed of off site. The total area excavated under this alternative would be approximately 89 acres. ■ Long-term effectiveness would be greatly increased over Alternatives 5a and 5b since the majority of contaminated materials posing a risk are contained and managed of at authorized offsite disposal facilities. ■ Residual contaminated materials could continue to migrate during freeze-thaw cycles and exposures could occur. However, the volume of residual contaminated materials exposed at the surface should be minimal. ■ Long-term effectiveness is not entirely ensured since contaminated materials potentially posing a risk are left on site in the existing onsite waste repository (although consolidated and covered). Protection to human health and the environment would be partially dependent on legal enforcement and people's adherence to institutional controls. ■ Long-term effectiveness would not be entirely ensured since residual subsurface contaminated materials potentially posing a risk would be left in backfilled excavations. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy. ■ Large portions of the site would be remediated to allow residential use with limited land use controls.
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site.	■ The majority of excavated contaminated materials would be contained at an authorized offsite permitted facility for asbestos to eliminate continued release and migration of asbestos fibers and non-asbestos COPCs to unimpacted media (soil and air). ■ Long-term effectiveness and permanence for covered and backfilled areas would be dependent on continued integrity of the covers and backfill. This is less certain on privately owned parcels. ■ Long-term effectiveness of institutional controls and access controls would not be ensured since humans and ecological receptors could ignore them, especially on privately owned parcels. Legal enforcement of institutional controls may be necessary. ■ O&M activities would be periodically required to repair damage or erosion to the covers and access controls. ■ Monitoring would be performed to determine long-term effectiveness and permanence of the remedy.

Table G-39. Evaluation Summary for Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 6

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluation Summary
The treatment processes, the alternative uses, and materials they will treat	■ This alternative would not treat contaminated materials. Thus there would be no reduction of toxicity, mobility, or volume of contamination through treatment. ■ The statutory preference for treatment as a principal element of the remedial action would not be met.
The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed	
The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment	
The degree to which the treatment is irreversible	
The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents	
Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action	

Table G-40. Short-Term Effectiveness Evaluation Summary – Alternative 6

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Short-term risks that might be posed to the community during implementation of an alternative	■ The alternative involves excavation of contaminated materials which could pose short-term risks to the community living close to the site boundary from inhalation of asbestos fibers or dust. Protective measures, such as dust suppression (water- or chemical-based) would be used to address those risks. ■ Offsite transportation and disposal of contaminated materials would pose short-term risks to the community. These risks would be mitigated through source control, such as dust suppression (water- or chemical-based) and proper packaging and transportation procedures during implementation. ■ Work area restrictions (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to the community. ■ Transport of clean borrow materials for construction of covers and backfilling excavations would pose short-term risks to the community from increased traffic. ■ Residents of privately owned parcels could be exposed to contaminated materials during implementation of the remedial action. Temporary relocation of residents from privately owned parcels may be required during excavation of contaminated materials. ■ Access controls would restrict access and hence quickly protect the community for receiver-managed parcels. However, they do not address short-term exposure to contaminated materials on privately owned parcels. ■ Short-term risks posed to the community during implementation of the alternative for receiver-managed parcels mainly relate to trespassers.
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	■ The alternative would involve excavation and offsite disposal of contaminated materials which could pose short-term risks to workers from inhalation of asbestos fibers and non-asbestos COPCs. Protective measures, such as dust suppression (water- or chemical-based) and PPE would be used to address those risks. ■ Work area restrictions (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to the community. ■ There would be significant impacts to the workers under this alternative, as additional truck traffic would be required for complete offsite disposal of contaminated materials as well as transport of cover and backfill soils. ■ Transport of clean borrow materials for construction of covers and backfilling excavations would pose short-term risks to the community from increased traffic. ■ Residents of privately owned parcels could be exposed to contaminated materials during implementation of the remedial action. Temporary relocation of residents from privately owned parcels may be required during excavation of contaminated materials. ■ Access controls would restrict access and hence quickly protect the community for receiver-managed parcels. However, they do not address short-term exposure to contaminated materials on privately owned parcels. ■ Short-term risks posed to the community during implementation of the alternative for receiver-managed parcels mainly relate to trespassers.
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	■ The alternative involves excavation of contaminated materials which could pose potential adverse impacts through dispersion of asbestos fibers or dust. ■ There could also be some impacts to the environment during implementation of the remedial action due to use of heavy construction and hauling equipment. Use of fuel efficient and low emission equipment could mitigate these impacts. ■ Development of offsite borrow areas could adversely impact the environment. Mitigation measures could include selection of easily accessible borrow locations and reclamation of borrow areas after use. ■ Water- or chemical- based suppression would be used for controlling contaminated materials and dust during construction.
Time until protection is achieved	■ The proposed remedial action and institutional controls could be implemented in approximately 4 years. ■ The proposed remedial action and land use controls could be implemented in 1 to 2 years for privately owned parcels.

Table G-41. Implementability Evaluation Summary – Alternative 6

Evaluation Factors for Implementability		Evaluation Summary
Technical feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	■ Excavated contaminated materials would require transportation to offsite disposal facilities in specialized enclosed trucks to minimize the exposure risks from asbestos fibers to the community. ■ Large volumes of contaminated materials would need to be transported offsite for disposal. ■ Special management procedures may be required for disposal at the permitted facilities. ■ Total volume to be excavated and transported off site for disposal would be approximately 139,600 cy. ■ Approximately 4,985 truck loads would be required to haul the whole excavated volume of contaminated materials. ■ Excavation and backfilling around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Logistics for working with large number of heavy equipment and trucks at site would be difficult to manage. ■ Institutional controls may be more difficult to implement and reliably operate, especially for privately owned parcels, due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Sampling and analysis for low concentration asbestos contamination in soils would be difficult with current technologies.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	■ Excavation and backfilling around homes or structures, trees, subsurface utilities, and roads may be challenging at specific locations. ■ Offsite disposal of excavated contaminated materials at permitted disposal facilities is relatively straightforward. However, the larger volume of materials removed than for Alternative 5b and the need to coordinate traffic for both offsite disposal and borrow soil delivery could be problematic. ■ A large volume of suitable backfilling material would be required, thus multiple offsite sources might be required, which might delay the schedule. ■ Excavated contaminated materials would require transportation to offsite disposal facilities in specialized enclosed trucks. ■ Special management procedures may be required for disposal at the permitted facilities. ■ Suitable uncontaminated materials for soil cover system construction at the authorized onsite disposal location and backfilling excavation areas are not available on site. Soil cover construction and backfill materials would be required from off site which might delay the schedule. ■ Monitoring, implementation, and enforcement of institutional controls may be more difficult, especially for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Access permission at privately owned parcels for implementing the remedial alternative is not currently available, but could be obtained. This could cause some delays in the schedule.
	Ease of undertaking additional remedial actions, including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	■ Future excavation and offsite disposal of contaminated materials could be implemented. ■ Additional remedial action may be more difficult to implement on privately owned parcels.

Table G-41. Implementability Evaluation Summary – Alternative 6 (continued)

Evaluation Factors for Implementability		Evaluation Summary
Technical feasibility - continued	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure	■ A comprehensive inspection, monitoring, and maintenance program would be implemented to maintain the integrity of covers, backfilled excavations, and effectiveness of land use controls. ■ Monitoring and maintenance of covers, backfilled areas, and institutional controls may be more difficult for privately owned parcels due to various degrees of contamination, types of ownership, and levels of occupancy. ■ Frequent/periodic monitoring and sampling would be conducted to ensure overall protection of human health and environment.
Administrative feasibility	Activities needed to coordinate with other offices and agencies	■ Regulatory and facility approval for offsite disposal at permitted disposal facilities should be obtainable. ■ Regulatory approvals for institutional and access controls should be obtainable. However, some difficulties may be encountered with regard to types of restrictions, especially on privately owned parcels. ■ Regulatory approvals for monitoring should be obtainable.
	The ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)	■ Regulatory and facility approval for offsite disposal at permitted disposal facilities should be obtainable. ■ Special management procedures may be required for disposal at the permitted facilities. ■ Development of offsite borrow sources for soil covers over the onsite disposal facilities and backfill would require coordination and approval from the affected agency.
Availability of services and materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services	■ Permitted disposal facilities authorized for asbestos are available within the State of Oregon. However, most facilities are somewhat distant from the site. ■ Many of the permitted disposal facilities may not have sufficient capacity to accept all of the contaminated materials. Use of multiple permitted disposal facilities may be required. ■ Total volume of contaminated materials for offsite disposal would be approximately 139,600 cy. ■ Approximately 4,985 truck loads would be required to haul contaminated materials to offsite disposal facilities.
	Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies Availability of prospective technologies	■ The property for implementing the remedial action has already been obtained for receiver-managed parcels. ■ Access permission at privately owned parcels for implementing the remedial action may not be currently available, but could be obtained. ■ Labor, equipment, and materials for cover construction are available. ■ Suitable cover construction materials would be required from offsite sources. ■ Labor, equipment, and materials for contaminated materials excavation and clean soil backfilling are available. ■ Suitable backfill materials would be required from offsite sources; significant volumes of clean borrow may be required compared to other alternatives. ■ Total volume of suitable soil cover and backfill material required would be approximately 143,600 cy. ■ Approximately 5,130 truck loads would be required to haul in the suitable material. ■ Materials, equipment, and labor resources used for land use controls and monitoring are easily obtainable. ■ Technical equipment and specialists are available for implementation of institutional controls and monitoring.

Table G-42. Cost Evaluation Summary – Alternative 6

Evaluation Factors for Cost	Approximate Cost (Dollars)
Total capital cost	$32,990,000
Total annual O&M cost	$1,050,000
Total periodic cost	$360,000
Total cost (excluding present value discounting)	$34,400,000
Total present value cost	$29,472,000

Note: Total costs are for the assumed period of evaluation (Years 0 through 30). Costs are rounded to the nearest $1,000.

Appendix H

Detailed Alternative Analysis Cost Information

The cost spreadsheets included in this appendix were developed in accordance with EPA 540-R-00-002 (OSWER 9355.0-75) July 2000.

These costs should be used to compare alternative relative costs. Costs for project management, remedial design, and construction management were determined as percentages of capital cost per the guidance. Costs for these work items may not reflect costs for implementation. These costs are determined based on specific client requirements during implementation.

Present Value and Cost Estimate Summary

Alternative 1

No Action

TABLE PV-1

PRESENT VALUE ANALYSIS

Alternative **1**
No Action

Site: **North Ridge Estates**
Location: **Klamath County, Oregon**
Phase: **Final Feasibility Study**
Base Year: **2010**

Year[1]	Capital Costs[2]	Annual O&M Costs	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	1.0000	$0
1	$0	$0	$0	$0	0.9346	$0
2	$0	$0	$0	$0	0.8734	$0
3	$0	$0	$0	$0	0.8163	$0
4	$0	$0	$0	$0	0.7629	$0
5	$0	$0	$86,000	$86,000	0.7130	$61,318
6	$0	$0	$0	$0	0.6663	$0
7	$0	$0	$0	$0	0.6227	$0
8	$0	$0	$0	$0	0.5820	$0
9	$0	$0	$0	$0	0.5439	$0
10	$0	$0	$86,000	$86,000	0.5083	$43,714
11	$0	$0	$0	$0	0.4751	$0
12	$0	$0	$0	$0	0.4440	$0
13	$0	$0	$0	$0	0.4150	$0
14	$0	$0	$0	$0	0.3878	$0
15	$0	$0	$86,000	$86,000	0.3624	$31,166
16	$0	$0	$0	$0	0.3387	$0
17	$0	$0	$0	$0	0.3166	$0
18	$0	$0	$0	$0	0.2959	$0
19	$0	$0	$0	$0	0.2765	$0
20	$0	$0	$86,000	$86,000	0.2584	$22,222
21	$0	$0	$0	$0	0.2415	$0
22	$0	$0	$0	$0	0.2257	$0
23	$0	$0	$0	$0	0.2109	$0
24	$0	$0	$0	$0	0.1971	$0
25	$0	$0	$86,000	$86,000	0.1842	$15,841
26	$0	$0	$0	$0	0.1722	$0
27	$0	$0	$0	$0	0.1609	$0
28	$0	$0	$0	$0	0.1504	$0
29	$0	$0	$0	$0	0.1406	$0
30	$0	$0	$86,000	$86,000	0.1314	$11,300
TOTALS:	$0	$0	$516,000	$516,000		$185,561
TOTAL PRESENT VALUE OF ALTERNATIVE 1[5]						**$186,000**

Notes:
1 Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.
2 Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-1.
3 Total annual expenditure is the total cost per year with no discounting.
4 Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.
5 Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented.
They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site:	North Ridge Estates
Location:	Klamath County, Oregon
Phase:	Final Feasibility Study
Base Year:	2010

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130		
6	0.6663		
7	0.6227		
8	0.5820		
9	0.5439		
10	0.5083		
11	0.4751		
12	0.4440		
13	0.4150		
14	0.3878		
15	0.3624		
16	0.3387		
17	0.3166		
18	0.2959		
19	0.2765		
20	0.2584		
21	0.2415		
22	0.2257		
23	0.2109		
24	0.1971		
25	0.1842		

Notes:

1 Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

2 The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE CS-1		
Alternative	**1**	**COST ESTIMATE SUMMARY**
No Action		

Site:	North Ridge Estates	**Description:**	Alternative 1 would leave removal action activities previously performed in their current conditions. No new remedial action activities would be initiated at the site to address contaminated materials or otherwise mitigate the associated risks to human health and the environment. A no action alternative is required by the NCP to provide an environmental baseline against which impacts of the various remedial alternatives can be compared. Five-year site reviews would be performed as required by the NCP to evaluate whether adequate protection of human health and the environment is provided since contaminated materials would remain at the site. Monitoring (consisting of non-intrusive visual inspections and sample collection with laboratory analysis) would be performed as necessary to complete the 5-year site reviews.
Location:	Klamath County, Oregon		
Phase:	Final Feasibility Study		
Base Year:	2010		
Date:	March 24, 2010		

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Reviews	CW1-1	1	LS	$26,957	$26,957	
Community Awareness Activities	CW1-2	1	LS	$6,039	$6,039	
Non-Intrusive Visual Inspection	CW1-3A	1	LS	$5,212	$5,212	
Ambient Air Sampling	CW1-3B	1	LS	$19,000	$19,000	
SUBTOTAL					$57,208	
Contingency (Scope and Bid)		20%			$11,442	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL						
Project Management		10%			$6,865	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$10,298	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$85,813	
TOTAL PERIODIC COST					**$86,000**	Total capital cost is rounded to the nearest $1,000.

Notes: $68,650

Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

EA Each
LS Lump Sum
QTY Quantity

Present Value and Cost Estimate Summary

Alternative 3

Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

TABLE PV-3

PRESENT VALUE ANALYSIS

Alternative 3

Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Year[1]	Capital Costs (Land Use Controls)[2]	Capital Costs (Construction)[2]	Annual O&M Costs (Cover and Access Controls)	Periodic Costs (Interior House Cleanings and Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$1,076,000	$4,258,000	$26,000	$0	$5,360,000	0.9346	$5,009,456
2	$0	$4,258,000	$26,000	$0	$4,284,000	0.8734	$3,741,646
3	$0	$0	$30,000	$0	$30,000	0.8163	$24,489
4	$0	$0	$30,000	$0	$30,000	0.7629	$22,887
5	$0	$0	$30,000	$159,000	$189,000	0.7130	$134,757
6	$0	$0	$30,000	$0	$30,000	0.6663	$19,989
7	$0	$0	$30,000	$0	$30,000	0.6227	$18,681
8	$0	$0	$30,000	$0	$30,000	0.5820	$17,460
9	$0	$0	$30,000	$0	$30,000	0.5439	$16,317
10	$0	$0	$30,000	$983,000	$1,013,000	0.5083	$514,908
11	$0	$0	$30,000	$0	$30,000	0.4751	$14,253
12	$0	$0	$30,000	$0	$30,000	0.4440	$13,320
13	$0	$0	$30,000	$0	$30,000	0.4150	$12,450
14	$0	$0	$30,000	$0	$30,000	0.3878	$11,634
15	$0	$0	$30,000	$159,000	$189,000	0.3624	$68,494
16	$0	$0	$30,000	$0	$30,000	0.3387	$10,161
17	$0	$0	$30,000	$0	$30,000	0.3166	$9,498
18	$0	$0	$30,000	$0	$30,000	0.2959	$8,877
19	$0	$0	$30,000	$0	$30,000	0.2765	$8,295
20	$0	$0	$30,000	$983,000	$1,013,000	0.2584	$261,759
21	$0	$0	$30,000	$0	$30,000	0.2415	$7,245
22	$0	$0	$30,000	$0	$30,000	0.2257	$6,771
23	$0	$0	$30,000	$0	$30,000	0.2109	$6,327
24	$0	$0	$30,000	$0	$30,000	0.1971	$5,913
25	$0	$0	$30,000	$159,000	$189,000	0.1842	$34,814
26	$0	$0	$30,000	$0	$30,000	0.1722	$5,166
27	$0	$0	$30,000	$0	$30,000	0.1609	$4,827
28	$0	$0	$30,000	$0	$30,000	0.1504	$4,512
29	$0	$0	$30,000	$0	$30,000	0.1406	$4,218
30	$0	$0	$30,000	$983,000	$1,013,000	0.1314	$133,108
TOTALS:	$1,076,000	$8,516,000	$892,000	$3,426,000	$13,910,000		$10,152,232
TOTAL PRESENT VALUE OF ALTERNATIVE 3[5]							**$10,152,000**

Notes:
[1] Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.
[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-3.
[3] Total annual expenditure is the total cost per year with no discounting.
[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.
[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented.
They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130		
6	0.6663		
7	0.6227		
8	0.5820		
9	0.5439		
10	0.5083		
11	0.4751		
12	0.4440		
13	0.4150		
14	0.3878		
15	0.3624		
16	0.3387		
17	0.3166		
18	0.2959		
19	0.2765		
20	0.2584		
21	0.2415		
22	0.2257		
23	0.2109		
24	0.1971		
25	0.1842		

Notes:

1 Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

2 The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE CS-3

Alternative 3

Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Description: Alternative 3 includes in-place capping (covering) of contaminated materials identified on privately owned parcels and a portion of the contaminated materials on receiver managed parcels (assumed to be 50% of identified contaminated materials for cost purposes). Covers used to cap contaminated materials are assumed to be constructed from clean soil transported from offsite borrow areas to ensure that contamination is not present. Current residential structures on receiver managed parcels would be relocated or demolished (assumed to be demolished for cost purposes). Interior cleaning would be performed on a periodic basis using vacuum extraction to remove asbestos fibers within residential structures on privately owned parcels. Land use controls would be used to protect covered areas as well as restrict access and use of contaminated areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, interior cleanings, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

LAND USE CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	CW3-1	1	LS	$622,800	$622,800	
Access Controls	CW3-2	1	LS	$13,369	$13,369	
SUBTOTAL					$636,169	
Contingency (Scope and Bid)		20%			$127,234	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$763,403		
Project Management		6%			$45,804	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		12%			$91,608	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		8%			$61,072	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$114,510	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$1,076,397	
TOTAL CAPITAL COST					**$1,076,000**	Total capital cost is rounded to the nearest $1,000.

CONSTRUCTION CAPITAL COSTS: (Assumed to be Incurred During Years 1 and 2)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Site Clearing and Grubbing	CW3-7	1	LS	$75,287	$75,287	
Mobilization/Demobilization	CW3-10	2	EA	$56,158	$112,316	Includes mobilization/demobilization for each construction year
Temporary Laydown Area Installation	CW3-6	1	LS	$6,106	$6,106	
Construction of Soil Cover	CW3-8	1	LS	$4,044,253	$4,044,253	
Revegetation of Soil Cover	CW3-9	1	LS	$123,569	$123,569	
Surveying for Construction Control	CW3-11	1	LS	$15,993	$15,993	
Equipment Decontamination	CW3-12	1	LS	$53,806	$53,806	
Site Maintenance and Control During Construction	CW3-13	1	LS	$197,501	$197,501	
House Demolition and Disposal	CW3-15	1	LS	$390,946	$390,946	
Borrow Source Testing	CW3-4A	1	LS	$70,329	$70,329	
Ambient Air Sampling (1 Year)	CW3-4C	2	YR	$62,857	$125,714	Ambient air sampling over the period of construction
Inspection of Areas without Identified Contamination	CW3-4D	1	LS	$30,997	$30,997	
Temporary Site Facilitites During Construction	CW3-14	1	LS	$49,497	$49,497	
SUBTOTAL					$5,296,314	
Contingency (Scope and Bid)		20%			$1,059,263	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$6,355,577		
Project Management		5%			$317,779	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		8%			$508,446	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		6%			$381,335	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$953,337	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$8,516,474	
TOTAL CAPITAL COST					**$8,516,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-3

Alternative 3
Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Description: Alternative 3 includes in-place capping (covering) of contaminated materials identified on privately owned parcels and a portion of the contaminated materials on receiver managed parcels (assumed to be 50% of identified contaminated materials for cost purposes). Covers used to cap contaminated materials are assumed to be constructed from clean soil transported from offsite borrow areas to ensure that contamination is not present. Current residential structures on receiver managed parcels would be relocated or demolished (assumed to be demolished for cost purposes). Interior cleaning would be performed on a periodic basis using vacuum extraction to remove asbestos fibers within residential structures on privately owned parcels. Land use controls would be used to protect covered areas as well as restrict access and use of contaminated areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, interior cleanings, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

COVER AND ACCESS CONTROLS ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 1 through 2)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Cover and Access Controls O&M During Construction	CW3-5A	1	LS	$10,150	$10,150	Includes labor for cover maintenance
Cover and Backfill Inspection	CW3-4B	1	LS	$5,212	$5,212	Includes annual site inspection
SUBTOTAL					$15,362	
Contingency (Scope and Bid)		20%			$3,072	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$18,434		
Project Management		10%			$1,843	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$2,765	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$2,765	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$25,807	
TOTAL ANNUAL O&M COST					**$26,000**	Total O&M cost is rounded to the nearest $1,000.

COVER AND ACCESS CONTROLS ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 3 through 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Cover and Access Controls O&M	CW3-5B	1	LS	$12,800	$12,800	Includes labor for cover and warning signs maintenance
Cover and Backfill Inspection	CW3-4B	1	LS	$5,212	$5,212	Includes annual site inspection
SUBTOTAL					$18,012	
Contingency (Scope and Bid)		20%			$3,602	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$21,614		
Project Management		10%			$2,161	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$3,242	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$3,242	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$30,259	
TOTAL ANNUAL O&M COST					**$30,000**	Total O&M cost is rounded to the nearest $1,000.

INTERIOR HOUSE CLEANING (Years 10, 20, and 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Interior Cleaning of Houses	CW3-16	1	LS	$549,502	$549,502	
SUBTOTAL					$549,502	
Contingency (Scope and Bid)		20%			$109,900	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$659,402		
Project Management		10%			$65,940	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$98,910	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$824,252	
TOTAL PERIODIC COST					**$824,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-3

Alternative 3
Capping of Contaminated Materials on Private Parcels, Partial Capping of Contaminated Materials on Receivership Parcels, Interior Cleaning, and Land Use Controls with Monitoring

COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Description: Alternative 3 includes in-place capping (covering) of contaminated materials identified on privately owned parcels and a portion of the contaminated materials on receiver managed parcels (assumed to be 50% of identified contaminated materials for cost purposes). Covers used to cap contaminated materials are assumed to be constructed from clean soil transported from offsite borrow areas to ensure that contamination is not present. Current residential structures on receiver managed parcels would be relocated or demolished (assumed to be demolished for cost purposes). Interior cleaning would be performed on a periodic basis using vacuum extraction to remove asbestos fibers within residential structures on privately owned parcels. Land use controls would be used to protect covered areas as well as restrict access and use of contaminated areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, interior cleanings, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25, and 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Reviews	CW3-3A	1	LS	$29,042	$29,042	
Indoor Air Sampling	CW3-3B	1	LS	$46,429	$46,429	
Visual Non-Intrusive Inspection	CW3-3C	1	LS	$5,212	$5,212	
Ambient Air Sampling (5 Year Review)	CW3-3D	1	LS	$19,000	$19,000	
Community Awareness Activities	CW3-3E	1	LS	$6,039	$6,039	
SUBTOTAL					$105,722	
Contingency (Scope and Bid)		20%			$21,144	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$126,866		
Project Management		10%			$12,687	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$19,030	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$158,583	
TOTAL PERIODIC COST					**$159,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

ABS	Activity Based Sampling
EA	Each
LS	Lump Sum
QTY	Quantity

Present Value and Cost Estimate Summary

Alternative 4

Capping of Contaminated Materials and Land Use Controls with Monitoring

TABLE PV-4

PRESENT VALUE ANALYSIS

Alternative 4

Capping of Contaminated Materials and Land Use Controls with Monitoring

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Year[1]	Capital Costs (Land Use Controls)[2]	Capital Costs (Construction)[2]	Annual O&M Costs (Cover and Access Controls)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$1,062,000	$6,219,000	$28,000	$0	$7,309,000	0.9346	$6,830,991
2	$0	$6,219,000	$28,000	$0	$6,247,000	0.8734	$5,456,130
3	$0	$0	$36,000	$0	$36,000	0.8163	$29,387
4	$0	$0	$36,000	$0	$36,000	0.7629	$27,464
5	$0	$0	$36,000	$60,000	$96,000	0.7130	$68,448
6	$0	$0	$36,000	$0	$36,000	0.6663	$23,987
7	$0	$0	$36,000	$0	$36,000	0.6227	$22,417
8	$0	$0	$36,000	$0	$36,000	0.5820	$20,952
9	$0	$0	$36,000	$0	$36,000	0.5439	$19,580
10	$0	$0	$36,000	$60,000	$96,000	0.5083	$48,797
11	$0	$0	$36,000	$0	$36,000	0.4751	$17,104
12	$0	$0	$36,000	$0	$36,000	0.4440	$15,984
13	$0	$0	$36,000	$0	$36,000	0.4150	$14,940
14	$0	$0	$36,000	$0	$36,000	0.3878	$13,961
15	$0	$0	$36,000	$60,000	$96,000	0.3624	$34,790
16	$0	$0	$36,000	$0	$36,000	0.3387	$12,193
17	$0	$0	$36,000	$0	$36,000	0.3166	$11,398
18	$0	$0	$36,000	$0	$36,000	0.2959	$10,652
19	$0	$0	$36,000	$0	$36,000	0.2765	$9,954
20	$0	$0	$36,000	$60,000	$96,000	0.2584	$24,806
21	$0	$0	$36,000	$0	$36,000	0.2415	$8,694
22	$0	$0	$36,000	$0	$36,000	0.2257	$8,125
23	$0	$0	$36,000	$0	$36,000	0.2109	$7,592
24	$0	$0	$36,000	$0	$36,000	0.1971	$7,096
25	$0	$0	$36,000	$60,000	$96,000	0.1842	$17,683
26	$0	$0	$36,000	$0	$36,000	0.1722	$6,199
27	$0	$0	$36,000	$0	$36,000	0.1609	$5,792
28	$0	$0	$36,000	$0	$36,000	0.1504	$5,414
29	$0	$0	$36,000	$0	$36,000	0.1406	$5,062
30	$0	$0	$36,000	$60,000	$96,000	0.1314	$12,614
TOTALS:	$1,062,000	$12,438,000	$1,064,000	$360,000	$14,924,000		$12,798,206
TOTAL PRESENT VALUE OF ALTERNATIVE 4[5]							**$12,798,000**

Notes:
[1] Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.
[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-4.
[3] Total annual expenditure is the total cost per year with no discounting.
[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.
[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented.
They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site:	**North Ridge Estates**
Location:	**Klamath County, Oregon**
Phase:	**Final Feasibility Study**
Base Year:	**2010**

Discount Rate (Percent): **7.0**

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130		
6	0.6663		
7	0.6227		
8	0.5820		
9	0.5439		
10	0.5083		
11	0.4751		
12	0.4440		
13	0.4150		
14	0.3878		
15	0.3624		
16	0.3387		
17	0.3166		
18	0.2959		
19	0.2765		
20	0.2584		
21	0.2415		
22	0.2257		
23	0.2109		
24	0.1971		
25	0.1842		

Notes:

1 Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

2 The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE CS-4

Alternative **4**
Capping of Contaminated Materials and Land Use Controls with Monitoring

COST ESTIMATE SUMMARY

Site:	North Ridge Estates
Location:	Klamath County, Oregon
Phase:	Final Feasibility Study
Base Year:	2010
Date:	March 24, 2010

Description: Alternative 4 uses a remedial strategy that emphasizes in-place capping (covering) of contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Covers used to contain contaminated materials are assumed to be constructed from clean soil transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

LAND USE CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	CW4-1	1	LS	$622,800	$622,800	
Access Controls	CW4-2	1	LS	$4,954	$4,954	
SUBTOTAL					$627,754	
Contingency (Scope and Bid)		20%			$125,551	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$753,305		
Project Management		6%			$45,198	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		12%			$90,397	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		8%			$60,264	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$112,996	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$1,062,160	
TOTAL CAPITAL COST					**$1,062,000**	Total capital cost is rounded to the nearest $1,000.

CONSTRUCTION CAPITAL COSTS: (Assumed to be Incurred During Years 1 and 2)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Site Clearing and Grubbing	CW4-6	1	LS	$150,574	$150,574	
Mobilization/Demobilization	CW4-9	2	EA	$56,158	$112,316	Includes mobilization/demobilization for each construction year.
Temporary Laydown Area Installation	CW4-5	1	LS	$6,106	$6,106	
Construction of Soil Cover	CW4-7	1	LS	$6,677,773	$6,677,773	
Revegetation of Soil Cover	CW4-8	1	LS	$205,161	$205,161	
Surveying for Construction Control	CW4-10	1	LS	$22,353	$22,353	
Equipment Decontamination	CW4-11	1	LS	$87,317	$87,317	
Site Maintenance and Control During Construction	CW4-12	1	LS	$323,520	$323,520	
Temporary Site Facilitites During Construction	CW4-13	1	LS	$60,594	$60,594	
Borrow Source Testing	CW4-15A	1	LS	$89,270	$89,270	
Ambient Air Sampling (1 Year)	CW4-15B	2	YR	$62,857	$125,714	Ambient air sampling over the period of construction.
Inspection of Areas without Identified Contamination	CW4-15C	1	LS	$30,997	$30,997	
SUBTOTAL					$7,734,984	
Contingency (Scope and Bid)		20%			$1,546,997	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$9,281,981		
Project Management		5%			$464,099	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		8%			$742,558	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		6%			$556,919	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$1,392,297	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$12,437,854	
TOTAL CAPITAL COST					**$12,438,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-4

Alternative **4**

Capping of Contaminated Materials and Land Use Controls with Monitoring

COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Description: Alternative 4 uses a remedial strategy that emphasizes in-place capping (covering) of contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Covers used to contain contaminated materials are assumed to be constructed from clean soil transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

COVER AND ACCESS CONTROLS ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 1 through 2)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Cover and Access Controls O&M During Construction	CW4-4A	1	LS	$11,690	$11,690	
Cover and Backfill Inspection	CW4-4C	1	LS	$5,212	$5,212	Includes annual site inspection.
SUBTOTAL					$16,902	
Contingency (Scope and Bid)		20%			$3,380	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$20,282		
Project Management		10%			$2,028	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$3,042	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$3,042	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$28,394	
TOTAL ANNUAL O&M COST					**$28,000**	Total O&M cost is rounded to the nearest $1,000.

COVER AND ACCESS CONTROLS ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 3 through 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Cover and Access Controls O&M	CW4-4B	1	LS	$16,300	$16,300	
Cover and Backfill Inspection	CW4-4C	1	LS	$5,212	$5,212	Includes annual site inspection.
SUBTOTAL					$21,512	
Contingency (Scope and Bid)		20%			$4,302	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$25,814		
Project Management		10%			$2,581	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$3,872	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$3,872	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$36,139	
TOTAL ANNUAL O&M COST					**$36,000**	Total O&M cost is rounded to the nearest $1,000.

TABLE CS-4

Alternative **4**
Capping of Contaminated Materials and Land Use Controls with Monitoring

COST ESTIMATE SUMMARY

Site:	North Ridge Estates
Location:	Klamath County, Oregon
Phase:	Final Feasibility Study
Base Year:	2010
Date:	March 24, 2010

Description: Alternative 4 uses a remedial strategy that emphasizes in-place capping (covering) of contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Covers used to contain contaminated materials are assumed to be constructed from clean soil transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25, and 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Reviews	CW4-3A	1	LS	$29,042	$29,042	
Non-Intrusive Visual Inspection	CW4-3B	1	LS	$5,212	$5,212	
Community Awareness Activities	CW4-14	1	LS	$6,039	$6,039	
SUBTOTAL					$40,293	
Contingency (Scope and Bid)		20%			$8,059	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL						
Project Management		10%			$4,835	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$7,253	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$60,440	
TOTAL PERIODIC COST					**$60,000**	Total capital cost is rounded to the nearest $1,000.

Notes:

$48,352

Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

ABS	Activity Based Sampling
EA	Each
LS	Lump Sum
QTY	Quantity

Present Value and Cost Estimate Summary

Alternative 5a

Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

TABLE PV-5a

PRESENT VALUE ANALYSIS

Alternative 5a

Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

Site:	**North Ridge Estates**
Location:	**Klamath County, Oregon**
Phase:	**Final Feasibility Study**
Base Year:	**2010**

Year[1]	Capital Costs (Land Use Controls)[2]	Capital Costs (Initial Construction)[2]	Annual O&M Costs (Future Surface Excavation)[2]	Annual O&M Costs (Cover, Backfill, and Access Controls)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	$0	1.0000	$0
1	$1,062,000	$4,457,500	$0	$29,000	$0	$5,548,500	0.9346	$5,185,628
2	$0	$4,457,500	$0	$29,000	$0	$4,486,500	0.8734	$3,918,509
3	$0	$0	$81,000	$36,000	$0	$117,000	0.8163	$95,507
4	$0	$0	$81,000	$36,000	$0	$117,000	0.7629	$89,259
5	$0	$0	$81,000	$36,000	$60,000	$177,000	0.7130	$126,201
6	$0	$0	$81,000	$36,000	$0	$117,000	0.6663	$77,957
7	$0	$0	$81,000	$36,000	$0	$117,000	0.6227	$72,856
8	$0	$0	$81,000	$36,000	$0	$117,000	0.5820	$68,094
9	$0	$0	$81,000	$36,000	$0	$117,000	0.5439	$63,636
10	$0	$0	$81,000	$36,000	$60,000	$177,000	0.5083	$89,969
11	$0	$0	$80,000	$36,000	$0	$116,000	0.4751	$55,112
12	$0	$0	$80,000	$36,000	$0	$116,000	0.4440	$51,504
13	$0	$0	$80,000	$36,000	$0	$116,000	0.4150	$48,140
14	$0	$0	$80,000	$36,000	$0	$116,000	0.3878	$44,985
15	$0	$0	$80,000	$36,000	$60,000	$176,000	0.3624	$63,782
16	$0	$0	$80,000	$36,000	$0	$116,000	0.3387	$39,289
17	$0	$0	$80,000	$36,000	$0	$116,000	0.3166	$36,726
18	$0	$0	$80,000	$36,000	$0	$116,000	0.2959	$34,324
19	$0	$0	$80,000	$36,000	$0	$116,000	0.2765	$32,074
20	$0	$0	$80,000	$36,000	$60,000	$176,000	0.2584	$45,478
21	$0	$0	$79,000	$36,000	$0	$115,000	0.2415	$27,773
22	$0	$0	$79,000	$36,000	$0	$115,000	0.2257	$25,956
23	$0	$0	$79,000	$36,000	$0	$115,000	0.2109	$24,254
24	$0	$0	$79,000	$36,000	$0	$115,000	0.1971	$22,667
25	$0	$0	$79,000	$36,000	$60,000	$175,000	0.1842	$32,235
26	$0	$0	$79,000	$36,000	$0	$115,000	0.1722	$19,803
27	$0	$0	$79,000	$36,000	$0	$115,000	0.1609	$18,504
28	$0	$0	$79,000	$36,000	$0	$115,000	0.1504	$17,296
29	$0	$0	$79,000	$36,000	$0	$115,000	0.1406	$16,169
30	$0	$0	$79,000	$36,000	$60,000	$175,000	0.1314	$22,995
TOTALS:	$1,062,000	$8,915,000	$2,238,000	$1,066,000	$360,000	$13,641,000		$10,466,682
TOTAL PRESENT VALUE OF ALTERNATIVE 5a [5]								**$10,467,000**

Notes:

[1] Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.

[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-5a.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.

[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.

Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented.
They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130		
6	0.6663		
7	0.6227		
8	0.5820		
9	0.5439		
10	0.5083		
11	0.4751		
12	0.4440		
13	0.4150		
14	0.3878		
15	0.3624		
16	0.3387		
17	0.3166		
18	0.2959		
19	0.2765		
20	0.2584		
21	0.2415		
22	0.2257		
23	0.2109		
24	0.1971		
25	0.1842		

Notes:

[1] Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

[2] The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE CS-5a

Alternative **5a**

Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Description: Alternative 5a uses a remedial strategy that emphasizes excavation of contaminated surface materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be consolidated at an onsite disposal location. Clean soil would be used to backfill removal areas and is assumed to be transported from offsite borrow areas tested for contamination. Future excavation events (i.e. surface excavation/pickup of contaminated materials) would be performed on a regular basis and would be disposed of at a permitted offsite disposal facility specifically authorized by Oregon DEQ to receive asbestos and other non-asbestos COPCs. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

LAND USE CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	CW5a-1	1	LS	$622,800	$622,800	
Access Controls	CW5a-2	1	LS	$4,954	$4,954	
SUBTOTAL					$627,754	
Contingency (Scope and Bid)		20%			$125,551	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$753,305		
Project Management		6%			$45,198	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		12%			$90,397	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		8%			$60,264	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$112,996	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$1,062,160	
TOTAL CAPITAL COST					**$1,062,000**	Total capital cost is rounded to the nearest $1,000.

INITIAL CONSTRUCTION CAPITAL COSTS: (Years 1 and 2)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Site Clearing and Grubbing	CW5a-6	1	LS	$150,574	$150,574	
Mobilization/Demobilization	CW5a-13	2	EA	$67,586	$135,172	Includes mobilization/demobilization for each construction year.
Temporary Laydown and Access Road Installation	CW5a-17	1	LS	$64,752	$64,752	
Contaminated Surface Materials Excavation and Hauling	CW5a-8	1	LS	$776,533	$776,533	
Construction of On-Site Consolidation Area	CW5a-9	1	LS	$1,996,450	$1,996,450	
Revegetation of On-Site Consolidation Area	CW5a-10	1	LS	$18,650	$18,650	
Excavation Backfilling	CW5a-10A	1	LS	$1,246,719	$1,246,719	
Revegetation of Disturbed Areas	CW5a-11	1	LS	$188,845	$188,845	
Borrow Source Testing	CW5a-4A	1	LS	$51,726	$51,726	
Ambient Air Sampling (1 Year)	CW5a-4B	2	YR	$62,857	$125,714	Ambient air sampling over the period of construction.
Inspection of Areas without Identified Contamination	CW5a-4C	1	LS	$30,997	$30,997	
Excavation Confirmatory Sampling	CW5a-4D	1	LS	$208,812	$208,812	
Site Maintenance and Control During Construction	CW5a-14	1	LS	$315,318	$315,318	
Temporary Site Facilitites During Construction	CW5a-15	1	LS	$59,741	$59,741	
Surveying for Construction Control	CW5a-16	1	LS	$23,533	$23,533	
Equipment Decontamination	CW5a-12	1	LS	$150,653	$150,653	
SUBTOTAL					$5,544,189	
Contingency (Scope and Bid)		20%			$1,108,838	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$6,653,027		
Project Management		5%			$332,651	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		8%			$532,242	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		6%			$399,182	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$997,954	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$8,915,056	
TOTAL CAPITAL COST					**$8,915,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-5a	

Alternative **5a**

Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

COST ESTIMATE SUMMARY

Site:	North Ridge Estates
Location:	Klamath County, Oregon
Phase:	Final Feasibility Study
Base Year:	2010
Date:	March 24, 2010

Description: Alternative 5a uses a remedial strategy that emphasizes excavation of contaminated surface materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be consolidated at an onsite disposal location. Clean soil would be used to backfill removal areas and is assumed to be transported from offsite borrow areas tested for contamination. Future excavation events (i.e. surface excavation/pickup of contaminated materials) would be performed on a regular basis and would be disposed of at a permitted offsite disposal facility specifically authorized by Oregon DEQ to receive asbestos and other non-asbestos COPCs. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

FUTURE SURFACE EXCAVATION ANNUAL O&M COSTS: (Years 3 through 10)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Contaminated Surface Materials Excavation Events	CW5a-7A	1	LS	$39,807	$39,807	Assume 1 surface excavation/pickup event per year.
Contaminated Materials Disposal At Permitted Disposal Facilities	CW5a-7B	1	LS	$2,491	$2,491	Assume 1 surface excavation/pickup event per year.
SUBTOTAL					$42,298	
Contingency (Scope and Bid)		20%			$8,460	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$50,758		
Project Management		10%			$5,076	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		20%			$10,152	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$7,614	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$7,614	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$81,214	
TOTAL ANNUAL O&M COST					**$81,000**	Total capital cost is rounded to the nearest $1,000.

FUTURE SURFACE EXCAVATION ANNUAL O&M COSTS: (Years 11 through 20)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Contaminated Surface Materials Excavation Events	CW5a-7A	1	LS	$39,807	$39,807	Assume 1 surface excavation/pickup event per year.
Contaminated Materials Disposal At Permitted Disposal Facilities	CW5a-7B	1	LS	$1,882	$1,882	Assume 1 surface excavation/pickup event per year.
SUBTOTAL					$41,689	
Contingency (Scope and Bid)		20%			$8,338	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$50,027		
Project Management		10%			$5,003	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		20%			$10,005	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$7,504	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$7,504	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$80,043	
TOTAL ANNUAL O&M COST					**$80,000**	Total capital cost is rounded to the nearest $1,000.

FUTURE SURFACE EXCAVATION O&M COSTS: (Years 21 through 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Contaminated Surface Materials Excavation Events	CW5a-7A	1	LS	$39,807	$39,807	Assume 1 surface excavation/pickup event per year.
Contaminated Materials Disposal At Permitted Disposal Facilities	CW5a-7B	1	LS	$1,152	$1,152	Assume 1 surface excavation/pickup event per year.
SUBTOTAL					$40,959	
Contingency (Scope and Bid)		20%			$8,192	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$49,151		
Project Management		10%			$4,915	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		20%			$9,830	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$7,373	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$7,373	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$78,642	
TOTAL ANNUAL O&M COST					**$79,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-5a

Alternative 5a

Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Description: Alternative 5a uses a remedial strategy that emphasizes excavation of contaminated surface materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be consolidated at an onsite disposal location. Clean soil would be used to backfill removal areas and is assumed to be transported from offsite borrow areas tested for contamination. Future excavation events (i.e. surface excavation/pickup of contaminated materials) would be performed on a regular basis and would be disposed of at a permitted offsite disposal facility specifically authorized by Oregon DEQ to receive asbestos and other non-asbestos COPCs. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

COVER, BACKFILL, AND ACCESS CONTROLS ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 1 through 2)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Cover, Backfill, and Access Controls O&M During Construction	CW5a-5A	1	LS	$11,950	$11,950	
Cover and Backfill Inspection	CW5a-5C	1	LS	$5,212	$5,212	Includes annual site inspection.
SUBTOTAL					$17,162	
Contingency (Scope and Bid)		20%			$3,432	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$20,594		
Project Management		10%			$2,059	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$3,089	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$3,089	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$28,831	
TOTAL ANNUAL O&M COST					**$29,000**	Total O&M cost is rounded to the nearest $1,000.

COVER, BACKFILL, AND ACCESS CONTROLS ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 3 through 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Cover, Backfill, and Access Controls O&M	CW5a-5B	1	LS	$16,400	$16,400	Includes labor for reclamation maintenance
Cover and Backfill Inspection	CW5a-5C	1	LS	$5,212	$5,212	Includes annual site inspection
SUBTOTAL					$21,612	
Contingency (Scope and Bid)		20%			$4,322	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$25,934		
Project Management		10%			$2,593	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$3,890	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$3,890	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$36,307	
TOTAL ANNUAL O&M COST					**$36,000**	Total O&M cost is rounded to the nearest $1,000.

TABLE CS-5a

Alternative 5a

Excavation and Onsite Consolidation/Disposal of Contaminated Surface Materials, Future Excavation and Offsite Disposal of Contaminated Surface Materials at Permitted Facilities, and Land Use Controls with Monitoring

COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Description: Alternative 5a uses a remedial strategy that emphasizes excavation of contaminated surface materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be consolidated at an onsite disposal location. Clean soil would be used to backfill removal areas and is assumed to be transported from offsite borrow areas tested for contamination. Future excavation events (i.e. surface excavation/pickup of contaminated materials) would be performed on a regular basis and would be disposed of at a permitted offsite disposal facility specifically authorized by Oregon DEQ to receive asbestos and other non-asbestos COPCs. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25, and 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Reviews	CW5a-3A	1	LS	$29,042	$29,042	
Non-Intrusive Visual Inspection	CW5a-3C	1	LS	$5,212	$5,212	
Community Awareness Activities	CW5a-3B	1	LS	$6,039	$6,039	
SUBTOTAL					$40,293	
Contingency (Scope and Bid)		20%			$8,059	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$48,352		
Project Management		10%			$4,835	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$7,253	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$60,440	
TOTAL PERIODIC COST					**$60,000**	Total capital cost is rounded to the nearest $1,000.

Notes:

Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

ABS Activity Based Sampling
EA Each
LS Lump Sum
QTY Quantity

Present Value and Cost Estimate Summary

Alternative 5b

Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

TABLE PV-5b

PRESENT VALUE ANALYSIS

Alternative 5b

Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monitoring

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Year[1]	Capital Costs (Land Use Controls)[2]	Capital Costs (Construction)[2]	Annual O&M Costs (Cover, Backfill, and Access Controls)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$1,062,000	$4,757,667	$26,000	$0	$5,845,667	0.9346	$5,463,360
2	$0	$4,757,667	$26,000	$0	$4,783,667	0.8734	$4,178,054
3	$0	$4,757,667	$26,000	$0	$4,783,667	0.8163	$3,904,907
4	$0	$0	$36,000	$0	$36,000	0.7629	$27,464
5	$0	$0	$36,000	$60,000	$96,000	0.7130	$68,448
6	$0	$0	$36,000	$0	$36,000	0.6663	$23,987
7	$0	$0	$36,000	$0	$36,000	0.6227	$22,417
8	$0	$0	$36,000	$0	$36,000	0.5820	$20,952
9	$0	$0	$36,000	$0	$36,000	0.5439	$19,580
10	$0	$0	$36,000	$60,000	$96,000	0.5083	$48,797
11	$0	$0	$36,000	$0	$36,000	0.4751	$17,104
12	$0	$0	$36,000	$0	$36,000	0.4440	$15,984
13	$0	$0	$36,000	$0	$36,000	0.4150	$14,940
14	$0	$0	$36,000	$0	$36,000	0.3878	$13,961
15	$0	$0	$36,000	$60,000	$96,000	0.3624	$34,790
16	$0	$0	$36,000	$0	$36,000	0.3387	$12,193
17	$0	$0	$36,000	$0	$36,000	0.3166	$11,398
18	$0	$0	$36,000	$0	$36,000	0.2959	$10,652
19	$0	$0	$36,000	$0	$36,000	0.2765	$9,954
20	$0	$0	$36,000	$60,000	$96,000	0.2584	$24,806
21	$0	$0	$36,000	$0	$36,000	0.2415	$8,694
22	$0	$0	$36,000	$0	$36,000	0.2257	$8,125
23	$0	$0	$36,000	$0	$36,000	0.2109	$7,592
24	$0	$0	$36,000	$0	$36,000	0.1971	$7,096
25	$0	$0	$36,000	$60,000	$96,000	0.1842	$17,683
26	$0	$0	$36,000	$0	$36,000	0.1722	$6,199
27	$0	$0	$36,000	$0	$36,000	0.1609	$5,792
28	$0	$0	$36,000	$0	$36,000	0.1504	$5,414
29	$0	$0	$36,000	$0	$36,000	0.1406	$5,062
30	$0	$0	$36,000	$60,000	$96,000	0.1314	$12,614
TOTALS:	$1,062,000	$14,273,000	$1,050,000	$360,000	$16,745,000		$14,028,019
TOTAL PRESENT VALUE OF ALTERNATIVE 5b[5]							**$14,028,000**

Notes:
1 Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.
2 Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-5b.
3 Total annual expenditure is the total cost per year with no discounting.
4 Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.
5 Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented.
They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130		
6	0.6663		
7	0.6227		
8	0.5820		
9	0.5439		
10	0.5083		
11	0.4751		
12	0.4440		
13	0.4150		
14	0.3878		
15	0.3624		
16	0.3387		
17	0.3166		
18	0.2959		
19	0.2765		
20	0.2584		
21	0.2415		
22	0.2257		
23	0.2109		
24	0.1971		
25	0.1842		

Notes:

1 Annual discount factors were calculated using the formulas and guidance presented in Section 4.0
"A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

2 The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE CS-5b

Alternative 5b
Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monito

COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Description: Alternative 5b uses a remedial strategy that emphasizes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be consolidated at onsite disposal locations specifically constructed to accept the excavated wastes. Clean soil would be used to backfill excavation areas and would be transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

LAND USE CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	CW5b-1	1	LS	$622,800	$622,800	
Access Controls	CW5b-2	1	LS	$4,954	$4,954	
SUBTOTAL					$627,754	
Contingency (Scope and Bid)		20%			$125,551	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$753,305		
Project Management		6%			$45,198	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		12%			$90,397	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		8%			$60,264	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$112,996	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$1,062,160	
TOTAL CAPITAL COST					**$1,062,000**	Total capital cost is rounded to the nearest $1,000.

CONSTRUCTION CAPITAL COSTS: (Assumed to be Incurred During Years 1, 2 and 3)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Site Clearing and Grubbing	CW5b-8	1	LS	$150,574	$150,574	
Mobilization/Demobilization	CW5b-16	3	EA	$67,586	$202,758	Includes mobilization/demobilization for each construction year.
Temporary Laydown and Access Road Installation	CW5b-7	1	LS	$64,752	$64,752	
Contaminated Surface Materials Excavation and Hauling	CW5b-9	1	LS	$776,533	$776,533	
Steam Pipe Excavation and Hauling	CW5b-10	1	LS	$412,394	$412,394	
Buried Contaminated Materials Excavation and Hauling	CW5b-11	1	LS	$1,127,698	$1,127,698	
Construction of Onsite Consolidation Area	CW5b-12	1	LS	$3,189,094	$3,189,094	
Revegetation of Onsite Consolidation Area	CW5b-13	1	LS	$18,650	$18,650	
Excavation Backfilling	CW5b-14	1	LS	$1,600,711	$1,600,711	
Revegetation of Disturbed Areas	CW5b-15	1	LS	$191,185	$191,185	
Surveying for Construction Control	CW5b-17	1	LS	$23,533	$23,533	
Equipment Decontamination	CW5b-18	1	LS	$191,896	$191,896	
Site Maintenance and Control During Construction	CW5b-19	1	LS	$470,418	$470,418	
Excavation Confirmatory Sampling	CW5b-4A	1	LS	$210,036	$210,036	
Confirmatory Sampling Data Evaluation Report	CW5b-4B	1	LS	$22,519	$22,519	
Borrow Source Testing	CW5b-3A	1	LS	$64,953	$64,953	
Ambient Air Sampling (1 Year)	CW5b-3B	3	YR	$62,857	$188,571	Ambient air sampling over the period of construction.
Inspection of Areas without Identified Contamination	CW5b-3C	1	LS	$30,997	$30,997	
Temporary Site Facilitites During Construction	CW5b-20	1	LS	$73,397	$73,397	
SUBTOTAL					$9,010,669	
Contingency (Scope and Bid)		20%			$1,802,134	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$10,812,803		
Project Management		5%			$540,640	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		6%			$648,768	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		6%			$648,768	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$1,621,920	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$14,272,899	
TOTAL CAPITAL COST					**$14,273,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-5b

Alternative 5b
Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monito

COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Description: Alternative 5b uses a remedial strategy that emphasizes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be consolidated at onsite disposal locations specifically constructed to accept the excavated wastes. Clean soil would be used to backfill excavation areas and would be transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

COVER, BACKFILL, AND ACCESS CONTROLS ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 1 through 3)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Cover, Backfill, and Access Controls O&M During Construction	CW5b-6A	1	LS	$10,500	$10,500	
Cover and Backfill Inspection	CW5b-6C	1	LS	$5,212	$5,212	Includes annual site inspection.
SUBTOTAL					$15,712	
Contingency (Scope and Bid)		20%			$3,142	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$18,854		
Project Management		10%			$1,885	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$2,828	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$2,828	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$26,395	
TOTAL ANNUAL O&M COST					**$26,000**	Total O&M cost is rounded to the nearest $1,000.

COVER, BACKFILL, AND ACCESS CONTROLS ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 4 through 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Cover, Backfill, and Access Controls O&M	CW5b-6B	1	LS	$16,500	$16,500	
Cover and Backfill Inspection	CW5b-6C	1	LS	$5,212	$5,212	Includes annual site inspection.
SUBTOTAL					$21,712	
Contingency (Scope and Bid)		20%			$4,342	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$26,054		
Project Management		10%			$2,605	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$3,908	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$3,908	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$36,475	
TOTAL ANNUAL O&M COST					**$36,000**	Total O&M cost is rounded to the nearest $1,000.

TABLE CS-5b

Alternative 5b
Excavation and Onsite Consolidation/Disposal of Contaminated Materials, and Land Use Controls with Monito

COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Description: Alternative 5b uses a remedial strategy that emphasizes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be consolidated at onsite disposal locations specifically constructed to accept the excavated wastes. Clean soil would be used to backfill excavation areas and would be transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25, and 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Reviews	CW5b-5A	1	LS	$29,042	$29,042	
Non-Intrusive Visual Inspection	CW5b-5C	1	LS	$5,212	$5,212	
Community Awareness Activities	CW5b-5B	1	LS	$6,039	$6,039	
SUBTOTAL					$40,293	
Contingency (Scope and Bid)		20%			$8,059	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$48,352		
Project Management		10%			$4,835	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$7,253	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$60,440	
TOTAL PERIODIC COST					**$60,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:
ABS Activity Based Sampling
EA Each
LS Lump Sum
QTY Quantity

Present Value and Cost Estimate Summary

Alternative 6

Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

TABLE PV-6

PRESENT VALUE ANALYSIS

Alternative 6

Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

Site:	**North Ridge Estates**
Location:	**Klamath County, Oregon**
Phase:	**Final Feasibility Study**
Base Year:	**2010**

Year[1]	Capital Costs (Land Use Controls)[2]	Capital Costs (Construction)[2]	Annual O&M Costs (Cover, Backfill, and Access Controls)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$1,062,000	$10,642,667	$26,000	$0	$11,730,667	0.9346	$10,963,481
2	$0	$10,642,667	$26,000	$0	$10,668,667	0.8734	$9,318,013
3	$0	$10,642,667	$26,000	$0	$10,668,667	0.8163	$8,708,833
4	$0	$0	$36,000	$0	$36,000	0.7629	$27,464
5	$0	$0	$36,000	$60,000	$96,000	0.7130	$68,448
6	$0	$0	$36,000	$0	$36,000	0.6663	$23,987
7	$0	$0	$36,000	$0	$36,000	0.6227	$22,417
8	$0	$0	$36,000	$0	$36,000	0.5820	$20,952
9	$0	$0	$36,000	$0	$36,000	0.5439	$19,580
10	$0	$0	$36,000	$60,000	$96,000	0.5083	$48,797
11	$0	$0	$36,000	$0	$36,000	0.4751	$17,104
12	$0	$0	$36,000	$0	$36,000	0.4440	$15,984
13	$0	$0	$36,000	$0	$36,000	0.4150	$14,940
14	$0	$0	$36,000	$0	$36,000	0.3878	$13,961
15	$0	$0	$36,000	$60,000	$96,000	0.3624	$34,790
16	$0	$0	$36,000	$0	$36,000	0.3387	$12,193
17	$0	$0	$36,000	$0	$36,000	0.3166	$11,398
18	$0	$0	$36,000	$0	$36,000	0.2959	$10,652
19	$0	$0	$36,000	$0	$36,000	0.2765	$9,954
20	$0	$0	$36,000	$60,000	$96,000	0.2584	$24,806
21	$0	$0	$36,000	$0	$36,000	0.2415	$8,694
22	$0	$0	$36,000	$0	$36,000	0.2257	$8,125
23	$0	$0	$36,000	$0	$36,000	0.2109	$7,592
24	$0	$0	$36,000	$0	$36,000	0.1971	$7,096
25	$0	$0	$36,000	$60,000	$96,000	0.1842	$17,683
26	$0	$0	$36,000	$0	$36,000	0.1722	$6,199
27	$0	$0	$36,000	$0	$36,000	0.1609	$5,792
28	$0	$0	$36,000	$0	$36,000	0.1504	$5,414
29	$0	$0	$36,000	$0	$36,000	0.1406	$5,062
30	$0	$0	$36,000	$60,000	$96,000	0.1314	$12,614
TOTALS:	$1,062,000	$31,928,000	$1,050,000	$360,000	$34,400,000		$29,472,025
TOTAL PRESENT VALUE OF ALTERNATIVE 6[5]							**$29,472,000**

Notes:

[1] Duration is assumed to be 31 years (Years 0 through 30) for present value analysis.

[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-6.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRIFT for details.

[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.

Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented.

They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130		
6	0.6663		
7	0.6227		
8	0.5820		
9	0.5439		
10	0.5083		
11	0.4751		
12	0.4440		
13	0.4150		
14	0.3878		
15	0.3624		
16	0.3387		
17	0.3166		
18	0.2959		
19	0.2765		
20	0.2584		
21	0.2415		
22	0.2257		
23	0.2109		
24	0.1971		
25	0.1842		

Notes:

1 Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 ("A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

2 The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE CS-6

Alternative 6

Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Description: Alternative 6 uses a remedial strategy that emphasizes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be transported offsite and placed within one or more permitted offsite disposal facilities specifically authorized by Oregon DEQ to receive asbestos and other non-asbestos COPCs. Clean soil would be used to backfill removal areas. Clean soil is assumed to be transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

LAND USE CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	CW6-1C	1	LS	$622,800	$622,800	
Access Controls	CW6-1D	1	LS	$4,954	$4,954	Includes labor and material for installing posted warning.
SUBTOTAL					$627,754	
Contingency (Scope and Bid)		20%			$125,551	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$753,305		
Project Management		6%			$45,198	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		12%			$90,397	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		8%			$60,264	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$112,996	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$1,062,160	
TOTAL CAPITAL COST					**$1,062,000**	Total capital cost is rounded to the nearest $1,000.

CONSTRUCTION CAPITAL COSTS: (Assumed to be Incurred During Years 1, 2, and 3)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Site Clearing and Grubbing	CW6-4B	1	LS	$150,574	$150,574	
Mobilization/Demobilization	CW6-11	3	EA	$67,586	$202,758	Includes mobilization/demobilization for each construction year
Temporary Laydown and Access Road Installation	CW6-4A	1	LS	$64,751	$64,751	
Contaminated Surface Materials Excavation	CW6-5	1	LS	$573,536	$573,536	
Steam Pipe Excavation	CW6-6	1	LS	$383,020	$383,020	
Buried Contaminated Materials Excavation	CW6-7	1	LS	$882,892	$882,892	
Hauling of Contaminated Materials for Offsite Disposal	CW6-8A	1	LS	$3,163,978	$3,163,978	
Disposal Charges for Permitted Facility	CW6-8B	1	LS	$11,545,736	$11,545,736	
Excavation Backfilling	CW6-9	1	LS	$1,715,246	$1,715,246	
Revegetation of Disturbed Areas	CW6-10	1	LS	$207,502	$207,502	
Surveying for Construction Control	CW6-12	1	LS	$23,533	$23,533	
Equipment Decontamination	CW6-13	1	LS	$191,896	$191,896	
Site Maintenance and Control During Construction	CW6-14	1	LS	$470,418	$470,418	
Excavation Confirmatory Sampling	CW6-1A	1	LS	$218,601	$218,601	
Confirmatory Sampling Data Evaluation Report	CW6-1B	1	LS	$22,519	$22,519	
Borrow Source Testing	CW6-3A	1	LS	$46,434	$46,434	
Ambient Air Sampling (1 Year)	CW6-3B	3	YR	$62,857	$188,571	
Inspection of Areas without Identified Contamination	CW6-3C	1	LS	$30,997	$30,997	
Temporary Site Facilitites During Construction	CW6-15	1	LS	$73,397	$73,397	
SUBTOTAL					$20,156,359	
Contingency (Scope and Bid)		20%			$4,031,272	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$24,187,631		
Project Management		5%			$1,209,382	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		6%			$1,451,258	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		6%			$1,451,258	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$3,628,145	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$31,927,674	
TOTAL CAPITAL COST					**$31,928,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-6

Alternative 6
Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Description: Alternative 6 uses a remedial strategy that emphasizes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be transported offsite and placed within one or more permitted offsite disposal facilities specifically authorized by Oregon DEQ to receive asbestos and other non-asbestos COPCs. Clean soil would be used to backfill removal areas. Clean soil is assumed to be transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

COVER, BACKFILL, AND ACCESS CONTROLS ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 1 through 3)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Cover, Backfill, and Access Controls O&M During Construction	CW6-16A	1	LS	$10,467	$10,467	Includes labor for reclamation maintenance
Cover and Backfill Inspection	CW6-16C	1	LS	$5,212	$5,212	Includes annual site inspection
SUBTOTAL					$15,679	
Contingency (Scope and Bid)		20%			$3,136	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$18,815		
Project Management		10%			$1,882	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$2,822	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$2,822	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$26,341	
TOTAL ANNUAL O&M COST					**$26,000**	Total O&M cost is rounded to the nearest $1,000.

COVER, BACKFILL, AND ACCESS CONTROLS ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 4 through 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Cover, Backfill, and Access Controls O&M	CW6-16B	1	LS	$16,400	$16,400	Includes labor for reclamation maintenance
Cover and Backfill Inspection	CW6-16C	1	LS	$5,212	$5,212	Includes annual site inspection
SUBTOTAL					$21,612	
Contingency (Scope and Bid)		20%			$4,322	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$25,934		
Project Management		10%			$2,593	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$3,890	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$3,890	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$36,307	
TOTAL ANNUAL O&M COST					**$36,000**	Total O&M cost is rounded to the nearest $1,000.

TABLE CS-6

Alternative 6
Excavation and Offsite Disposal of Contaminated Materials at Permitted Facilities, and Land Use Controls with Monitoring

COST ESTIMATE SUMMARY

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010
Date: March 24, 2010

Description: Alternative 6 uses a remedial strategy that emphasizes excavation of surface and subsurface contaminated materials identified on all parcels, regardless of whether they are privately owned or receiver-managed parcels. This alternative includes installation of a permanent cover over the existing onsite waste repository. Excavated contaminated materials would be transported offsite and placed within one or more permitted offsite disposal facilities specifically authorized by Oregon DEQ to receive asbestos and other non-asbestos COPCs. Clean soil would be used to backfill removal areas. Clean soil is assumed to be transported from offsite borrow areas tested for contamination. Land use controls would be used to protect and restrict use of covered and backfilled areas, and provide awareness of risks from potential exposure to contaminated materials. Monitoring would be conducted to ensure that covers, excavation backfill, and land use controls are protective of human health and the environment. Five-year site reviews would be performed since contaminated materials would remain at the site.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25, and 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Reviews	CW6-2A	1	LS	$29,042	$29,042	
Non-Intrusive Visual Inspection	CW6-2C	1	LS	$5,212	$5,212	
Community Awareness Activities	CW6-2B	1	LS	$6,039	$6,039	
SUBTOTAL					$40,293	
Contingency (Scope and Bid)		20%			$8,059	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$48,352		
Project Management		10%			$4,835	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$7,253	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$60,440	
TOTAL PERIODIC COST					**$60,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

ABS	Activity Based Sampling
EA	Each
LS	Lump Sum
QTY	Quantity

Cost Worksheets

Alternative 1

TABLE CW1-1

Alternative 1 **Cost Worksheet: CW1-1**
Capital Cost Sub-Element
5-Year Site Reviews

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the 5-year site visits and 5-year site review report. The following cost includes labor, material and shipping costs for site visits and 5-year site review reports.

Cost Analysis:
Cost for 5-Year Site Review (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6A	Site Inspection - 2 Person Crew	3	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$1,922.72	8%	9%	$2,263	MII MII Assemblies	0.5 hrs per parcel, 45 parcels
M56	Per Diem for 2 People	3	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$864.00	0%	0%	$864	GSA www.gsa.gov	
L13	Project Manager	40	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$1,861.20	100%	9%	$4,057	SE SalaryExpert.com	Hours for 5-year review report
L5	Environmental Engineer	80	HR	1.00	$31.39	$31.39	$0.00	$0.00	$0.00	$0.00	$31.39	$2,511.20	100%	9%	$5,474	SE SalaryExpert.com	Hours for 5-year review report
L7	Environmental Scientist	120	HR	1.00	$27.87	$27.87	$0.00	$0.00	$0.00	$0.00	$27.87	$3,344.40	100%	9%	$7,291	SE SalaryExpert.com	Hours for 5-year review report
L14	Quality Control Engineer	16	HR	1.00	$46.04	$46.04	$0.00	$0.00	$0.00	$0.00	$46.04	$736.64	100%	9%	$1,606	SE SalaryExpert.com	Hours for 5-year review report
L1	CAD Drafter	40	HR	1.00	$25.70	$25.70	$0.00	$0.00	$0.00	$0.00	$25.70	$1,028.00	100%	9%	$2,241	SE SalaryExpert.com	Hours for 5-year review report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$762.00	100%	9%	$1,661	SE SalaryExpert.com	Hours for 5-year review report
M10A	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$26,957		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW1-2

Alternative 1 | **Cost Worksheet: CW1-2**
Capital Cost Sub-Element
Community Awareness Activities

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves setting up a community meeting to inform the local community about the status of site. The following includes the labor, material and other cost required for setting up the community awareness meeting which includes costs for renting a meeting hall, court reporter, and publishing and sending notices or informational flyers.

Cost Analysis:
Cost for Community Awareness (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L12	General Superintendent (P.M.)	16	HR	1.00	$52.74	$52.74	$0.00	$0.00	$0.00	$0.00	$52.74	$843.84	100%	9%	$1,840	SE SalaryExpert.com	8 hrs per day, 2 days
L13	Project Manager	16	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$744.48	100%	9%	$1,623	SE SalaryExpert.com	8 hrs per day, 2 days
M56	Per Diem for 2 People	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$576.00	0%	0%	$576	GSA www.gsa.gov	
M65	Community Awareness Activities Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,000.00	$2,000.00	$2,000.00	0%	0%	$2,000	A Allowance	1 event per 5-yr review.
												TOTAL UNIT COST:			$6,039		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW1-3A

Alternative 1 **Cost Worksheet: CW1-3A**
Capital Cost Sub-Element
Non-Intrusive Visual Inspection

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves non-intrusive visual inspections (i.e. surface inspections) performed in support of 5-year site reviews would be made on all parcels within the site boundary regardless of ownership. The following includes the labor, material and equipment cost inspection.

Cost Analysis:
Cost for Visual Non-Intrusive Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
												TOTAL UNIT COST:			$5,212		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW1-3B

Alternative 1
Capital Cost Sub-Element
Ambient Air Sampling

Cost Worksheet: CW1-3B

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:

This sub-element involves ambient air sampling and analysis from various locations of the site to assess whether there are current exposure risks from asbestos fibers and non-asbestos COPCs in ambient air. Five locations (TBD) would be selected for sampling and samples would be analyzed for asbestos by TEM Method. The following includes the labor, material and equipment cost, and shipping cost.

Cost Analysis:

Cost for Ambient Air Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$3,938.14	8%	9%	$4,636	MII MII Assemblies	1 week
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
M51A	Ambient Air Sample Analysis	5	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$396.00	$396.00	$1,980.00	8%	9%	$2,331	P Previous Work	1 sample/station/month, 5 stations
M52A	Sampling Setup (Equipment and Utility)	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,200.00	$4,200.00	$4,200.00	8%	9%	$4,944	P Previous Work	Includes sampling equipments and electrical hook-up
M52B	Equipment/Ambient Air Sampling Event	5	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$150.00	$150.00	$750.00	8%	9%	$883	P Previous Work	1 sample/station/month, 5 stations
M53C	Sampling/Other Supplies/Ambient Air Samplinç Event	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	8%	9%	$1,766	P Previous Work	
M54A	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
												TOTAL UNIT COST:			$19,000		

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote

For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE. MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Worksheets

Alternative 3

TABLE CW3-1

Alternative 3 **Cost Worksheet: CW3-1**
Capital Cost Sub-Element
Institutional Controls

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves implementation of institutional controls for the site. The following cost includes hours for and document legal procedures to establish and cost for document submission and recording. The cost also includes site survey to establish parcel/site boundaries.

Cost Analysis:
Cost for Institutional Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Institutional Controls for Private Ownership Parcels (27)																
L6	Environmental Lawyer	648	HR	1.00	$71.06	$71.06	$0.00	$0.00	$0.00	$0.00	$71.06	$46,046.88	100%	9%	$100,382	SE SalaryExpert.com	24 hrs per parcel
L15	Paralegal	864	HR	1.00	$37.29	$37.29	$0.00	$0.00	$0.00	$0.00	$37.29	$32,218.56	100%	9%	$70,236	SE SalaryExpert.com	32 hrs per parcel
L3	Clerks, Typist, Bookkeeper & Receptionist	270	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$5,143.50	100%	9%	$11,213	SE SalaryExpert.com	10 hrs per parcel
M11A	Document Submission and Recording Allowance	27	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$135,000.00	0%	0%	$135,000	A Allowance	
	Institutional Controls for Receivership Parcels (29)																
L6	Environmental Lawyer	464	HR	1.00	$71.06	$71.06	$0.00	$0.00	$0.00	$0.00	$71.06	$32,971.84	100%	9%	$71,879	SE SalaryExpert.com	16 hrs per parcel
L15	Paralegal	696	HR	1.00	$37.29	$37.29	$0.00	$0.00	$0.00	$0.00	$37.29	$25,953.84	100%	9%	$56,579	SE SalaryExpert.com	24 hrs per parcel
L3	Clerks, Typist, Bookkeeper & Receptionist	290	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$5,524.50	100%	9%	$12,043	SE SalaryExpert.com	10 hrs per parcel
M11A	Document Submission and Recording Allowance	29	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$145,000.00	0%	0%	$145,000	A Allowance	
A38A	Site Survey - Clean Area	10	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$464.52	$464.52	$4,645.19	8%	9%	$5,468	MII MII Assemblies	needed
M12	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$15,000.00	$15,000.00	$15,000.00	0%	0%	$15,000	A Allowance	
												TOTAL UNIT COST:			$622,800		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-2

Alternative 3 **Cost Worksheet: CW3-2**
Capital Cost Sub-Element
Access Controls

COST WORKSHEET

Site: North Ridge Estates **Prepared By:** AS **Date:** 3/16/2010
Location: Klamath County, Oregon
Phase: Final Feasibility Study **Checked By:** GH **Date:** 3/24/2010
Base Year: 2010

Work Statement:
This sub-element involves the cost associated with access controls on the site. Access controls include installation of sign posts along the perimeter of the disturbed area, the onsite repositories, and signage along steam pipe on the east side of Old Fort Road.

Cost Analysis:
Cost for Access Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A31C	Signage Installation - Clean Area	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,585.31	$1,585.31	$3,170.61	8%	9%	$3,732	MII MII Assemblies	
M4A	T-Post, 7' High Steel Post	78	EA	1.00	$0.00	$0.00	$0.00	$0.00	$5.86	$0.00	$5.86	$457.08	8%	9%	$538	V Vendor Quote	Includes wire clips
M9	Signs	78	EA	1.00	$0.00	$0.00	$0.00	$0.00	$99.09	$0.00	$99.09	$7,729.02	8%	9%	$9,099	V Vendor Quote	Assume every 300 FT
												TOTAL UNIT COST:			$13,369		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-3A

Alternative 3 **Cost Worksheet: CW3-3A**
Capital Cost Sub-Element
5-Year Site Reviews

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the 5-year site visits and 5-year site review report. The following cost includes labor, material and shipping costs for site visits and 5-year site review reports.

Cost Analysis:
Cost for 5-Year Site Review (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6A	Site Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	1 hour per parcel per site visit, 45 parcels
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
L13	Project Manager	40	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$1,861.20	100%	9%	$4,057	SE SalaryExpert.com	Hours for 5-year review report
L5	Environmental Engineer	80	HR	1.00	$31.39	$31.39	$0.00	$0.00	$0.00	$0.00	$31.39	$2,511.20	100%	9%	$5,474	SE SalaryExpert.com	Hours for 5-year review report
L7	Environmental Scientist	120	HR	1.00	$27.87	$27.87	$0.00	$0.00	$0.00	$0.00	$27.87	$3,344.40	100%	9%	$7,291	SE SalaryExpert.com	Hours for 5-year review report
L14	Quality Control Engineer	16	HR	1.00	$46.04	$46.04	$0.00	$0.00	$0.00	$0.00	$46.04	$736.64	100%	9%	$1,606	SE SalaryExpert.com	Hours for 5-year review report
L1	CAD Drafter	40	HR	1.00	$25.70	$25.70	$0.00	$0.00	$0.00	$0.00	$25.70	$1,028.00	100%	9%	$2,241	SE SalaryExpert.com	Hours for 5-year review report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$762.00	100%	9%	$1,661	SE SalaryExpert.com	Hours for 5-year review report
M10A	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$29,042		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-3B

Alternative 3 **Cost Worksheet: CW3-3B**
Capital Cost Sub-Element
Indoor Air Sampling

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves indoor air sampling conducted at each 5-year review. A total of five samples would be collected per house and would be analyzed by TEM Method. The following includes the labor, material and equipment cost, and shipping cost required for the sampling.

Cost Analysis:
Cost for Indoor Air Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$3,938.14	8%	9%	$4,636	MII MII Assemblies	Assume 5 houses per day
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
M51B	Indoor Air Sample Analysis	120	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$222.75	$222.75	$26,730.00	8%	9%	$31,467	P Previous Work	5 samples per house, 24 houses
M51C	Equipment/Indoor Air Sampling Event	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	8%	9%	$5,886	P Previous Work	
M54A	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
												TOTAL UNIT COST:			$46,429		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

FACTOR:	NOTES:
	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-3C

Alternative 3 **Cost Worksheet: CW3-3C**
Capital Cost Sub-Element
Visual Non-Intrusive Inspection

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves non-intrusive visual inspections (i.e. surface inspections) performed in support of 5-year site reviews would be made on all parcels within the site boundary regardless of ownership. The following includes the labor, material and equipment cost for inspection.

Cost Analysis:
Cost for Visual Non-Intrusive Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
												TOTAL UNIT COST:			$5,212		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-3D

Alternative 3 — **Cost Worksheet: CW3-3D**
Capital Cost Sub-Element
Ambient Air Sampling (5 Year Review)

COST WORKSHEET

Site: North Ridge Estates — **Prepared By:** AS — **Date:** 3/16/2010
Location: Klamath County, Oregon
Phase: Final Feasibility Study — **Checked By:** GH — **Date:** 3/24/2010
Base Year: 2010

Work Statement:
This sub-element involves ambient air sampling and analysis from various locations of the site to assess whether there are current exposure risks from asbestos fibers and non-asbestos COPCs in ambient air. Five locations (TBD) would be selected for sampling and samples would be analyzed for asbestos by TEM Method. The following includes the labor, material and equipment cost, and shipping cost.

Cost Analysis:
Cost for Ambient Air Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$3,938.14	8%	9%	$4,636	MII MII Assemblies	1 week
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
M51A	Ambient Air Sample Analysis	5	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$396.00	$396.00	$1,980.00	8%	9%	$2,331	P Previous Work	1 sample/station/month, 5 stations
M52A	Sampling Setup (Equipment and Utility)	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,200.00	$4,200.00	$4,200.00	8%	9%	$4,944	P Previous Work	Includes sampling equipments and electrical hook-up
M52B	Equipment/Ambient Air Sampling Event	5	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$150.00	$150.00	$750.00	8%	9%	$883	P Previous Work	1 sample/station/month, 5 stations
M53C	Event	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	8%	9%	$1,766	P Previous Work	
M54A	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
												TOTAL UNIT COST:			$19,000		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-3E

Alternative 3 **Cost Worksheet: CW3-3E**
Capital Cost Sub-Element
Community Awareness Activities

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves setting up a community meeting to inform the local community about the status of site. The following includes the labor, material and other cost required for setting up the community awareness meeting which includes costs for renting a meeting hall, court reporter, and publishing and sending notices or informational flyers.

Cost Analysis:
Cost for Community Awareness Activities (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L12	General Superintendent (P.M.)	16	HR	1.00	$52.74	$52.74	$0.00	$0.00	$0.00	$0.00	$52.74	$843.84	100%	9%	$1,840	SE SalaryExpert.com	8 hrs per day
L13	Project Manager	16	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$744.48	100%	9%	$1,623	SE SalaryExpert.com	8 hrs per day
M56	Per Diem for 2 People	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$576.00	0%	0%	$576	GSA www.gsa.gov	
M65	Community Awareness Activities Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,000.00	$2,000.00	$2,000.00	0%	0%	$2,000	A Allowance	1 event per 5-yr review.
												TOTAL UNIT COST:			$6,039		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-4A

Alternative 3 | **Cost Worksheet:** **CW3-4A**

Capital Cost Sub-Element

Borrow Source Testing

COST WORKSHEET

Site:	North Ridge Estates	**Prepared By:** AS	**Date:** 3/16/2010
Location:	Klamath County, Oregon		
Phase:	Final Feasibility Study	**Checked By:** GH	**Date:** 3/24/2010
Base Year:	2010		

Work Statement:

This sub-element involves determining whether asbestos fibers and non-asbestos COPCs are present in proposed borrow source. Samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Visual inspection and ABS activities would be conducted to determine asbestos contamination. The ABS samples would be analyzed by TEM Method. Non-asbestos COPCs would include organic/inorganic analysis for VOCs, SVOCs, PCBs, TPH, herbicides, pesticides, and target analyte list metals. The following includes the labor, material and equipment cost, and shipping cost required for the borrow material

Cost Analysis:

Cost for Borrow Material Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	20	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$15,752.57	8%	9%	$18,544	MII MII Assemblies	Assume 1 day per sample
M51	ABS, Sample and Analysis	20	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$891.00	$891.00	$17,820.00	8%	9%	$20,978	P Previous Work	
M52	Equipment/ABS Area/ABS Event	20	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.50	$148.50	$2,970.00	8%	9%	$3,496	P Previous Work	
M66A	Analysis - Volatile Organic Compounds	20	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$105.78	$105.78	$2,115.60	8%	9%	$2,490	V Vendor Quote	
M66B	Analysis - Semivolatile Organic Compounds	20	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$215.47	$215.47	$4,309.40	8%	9%	$5,073	V Vendor Quote	
M66C	Analysis - Pesticides	20	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$152.79	$152.79	$3,055.80	8%	9%	$3,597	V Vendor Quote	
M66D	Analysis - Herbicides	20	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$132.64	$132.64	$2,652.80	8%	9%	$3,123	V Vendor Quote	
M66E	Analysis - TAL Metals	20	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$129.28	$129.28	$2,585.60	8%	9%	$3,044	V Vendor Quote	
M66F	Analysis - PCBs	20	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$133.20	$133.20	$2,664.00	8%	9%	$3,136	V Vendor Quote	
M66G	Analysis - TPH	20	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$88.43	$88.43	$1,768.60	8%	9%	$2,082	V Vendor Quote	
M54A	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
M53B	Sampling/Other Supplies	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	8%	9%	$1,766	P Previous Work	
												TOTAL UNIT COST:			$70,329		

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote

For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3-4B

Alternative 3 | **Cost Worksheet:** **CW3-4B**
Capital Cost Sub-Element
Cover and Backfill Inspection

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves monitoring protocol for covered portions of privately owned and receiver managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers. The following includes the labor, material and equipment costs for inspection.

Cost Analysis:
Cost for Cover and Backfill Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
												TOTAL UNIT COST:			$5,212		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-4C

Alternative 3 **Cost Worksheet: CW3-4C**
Capital Cost Sub-Element
Ambient Air Sampling (1 Year)

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves ambient air sampling and analysis from various locations of the site to assess whether there are current exposure risks from asbestos fibers and non-asbestos COPCs in ambient air. Five locations (TBD) would be selected for sampling and samples would be analyzed for asbestos by TEM Method. The following includes the labor, material and equipment cost, and shipping cost.

Cost Analysis:
Cost for Ambient Air Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$9,451.54	8%	9%	$11,126	MII MII Assemblies	1 yr, 12 months, 1 sample/month
M56	Per Diem for 2 People	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$3,456.00	0%	0%	$3,456	GSA www.gsa.gov	
M51A	Ambient Air Sample Analysis	60	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$396.00	$396.00	$23,760.00	8%	9%	$27,970	P Previous Work	1 sample/station/month, 5 stations, 12 months
M52A	Sampling Setup (Equipment and Utility)	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,200.00	$4,200.00	$4,200.00	8%	9%	$4,944	P Previous Work	Includes sampling equipments and electrical hook-up
M52B	Equipment/Ambient Air Sampling Event	60	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$150.00	$150.00	$9,000.00	8%	9%	$10,595	P Previous Work	1 sample/station/month, 5 stations, 12 months
M53C	Sampling/Other Supplies/Ambient Air Sampling Event	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	8%	9%	$1,766	P Previous Work	
M54A	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
												TOTAL UNIT COST:			$62,857		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-4D

Alternative 3 — **Cost Worksheet: CW3-4D**

Capital Cost Sub-Element

Inspection of Areas without Identified Contamination

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:

This sub-element involves monitoring for areas of the site with no historical or current contamination and would be performed some time during construction. The monitoring would be performed using a tiered approach with intrusive visual inspection (hand dug test pits), followed by ABS to provide a point-in-time determination whether these areas were adversely impacted by contamination. A total of ten locations would be tested.

Cost Analysis:

Cost for Intrusive Visual Inspection and ABS (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
A5A	Sampling - 3 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,179.92	$1,179.92	$5,899.61	8%	9%	$6,945	MII MII Assemblies	2 ABS per day
M55	Per Diem for 3 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$432.00	$432.00	$2,160.00	0%	0%	$2,160	GSA www.gsa.gov	
M51	ABS, Sample and Analysis	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$891.00	$891.00	$8,910.00	8%	9%	$10,489	P Previous Work	10 ABS samples, Analysis by ISO 10312 TEM, PLM-VE and Stereomicroscopy
M52	Equipment/ABS Area/ABS Event	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.50	$148.50	$1,485.00	8%	9%	$1,748	P Previous Work	
M53A	Sampling and Other Supplies/ABS Area/ABS Event	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$250.00	$250.00	$2,500.00	8%	9%	$2,943	P Previous Work	
M54B	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$30,997		

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote

For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-5A

Alternative 3 **Cost Worksheet: CW3-5A**
Capital Cost Sub-Element
Cover and Access Controls O&M During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cover and access controls O&M pertaining to the covered/backfilled areas during construction. It includes costs for on-site labor, equipment, materials and allowances for maintaining the cover and signage.

Cost Analysis:
Cost for Cover and Access Controls O&M During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7A	Cover and Backfill Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$530.94	$530.94	$6,371.24	8%	9%	$7,500	MII MII Assemblies	1 day/month
M22B	O&M Allowance	26.5	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$100.00	$100.00	$2,650.00	0%	0%	$2,650	A Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
												TOTAL UNIT COST:			$10,150		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-5B

Alternative 3 | **Cost Worksheet: CW3-5B**
Capital Cost Sub-Element
Cover and Access Controls O&M

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cover and access controls O&M pertaining to the cover and signage at the site. It includes costs for on-site labor, equipment, materials and allowances for maintaining the cover and signage.

Cost Analysis:
Cost for Cover and Access Controls O&M (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7A	Cover and Backfill Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$530.94	$530.94	$6,371.24	8%	9%	$7,500	MII MII Assemblies	1 days/month
M22B	O&M Allowance	53	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$100.00	$100.00	$5,300.00	0%	0%	$5,300	A Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
												TOTAL UNIT COST:			$12,800		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-6

Alternative 3 **Cost Worksheet: CW3-6**
Capital Cost Sub-Element
Temporary Laydown Area Installation

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves temporary gravel construction at the site for the gravel laydown area during construction. It includes costs for material, labor, and equipment.

Cost Analysis:
Cost for Temporary Laydown Area Installation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Gravel Laydown Area																
A18A	Gravel Placement - Clean Area	1,111	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$359.11	8%	9%	$423	MII MII Assemblies	
M43B	Gravel, Delivered	230	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$20.99	$0.00	$20.99	$4,827.70	8%	9%	$5,683	V Vendor Quote	
												TOTAL UNIT COST:			$6,106		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3-7

Alternative 3 **Cost Worksheet: CW3-7**
Capital Cost Sub-Element
Site Clearing and Grubbing

COST WORKSHEET

Site: North Ridge Estates **Prepared By:** AS **Date:** 3/16/2010
Location: Klamath County, Oregon
Phase: Final Feasibility Study **Checked By:** GH **Date:** 3/24/2010
Base Year: 2010

Work Statement:
This sub-element involves site clearing and grubbing for 50% of the contaminated area. It includes costs for labor, equipment and materials. All the cleared and grubbed material will be chipped in-place.

Cost Analysis:
Cost for Site Clearing and Grubbing (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A32A	Clearing and Grubbing	7	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$9,136.35	$9,136.35	$63,954.44	8%	9%	$75,287	MII MII Assemblies	
												TOTAL UNIT COST:			$75,287		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-8

Alternative 3 **Cost Worksheet:** **CW3-8**
Capital Cost Sub-Element
Construction of Soil Cover

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the construction of an in-place cap using soil cover materials. It includes cost for labor, equipment and material (soil from near offsite and distant offsite borrow areas, and organic material).

Cost Analysis:
Cost for Construction of Soil Cover (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Subsoil Placement Over Contaminated Materials																
A12C	Subsoil Spreading/Grading	144,952	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12.42	$12.42	$1,800,738.70	8%	9%	$2,119,830	MII MII Assemblies	
A21A	Clean Fill Compaction - Large Open Area	130,457	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$23,717.05	8%	9%	$27,920	MII MII Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	14,495	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.24	$2.24	$32,501.14	8%	9%	$38,260	MII MII Assemblies	Assume 10% of total fill
M39A	Marker Layer for Cover or Backfill Demarcation	2,268,800	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.08	$0.00	$0.08	$181,504.00	8%	9%	$213,667	V Vendor Quote	Marker layer assumed to be orange construction fencing.
	Topsoil Placement for Cover																
A13B	Top Soil Spreading/Grading	48,318	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.68	$2.68	$129,323.13	8%	9%	$152,239	MII MII Assemblies	
A21A	Clean Fill Compaction - Large Open Area	43,486	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$7,905.79	8%	9%	$9,307	MII MII Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	4,832	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.24	$2.24	$10,833.86	8%	9%	$12,754	MII MII Assemblies	Assume 10% of total fill
	Clean Fill/Soil from Near Offsite Borrow Source																
A10A	Excavation - Borrow Source	84,030	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$179,076.33	8%	9%	$210,809	MII MII Assemblies	
A14A	Material Loading - Clean Fill	96,635	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$31,232.43	8%	9%	$36,767	MII MII Assemblies	
A23B	Hauling - Near Offsite Borrow Source	96,635	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.12	$2.12	$204,962.84	8%	9%	$241,282	MII MII Assemblies	
	Clean Fill/Soil from Distant Offsite Borrow Source																
A10A	Excavation - Borrow Source	84,030	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$179,076.33	8%	9%	$210,809	MII MII Assemblies	
A14A	Material Loading - Clean Fill	96,635	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$31,232.43	8%	9%	$36,767	MII MII Assemblies	
A23A	Hauling - Distant Offsite Borrow Source	96,635	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.82	$2.82	$272,307.77	8%	9%	$320,561	MII MII Assemblies	
M49	Assumed Royalty Allowance for Soil	96,635	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.00	$3.00	$289,905.00	0%	0%	$289,905	A Allowance	
	Organic Material for Topsoil Amendment																
A39B	Organic Delivery	1,400	TN	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.65	$8.65	$12,103.84	8%	9%	$14,249	MII MII Assemblies	
A40A	Organic Amendment and Processing	53	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,082.08	$1,082.08	$57,350.44	8%	9%	$67,513	MII MII Assemblies	
M25	Organic Material	1,400	TN	1.00	$0.00	$0.00	$0.00	$0.00	$25.25	$0.00	$25.25	$35,350.00	8%	9%	$41,614	V Vendor Quote	
												TOTAL UNIT COST:			$4,044,253		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-9

Alternative 3 | **Cost Worksheet: CW3-9**

Capital Cost Sub-Element

Revegetation of Soil Cover

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the revegetation of soil covers with hydroseeding. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Revegetation of Soil Cover (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Hydroseeding/Revegetation																
A30A	Hydro-Seeding Crew	53	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$113.57	$113.57	$6,019.45	8%	9%	$7,086	MII MII Assemblies	
M16	Seed Mix	5,300	LB	1.00	$0.00	$0.00	$0.00	$0.00	$2.02	$0.00	$2.02	$10,706.00	8%	9%	$12,603	V Vendor Quote	
M18A	Fertilizer (N2)	3,500	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.30	$0.00	$0.30	$1,050.00	8%	9%	$1,236	V Vendor Quote	
M18B	Fertilizer (P2O5)	5,800	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.23	$0.00	$0.23	$1,334.00	8%	9%	$1,570	V Vendor Quote	
M20	Hydomulching	159,000	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.27	$0.27	$0.54	$85,860.00	8%	9%	$101,074	P Previous Work	
												TOTAL UNIT COST:			$123,569		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-10

Alternative 3 **Cost Worksheet: CW3-10**
Capital Cost Sub-Element
Mobilization/Demobilization

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves mobilization and demobilization of all the required equipment to and from the site respectively.

Cost Analysis:
Cost for Mobilization/Demobilization (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A37A	Mobilization and Demobilization - Heavy Equipment	8	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,384.82	$2,384.82	$19,078.58	8%	9%	$22,459	MII MII Assemblies	
A37B	Mobilization and Demobilization - Medium-Sized Equipment	6	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$974.68	$974.68	$5,848.08	8%	9%	$6,884	MII MII Assemblies	
A37C	Mobilization and Demobilization - Small Equipment	5	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$605.12	$605.12	$3,025.61	8%	9%	$3,562	MII MII Assemblies	
A37D	Mobilization and Demobilization - Self-Propelled Equipment	8	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,469.12	$2,469.12	$19,752.93	8%	9%	$23,253	MII MII Assemblies	
												TOTAL UNIT COST:			$56,158		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-11

Alternative 3 **Cost Worksheet: CW3-11**
Capital Cost Sub-Element
Surveying for Construction Control

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves cost for site surveying before and after the remedial alternative is implemented.

Cost Analysis:
Cost for Surveying for Construction Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A38B	Site Survey - Contaminated Area	7	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,002.24	$1,002.24	$7,015.70	8%	9%	$8,259	MII MII Assemblies	Assume 4 acres/day
A38A	Site Survey - Clean Area	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$464.52	$464.52	$2,322.60	8%	9%	$2,734	MII MII Assemblies	Assume 6 acres/day
M12A	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
												TOTAL UNIT COST:			$15,993		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-12

Alternative 3 — **Cost Worksheet: CW3-12**
Capital Cost Sub-Element
Equipment Decontamination

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves decontamination of equipment used onsite.

Cost Analysis:
Cost for Equipment Decontamination (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Equipment Decon/Washing																
A3A	Equipment Decon/Washing	258	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$168.44	$168.44	$43,456.93	8%	9%	$51,157	MII MII Assemblies	Assume 10 months
M46	Poly Tank, 5,300 Gal	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$2,250.24	$0.00	$2,250.24	$2,250.24	8%	9%	$2,649	V Vendor Quote	
												TOTAL UNIT COST:			$53,806		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-13

Alternative 3 **Cost Worksheet: CW3-13**

Capital Cost Sub-Element

Site Maintenance and Control During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves site maintenance during construction. The annual costs for site maintenance during construction include labor, material, and equipment.

Cost Analysis:
Cost for Site Maintenance and Control During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Dust Control																
A1A	Dust Control/Washing	258	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$564.97	$564.97	$145,763.24	8%	9%	$171,592	MII MII Assemblies	
	Equipment Fueling																
A2A	Equipment Fueling	258	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$68.46	$68.46	$17,662.11	8%	9%	$20,792	MII MII Assemblies	
	Construction Safety and Traffic Control																
A33A	Barricade and Traffic Control Setup	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$987.96	$987.96	$1,975.92	8%	9%	$2,326	MII MII Assemblies	
M36	3" x 1,000' Yellow Caution Tape	10	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.61	$0.00	$10.61	$106.10	8%	9%	$125	V Vendor Quote	
M37	3" x 1,000' Red Danger Asbestos Haz Tape	10	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.61	$0.00	$10.61	$106.10	8%	9%	$125	V Vendor Quote	
M38	Reflecting Barricade with Light	15	EA	1.00	$0.00	$0.00	$0.00	$0.00	$72.55	$0.00	$72.55	$1,088.25	8%	9%	$1,281	V Vendor Quote	
M39	Orange Safety Fence with Posts	20	CLF	1.00	$0.00	$0.00	$0.00	$0.00	$53.52	$0.00	$53.52	$1,070.40	8%	9%	$1,260	V Vendor Quote	
												TOTAL UNIT COST:			$197,501		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-14

Alternative 3 **Cost Worksheet: CW3-14**
Capital Cost Sub-Element
Temporary Site Facilitites During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves rental cost for onsite office trailer, storage box, portable toilets, and utilities.

Cost Analysis:
Cost for Temporary Site Facilitites During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Site Trailer/Office																
M58	Site Office Trailer Installation - One Time Cost	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,060.40	$2,060.40	$2,060.40	8%	9%	$2,426	V Vendor Quote	
M59	Trailer Rental and Storage Box	10	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$80.80	$80.80	$808.00	8%	9%	$951	V Vendor Quote	
M60	Office Furniture	10	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$207.05	$207.05	$2,070.50	8%	9%	$2,437	V Vendor Quote	
M61	Portable Toilets	10	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$368.65	$368.65	$3,686.50	8%	9%	$4,340	V Vendor Quote	
M63	General Office Supplies Allowance	10	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$750.00	$750.00	$7,500.00	0%	0%	$7,500	A Allowance	
M64	Erosion Control Measures Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30,000.00	$30,000.00	$30,000.00	0%	0%	$30,000	A Allowance	
M62	Utilities (Phone, Internet, Electricity)	10	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$156.55	$156.55	$1,565.50	8%	9%	$1,843	V Vendor Quote	
												TOTAL UNIT COST:			$49,497		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-15

Alternative 3 — **Cost Worksheet: CW3-15**
Capital Cost Sub-Element
House Demolition and Disposal

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves demolition of houses located on receiver managed parcels. It includes costs for labor, equipment, materials, hauling and disposal charges.

Cost Analysis:
Cost for House Demolition and Disposal (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L8	Field Engineer	90	HR	1.00	$22.94	$22.94	$0.00	$0.00	$0.00	$0.00	$22.94	$2,064.60	100%	9%	$4,501	SE SalaryExpert.com	
A27B	Onsite House Demolition	90	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$571.94	$571.94	$51,474.85	8%	9%	$60,596	MII MII Assemblies	5 hrs per house, 18 houses
A23D	Hauling - Debris Offsite	90	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$388.95	$388.95	$35,005.59	8%	9%	$41,209	MII MII Assemblies	Includes 5 trucks
S2B	Disposal Facility Charges	18	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13,433.00	$13,433.00	$241,794.00	8%	9%	$284,640	V Vendor Quote	18 houses
												TOTAL UNIT COST:			$390,946		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-16

Alternative 3 **Cost Worksheet: CW3-16**
Capital Cost Sub-Element
Interior Cleaning of Houses

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves interior cleaning of houses (privately owned) located within the site boundary. It also includes temporary relocation cost for residents (assume two residents per house) during cleaning. Average time for interior cleaning is assumed to be 5 days (3 days for cleaning + 1 day for set-up + 1 day for restoration). It includes costs for labor, equipment, and materials.

Cost Analysis:
Cost for Interior Cleaning of Houses (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
M57A	Interior Cleaning	24	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$18,600.00	$18,600.00	$446,400.00	8%	9%	$525,502	P Previous Work	
M57B	Per Diem for Resident Temporary Relocation-Lodging	120	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$88.00	$88.00	$10,560.00	0%	0%	$10,560	GSA www.gsa.gov	Per House
M57C	M&IE	240	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$56.00	$56.00	$13,440.00	0%	0%	$13,440	GSA www.gsa.gov	Per Person
												TOTAL UNIT COST:			$549,502		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Worksheets

Alternative 4

TABLE CW4-1

Alternative 4 | **Cost Worksheet: CW4-1**

Capital Cost Sub-Element

Institutional Controls

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves implementation of institutional control for the site. The following cost includes hours for and document legal procedures to establish and cost for document submission and recording. The cost also includes site survey to establish parcel/site boundaries.

Cost Analysis:
Cost for Institutional Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Institutional Controls for Private Ownership Parcels (27)																
L6	Environmental Lawyer	648	HR	1.00	$71.06	$71.06	$0.00	$0.00	$0.00	$0.00	$71.06	$46,046.88	100%	9%	$100,382	SE SalaryExpert.com	24 hrs per parcel
L15	Paralegal	864	HR	1.00	$37.29	$37.29	$0.00	$0.00	$0.00	$0.00	$37.29	$32,218.56	100%	9%	$70,236	SE SalaryExpert.com	32 hrs per parcel
L3	Clerks, Typist, Bookkeeper & Receptionist	270	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$5,143.50	100%	9%	$11,213	SE SalaryExpert.com	10 hrs per parcel
M11A	Document Submission and Recording Allowance	27	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$135,000.00	0%	0%	$135,000	A Allowance	
	Institutional Controls for Receivership Parcels (29)																
L6	Environmental Lawyer	464	HR	1.00	$71.06	$71.06	$0.00	$0.00	$0.00	$0.00	$71.06	$32,971.84	100%	9%	$71,879	SE SalaryExpert.com	16 hrs per parcel
L15	Paralegal	696	HR	1.00	$37.29	$37.29	$0.00	$0.00	$0.00	$0.00	$37.29	$25,953.84	100%	9%	$56,579	SE SalaryExpert.com	24 hrs per parcel
L3	Clerks, Typist, Bookkeeper & Receptionist	290	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$5,524.50	100%	9%	$12,043	SE SalaryExpert.com	10 hrs per parcel
M11A	Document Submission and Recording Allowance	29	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$145,000.00	0%	0%	$145,000	A Allowance	
A38A	Site Survey - Clean Area	10	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$464.52	$464.52	$4,645.19	8%	9%	$5,468	MII MII Assemblies	needed
M12	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$15,000.00	$15,000.00	$15,000.00	0%	0%	$15,000	A Allowance	
												TOTAL UNIT COST:			$622,800		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW4-2

Alternative 4 **Cost Worksheet: CW4-2**
Capital Cost Sub-Element
Access Controls

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cost associated with access controls on the site. Access controls include installation of sign posts along the perimeter of the disturbed area, the onsite repositories, and signage along steam pipe on the east side of Old Fort Road.

Cost Analysis:
Cost for Access Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A31C	Signage Installation - Clean Area	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,585.31	$1,585.31	$1,585.31	8%	9%	$1,866	MII MII Assemblies	
M4A	T-Post, 7' High Steel Post	25	EA	1.00	$0.00	$0.00	$0.00	$0.00	$5.86	$0.00	$5.86	$146.50	8%	9%	$172	V Vendor Quote	
M9	Signs	25	EA	1.00	$0.00	$0.00	$0.00	$0.00	$99.09	$0.00	$99.09	$2,477.25	8%	9%	$2,916	V Vendor Quote	Assume every 300 FT
												TOTAL UNIT COST:			$4,954		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-3A

Alternative 4 **Cost Worksheet: CW4-3A**
Capital Cost Sub-Element
5-Year Site Reviews

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the 5-year site visits and 5-year site review report. The following cost includes labor, material and shipping costs for site visits and 5-year site review reports.

Cost Analysis:
Cost for 5-Year Site Review (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	1 hour per parcel per site visit, 45 parcels
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
L13	Project Manager	40	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$1,861.20	100%	9%	$4,057	SE SalaryExpert.com	Hours for 5-year review report
L5	Environmental Engineer	80	HR	1.00	$31.39	$31.39	$0.00	$0.00	$0.00	$0.00	$31.39	$2,511.20	100%	9%	$5,474	SE SalaryExpert.com	Hours for 5-year review report
L7	Environmental Scientist	120	HR	1.00	$27.87	$27.87	$0.00	$0.00	$0.00	$0.00	$27.87	$3,344.40	100%	9%	$7,291	SE SalaryExpert.com	Hours for 5-year review report
L14	Quality Control Engineer	16	HR	1.00	$46.04	$46.04	$0.00	$0.00	$0.00	$0.00	$46.04	$736.64	100%	9%	$1,606	SE SalaryExpert.com	Hours for 5-year review report
L1	CAD Drafter	40	HR	1.00	$25.70	$25.70	$0.00	$0.00	$0.00	$0.00	$25.70	$1,028.00	100%	9%	$2,241	SE SalaryExpert.com	Hours for 5-year review report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$762.00	100%	9%	$1,661	SE SalaryExpert.com	Hours for 5-year review report
M10A	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$29,042		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW4-3B

Alternative 4 **Cost Worksheet: CW4-3B**
Capital Cost Sub-Element
Non-Intrusive Visual Inspection

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves non-intrusive visual inspections (i.e. surface inspections) performed in support of 5-year site reviews would be made on all parcels within the site boundary regardless of ownership. The following includes the labor, material and equipment cost for inspection.

Cost Analysis:
Cost for Non-Intrusive Visual Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
												TOTAL UNIT COST:			$5,212		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-4A

Alternative 4 **Cost Worksheet: CW4-4A**
Capital Cost Sub-Element
Cover and Access Controls O&M During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cover and access controls O&M pertaining to the covered/backfilled areas during construction. It includes costs for on-site labor, equipment, materials and allowances for maintaining the cover and signage.

Cost Analysis:
Cost for Cover and Access Controls O&M During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7A	Cover and Backfill Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$530.94	$530.94	$6,371.24	8%	9%	$7,500	MII MII Assemblies	1 day/month
M22B	O&M Allowance	41.9	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$100.00	$100.00	$4,190.48	0%	0%	$4,190	A Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
												TOTAL UNIT COST:			$11,690		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-4B

Alternative 4 | **Cost Worksheet: CW4-4B**
Capital Cost Sub-Element
Cover and Access Controls O&M

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cover and access controls O&M pertaining to the cover and signage at the site. It includes costs for on-site labor, equipment, materials and allowances for maintaining the cover and signage.

Cost Analysis:
Cost for Cover and Access Controls O&M (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7A	Cover and Backfill Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$530.94	$530.94	$6,371.24	8%	9%	$7,500	MII MII Assemblies	
M22B	O&M Allowance	88	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$100.00	$100.00	$8,800.00	0%	0%	$8,800	A Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
												TOTAL UNIT COST:			$16,300		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-4C

Alternative 4 **Cost Worksheet: CW4-4C**
Capital Cost Sub-Element
Cover and Backfill Inspection

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves monitoring protocol for covered portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers and backfill. The following includes the labor, material and equipment costs for inspection.

Cost Analysis:
Cost for Cover and Backfill Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
												TOTAL UNIT COST:			$5,212		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-5

Alternative 4 **Cost Worksheet:** **CW4-5**
Capital Cost Sub-Element
Temporary Laydown Area Installation

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves temporary gravel construction at the site for the gravel laydown area. It includes costs for material, labor, and equipment.

Cost Analysis:
Cost for Temporary Laydown Area Installation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Gravel Laydown Area																
A18A	Gravel Placement - Clean Area	1,111	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$359.11	8%	9%	$423	MII MII Assemblies	
M43B	Gravel, Delivered	230	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$20.99	$0.00	$20.99	$4,827.70	8%	9%	$5,683	V Vendor Quote	
												TOTAL UNIT COST:			$6,106		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-6

Alternative 4 **Cost Worksheet: CW4-6**
Capital Cost Sub-Element
Site Clearing and Grubbing

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves site clearing and grubbing of the contaminated area. It includes costs for labor, equipment and materials. All the cleared and grubbed material will be chipped in-place.

Cost Analysis:
Cost for Site Clearing and Grubbing (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A32A	Clearing and Grubbing	14	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$9,136.35	$9,136.35	$127,908.88	8%	9%	$150,574	MII MII Assemblies	
												TOTAL UNIT COST:			$150,574		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-7

Alternative 4 **Cost Worksheet: CW4-7**
Capital Cost Sub-Element
Construction of Soil Cover

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the construction of an in-place cap using soil cover. It includes cost for labor, equipment and material (soil from near offsite and distant offsite borrow areas, and organic material).

Cost Analysis:
Cost for Construction of Soil Cover (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Subsoil Placement Over Contaminated Materials																
A12C	Subsoil Spreading/Grading	238,745	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12.42	$12.42	$2,965,929.14	8%	9%	$3,491,492	MII MII Assemblies	
A21A	Clean Fill Compaction - Large Open Area	214,871	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$39,063.46	8%	9%	$45,986	MII MII Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	23,875	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.24	$2.24	$53,531.40	8%	9%	$63,017	MII MII Assemblies	Assume 10% of total fill
M39A	Marker Layer for Cover or Backfill Demarcation	3,799,400	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.08	$0.00	$0.08	$303,952.00	8%	9%	$357,812	V Vendor Quote	Assume 10% of total fill
	Topsoil Placement for Cover																
A13B	Top Soil Spreading/Grading	80,914	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.68	$2.68	$216,566.32	8%	9%	$254,942	MII MII Assemblies	
A21A	Clean Fill Compaction - Large Open Area	72,823	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$13,239.15	8%	9%	$15,585	MII MII Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	8,091	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.24	$2.24	$18,142.54	8%	9%	$21,357	MII MII Assemblies	Assume 10% of total fill
	Clean Fill/Soil from Near Offsite Borrow Source																
A10A	Excavation - Borrow Source	138,982	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$296,184.54	8%	9%	$348,668	MII MII Assemblies	
A14A	Material Loading - Clean Fill	159,829	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$51,656.73	8%	9%	$60,810	MII MII Assemblies	
A23B	Hauling - Near Offsite Borrow Source	159,829	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.12	$2.12	$338,997.31	8%	9%	$399,068	MII MII Assemblies	
	Clean Fill/Soil from Distant Offsite Borrow Source																
A10A	Excavation - Borrow Source	138,982	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$296,184.54	8%	9%	$348,668	MII MII Assemblies	
A14A	Material Loading - Clean Fill	159,829	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$51,656.73	8%	9%	$60,810	MII MII Assemblies	
A23A	Hauling - Distant Offsite Borrow Source	159,829	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.82	$2.82	$450,382.14	8%	9%	$530,190	MII MII Assemblies	
M49	Assumed Royalty Allowance for Soil	159,829	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.00	$3.00	$479,487.00	0%	0%	$479,487	A Allowance	
	Organic Material for Topsoil Amendment																
A39B	Organic Delivery	2,200	TN	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.65	$8.65	$19,020.32	8%	9%	$22,391	MII MII Assemblies	
A40A	Organic Amendment and Processing	88	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,082.08	$1,082.08	$95,223.37	8%	9%	$112,097	MII MII Assemblies	
M25	Organic Material	2,200	TN	1.00	$0.00	$0.00	$0.00	$0.00	$25.25	$0.00	$25.25	$55,550.00	8%	9%	$65,393	V Vendor Quote	
												TOTAL UNIT COST:			$6,677,773		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-8

Alternative 4 | **Cost Worksheet: CW4-8**
Capital Cost Sub-Element
Revegetation of Soil Cover

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the revegetation of the soil cover with hydroseeding. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Revegetation of Soil Cover (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Hydroseeding/Revegetation																
A30A	Hydro-Seeding Crew	88	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$113.57	$113.57	$9,994.56	8%	9%	$11,766	MII MII Assemblies	
M16	Seed Mix	8,800	LB	1.00	$0.00	$0.00	$0.00	$0.00	$2.02	$0.00	$2.02	$17,776.00	8%	9%	$20,926	V Vendor Quote	
M18A	Fertilizer (N2)	5,800	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.30	$0.00	$0.30	$1,740.00	8%	9%	$2,048	V Vendor Quote	
M18B	Fertilizer (P2O5)	9,600	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.23	$0.00	$0.23	$2,208.00	8%	9%	$2,599	V Vendor Quote	
M20	Hydomulching	264,000	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.27	$0.27	$0.54	$142,560.00	8%	9%	$167,822	P Previous Work	
												TOTAL UNIT COST:			$205,161		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-9

Alternative 4 **Cost Worksheet:** **CW4-9**
Capital Cost Sub-Element
Mobilization/Demobilization

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves mobilization and demobilization of all the required equipment to and from the site respectively.

Cost Analysis:
Cost for Mobilization/Demobilization (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A37A	Mobilization and Demobilization - Heavy Equipment	8	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,384.82	$2,384.82	$19,078.58	8%	9%	$22,459	MII MII Assemblies	
A37B	Mobilization and Demobilization - Medium-Sized Equipment	6	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$974.68	$974.68	$5,848.08	8%	9%	$6,884	MII MII Assemblies	
A37C	Mobilization and Demobilization - Small Equipment	5	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$605.12	$605.12	$3,025.61	8%	9%	$3,562	MII MII Assemblies	
A37D	Mobilization and Demobilization - Self-Propelled Equipment	8	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,469.12	$2,469.12	$19,752.93	8%	9%	$23,253	MII MII Assemblies	
												TOTAL UNIT COST:			$56,158		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-10

Alternative 4 **Cost Worksheet: CW4-10**
Capital Cost Sub-Element
Surveying for Construction Control

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves cost for site surveying before and after the remedial alternative is implemented.

Cost Analysis:
Cost for Surveying for Construction Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A38B	Site Survey - Contaminated Area	11	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,002.24	$1,002.24	$11,024.68	8%	9%	$12,978	MII MII Assemblies	Assume 4 acres/day
A38A	Site Survey - Clean Area	8	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$464.52	$464.52	$3,716.15	8%	9%	$4,375	MII MII Assemblies	Assume 6 acres/day
M12A	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
												TOTAL UNIT COST:			$22,353		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-11

Alternative 4 **Cost Worksheet: CW4-11**
Capital Cost Sub-Element
Equipment Decontamination

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves decontamination of equipment used onsite.

Cost Analysis:
Cost for Equipment Decontamination (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Equipment Decon/Washing																
A3A	Equipment Decon/Washing	427	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$168.44	$168.44	$71,922.90	8%	9%	$84,668	MII MII Assemblies	Assume 8 months/yr, 2 yrs
M46	Poly Tank, 5,300 Gal	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$2,250.24	$0.00	$2,250.24	$2,250.24	8%	9%	$2,649	V Vendor Quote	
												TOTAL UNIT COST:			$87,317		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-12

Alternative 4 **Cost Worksheet: CW4-12**
Capital Cost Sub-Element
Site Maintenance and Control During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves site maintenance during construction. The annual costs for site maintenance during construction include labor, material, and equipment.

Cost Analysis:
Cost for Site Maintenance and Control During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Dust Control																
A1A	Dust Control/Washing	427	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$564.97	$564.97	$241,243.81	8%	9%	$283,992	MII MII Assemblies	
	Equipment Fueling																
A2A	Equipment Fueling	427	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$68.46	$68.46	$29,231.48	8%	9%	$34,411	MII MII Assemblies	
	Construction Safety and Traffic Control																
A33A	Barricade and Traffic Control Setup	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$987.96	$987.96	$1,975.92	8%	9%	$2,326	MII MII Assemblies	
M36	3" x 1,000' Yellow Caution Tape	10	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.61	$0.00	$10.61	$106.10	8%	9%	$125	V Vendor Quote	
M37	3" x 1,000' Red Danger Asbestos Haz Tape	10	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.61	$0.00	$10.61	$106.10	8%	9%	$125	V Vendor Quote	
M38	Reflecting Barricade with Light	15	EA	1.00	$0.00	$0.00	$0.00	$0.00	$72.55	$0.00	$72.55	$1,088.25	8%	9%	$1,281	V Vendor Quote	
M39	Orange Safety Fence with Posts	20	CLF	1.00	$0.00	$0.00	$0.00	$0.00	$53.52	$0.00	$53.52	$1,070.40	8%	9%	$1,260	V Vendor Quote	
												TOTAL UNIT COST:			$323,520		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
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Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-13

Alternative 4 | **Cost Worksheet:** **CW4-13**

Capital Cost Sub-Element

Temporary Site Facilitites During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves rental cost for onsite office trailer, storage box, portable toilets, and utilities.

Cost Analysis:
Cost for Temporary Site Facilitites During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Site Trailer/Office																
M58	Site Office Trailer Installation - One Time Cost	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,060.40	$2,060.40	$2,060.40	8%	9%	$2,426	V Vendor Quote	
M59	Trailer Rental and Storage Box	16.5	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$80.80	$80.80	$1,333.20	8%	9%	$1,569	V Vendor Quote	
M60	Office Furniture	16.5	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$207.05	$207.05	$3,416.33	8%	9%	$4,022	V Vendor Quote	
M61	Portable Toilets	16.5	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$368.65	$368.65	$6,082.73	8%	9%	$7,161	V Vendor Quote	
M63	General Office Supplies Allowance	16.5	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$750.00	$750.00	$12,375.00	0%	0%	$12,375	A Allowance	
M64	Erosion Control Measures Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30,000.00	$30,000.00	$30,000.00	0%	0%	$30,000	A Allowance	
M62	Utilities (Phone, Internet, Electricity)	16.5	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$156.55	$156.55	$2,583.08	8%	9%	$3,041	V Vendor Quote	
												TOTAL UNIT COST:			$60,594		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-14

Alternative 4 **Cost Worksheet: CW4-14**
Capital Cost Sub-Element
Community Awareness Activities

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves setting up a community meeting to inform the local community about the status of site. The following includes the labor, material and other cost required for setting up the community awareness meeting which includes costs for renting a meeting hall, court reporter, and publishing and sending notices or informational flyers.

Cost Analysis:
Cost for Community Awareness Activities (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L12	General Superintendent (P.M.)	16	HR	1.00	$52.74	$52.74	$0.00	$0.00	$0.00	$0.00	$52.74	$843.84	100%	9%	$1,840	SE SalaryExpert.com	
L13	Project Manager	16	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$744.48	100%	9%	$1,623	SE SalaryExpert.com	
M56	Per Diem for 2 People	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$576.00	0%	0%	$576	GSA www.gsa.gov	
M65	Community Awareness Activities Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,000.00	$2,000.00	$2,000.00	0%	0%	$2,000	A Allowance	1 event per 5-yr review.
												TOTAL UNIT COST:			$6,039		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist: FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE. MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-15A

Alternative 4 | **Cost Worksheet: CW4-15A**

Capital Cost Sub-Element

Borrow Source Testing

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:

This sub-element involves determining whether asbestos fibers are present in proposed borrow source. Samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Visual inspection and ABS activities would be conducted to determine asbestos contamination. The ABS samples would be analyzed by TEM Method. Non-asbestos contamination would include organic/inorganic analysis for VOCs, SVOCs, PCBs, TPH, herbicides, pesticides, and target analyte list metals. The following includes the labor, material and equipment cost, and shipping cost required for the borrow material sampling.

Cost Analysis:

Cost for Borrow Material Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	10	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$7,876.28	8%	9%	$9,272	MII MII Assemblies	
M51	ABS, Sample and Analysis	32	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$891.00	$891.00	$28,512.00	8%	9%	$33,564	P Previous Work	
M52	Equipment/ABS Area/ABS Event	32	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.50	$148.50	$4,752.00	8%	9%	$5,594	P Previous Work	
M66A	Analysis - Volatile Organic Compounds	32	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$105.78	$105.78	$3,384.96	8%	9%	$3,985	V Vendor Quote	
M66B	Analysis - Semivolatile Organic Compounds	32	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$215.47	$215.47	$6,895.04	8%	9%	$8,117	V Vendor Quote	
M66C	Analysis - Pesticides	32	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$152.79	$152.79	$4,889.28	8%	9%	$5,756	V Vendor Quote	
M66D	Analysis - Herbicides	32	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$132.64	$132.64	$4,244.48	8%	9%	$4,997	V Vendor Quote	
M66E	Analysis - TAL Metals	32	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$129.28	$129.28	$4,136.96	8%	9%	$4,870	V Vendor Quote	
M66F	Analysis - PCBs	32	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$133.20	$133.20	$4,262.40	8%	9%	$5,018	V Vendor Quote	
M66G	Analysis - TPH	32	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$88.43	$88.43	$2,829.76	8%	9%	$3,331	V Vendor Quote	
M54A	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
M53B	Sampling/Other Supplies	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	8%	9%	$1,766	P Previous Work	
												TOTAL UNIT COST:			$89,270		

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000

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Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote

For citation references, the following sources apply:

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Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE. MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

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MATL	Material	CLF	100 Linear Foot
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ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-15B

Alternative 4 | **Cost Worksheet: CW4-15B**

Capital Cost Sub-Element

Ambient Air Sampling (1 Year)

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:

This sub-element involves ambient air sampling and analysis from various locations of the site to assess whether there are current exposure risks from asbestos fibers and non-asbestos COPCs in ambient air. Five locations (TBD) would be selected for sampling and samples would be analyzed for asbestos by TEM Method. The following includes the labor, material and equipment cost, and shipping cost.

Cost Analysis:

Cost for Ambient Air Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$9,451.54	8%	9%	$11,126	MII MII Assemblies	1 yr, 12 months, 1 sample/month
M56	Per Diem for 2 People	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$3,456.00	0%	0%	$3,456	GSA www.gsa.gov	
M51A	Ambient Air Sample Analysis	60	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$396.00	$396.00	$23,760.00	8%	9%	$27,970	P Previous Work	1 sample/station/month, 5 stations, 12 months
M52A	Sampling Setup (Equipment and Utility)	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,200.00	$4,200.00	$4,200.00	8%	9%	$4,944	P Previous Work	Includes sampling equipments and electrical hook-up
M52B	Equipment/Ambient Air Sampling Event	60	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$150.00	$150.00	$9,000.00	8%	9%	$10,595	P Previous Work	1 sample/station/month, 5 stations, 12 months
M53C	Sampling/Other Supplies/Ambient Air Sampling Event	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	8%	9%	$1,766	P Previous Work	
M54A	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
												TOTAL UNIT COST:			$62,857		

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote

For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-15C

Alternative 4 **Cost Worksheet: CW4-15C**
Capital Cost Sub-Element
Inspection of Areas without Identified Contamination

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves monitoring for areas of the site with no historical or current contamination and would be performed some time during construction. The monitoring would be performed using a tiered approach with intrusive visual inspection (hand dug test pits), followed by ABS to provide a point-in-time determination whether these areas were adversely impacted by contamination. A total of ten locations would be tested.

Cost Analysis:
Cost for Intrusive Visual Inspection and ABS (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
A5A	Sampling - 3 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,179.92	$1,179.92	$5,899.61	8%	9%	$6,945	MII MII Assemblies	
M55	Per Diem for 3 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$432.00	$432.00	$2,160.00	0%	0%	$2,160	GSA www.gsa.gov	
M51	ABS, Sample and Analysis	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$891.00	$891.00	$8,910.00	8%	9%	$10,489	P Previous Work	
M52	Equipment/ABS Area/ABS Event	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.50	$148.50	$1,485.00	8%	9%	$1,748	P Previous Work	
M53A	Sampling and Other Supplies/ABS Area/ABS Event	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$250.00	$250.00	$2,500.00	8%	9%	$2,943	P Previous Work	
M54B	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$30,997		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Cost Worksheets
Alternative 5a

TABLE CW5a-1

Alternative 5a **Cost Worksheet: CW5a-1**
Capital Cost Sub-Element
Institutional Controls

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves implementation of institutional controls for the site. The following cost includes hours for and document legal procedures to establish and cost for document submission and recording. The cost also includes site survey to establish parcel/site boundaries.

Cost Analysis:
Cost for Institutional Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Institutional Controls for Private Ownership Parcels (27)																
L6	Environmental Lawyer	648	HR	1.00	$71.06	$71.06	$0.00	$0.00	$0.00	$0.00	$71.06	$46,046.88	100%	9%	$100,382	SE SalaryExpert.com	24 hrs per parcel
L15	Paralegal	864	HR	1.00	$37.29	$37.29	$0.00	$0.00	$0.00	$0.00	$37.29	$32,218.56	100%	9%	$70,236	SE SalaryExpert.com	32 hrs per parcel
L3	Clerks, Typist, Bookkeeper & Receptionist	270	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$5,143.50	100%	9%	$11,213	SE SalaryExpert.com	10 hrs per parcel
M11A	Document Submission and Recording Allowance	27	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$135,000.00	0%	0%	$135,000	A Allowance	
	Institutional Controls for Receivership Parcels (29)																
L6	Environmental Lawyer	464	HR	1.00	$71.06	$71.06	$0.00	$0.00	$0.00	$0.00	$71.06	$32,971.84	100%	9%	$71,879	SE SalaryExpert.com	16 hrs per parcel
L15	Paralegal	696	HR	1.00	$37.29	$37.29	$0.00	$0.00	$0.00	$0.00	$37.29	$25,953.84	100%	9%	$56,579	SE SalaryExpert.com	24 hrs per parcel
L3	Clerks, Typist, Bookkeeper & Receptionist	290	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$5,524.50	100%	9%	$12,043	SE SalaryExpert.com	10 hrs per parcel
M11A	Document Submission and Recording Allowance	29	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$145,000.00	0%	0%	$145,000	A Allowance	
A38A	Site Survey - Clean Area	10	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$464.52	$464.52	$4,645.19	8%	9%	$5,468	MII MII Assemblies	needed
M12	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$15,000.00	$15,000.00	$15,000.00	0%	0%	$15,000	A Allowance	
												TOTAL UNIT COST:			$622,800		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-2

Alternative 5a **Cost Worksheet:** **CW5a-2**
Capital Cost Sub-Element
Access Controls

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cost associated with access controls on the site. Access controls include installation of sign posts along the perimeter of the disturbed area, the onsite repositories, and signage along steam pipe on the east side of Old Fort Road.

Cost Analysis:
Cost for Access Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A31C	Signage Installation - Clean Area	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,585.31	$1,585.31	$1,585.31	8%	9%	$1,866	MII MII Assemblies	
M4A	T-Post, 7' High Steel Post	25	EA	1.00	$0.00	$0.00	$0.00	$0.00	$5.86	$0.00	$5.86	$146.50	8%	9%	$172	V Vendor Quote	Includes wire clips
M9	Signs	25	EA	1.00	$0.00	$0.00	$0.00	$0.00	$99.09	$0.00	$99.09	$2,477.25	8%	9%	$2,916	V Vendor Quote	Assume every 300 FT
												TOTAL UNIT COST:			$4,954		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-3A

Alternative 5a **Cost Worksheet: CW5a-3A**
Capital Cost Sub-Element
5-Year Site Reviews

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the 5-year site visits and 5-year site review report. The following cost includes labor, material and shipping costs for site visits and 5-year site review reports.

Cost Analysis:
Cost for 5-Year Site Review (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6A	Site Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	1 hour per parcel per site visit, 45 parcels
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
L13	Project Manager	40	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$1,861.20	100%	9%	$4,057	SE SalaryExpert.com	Hours for 5-year review report
L5	Environmental Engineer	80	HR	1.00	$31.39	$31.39	$0.00	$0.00	$0.00	$0.00	$31.39	$2,511.20	100%	9%	$5,474	SE SalaryExpert.com	Hours for 5-year review report
L7	Environmental Scientist	120	HR	1.00	$27.87	$27.87	$0.00	$0.00	$0.00	$0.00	$27.87	$3,344.40	100%	9%	$7,291	SE SalaryExpert.com	Hours for 5-year review report
L14	Quality Control Engineer	16	HR	1.00	$46.04	$46.04	$0.00	$0.00	$0.00	$0.00	$46.04	$736.64	100%	9%	$1,606	SE SalaryExpert.com	Hours for 5-year review report
L1	CAD Drafter	40	HR	1.00	$25.70	$25.70	$0.00	$0.00	$0.00	$0.00	$25.70	$1,028.00	100%	9%	$2,241	SE SalaryExpert.com	Hours for 5-year review report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$762.00	100%	9%	$1,661	SE SalaryExpert.com	Hours for 5-year review report
M10A	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$29,042		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-3B

Alternative 5a **Cost Worksheet: CW5a-3B**
Capital Cost Sub-Element
Community Awareness Activities

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves setting up a community meeting to inform the local community about the status of site. The following includes the labor, material and other cost required for setting up the community awareness meeting which includes costs for renting a meeting hall, court reporter, and publishing and sending notices or informational flyers.

Cost Analysis:
Cost for Community Awareness Activities (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L12	General Superintendent (P.M.)	16	HR	1.00	$52.74	$52.74	$0.00	$0.00	$0.00	$0.00	$52.74	$843.84	100%	9%	$1,840	SE SalaryExpert.com	
L13	Project Manager	16	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$744.48	100%	9%	$1,623	SE SalaryExpert.com	
M56	Per Diem for 2 People	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$576.00	0%	0%	$576	GSA www.gsa.gov	
M65	Community Awareness Activities Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,000.00	$2,000.00	$2,000.00	0%	0%	$2,000	A Allowance	1 event per 5-yr review.
												TOTAL UNIT COST:			$6,039		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-3C

Alternative 5a **Cost Worksheet: CW5a-3C**
Capital Cost Sub-Element
Non-Intrusive Visual Inspection

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves non-intrusive visual inspections (i.e. surface inspections) performed in support of 5-year site reviews would be made on all parcels within the site boundary regardless of ownership. The following includes the labor, material and equipment cost for inspection.

Cost Analysis:
Cost for Visual Non-Intrusive Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
												TOTAL UNIT COST:			$5,212		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW5a-4A

Alternative 5a **Cost Worksheet: CW5a-4A**
Capital Cost Sub-Element
Borrow Source Testing

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves determining whether asbestos fibers are present in proposed borrow source. Samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Visual inspection and ABS activities would be conducted to determine asbestos contamination. The ABS samples would be analyzed by TEM Method. Non-asbestos contamination would include organic/inorganic analysis for VOCs, SVOCs, PCBs, TPH, herbicides, pesticides, and target analyte list metals. The following includes the labor, material and equipment cost, and shipping cost required for the borrow material sampling.

Cost Analysis:
Cost for Borrow Material Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$3,938.14	8%	9%	$4,636	MII MII Assemblies	
M51	ABS, Sample and Analysis	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$891.00	$891.00	$14,256.00	8%	9%	$16,782	P Previous Work	
M52	Equipment/ABS Area/ABS Event	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.50	$148.50	$2,376.00	8%	9%	$2,797	P Previous Work	
M53A	Sampling and Other Supplies/ABS Area/ABS Event	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$250.00	$250.00	$4,000.00	8%	9%	$4,709	P Previous Work	
M66A	Analysis - Volatile Organic Compounds	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$105.78	$105.78	$1,692.48	8%	9%	$1,992	V Vendor Quote	
M66B	Analysis - Semivolatile Organic Compounds	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$215.47	$215.47	$3,447.52	8%	9%	$4,058	V Vendor Quote	
M66C	Analysis - Pesticides	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$152.79	$152.79	$2,444.64	8%	9%	$2,878	V Vendor Quote	
M66D	Analysis - Herbicides	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$132.64	$132.64	$2,122.24	8%	9%	$2,498	V Vendor Quote	
M66E	Analysis - TAL Metals	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$129.28	$129.28	$2,068.48	8%	9%	$2,435	V Vendor Quote	
M66F	Analysis - PCBs	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$133.20	$133.20	$2,131.20	8%	9%	$2,509	V Vendor Quote	
M66G	Analysis - TPH	16	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$88.43	$88.43	$1,414.88	8%	9%	$1,666	V Vendor Quote	
M54A	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
M53B	Sampling/Other Supplies	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	8%	9%	$1,766	P Previous Work	
												TOTAL UNIT COST:			$51,726		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-4B

Alternative 5a **Cost Worksheet: CW5a-4B**
Capital Cost Sub-Element
Ambient Air Sampling (1 Year)

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves ambient air sampling and analysis from various locations of the site to assess whether there are current exposure risks from asbestos fibers and non-asbestos COPCs in ambient air. Five locations (TBD) would be selected for sampling and samples would be analyzed for asbestos by TEM Method. The following includes the labor, material and equipment cost, and shipping cost.

Cost Analysis:
Cost for Ambient Air Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$9,451.54	8%	9%	$11,126	MII MII Assemblies	1 yr, 12 months, 1 sample/month
M56	Per Diem for 2 People	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$3,456.00	0%	0%	$3,456	GSA www.gsa.gov	
M51A	Ambient Air Sample Analysis	60	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$396.00	$396.00	$23,760.00	8%	9%	$27,970	P Previous Work	1 sample/station/month, 5 stations, 12 months
M52A	Sampling Setup (Equipment and Utility)	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,200.00	$4,200.00	$4,200.00	8%	9%	$4,944	P Previous Work	Includes sampling equipments and electrical hook-up
M52B	Equipment/Ambient Air Sampling Event	60	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$150.00	$150.00	$9,000.00	8%	9%	$10,595	P Previous Work	1 sample/station/month, 5 stations, 12 months
M53C	Sampling/Other Supplies/Ambient Air Sampling Event	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	8%	9%	$1,766	P Previous Work	
M54A	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
												TOTAL UNIT COST:			$62,857		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

FACTOR:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-4C

Alternative 5a **Cost Worksheet: CW5a-4C**
Capital Cost Sub-Element
Inspection of Areas without Identified Contamination

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves monitoring for areas of the site with no historical or current contamination and would be performed some time during construction. The monitoring would be performed using a tiered approach with intrusive visual inspection (hand dug test pits), followed by ABS to provide a point-in-time determination whether these areas were adversely impacted by contamination. A total of ten locations would be tested.

Cost Analysis:
Cost for Intrusive Visual Inspection and ABS (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
A5A	Sampling - 3 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,179.92	$1,179.92	$5,899.61	8%	9%	$6,945	MII MII Assemblies	
M55	Per Diem for 3 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$432.00	$432.00	$2,160.00	0%	0%	$2,160	GSA www.gsa.gov	
M51	ABS, Sample and Analysis	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$891.00	$891.00	$8,910.00	8%	9%	$10,489	P Previous Work	
M52	Equipment/ABS Area/ABS Event	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.50	$148.50	$1,485.00	8%	9%	$1,748	P Previous Work	
M53A	Sampling and Other Supplies/ABS Area/ABS Event	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$250.00	$250.00	$2,500.00	8%	9%	$2,943	P Previous Work	
M54B	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$30,997		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-4D

Alternative 5a | **Cost Worksheet: CW5a-4D**
Capital Cost Sub-Element
Excavation Confirmatory Sampling

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:

This sub-element involves intrusive visual inspections (i.e. subsurface inspections within excavations) coupled with ABS analysis would be conducted adjacent to the removal areas after initial surface excavation is completed to confirm that contaminated surface materials would be excavated horizontally to the extent they can be detected. The most conservative ABS scenario (e.g. raking) would be conducted for areas no greater than 40,000 square feet and would be analyzed by TEM Method. Arsenic sampling at the power plant area would be conducted at a frequency of one sample per 2,500 square feet along the bottom and side-walls of the excavation area. The following includes the labor, material and equipment cost, and shipping cost required for the soil sampling.

Cost Analysis:

Cost for Confirmatory Soil Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	45	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$28,840.75	8%	9%	$33,951	MII MII Assemblies	
M56	Per Diem for 2 People	45	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$12,960.00	0%	0%	$12,960	GSA www.gsa.gov	
A4A	Sampling - 2 Person Crew	45	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$35,443.27	8%	9%	$41,724	MII MII Assemblies	
M56	Per Diem for 2 People	45	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$12,960.00	0%	0%	$12,960	GSA www.gsa.gov	
M51	ABS, Sample and Analysis	87	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$891.00	$891.00	$77,517.00	8%	9%	$91,253	P Previous Work	
M52	Equipment/ABS Area/ABS Event	87	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.50	$148.50	$12,919.50	8%	9%	$15,209	P Previous Work	
M66H	Analysis - Arsenic	24	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$26.71	$26.71	$641.04	8%	9%	$755	V Vendor Quote	
												TOTAL UNIT COST:			$208,812		

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote

For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-5A

Alternative 5a **Cost Worksheet: CW5a-5A**
Capital Cost Sub-Element
Cover, Backfill, and Access Controls O&M During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cover, backfill, and access controls O&M pertaining to the covered/backfilled areas during construction. It includes costs for on-site labor, equipment, materials and allowances for maintaining the cover and signage.

Cost Analysis:
Cost for Cover, Backfill, and Access Controls O&M During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7A	Cover and Backfill Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$530.94	$530.94	$6,371.24	8%	9%	$7,500	MII MII Assemblies	1 days/month
M22B	O&M Allowance	45	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$100.00	$100.00	$4,450.00	0%	0%	$4,450	A Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
												TOTAL UNIT COST:			$11,950		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-5B

Alternative 5a **Cost Worksheet: CW5a-5B**
Capital Cost Sub-Element
Cover, Backfill, and Access Controls O&M

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cover, backfill, and access controls O&M pertaining to the covered/backfilled areas. It includes costs for on-site labor, equipment, materials and allowances for maintaining the cover, backfill, and signage.

Cost Analysis:
Cost for Cover, Backfill, and Access Controls O&M (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7A	Cover and Backfill Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$530.94	$530.94	$6,371.24	8%	9%	$7,500	MII MII Assemblies	
M22B	O&M Allowance	89	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$100.00	$100.00	$8,900.00	0%	0%	$8,900	A Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
												TOTAL UNIT COST:			$16,400		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-5C

Alternative 5a **Cost Worksheet: CW5a-5C**
Capital Cost Sub-Element
Cover and Backfill Inspection

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves monitoring protocol for covered portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers and backfill. The following includes the labor, material and equipment costs for inspection.

Cost Analysis:
Cost for Cover and Backfill Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
												TOTAL UNIT COST:			$5,212		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-6

Alternative 5a **Cost Worksheet: CW5a-6**
Capital Cost Sub-Element
Site Clearing and Grubbing

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves site clearing and grubbing of the contaminated area. It includes costs for labor, equipment and materials. All the cleared and grubbed material will be chipped in-place.

Cost Analysis:
Cost for Site Clearing and Grubbing (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A32A	Clearing and Grubbing	14	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$9,136.35	$9,136.35	$127,908.88	8%	9%	$150,574	MII MII Assemblies	
												TOTAL UNIT COST:			$150,574		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-7A

Alternative 5a **Cost Worksheet: CW5a-7A**
Capital Cost Sub-Element
Contaminated Surface Materials Excavation Events

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the future excavation events (assumed to be surface excavation/pickup) for contaminated materials such as ACM. These events are assumed to be conducted once per year. The sub-element includes costs for labor, material, and equipment. The field engineer is for oversight of future excavation.

Cost Analysis:
Cost for Contaminated Surface Materials Excavation Events (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L8	Field Engineer	100	HR	1.00	$22.94	$22.94	$0.00	$0.00	$0.00	$0.00	$22.94	$2,294.00	100%	9%	$5,001	SE SalaryExpert.com	10 days per event
M57	Per Diem for 1 Person	10	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$144.00	$144.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	10 days per event
A41A	ACM Surface Excavation/Pickup Crew	10	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,834.38	$2,834.38	$28,343.83	8%	9%	$33,366	MII MII Assemblies	10 days per event
												TOTAL UNIT COST:			$39,807		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-7B

Alternative 5a **Cost Worksheet: CW5a-7B**

Capital Cost Sub-Element

Contaminated Materials Disposal At Permitted Disposal Facilities

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves disposal of contaminated materials at permitted disposal facilities and hauling of contaminated materials for offsite disposal. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Contaminated Materials Disposal At Permitted Disposal Facilities (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Disposal for Years 3 to 10																
S2E	Permitted Authorized Disposal Facility Charges	11	TN	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$120.09	$120.09	$1,320.98	8%	9%	$1,555	V Vendor Quote	Lowest unit cost of disposal fees for 3 Oregon Permitted Authorized Disposal Facilities
A23G	Offsite Debris Disposal, Hauling to Permitted Authorized Landfill	10	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$79.51	$79.51	$795.07	8%	9%	$936	MII MII Assemblies	
												TOTAL UNIT COST:			$2,491		
	Disposal for Years 11 to 20																
S2E	Permitted Authorized Disposal Facility Charges	7	TN	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$120.09	$120.09	$840.62	8%	9%	$990	V Vendor Quote	Lowest unit cost of disposal fees for 3 Oregon Permitted Authorized Disposal Facilities
A23E	Offsite Debris Disposal, Hauling to Permitted Authorized Landfill	10	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$75.76	$75.76	$757.60	8%	9%	$892	MII MII Assemblies	
												TOTAL UNIT COST:			$1,882		
	Disposal for Years 21 to 30																
S2E	Permitted Authorized Disposal Facility Charges	3	TN	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$120.09	$120.09	$360.27	8%	9%	$424	V Vendor Quote	Lowest unit cost of disposal fees for 3 Oregon Permitted Authorized Disposal Facilities
A23F	Offsite Debris Disposal, Hauling to Permitted Authorized Landfill	10	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$61.83	$61.83	$618.32	8%	9%	$728	MII MII Assemblies	
												TOTAL UNIT COST:			$1,152		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW5a-8

Alternative 5a **Cost Worksheet: CW5a-8**
Capital Cost Sub-Element
Contaminated Surface Materials Excavation and Hauling

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the excavation of contaminated surface materials and hauling of contaminated materials for onsite consolidation and disposal. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Contaminated Surface Materials Excavation and Hauling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A9A	Excavation/Loading - Surficial Contaminatec Materials	49,778	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.99	$8.99	$447,454.44	8%	9%	$526,743	MII MII Assemblies	
A24A	Hauling - Onsite Disposal	57,245	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.71	$3.71	$212,190.04	8%	9%	$249,790	MII MII Assemblies	
												TOTAL UNIT COST:			$776,533		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-9

Alternative 5a **Cost Worksheet:** **CW5a-9**
Capital Cost Sub-Element
Construction of On-Site Consolidation Area

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the construction of an onsite consolidation area for contaminated materials disposal. It includes cost for labor, equipment and material (soil from near offsite and distant offsite borrow areas, and organic material).

Cost Analysis:
Cost for Construction of On-Site Consolidation Area (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Contaminated Materials Placement																
A11A	Contaminated Material Spreading/Grading	57,245	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10.74	$10.74	$614,599.49	8%	9%	$723,507	MII MII Assemblies	
A12A	Interim Cover Spreading/Grading	24,239	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12.42	$12.42	$301,121.10	8%	9%	$354,480	MII MII Assemblies	
A19A	Contaminated Material Compaction - Large Open Area	81,484	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.90	$0.90	$73,245.97	8%	9%	$86,225	MII MII Assemblies	
	Clean Soil Placement for Cover																
A12B	Final CoverSpreading/Grading	26,450	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12.42	$12.42	$328,588.35	8%	9%	$386,814	MII MII Assemblies	
A13A	Clean Fill Spreading/Grading	6,613	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.68	$2.68	$17,699.69	8%	9%	$20,836	MII MII Assemblies	Top soil placement
A21A	Clean Fill Compaction - Large Open Area	33,063	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$6,010.85	8%	9%	$7,076	MII MII Assemblies	
	Clean Fill/Soil from Near Offsite Borrow Source																
A10A	Excavation - Borrow Source	24,914	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$53,094.23	8%	9%	$62,503	MII MII Assemblies	
A14A	Material Loading - Clean Fill	28,651	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$9,260.00	8%	9%	$10,901	MII MII Assemblies	
A23B	Hauling - Near Offsite Borrow Source	28,651	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.12	$2.12	$60,768.77	8%	9%	$71,537	MII MII Assemblies	
	Clean Fill/Soil from Distant Offsite Borrow Source																
A10A	Excavation - Borrow Source	24,914	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$53,094.23	8%	9%	$62,503	MII MII Assemblies	
A14A	Material Loading - Clean Fill	28,651	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$9,260.00	8%	9%	$10,901	MII MII Assemblies	
A23A	Hauling - Distant Offsite Borrow Source	28,651	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.82	$2.82	$80,735.65	8%	9%	$95,042	MII MII Assemblies	
M49	Assumed Royalty Allowance for Soil	28,651	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.00	$3.00	$85,953.00	0%	0%	$85,953	A Allowance	
	Organic Material for Topsoil Amendment																
A39B	Organic Delivery	200	TN	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.65	$8.65	$1,729.12	8%	9%	$2,036	MII MII Assemblies	
A40A	Organic Amendment and Processing	8	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,082.08	$1,082.08	$8,656.67	8%	9%	$10,191	MII MII Assemblies	
M25	Organic Material	200	TN	1.00	$0.00	$0.00	$0.00	$0.00	$25.25	$0.00	$25.25	$5,050.00	8%	9%	$5,945	V Vendor Quote	
												TOTAL UNIT COST:			$1,996,450		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-10

Alternative 5a **Cost Worksheet: CW5a-10**
Capital Cost Sub-Element
Revegetation of On-Site Consolidation Area

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the revegetation of the onsite consolidation area with hydroseeding. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Revegetation of On-Site Consolidation Area (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Hydroseeding/Revegetation																
A30A	Hydro-Seeding Crew	8	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$113.57	$113.57	$908.60	8%	9%	$1,070	MII MII Assemblies	
M16	Seed Mix	800	LB	1.00	$0.00	$0.00	$0.00	$0.00	$2.02	$0.00	$2.02	$1,616.00	8%	9%	$1,902	V Vendor Quote	
M18A	Fertilizer (N2)	500	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.30	$0.00	$0.30	$150.00	8%	9%	$177	V Vendor Quote	
M18B	Fertilizer (P2O5)	900	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.23	$0.00	$0.23	$207.00	8%	9%	$244	V Vendor Quote	
M20	Hydomulching	24,000	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.27	$0.27	$0.54	$12,960.00	8%	9%	$15,257	P Previous Work	
												TOTAL UNIT COST:			$18,650		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-10A

Alternative 5a | **Cost Worksheet: CW5a-10A**

Capital Cost Sub-Element

Excavation Backfilling

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010

Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves backfilling of excavations. The backfill would include a subsoil layer placed below a topsoil layer and organic amendment of the topsoil. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Excavation Backfilling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Clean Fill/Soil from Near Offsite Borrow Source																
A10A	Excavation - Borrow Source	43,893	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$93,540.37	8%	9%	$110,116	MII MII Assemblies	
A14A	Material Loading - Clean Fill	50,477	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$16,314.17	8%	9%	$19,205	MII MII Assemblies	
A23B	Hauling - Near Offsite Borrow Source	50,477	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.12	$2.12	$107,061.72	8%	9%	$126,033	MII MII Assemblies	
	Clean Fill/Soil from Distant Offsite Borrow Source																
A10A	Excavation - Borrow Source	43,893	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$93,540.37	8%	9%	$110,116	MII MII Assemblies	
A14A	Material Loading - Clean Fill	50,477	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$16,314.17	8%	9%	$19,205	MII MII Assemblies	
A23A	Hauling - Distant Offsite Borrow Source	50,477	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.82	$2.82	$142,239.14	8%	9%	$167,444	MII MII Assemblies	
M49	Assumed Royalty Allowance for Soil	50,477	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.00	$3.00	$151,431.00	0%	0%	$151,431	A Allowance	
	Subsoil Replacement and Compaction																
A13A	Clean Fill Spreading/Grading	31,502	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.68	$2.68	$84,315.10	8%	9%	$99,256	MII MII Assemblies	
A21A	Clean Fill Compaction - Large Open Area	28,352	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$5,154.36	8%	9%	$6,068	MII MII Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	3,150	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.24	$2.24	$7,063.38	8%	9%	$8,315	MII MII Assemblies	Assume 10% of total fill
	Topsoil Replacement and Compaction																
A13B	Top Soil Spreading/Grading	69,452	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.68	$2.68	$185,888.28	8%	9%	$218,828	MII MII Assemblies	
A21A	Clean Fill Compaction - Large Open Area	62,507	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$11,363.74	8%	9%	$13,377	MII MII Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	6,945	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.24	$2.24	$15,572.53	8%	9%	$18,332	MII MII Assemblies	Assume 10% of total fill
	Organic Material for Topsoil Amendment																
A39B	Organic Delivery	1,900	TN	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.65	$8.65	$16,426.64	8%	9%	$19,337	MII MII Assemblies	
A40A	Organic Amendment and Processing	81	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,082.08	$1,082.08	$87,648.78	8%	9%	$103,180	MII MII Assemblies	
M25	Organic Material	1,900	TN	1.00	$0.00	$0.00	$0.00	$0.00	$25.25	$0.00	$25.25	$47,975.00	8%	9%	$56,476	V Vendor Quote	
												TOTAL UNIT COST:			$1,246,719		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-11

Alternative 5a **Cost Worksheet: CW5a-11**
Capital Cost Sub-Element
Revegetation of Disturbed Areas

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the revegetation of disturbed areas on the site. It includes hydro-seeding with fertilizer and hydomulch.

Cost Analysis:
Cost for Revegetation of Disturbed Areas (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Hydroseeding/Revegetation																
A30A	Hydro-Seeding Crew	81	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$113.57	$113.57	$9,199.53	8%	9%	$10,830	MII MII Assemblies	
M16	Seed Mix	8,100	LB	1.00	$0.00	$0.00	$0.00	$0.00	$2.02	$0.00	$2.02	$16,362.00	8%	9%	$19,261	V Vendor Quote	
M18A	Fertilizer (N2)	5,300	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.30	$0.00	$0.30	$1,590.00	8%	9%	$1,872	V Vendor Quote	
M18B	Fertilizer (P2O5)	8,900	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.23	$0.00	$0.23	$2,047.00	8%	9%	$2,410	V Vendor Quote	
M20	Hydomulching	243,000	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.27	$0.27	$0.54	$131,220.00	8%	9%	$154,472	P Previous Work	
												TOTAL UNIT COST:			$188,845		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-12

Alternative 5a **Cost Worksheet: CW5a-12**
Capital Cost Sub-Element
Equipment Decontamination

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves decontamination of equipment used onsite.

Cost Analysis:
Cost for Equipment Decontamination (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Equipment Decon/Washing																
A3A	Equipment Decon/Washing	416	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$168.44	$168.44	$70,070.08	8%	9%	$82,487	MII MII Assemblies	Assume 8 months/yr, 2 yrs
M46	Poly Tank, 5,300 Gal	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$2,250.24	$0.00	$2,250.24	$2,250.24	8%	9%	$2,649	V Vendor Quote	
M47	Wash Rack w/ Solids Filtration Unit, Closed Loop	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$55,655.04	$0.00	$55,655.04	$55,655.04	8%	9%	$65,517	V Vendor Quote	
												TOTAL UNIT COST:			$150,653		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-13

Alternative 5a **Cost Worksheet:** **CW5a-13**
Capital Cost Sub-Element
Mobilization/Demobilization

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves mobilization and demobilization of all the required equipment to and from the site respectively.

Cost Analysis:
Cost for Mobilization/Demobilization (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A37A	Mobilization and Demobilization - Heavy Equipment	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,384.82	$2,384.82	$23,848.22	8%	9%	$28,074	MII MII Assemblies	
A37B	Mobilization and Demobilization - Medium-Sized Equipment	6	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$974.68	$974.68	$5,848.08	8%	9%	$6,884	MII MII Assemblies	
A37C	Mobilization and Demobilization - Small Equipment	5	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$605.12	$605.12	$3,025.61	8%	9%	$3,562	MII MII Assemblies	
A37D	Mobilization and Demobilization - Self-Propelled Equipment	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,469.12	$2,469.12	$24,691.17	8%	9%	$29,066	MII MII Assemblies	
												TOTAL UNIT COST:			$67,586		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW5a-14

Alternative 5a **Cost Worksheet: CW5a-14**
Capital Cost Sub-Element
Site Maintenance and Control During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves site maintenance during construction. The annual costs for site maintenance during construction include labor, material, and equipment.

Cost Analysis:
Cost for Site Maintenance and Control During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Dust Control																
A1A	Dust Control/Washing	416	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$564.97	$564.97	$235,029.10	8%	9%	$276,676	MII MII Assemblies	
	Equipment Fueling																
A2A	Equipment Fueling	416	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$68.46	$68.46	$28,478.44	8%	9%	$33,525	MII MII Assemblies	
	Construction Safety and Traffic Control																
A33A	Barricade and Traffic Control Setup	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$987.96	$987.96	$1,975.92	8%	9%	$2,326	MII MII Assemblies	
M36	3" x 1,000' Yellow Caution Tape	10	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.61	$0.00	$10.61	$106.10	8%	9%	$125	V Vendor Quote	
M37	3" x 1,000' Red Danger Asbestos Haz Tape	10	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.61	$0.00	$10.61	$106.10	8%	9%	$125	V Vendor Quote	
M38	Reflecting Barricade with Light	15	EA	1.00	$0.00	$0.00	$0.00	$0.00	$72.55	$0.00	$72.55	$1,088.25	8%	9%	$1,281	V Vendor Quote	
M39	Orange Safety Fence with Posts	20	CLF	1.00	$0.00	$0.00	$0.00	$0.00	$53.52	$0.00	$53.52	$1,070.40	8%	9%	$1,260	V Vendor Quote	
												TOTAL UNIT COST:			$315,318		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-15

Alternative 5a **Cost Worksheet: CW5a-15**
Capital Cost Sub-Element
Temporary Site Facilitites During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves rental cost for onsite office trailer, storage box, portable toilets, and utilities.

Cost Analysis:
Cost for Temporary Site Facilitites During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Site Trailer/Office																
M58	Site Office Trailer Installation - One Time Cost	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,060.40	$2,060.40	$2,060.40	8%	9%	$2,426	V Vendor Quote	
M59	Trailer Rental and Storage Box	16.0	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$80.80	$80.80	$1,292.80	8%	9%	$1,522	V Vendor Quote	
M60	Office Furniture	16.0	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$207.05	$207.05	$3,312.80	8%	9%	$3,900	V Vendor Quote	
M61	Portable Toilets	16.0	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$368.65	$368.65	$5,898.40	8%	9%	$6,944	V Vendor Quote	
M63	General Office Supplies Allowance	16.0	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$750.00	$750.00	$12,000.00	0%	0%	$12,000	A Allowance	
M64	Erosion Control Measures Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30,000.00	$30,000.00	$30,000.00	0%	0%	$30,000	A Allowance	
M62	Utilities (Phone, Internet, Electricity)	16.0	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$156.55	$156.55	$2,504.80	8%	9%	$2,949	V Vendor Quote	
												TOTAL UNIT COST:			$59,741		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-16

Alternative 5a **Cost Worksheet: CW5a-16**
Capital Cost Sub-Element
Surveying for Construction Control

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves cost for site surveying before and after the remedial alternative is implemented.

Cost Analysis:
Cost for Surveying for Construction Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A38B	Site Survey - Contaminated Area	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,002.24	$1,002.24	$12,026.92	8%	9%	$14,158	MII MII Assemblies	Assume 4 acres/day
A38A	Site Survey - Clean Area	8	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$464.52	$464.52	$3,716.15	8%	9%	$4,375	MII MII Assemblies	Assume 6 acres/day
M12A	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
												TOTAL UNIT COST:			$23,533		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5a-17

Alternative 5a **Cost Worksheet: CW5a-17**
Capital Cost Sub-Element
Temporary Laydown and Access Road Installation

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves temporary gravel construction at the site for the gravel laydown area and temporary access roads used to access contaminated areas during construction. It includes costs for material, labor, and equipment.

Cost Analysis:
Cost for Temporary Laydown and Access Road Installation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Gravel Laydown Area																
A18A	Gravel Placement - Clean Area	1,112	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$359.40	8%	9%	$423	MII MII Assemblies	
M43B	Gravel, Delivered	230	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$20.99	$0.00	$20.99	$4,827.70	8%	9%	$5,683	V Vendor Quote	
	Temporary Gravel Access Roads																
A18B	Gravel Placement - Contaminated Area	9,167	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.48	$1.48	$13,610.24	8%	9%	$16,022	MII MII Assemblies	Assume 1 mile road, 15 ft wide
M43B	Gravel, Delivered	1,725	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$20.99	$0.00	$20.99	$36,207.75	8%	9%	$42,624	V Vendor Quote	
												TOTAL UNIT COST:			$64,752		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Worksheets

Alternative 5b

TABLE CW5b-1

Alternative 5b **Cost Worksheet: CW5b-1**
Capital Cost Sub-Element
Institutional Controls

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves implementation of institutional controls for the site. The following cost includes hours for and document legal procedures to establish and cost for document submission and recording. The cost also includes site survey to establish parcel/site boundaries.

Cost Analysis:
Cost for Institutional Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Institutional Controls for Private Ownership Parcels (27)																
L6	Environmental Lawyer	648	HR	1.00	$71.06	$71.06	$0.00	$0.00	$0.00	$0.00	$71.06	$46,046.88	100%	9%	$100,382	SE SalaryExpert.com	24 hrs per parcel
L15	Paralegal	864	HR	1.00	$37.29	$37.29	$0.00	$0.00	$0.00	$0.00	$37.29	$32,218.56	100%	9%	$70,236	SE SalaryExpert.com	32 hrs per parcel
L3	Clerks, Typist, Bookkeeper & Receptionist	270	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$5,143.50	100%	9%	$11,213	SE SalaryExpert.com	10 hrs per parcel
M11A	Document Submission and Recording Allowance	27	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$135,000.00	0%	0%	$135,000	A Allowance	
	Institutional Controls for Receivership Parcels (29)																
L6	Environmental Lawyer	464	HR	1.00	$71.06	$71.06	$0.00	$0.00	$0.00	$0.00	$71.06	$32,971.84	100%	9%	$71,879	SE SalaryExpert.com	16 hrs per parcel
L15	Paralegal	696	HR	1.00	$37.29	$37.29	$0.00	$0.00	$0.00	$0.00	$37.29	$25,953.84	100%	9%	$56,579	SE SalaryExpert.com	24 hrs per parcel
L3	Clerks, Typist, Bookkeeper & Receptionist	290	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$5,524.50	100%	9%	$12,043	SE SalaryExpert.com	10 hrs per parcel
M11A	Document Submission and Recording Allowance	29	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$145,000.00	0%	0%	$145,000	A Allowance	
A38A	Site Survey - Clean Area	10	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$464.52	$464.52	$4,645.19	8%	9%	$5,468	MII MII Assemblies	needed
M12	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$15,000.00	$15,000.00	$15,000.00	0%	0%	$15,000	A Allowance	
												TOTAL UNIT COST:			$622,800		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-2

Alternative 5b **Cost Worksheet: CW5b-2**
Capital Cost Sub-Element
Access Controls

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cost associated with access controls on the site. Access controls include installation of sign posts along the perimeter of the disturbed area, the onsite repositories, and signage along steam pipe on the east side of Old Fort Road.

Cost Analysis:
Cost for Access Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A31C	Signage Installation - Clean Area	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,585.31	$1,585.31	$1,585.31	8%	9%	$1,866	MII MII Assemblies	
M4A	T-Post, 7' High Steel Post	25	EA	1.00	$0.00	$0.00	$0.00	$0.00	$5.86	$0.00	$5.86	$146.50	8%	9%	$172	V Vendor Quote	Includes wire clips
M9	Signs	25	EA	1.00	$0.00	$0.00	$0.00	$0.00	$99.09	$0.00	$99.09	$2,477.25	8%	9%	$2,916	V Vendor Quote	Assume every 300 FT
												TOTAL UNIT COST:			$4,954		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-3A

Alternative 5b | **Cost Worksheet: CW5b-3A**
Capital Cost Sub-Element
Borrow Source Testing

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves determining whether asbestos fibers are present in proposed borrow source. Samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Visual inspection and ABS activities would be conducted to determine asbestos contamination. The ABS samples would be analyzed by TEM Method. Non-asbestos contamination would include organic/inorganic analysis for VOCs, SVOCs, PCBs, TPH, herbicides, pesticides, and target analyte list metals. The following includes the labor, material and equipment cost, and shipping cost required for the borrow material sampling.

Cost Analysis:
Cost for Borrow Material Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$3,938.14	8%	9%	$4,636	MII MII Assemblies	
M51	ABS, Sample and Analysis	21	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$891.00	$891.00	$18,711.00	8%	9%	$22,027	P Previous Work	
M52	Equipment/ABS Area/ABS Event	21	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.50	$148.50	$3,118.50	8%	9%	$3,671	P Previous Work	
M53A	Sampling and Other Supplies/ABS Area/ABS Event	21	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$250.00	$250.00	$5,250.00	8%	9%	$6,180	P Previous Work	
M66A	Analysis - Volatile Organic Compounds	21	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$105.78	$105.78	$2,221.38	8%	9%	$2,615	V Vendor Quote	
M66B	Analysis - Semivolatile Organic Compounds	21	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$215.47	$215.47	$4,524.87	8%	9%	$5,327	V Vendor Quote	
M66C	Analysis - Pesticides	21	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$152.79	$152.79	$3,208.59	8%	9%	$3,777	V Vendor Quote	
M66D	Analysis - Herbicides	21	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$132.64	$132.64	$2,785.44	8%	9%	$3,279	V Vendor Quote	
M66E	Analysis - TAL Metals	21	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$129.28	$129.28	$2,714.88	8%	9%	$3,196	V Vendor Quote	
M66F	Analysis - PCBs	21	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$133.20	$133.20	$2,797.20	8%	9%	$3,293	V Vendor Quote	
M66G	Analysis - TPH	21	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$88.43	$88.43	$1,857.03	8%	9%	$2,186	V Vendor Quote	
M54A	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
M53B	Sampling/Other Supplies	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	8%	9%	$1,766	P Previous Work	
												TOTAL UNIT COST:			$64,953		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-3B

Alternative 5b **Cost Worksheet: CW5b-3B**
Capital Cost Sub-Element
Ambient Air Sampling (1 Year)

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves ambient air sampling and analysis from various locations of the site to assess whether there are current exposure risks from asbestos fibers and non-asbestos COPCs in ambient air. Five locations (TBD) would be selected for sampling and samples would be analyzed for asbestos by TEM Method. The following includes the labor, material and equipment cost, and shipping cost.

Cost Analysis:
Cost for Ambient Air Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$9,451.54	8%	9%	$11,126	MII MII Assemblies	1 yr, 12 months, 1 sample/month
M56	Per Diem for 2 People	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$3,456.00	0%	0%	$3,456	GSA www.gsa.gov	
M51A	Ambient Air Sample Analysis	60	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$396.00	$396.00	$23,760.00	8%	9%	$27,970	P Previous Work	1 sample/station/month, 5 stations, 12 months
M52A	Sampling Setup (Equipment and Utility)	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,200.00	$4,200.00	$4,200.00	8%	9%	$4,944	P Previous Work	Includes sampling equipments and electrical hook-up
M52B	Equipment/Ambient Air Sampling Event	60	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$150.00	$150.00	$9,000.00	8%	9%	$10,595	P Previous Work	1 sample/station/month, 5 stations, 12 months
M53C	Sampling/Other Supplies/Ambient Air Sampling Event	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	8%	9%	$1,766	P Previous Work	
M54A	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
												TOTAL UNIT COST:			$62,857		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW5b-3C

Alternative 5b **Cost Worksheet: CW5b-3C**
Capital Cost Sub-Element
Inspection of Areas without Identified Contamination

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves monitoring for areas of the site with no historical or current contamination and would be performed some time during construction. The monitoring would be performed using a tiered approach with intrusive visual inspection (hand dug test pits), followed by ABS to provide a point-in-time determination whether these areas were adversely impacted by contamination. A total of ten locations would be tested.

Cost Analysis:
Cost for Intrusive Visual Inspection and ABS (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
A5A	Sampling - 3 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,179.92	$1,179.92	$5,899.61	8%	9%	$6,945	MII MII Assemblies	
M55	Per Diem for 3 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$432.00	$432.00	$2,160.00	0%	0%	$2,160	GSA www.gsa.gov	
M51	ABS, Sample and Analysis	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$891.00	$891.00	$8,910.00	8%	9%	$10,489	P Previous Work	
M52	Equipment/ABS Area/ABS Event	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.50	$148.50	$1,485.00	8%	9%	$1,748	P Previous Work	
M53A	Sampling and Other Supplies/ABS Area/ABS Event	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$250.00	$250.00	$2,500.00	8%	9%	$2,943	P Previous Work	
M54B	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$30,997		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-4A

Alternative 5b | **Cost Worksheet: CW5b-4A**
Capital Cost Sub-Element
Excavation Confirmatory Sampling

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves intrusive visual inspections (i.e. subsurface inspections within excavations) coupled with ABS analysis would be conducted adjacent to the excavation areas after initial excavation is completed to confirm that contaminated surface materials would be excavated horizontally to the extent they can be detected most conservative ABS scenario (e.g. raking) would be conducted for areas no greater than 40,000 square feet and would be analyzed by TEM Method. Arsenic sampling at the power plant area would be conducted at a frequency of one sample per 2,500 square feet along the bottom and side-walls of the excavation area. The following includes the labor, material and equipment cost, and shipping cost required for the soil sampling.

Cost Analysis:
Cost for Confirmatory Soil Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	45	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$28,840.75	8%	9%	$33,951	MII MII Assemblies	
M56	Per Diem for 2 People	45	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$12,960.00	0%	0%	$12,960	GSA www.gsa.gov	
A4A	Sampling - 2 Person Crew	45	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$35,443.27	8%	9%	$41,724	MII MII Assemblies	
M56	Per Diem for 2 People	45	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$12,960.00	0%	0%	$12,960	GSA www.gsa.gov	
M51	ABS, Sample and Analysis	88	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$891.00	$891.00	$78,408.00	8%	9%	$92,302	P Previous Work	
M52	Equipment/ABS Area/ABS Event	88	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.50	$148.50	$13,068.00	8%	9%	$15,384	P Previous Work	
M66H	Analysis - Arsenic	24	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$26.71	$26.71	$641.04	8%	9%	$755	V Vendor Quote	
											TOTAL UNIT COST:				$210,036		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-4B

Alternative 5b **Cost Worksheet: CW5b-4B**
Capital Cost Sub-Element
Confirmatory Sampling Data Evaluation Report

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the excavation sampling data evaluation report. The following cost includes labor, material and shipping costs for the removal sampling data evaluation report.

Cost Analysis:
Cost for Confirmatory Sampling Data Evaluation Report (Each)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L13	Project Manager	32	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$1,488.96	100%	9%	$3,246	SE SalaryExpert.com	Hours for 1 report
L5	Environmental Engineer	80	HR	1.00	$31.39	$31.39	$0.00	$0.00	$0.00	$0.00	$31.39	$2,511.20	100%	9%	$5,474	SE SalaryExpert.com	Hours for 1 report
L7	Environmental Scientist	120	HR	1.00	$27.87	$27.87	$0.00	$0.00	$0.00	$0.00	$27.87	$3,344.40	100%	9%	$7,291	SE SalaryExpert.com	Hours for 1 report
L14	Quality Control Engineer	16	HR	1.00	$46.04	$46.04	$0.00	$0.00	$0.00	$0.00	$46.04	$736.64	100%	9%	$1,606	SE SalaryExpert.com	Hours for 1 report
L1	CAD Drafter	40	HR	1.00	$25.70	$25.70	$0.00	$0.00	$0.00	$0.00	$25.70	$1,028.00	100%	9%	$2,241	SE SalaryExpert.com	Hours for 1 report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$762.00	100%	9%	$1,661	SE SalaryExpert.com	Hours for 1 report
M11	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,000.00	$1,000.00	$1,000.00	0%	0%	$1,000	A Allowance	
												TOTAL UNIT COST:			$22,519		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-5A

Alternative 5b | **Cost Worksheet: CW5b-5A**
Capital Cost Sub-Element
5-Year Site Reviews

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the 5-year site visits and 5-year site review report. The following cost includes labor, material and shipping costs for site visits and 5-year site review reports.

Cost Analysis:
Cost for 5-Year Site Review (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6A	Site Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	1 hour per parcel per site visit, 45 parcels
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
L13	Project Manager	40	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$1,861.20	100%	9%	$4,057	SE SalaryExpert.com	Hours for 5-year review report
L5	Environmental Engineer	80	HR	1.00	$31.39	$31.39	$0.00	$0.00	$0.00	$0.00	$31.39	$2,511.20	100%	9%	$5,474	SE SalaryExpert.com	Hours for 5-year review report
L7	Environmental Scientist	120	HR	1.00	$27.87	$27.87	$0.00	$0.00	$0.00	$0.00	$27.87	$3,344.40	100%	9%	$7,291	SE SalaryExpert.com	Hours for 5-year review report
L14	Quality Control Engineer	16	HR	1.00	$46.04	$46.04	$0.00	$0.00	$0.00	$0.00	$46.04	$736.64	100%	9%	$1,606	SE SalaryExpert.com	Hours for 5-year review report
L1	CAD Drafter	40	HR	1.00	$25.70	$25.70	$0.00	$0.00	$0.00	$0.00	$25.70	$1,028.00	100%	9%	$2,241	SE SalaryExpert.com	Hours for 5-year review report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$762.00	100%	9%	$1,661	SE SalaryExpert.com	Hours for 5-year review report
M10A	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$29,042		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-5B

Alternative 5b **Cost Worksheet: CW5b-5B**
Capital Cost Sub-Element
Community Awareness Activities

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves setting up a community meeting to inform the local community about the status of site. The following includes the labor, material and other cost required for setting up the community awareness meeting which includes costs for renting a meeting hall, court reporter, and publishing and sending notices or informational flyers.

Cost Analysis:
Cost for Community Awareness Activities (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L12	General Superintendent (P.M.)	16	HR	1.00	$52.74	$52.74	$0.00	$0.00	$0.00	$0.00	$52.74	$843.84	100%	9%	$1,840	SE SalaryExpert.com	
L13	Project Manager	16	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$744.48	100%	9%	$1,623	SE SalaryExpert.com	
M56	Per Diem for 2 People	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$576.00	0%	0%	$576	GSA www.gsa.gov	
M65	Community Awareness Activities Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,000.00	$2,000.00	$2,000.00	0%	0%	$2,000	A Allowance	1 event per 5-yr review.
												TOTAL UNIT COST:			$6,039		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-5C

Alternative 5b **Cost Worksheet: CW5b-5C**
Capital Cost Sub-Element
Non-Intrusive Visual Inspection

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves non-intrusive visual inspections (i.e. surface inspections) performed in support of 5-year site reviews would be made on all parcels within the site boundary regardless of ownership. The following includes the labor, material and equipment cost for inspection.

Cost Analysis:
Cost for Non-Intrusive Visual Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
												TOTAL UNIT COST:			$5,212		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-6A

Alternative 5b | **Cost Worksheet: CW5b-6A**
Capital Cost Sub-Element
Cover, Backfill, and Access Controls O&M During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cover, backfill, and access controls O&M pertaining to the covered/backfilled areas during construction. It includes costs for on-site labor, equipment, materials and allowances for maintaining the cover and signage.

Cost Analysis:
Cost for Cover, Backfill, and Access Controls O&M During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7A	Cover and Backfill Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$530.94	$530.94	$6,371.24	8%	9%	$7,500	MII MII Assemblies	1 days/month, 10 hrs/day
M22B	O&M Allowance	30	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$100.00	$100.00	$3,000.00	0%	0%	$3,000	A Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
												TOTAL UNIT COST:			$10,500		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-6B

Alternative 5b **Cost Worksheet: CW5b-6B**
Capital Cost Sub-Element
Cover, Backfill, and Access Controls O&M

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cover, backfill, and access controls O&M pertaining to the covered/backfilled areas. It includes costs for on-site labor, equipment, materials and allowances for maintaining the cover, backfill, and signage.

Cost Analysis:
Cost for Cover, Backfill, and Access Controls O&M (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7A	Cover and Backfill Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$530.94	$530.94	$6,371.24	8%	9%	$7,500	MII MII Assemblies	1 days/month, 10 hrs/day
M22B	O&M Allowance	90	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$100.00	$100.00	$9,000.00	0%	0%	$9,000	A Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
												TOTAL UNIT COST:			$16,500		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-6C

Alternative 5b | **Cost Worksheet: CW5b-6C**
Capital Cost Sub-Element
Cover and Backfill Inspection

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves monitoring protocol for covered portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers and backfill. The following includes the labor, material and equipment costs for inspection.

Cost Analysis:
Cost for Cover and Backfill Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	1 days/month, 10 hrs/day
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
												TOTAL UNIT COST:			$5,212		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-7

Alternative 5b | **Cost Worksheet: CW5b-7**
Capital Cost Sub-Element
Temporary Laydown and Access Road Installation

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves temporary gravel construction at the site for the gravel laydown area and temporary access roads used to access contaminated areas during construction. It includes costs for material, labor, and equipment.

Cost Analysis:
Cost for Temporary Laydown and Access Road Installation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Gravel Laydown Area																
A18A	Gravel Placement - Clean Area	1,112	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$359.40	8%	9%	$423	MII MII Assemblies	
M43B	Gravel, Delivered	230	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$20.99	$0.00	$20.99	$4,827.70	8%	9%	$5,683	V Vendor Quote	
	Temporary Gravel Access Roads																
A18B	Gravel Placement - Contaminated Area	9,167	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.48	$1.48	$13,610.24	8%	9%	$16,022	MII MII Assemblies	Assume 1 mile road, 15 ft wide
M43B	Gravel, Delivered	1,725	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$20.99	$0.00	$20.99	$36,207.75	8%	9%	$42,624	V Vendor Quote	
												TOTAL UNIT COST:			$64,752		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-8

Alternative 5b **Cost Worksheet: CW5b-8**
Capital Cost Sub-Element
Site Clearing and Grubbing

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves site clearing and grubbing of the contaminated area. It includes costs for labor, equipment and materials. All the cleared and grubbed material will be chipped in-place.

Cost Analysis:
Cost for Site Clearing and Grubbing (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A32A	Clearing and Grubbing	14	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$9,136.35	$9,136.35	$127,908.88	8%	9%	$150,574	MII MII Assemblies	
												TOTAL UNIT COST:			$150,574		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-9

Alternative 5b **Cost Worksheet: CW5b-9**
Capital Cost Sub-Element
Contaminated Surface Materials Excavation and Hauling

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the excavation of contaminated surface materials and hauling of contaminated materials for onsite consolidation and disposal. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Contaminated Surface Materials Excavation and Hauling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A9A	Excavation/Loading - Surficial Contaminatec Materials	49,778	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.99	$8.99	$447,454.44	8%	9%	$526,743	MII MII Assemblies	
A24A	Hauling - Onsite Disposal	57,245	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.71	$3.71	$212,190.04	8%	9%	$249,790	MII MII Assemblies	
												TOTAL UNIT COST:			$776,533		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-10

Alternative 5b **Cost Worksheet: CW5b-10**
Capital Cost Sub-Element
Steam Pipe Excavation and Hauling

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the excavation, demolition, and hauling of steam pipe for onsite disposal. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Steam Pipe Excavation and Hauling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A8A	Excavation/Loading - Steam Pipe	8,426	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10.49	$10.49	$88,421.60	8%	9%	$104,090	MII MII Assemblies	
A27A	Steam Pipe Segmentation	14,125	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$16.00	$16.00	$225,977.40	8%	9%	$266,021	MII MII Assemblies	
A24A	Hauling - Onsite Disposal	9,690	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.71	$3.71	$35,917.92	8%	9%	$42,283	MII MII Assemblies	
												TOTAL UNIT COST:			$412,394		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-11

Alternative 5b **Cost Worksheet: CW5b-11**
Capital Cost Sub-Element
Buried Contaminated Materials Excavation and Hauling

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the excavation of buried contaminated materials and hauling for onsite consolidation and disposal. This work also includes installation of sheet piling to provide stability to the area surrounding the excavation. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Buried Contaminated Materials Excavation and Hauling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A8B	Materials	55,104	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10.49	$10.49	$578,255.87	8%	9%	$680,723	MII MII Assemblies	
A24A	Hauling - Onsite Disposal	63,370	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.71	$3.71	$234,893.58	8%	9%	$276,517	MII MII Assemblies	
A36A	Sheet Piling	4,095	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$35.36	$35.36	$144,799.61	8%	9%	$170,458	MII MII Assemblies	
												TOTAL UNIT COST:			$1,127,698		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-12

Alternative 5b **Cost Worksheet: CW5b-12**
Capital Cost Sub-Element
Construction of Onsite Consolidation Area

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the construction of an onsite consolidation area for contaminated materials disposal. It includes cost for labor, equipment and material (soil from near offsite and distant offsite borrow areas, and organic material).

Cost Analysis:
Cost for Construction of Onsite Consolidation Area (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Contaminated Materials Placement																
A11A	Contaminated Material Spreading/Grading	130,305	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10.74	$10.74	$1,398,993.57	8%	9%	$1,646,895	MII MII Assemblies	
A12A	Interim Cover Spreading/Grading	32,575	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12.42	$12.42	$404,679.23	8%	9%	$476,388	MII MII Assemblies	
A19A	Contaminated Material Compaction - Large Open Area	162,880	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.90	$0.90	$146,412.83	8%	9%	$172,357	MII MII Assemblies	
	Clean Soil Placement for Cover																
A12B	Final CoverSpreading/Grading	26,578	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12.42	$12.42	$330,178.49	8%	9%	$388,686	MII MII Assemblies	
A13A	Clean Fill Spreading/Grading	6,645	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.68	$2.68	$17,785.34	8%	9%	$20,937	MII MII Assemblies	Top soil placement
A21A	Clean Fill Compaction - Large Open Area	33,223	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$6,039.94	8%	9%	$7,110	MII MII Assemblies	
	Clean Fill/Soil from Near Offsite Borrow Source																
A10A	Excavation - Borrow Source	28,608	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$60,966.51	8%	9%	$71,770	MII MII Assemblies	
A14A	Material Loading - Clean Fill	32,899	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$10,632.96	8%	9%	$12,517	MII MII Assemblies	
A23B	Hauling - Near Offsite Borrow Source	32,899	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.12	$2.12	$69,778.78	8%	9%	$82,144	MII MII Assemblies	
	Clean Fill/Soil from Distant Offsite Borrow Source																
A10A	Excavation - Borrow Source	28,608	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$60,966.51	8%	9%	$71,770	MII MII Assemblies	
A14A	Material Loading - Clean Fill	32,899	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$10,632.96	8%	9%	$12,517	MII MII Assemblies	
A23A	Hauling - Distant Offsite Borrow Source	32,899	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.82	$2.82	$92,706.09	8%	9%	$109,134	MII MII Assemblies	
M49	Assumed Royalty Allowance for Soil	32,899	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.00	$3.00	$98,697.00	0%	0%	$98,697	A Allowance	
	Organic Material for Topsoil Amendment																
A39B	Organic Delivery	200	TN	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.65	$8.65	$1,729.12	8%	9%	$2,036	MII MII Assemblies	
A40A	Organic Amendment and Processing	8	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,082.08	$1,082.08	$8,656.67	8%	9%	$10,191	MII MII Assemblies	
M25	Organic Material	200	TN	1.00	$0.00	$0.00	$0.00	$0.00	$25.25	$0.00	$25.25	$5,050.00	8%	9%	$5,945	V Vendor Quote	
												TOTAL UNIT COST:			$3,189,094		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-13

Alternative 5b **Cost Worksheet: CW5b-13**
Capital Cost Sub-Element
Revegetation of Onsite Consolidation Area

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the revegetation of the onsite consolidation area. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Revegetation of Onsite Consolidation Area (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Hydroseeding/Revegetation																
A30A	Hydro-Seeding Crew	8	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$113.57	$113.57	$908.60	8%	9%	$1,070	MII MII Assemblies	
M16	Seed Mix	800	LB	1.00	$0.00	$0.00	$0.00	$0.00	$2.02	$0.00	$2.02	$1,616.00	8%	9%	$1,902	V Vendor Quote	
M18A	Fertilizer (N2)	500	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.30	$0.00	$0.30	$150.00	8%	9%	$177	V Vendor Quote	
M18B	Fertilizer (P2O5)	900	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.23	$0.00	$0.23	$207.00	8%	9%	$244	V Vendor Quote	
M20	Hydomulching	24,000	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.27	$0.27	$0.54	$12,960.00	8%	9%	$15,257	P Previous Work	
												TOTAL UNIT COST:			$18,650		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-14

Alternative 5b **Cost Worksheet: CW5b-14**
Capital Cost Sub-Element
Excavation Backfilling

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves backfilling of excavations. The backfill would include a subsoil layer placed below a topsoil layer and organic amendment of the topsoil. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Excavation Backfilling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Clean Fill/Soil from Near Offsite Borrow Source																
A10A	Excavation - Borrow Source	58,393	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$124,441.32	8%	9%	$146,492	MII MII Assemblies	
A14A	Material Loading - Clean Fill	67,152	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$21,703.53	8%	9%	$25,549	MII MII Assemblies	
A23B	Hauling - Near Offsite Borrow Source	67,152	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.12	$2.12	$142,429.39	8%	9%	$167,668	MII MII Assemblies	
	Clean Fill/Soil from Distant Offsite Borrow Source																
A10A	Excavation - Borrow Source	58,393	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$124,441.32	8%	9%	$146,492	MII MII Assemblies	
A14A	Material Loading - Clean Fill	67,152	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$21,703.53	8%	9%	$25,549	MII MII Assemblies	
A23A	Hauling - Distant Offsite Borrow Source	67,152	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.82	$2.82	$189,227.62	8%	9%	$222,759	MII MII Assemblies	
M49	Assumed Royalty Allowance for Soil	67,152	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.00	$3.00	$201,456.00	0%	0%	$201,456	A Allowance	
	Subsoil Replacement and Compaction																
A13A	Clean Fill Spreading/Grading	63,740	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.68	$2.68	$170,600.11	8%	9%	$200,830	MII MII Assemblies	
A21A	Clean Fill Compaction - Large Open Area	57,366	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$10,429.14	8%	9%	$12,277	MII MII Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	6,374	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.24	$2.24	$14,291.78	8%	9%	$16,824	MII MII Assemblies	Assume 10% of total fill
	Topsoil Replacement and Compaction																
A13B	Top Soil Spreading/Grading	70,564	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.68	$2.68	$188,864.55	8%	9%	$222,331	MII MII Assemblies	
A21A	Clean Fill Compaction - Large Open Area	63,508	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$11,545.68	8%	9%	$13,592	MII MII Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	7,056	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.24	$2.24	$15,821.86	8%	9%	$18,625	MII MII Assemblies	Assume 10% of total fill
	Organic Material for Topsoil Amendment																
A39B	Organic Delivery	1,900	TN	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.65	$8.65	$16,426.64	8%	9%	$19,337	MII MII Assemblies	
A40A	Organic Amendment and Processing	82	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,082.08	$1,082.08	$88,730.86	8%	9%	$104,454	MII MII Assemblies	
M25	Organic Material	1,900	TN	1.00	$0.00	$0.00	$0.00	$0.00	$25.25	$0.00	$25.25	$47,975.00	8%	9%	$56,476	V Vendor Quote	
												TOTAL UNIT COST:			$1,600,711		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-15

Alternative 5b **Cost Worksheet: CW5b-15**
Capital Cost Sub-Element
Revegetation of Disturbed Areas

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the revegetation of disturbed areas on the site. It includes hydro-seeding with fertilizer and hydomulch.

Cost Analysis:
Cost for Revegetation of Disturbed Areas (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Hydroseeding/Revegetation																
A30A	Hydro-Seeding Crew	82	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$113.57	$113.57	$9,313.11	8%	9%	$10,963	MII MII Assemblies	
M16	Seed Mix	8,200	LB	1.00	$0.00	$0.00	$0.00	$0.00	$2.02	$0.00	$2.02	$16,564.00	8%	9%	$19,499	V Vendor Quote	
M18A	Fertilizer (N2)	5,400	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.30	$0.00	$0.30	$1,620.00	8%	9%	$1,907	V Vendor Quote	
M18B	Fertilizer (P2O5)	9,000	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.23	$0.00	$0.23	$2,070.00	8%	9%	$2,437	V Vendor Quote	
M20	Hydomulching	246,000	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.27	$0.27	$0.54	$132,840.00	8%	9%	$156,379	P Previous Work	
												TOTAL UNIT COST:			$191,185		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-16

Alternative 5b **Cost Worksheet: CW5b-16**
Capital Cost Sub-Element
Mobilization/Demobilization

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves mobilization and demobilization of all the required equipment to and from the site respectively.

Cost Analysis:
Cost for Mobilization/Demobilization (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A37A	Mobilization and Demobilization - Heavy Equipment	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,384.82	$2,384.82	$23,848.22	8%	9%	$28,074	MII MII Assemblies	
A37B	Mobilization and Demobilization - Medium-Sized Equipment	6	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$974.68	$974.68	$5,848.08	8%	9%	$6,884	MII MII Assemblies	
A37C	Mobilization and Demobilization - Small Equipment	5	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$605.12	$605.12	$3,025.61	8%	9%	$3,562	MII MII Assemblies	
A37D	Mobilization and Demobilization - Self-Propelled Equipment	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,469.12	$2,469.12	$24,691.17	8%	9%	$29,066	MII MII Assemblies	
												TOTAL UNIT COST:			$67,586		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-17

Alternative 5b **Cost Worksheet: CW5b-17**
Capital Cost Sub-Element
Surveying for Construction Control

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves cost for site surveying before and after the remedial alternative is implemented.

Cost Analysis:
Cost for Surveying for Construction Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A38B	Site Survey - Contaminated Area	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,002.24	$1,002.24	$12,026.92	8%	9%	$14,158	MII MII Assemblies	Assume 4 acres/day
A38A	Site Survey - Clean Area	8	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$464.52	$464.52	$3,716.15	8%	9%	$4,375	MII MII Assemblies	Assume 6 acres/day
M12A	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
												TOTAL UNIT COST:			$23,533		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-18

Alternative 5b — **Cost Worksheet: CW5b-18**
Capital Cost Sub-Element
Equipment Decontamination

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves decontamination of equipment used onsite.

Cost Analysis:
Cost for Equipment Decontamination (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Equipment Decon/Washing																
A3A	Equipment Decon/Washing	624	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$168.44	$168.44	$105,105.12	8%	9%	$123,730	MII MII Assemblies	Assume 8 months/yr, 3 yrs
M46	Poly Tank, 5,300 Gal	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$2,250.24	$0.00	$2,250.24	$2,250.24	8%	9%	$2,649	V Vendor Quote	
M47	Wash Rack w/ Solids Filtration Unit, Closed Loop	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$55,655.04	$0.00	$55,655.04	$55,655.04	8%	9%	$65,517	V Vendor Quote	
												TOTAL UNIT COST:			$191,896		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-19

Alternative 5b **Cost Worksheet: CW5b-19**
Capital Cost Sub-Element
Site Maintenance and Control During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves site maintenance during construction. The annual costs for site maintenance during construction include labor, material, and equipment.

Cost Analysis:
Cost for Site Maintenance and Control During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Dust Control																
A1A	Dust Control/Washing	624	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$564.97	$564.97	$352,543.65	8%	9%	$415,014	MII MII Assemblies	
	Equipment Fueling																
A2A	Equipment Fueling	624	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$68.46	$68.46	$42,717.67	8%	9%	$50,287	MII MII Assemblies	
	Construction Safety and Traffic Control																
A33A	Barricade and Traffic Control Setup	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$987.96	$987.96	$1,975.92	8%	9%	$2,326	MII MII Assemblies	
M36	3" x 1,000' Yellow Caution Tape	10	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.61	$0.00	$10.61	$106.10	8%	9%	$125	V Vendor Quote	
M37	3" x 1,000' Red Danger Asbestos Haz Tape	10	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.61	$0.00	$10.61	$106.10	8%	9%	$125	V Vendor Quote	
M38	Reflecting Barricade with Light	15	EA	1.00	$0.00	$0.00	$0.00	$0.00	$72.55	$0.00	$72.55	$1,088.25	8%	9%	$1,281	V Vendor Quote	
M39	Orange Safety Fence with Posts	20	CLF	1.00	$0.00	$0.00	$0.00	$0.00	$53.52	$0.00	$53.52	$1,070.40	8%	9%	$1,260	V Vendor Quote	
												TOTAL UNIT COST:			$470,418		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW5b-20

Alternative 5b **Cost Worksheet: CW5b-20**
Capital Cost Sub-Element
Temporary Site Facilitites During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves rental cost for onsite office trailer, storage box, portable toilets, and utilities.

Cost Analysis:
Cost for Temporary Site Facilitites During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Site Trailer/Office																
M58	Site Office Trailer Installation - One Time Cost	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,060.40	$2,060.40	$2,060.40	8%	9%	$2,426	V Vendor Quote	
M59	Trailer Rental and Storage Box	24	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$80.80	$80.80	$1,939.20	8%	9%	$2,283	V Vendor Quote	
M60	Office Furniture	24	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$207.05	$207.05	$4,969.20	8%	9%	$5,850	V Vendor Quote	
M61	Portable Toilets	24	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$368.65	$368.65	$8,847.60	8%	9%	$10,415	V Vendor Quote	
M63	General Office Supplies Allowance	24	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$750.00	$750.00	$18,000.00	0%	0%	$18,000	A Allowance	
M64	Erosion Control Measures Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30,000.00	$30,000.00	$30,000.00	0%	0%	$30,000	A Allowance	
M62	Utilities (Phone, Internet, Electricity)	24	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$156.55	$156.55	$3,757.20	8%	9%	$4,423	V Vendor Quote	
												TOTAL UNIT COST:			$73,397		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Worksheets
Alternative 6

TABLE CW6-1A

Alternative 6 | **Cost Worksheet:** **CW6-1A**

Capital Cost Sub-Element

Excavation Confirmatory Sampling

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:

This sub-element involves intrusive visual inspections (i.e. subsurface inspections within excavations) coupled with ABS analysis would be conducted adjacent to the excavation areas after initial excavation is completed to confirm that contaminated surface materials would be excavated horizontally to the extent they can be detected most conservative ABS scenario (e.g. raking) would be conducted for areas no greater than 40,000 square feet and would be analyzed by TEM Method. Arsenic sampling at the power plant area would be conducted at a frequency of one sample per 2,500 square feet along the bottom and side-walls of the excavation area. The following includes the labor, material and equipment cost, and shipping cost required for the soil sampling.

Cost Analysis:

Cost for Confirmatory Soil Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	45	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$28,840.75	8%	9%	$33,951	MII MII Assemblies	
M56	Per Diem for 2 People	45	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$12,960.00	0%	0%	$12,960	GSA www.gsa.gov	
A4A	Sampling - 2 Person Crew	45	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$35,443.27	8%	9%	$41,724	MII MII Assemblies	
M56	Per Diem for 2 People	45	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$12,960.00	0%	0%	$12,960	GSA www.gsa.gov	
M51	ABS, Sample and Analysis	95	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$891.00	$891.00	$84,645.00	8%	9%	$99,644	P Previous Work	
M52	Equipment/ABS Area/ABS Event	95	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.50	$148.50	$14,107.50	8%	9%	$16,607	P Previous Work	
M66H	Analysis - Arsenic	24	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$26.71	$26.71	$641.04	8%	9%	$755	V Vendor Quote	
												TOTAL UNIT COST:			$218,601		

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote

For citation references, the following sources apply:

MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-1B

Alternative 6 | **Cost Worksheet: CW6-1B**

Capital Cost Sub-Element

Confirmatory Sampling Data Evaluation Report

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the excavation sampling data evaluation report. The following cost includes labor, material and shipping costs for the removal sampling data evaluation report.

Cost Analysis:
Cost for Confirmatory Sampling Data Evaluation Report (Each)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L13	Project Manager	32	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$1,488.96	100%	9%	$3,246	SE SalaryExpert.com	Hours for 1 report
L5	Environmental Engineer	80	HR	1.00	$31.39	$31.39	$0.00	$0.00	$0.00	$0.00	$31.39	$2,511.20	100%	9%	$5,474	SE SalaryExpert.com	Hours for 1 report
L7	Environmental Scientist	120	HR	1.00	$27.87	$27.87	$0.00	$0.00	$0.00	$0.00	$27.87	$3,344.40	100%	9%	$7,291	SE SalaryExpert.com	Hours for 1 report
L14	Quality Control Engineer	16	HR	1.00	$46.04	$46.04	$0.00	$0.00	$0.00	$0.00	$46.04	$736.64	100%	9%	$1,606	SE SalaryExpert.com	Hours for 1 report
L1	CAD Drafter	40	HR	1.00	$25.70	$25.70	$0.00	$0.00	$0.00	$0.00	$25.70	$1,028.00	100%	9%	$2,241	SE SalaryExpert.com	Hours for 1 report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$762.00	100%	9%	$1,661	SE SalaryExpert.com	Hours for 1 report
M11	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,000.00	$1,000.00	$1,000.00	0%	0%	$1,000	A Allowance	
												TOTAL UNIT COST:			$22,519		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-1C

Alternative 6a **Cost Worksheet: CW6-1C**
Capital Cost Sub-Element
Institutional Controls

COST WORKSHEET

Site: North Ridge Estates		**Prepared By:** AS	**Date:** 3/16/2010
Location: Klamath County, Oregon			
Phase: Final Feasibility Study		**Checked By:** GH	**Date:** 3/24/2010
Base Year: 2010			

Work Statement:
This sub-element involves implementation of institutional controls for the site. The following cost includes hours for and document legal procedures to establish and cost for document submission and recording. The cost also includes site survey to establish parcel/site boundaries.

Cost Analysis:
Cost for Institutional Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Institutional Controls for Private Ownership Parcels (27)																
L6	Environmental Lawyer	648	HR	1.00	$71.06	$71.06	$0.00	$0.00	$0.00	$0.00	$71.06	$46,046.88	100%	9%	$100,382	SE SalaryExpert.com	24 hrs per parcel
L15	Paralegal	864	HR	1.00	$37.29	$37.29	$0.00	$0.00	$0.00	$0.00	$37.29	$32,218.56	100%	9%	$70,236	SE SalaryExpert.com	32 hrs per parcel
L3	Clerks, Typist, Bookkeeper & Receptionist	270	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$5,143.50	100%	9%	$11,213	SE SalaryExpert.com	10 hrs per parcel
M11A	Document Submission and Recording Allowance	27	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$135,000.00	0%	0%	$135,000	A Allowance	
	Institutional Controls for Receivership Parcels (29)																
L6	Environmental Lawyer	464	HR	1.00	$71.06	$71.06	$0.00	$0.00	$0.00	$0.00	$71.06	$32,971.84	100%	9%	$71,879	SE SalaryExpert.com	16 hrs per parcel
L15	Paralegal	696	HR	1.00	$37.29	$37.29	$0.00	$0.00	$0.00	$0.00	$37.29	$25,953.84	100%	9%	$56,579	SE SalaryExpert.com	24 hrs per parcel
L3	Clerks, Typist, Bookkeeper & Receptionist	290	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$5,524.50	100%	9%	$12,043	SE SalaryExpert.com	10 hrs per parcel
M11A	Document Submission and Recording Allowance	29	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$145,000.00	0%	0%	$145,000	A Allowance	
A38A	Site Survey - Clean Area	10	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$464.52	$464.52	$4,645.19	8%	9%	$5,468	MII MII Assemblies	needed
M12	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$15,000.00	$15,000.00	$15,000.00	0%	0%	$15,000	A Allowance	
												TOTAL UNIT COST:			$622,800		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW6-1D

Alternative 6b **Cost Worksheet: CW6-1D**
Capital Cost Sub-Element
Access Controls

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cost associated with access controls on the site. Access controls include installation of sign posts along the perimeter of the disturbed area, the onsite repositories, and signage along steam pipe on the east side of Old Fort Road.

Cost Analysis:
Cost for Access Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A31C	Signage Installation - Clean Area	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,585.31	$1,585.31	$1,585.31	8%	9%	$1,866	MII MII Assemblies	
M4A	T-Post, 7' High Steel Post	25	EA	1.00	$0.00	$0.00	$0.00	$0.00	$5.86	$0.00	$5.86	$146.50	8%	9%	$172	V Vendor Quote	Includes wire clips
M9	Signs	25	EA	1.00	$0.00	$0.00	$0.00	$0.00	$99.09	$0.00	$99.09	$2,477.25	8%	9%	$2,916	V Vendor Quote	Assume every 300 FT
												TOTAL UNIT COST:			$4,954		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW6-2A

Alternative 6 **Cost Worksheet: CW6-2A**
Capital Cost Sub-Element
5-Year Site Reviews

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the 5-year site visits and 5-year site review report. The following cost includes labor, material and shipping costs for site visits and 5-year site review reports.

Cost Analysis:
Cost for 5-Year Site Review (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6A	Site Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	1 hour per parcel per site visit, 45 parcels
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
L13	Project Manager	40	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$1,861.20	100%	9%	$4,057	SE SalaryExpert.com	Hours for 5-year review report
L5	Environmental Engineer	80	HR	1.00	$31.39	$31.39	$0.00	$0.00	$0.00	$0.00	$31.39	$2,511.20	100%	9%	$5,474	SE SalaryExpert.com	Hours for 5-year review report
L7	Environmental Scientist	120	HR	1.00	$27.87	$27.87	$0.00	$0.00	$0.00	$0.00	$27.87	$3,344.40	100%	9%	$7,291	SE SalaryExpert.com	Hours for 5-year review report
L14	Quality Control Engineer	16	HR	1.00	$46.04	$46.04	$0.00	$0.00	$0.00	$0.00	$46.04	$736.64	100%	9%	$1,606	SE SalaryExpert.com	Hours for 5-year review report
L1	CAD Drafter	40	HR	1.00	$25.70	$25.70	$0.00	$0.00	$0.00	$0.00	$25.70	$1,028.00	100%	9%	$2,241	SE SalaryExpert.com	Hours for 5-year review report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$19.05	$19.05	$0.00	$0.00	$0.00	$0.00	$19.05	$762.00	100%	9%	$1,661	SE SalaryExpert.com	Hours for 5-year review report
M10A	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$29,042		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-2B

Alternative 6 **Cost Worksheet: CW6-2B**
Capital Cost Sub-Element
Community Awareness Activities

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves setting up a community meeting to inform the local community about the status of site. The following includes the labor, material and other cost required for setting up the community awareness meeting which includes costs for renting a meeting hall, court reporter, and publishing and sending notices or informational flyers.

Cost Analysis:
Cost for Community Awareness Activities (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L12	General Superintendent (P.M.)	16	HR	1.00	$52.74	$52.74	$0.00	$0.00	$0.00	$0.00	$52.74	$843.84	100%	9%	$1,840	SE SalaryExpert.com	
L13	Project Manager	16	HR	1.00	$46.53	$46.53	$0.00	$0.00	$0.00	$0.00	$46.53	$744.48	100%	9%	$1,623	SE SalaryExpert.com	
M56	Per Diem for 2 People	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$576.00	0%	0%	$576	GSA www.gsa.gov	
M65	Community Awareness Activities Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,000.00	$2,000.00	$2,000.00	0%	0%	$2,000	A Allowance	1 event per 5-yr review.
												TOTAL UNIT COST:			$6,039		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-2C

Alternative 6 **Cost Worksheet: CW6-2C**
Capital Cost Sub-Element
Non-Intrusive Visual Inspection

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves non-intrusive visual inspections (i.e. surface inspections) performed in support of 5-year site reviews would be made on all parcels within the site boundary regardless of ownership. The following includes the labor, material and equipment cost inspection.

Cost Analysis:
Cost for Non-Intrusive Visual Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
												TOTAL UNIT COST:			$5,212		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-3A

Alternative 6 | **Cost Worksheet: CW6-3A**
Capital Cost Sub-Element
Borrow Source Testing

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves determining whether asbestos fibers are present in proposed borrow source. Samples would be collected from potential soil borrow areas and analyzed for asbestos and non-asbestos COPCs. Visual inspection and ABS activities would be conducted to determine asbestos contamination. The ABS samples would be analyzed by TEM Method. Non-asbestos contamination would include organic/inorganic analysis for VOCs, SVOCs, PCBs, TPH, herbicides, pesticides, and target analyte list metals. The following includes the labor, material and equipment cost, and shipping cost required for the borrow material sampling.

Cost Analysis:
Cost for Borrow Material Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$3,938.14	8%	9%	$4,636	MII MII Assemblies	
M51	ABS, Sample and Analysis	14	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$891.00	$891.00	$12,474.00	8%	9%	$14,684	P Previous Work	
M52	Equipment/ABS Area/ABS Event	14	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.50	$148.50	$2,079.00	8%	9%	$2,447	P Previous Work	
M53A	Sampling and Other Supplies/ABS Area/ABS Event	14	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$250.00	$250.00	$3,500.00	8%	9%	$4,120	P Previous Work	
M66A	Analysis - Volatile Organic Compounds	14	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$105.78	$105.78	$1,480.92	8%	9%	$1,743	V Vendor Quote	
M66B	Analysis - Semivolatile Organic Compounds	14	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$215.47	$215.47	$3,016.58	8%	9%	$3,551	V Vendor Quote	
M66C	Analysis - Pesticides	14	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$152.79	$152.79	$2,139.06	8%	9%	$2,518	V Vendor Quote	
M66D	Analysis - Herbicides	14	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$132.64	$132.64	$1,856.96	8%	9%	$2,186	V Vendor Quote	
M66E	Analysis - TAL Metals	14	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$129.28	$129.28	$1,809.92	8%	9%	$2,131	V Vendor Quote	
M66F	Analysis - PCBs	14	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$133.20	$133.20	$1,864.80	8%	9%	$2,195	V Vendor Quote	
M66G	Analysis - TPH	14	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$88.43	$88.43	$1,238.02	8%	9%	$1,457	V Vendor Quote	
M54A	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
M53B	Sampling/Other Supplies	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	8%	9%	$1,766	P Previous Work	
												TOTAL UNIT COST:			$46,434		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-3B

Alternative 6 — **Cost Worksheet: CW6-3B**
Capital Cost Sub-Element
Ambient Air Sampling (1 Year)

COST WORKSHEET

Site: North Ridge Estates — **Prepared By:** AS — **Date:** 3/16/2010
Location: Klamath County, Oregon
Phase: Final Feasibility Study — **Checked By:** GH — **Date:** 3/24/2010
Base Year: 2010

Work Statement:
This sub-element involves ambient air sampling and analysis from various locations of the site to assess whether there are current exposure risks from asbestos fibers and non-asbestos COPCs in ambient air. Five locations (TBD) would be selected for sampling and samples would be analyzed for asbestos by TEM Method. The following includes the labor, material and equipment cost, and shipping cost.

Cost Analysis:
Cost for Ambient Air Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$787.63	$787.63	$9,451.54	8%	9%	$11,126	MII MII Assemblies	1 yr, 12 months, 1 sample/month
M56	Per Diem for 2 People	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$3,456.00	0%	0%	$3,456	GSA www.gsa.gov	
M51A	Ambient Air Sample Analysis	60	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$396.00	$396.00	$23,760.00	8%	9%	$27,970	P Previous Work	1 sample/station/month, 5 stations, 12 months
M52A	Sampling Setup (Equipment and Utility)	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,200.00	$4,200.00	$4,200.00	8%	9%	$4,944	P Previous Work	Includes sampling equipments and electrical hook-up
M52B	Equipment/Ambient Air Sampling Event	60	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$150.00	$150.00	$9,000.00	8%	9%	$10,595	P Previous Work	1 sample/station/month, 5 stations, 12 months
M53C	Sampling/Other Supplies/Ambient Air Sampling Event	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	8%	9%	$1,766	P Previous Work	
M54A	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
												TOTAL UNIT COST:			$62,857		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW6-3C

Alternative 6 **Cost Worksheet: CW6-3C**
Capital Cost Sub-Element
Inspection of Areas without Identified Contamination

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves monitoring for areas of the site with no historical or current contamination and would be performed some time during construction. The monitoring would be performed using a tiered approach with intrusive visual inspection (hand dug test pits), followed by ABS to provide a point-in-time determination whether these areas were adversely impacted by contamination. A total of ten locations would be tested.

Cost Analysis:
Cost for Intrusive Visual Inspection and ABS (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
A5A	Sampling - 3 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,179.92	$1,179.92	$5,899.61	8%	9%	$6,945	MII MII Assemblies	
M55	Per Diem for 3 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$432.00	$432.00	$2,160.00	0%	0%	$2,160	GSA www.gsa.gov	
M51	ABS, Sample and Analysis	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$891.00	$891.00	$8,910.00	8%	9%	$10,489	P Previous Work	
M52	Equipment/ABS Area/ABS Event	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.50	$148.50	$1,485.00	8%	9%	$1,748	P Previous Work	
M53A	Sampling and Other Supplies/ABS Area/ABS Event	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$250.00	$250.00	$2,500.00	8%	9%	$2,943	P Previous Work	
M54B	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$30,997		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW6-4A

Alternative 6 **Cost Worksheet: CW6-4A**
Capital Cost Sub-Element
Temporary Laydown and Access Road Installation

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves temporary gravel construction at the site for the gravel laydown area and temporary access roads used to access contaminated areas during construction. It includes costs for material, labor, and equipment.

Cost Analysis:
Cost for Temporary Laydown and Access Road Installation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Gravel Laydown Area																
A18A	Gravel Placement - Clean Area	1,111	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$359.11	8%	9%	$423	MII MII Assemblies	
M43B	Gravel, Delivered	230	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$20.99	$0.00	$20.99	$4,827.70	8%	9%	$5,683	V Vendor Quote	
	Temporary Gravel Access Roads																
A18B	Gravel Placement - Contaminated Area	9,167	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.48	$1.48	$13,609.75	8%	9%	$16,021	MII MII Assemblies	Assume 1 mile road, 15 ft wide
M43B	Gravel, Delivered	1,725	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$20.99	$0.00	$20.99	$36,207.75	8%	9%	$42,624	V Vendor Quote	
												TOTAL UNIT COST:			$64,751		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-4B

Alternative 6 **Cost Worksheet: CW6-4B**
Capital Cost Sub-Element
Site Clearing and Grubbing

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves site clearing and grubbing of the contaminated area. It includes costs for labor, equipment and materials. All the cleared and grubbed material will be chipped in-place.

Cost Analysis:
Cost for Site Clearing and Grubbing (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A32A	Clearing and Grubbing	14	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$9,136.35	$9,136.35	$127,908.88	8%	9%	$150,574	MII MII Assemblies	
												TOTAL UNIT COST:			$150,574		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-5

Alternative 6 **Cost Worksheet: CW6-5**
Capital Cost Sub-Element
Contaminated Surface Materials Excavation

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the excavation of contaminated surface materials for offsite disposal. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Contaminated Surface Materials Excavation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A9A	Excavation/Loading - Surficial Contaminatec Materials	54,200	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.99	$8.99	$487,203.80	8%	9%	$573,536	MII MII Assemblies	
												TOTAL UNIT COST:			$573,536		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-6

Alternative 6 **Cost Worksheet: CW6-6**
Capital Cost Sub-Element
Steam Pipe Excavation

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the excavation and segmentation of steam pipe for offsite disposal. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Steam Pipe Excavation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A8A	Excavation/Loading - Steam Pipe	9,471	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10.49	$10.49	$99,387.73	8%	9%	$116,999	MII MII Assemblies	
A27A	Steam Pipe Segmentation	14,125	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$16.00	$16.00	$225,977.40	8%	9%	$266,021	MII MII Assemblies	
												TOTAL UNIT COST:			$383,020		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-7

Alternative 6 **Cost Worksheet: CW6-7**
Capital Cost Sub-Element
Buried Contaminated Materials Excavation

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the excavation of buried contaminated materials for offsite disposal. This work also includes installation of sheet piling to provide stability to the area surrounding the excavation. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Buried Contaminated Materials Excavation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A8B	Materials	57,671	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10.49	$10.49	$605,193.71	8%	9%	$712,434	MII MII Assemblies	
A36A	Sheet Piling	4,095	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$35.36	$35.36	$144,799.61	8%	9%	$170,458	MII MII Assemblies	
												TOTAL UNIT COST:			$882,892		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-8A

Alternative 6 **Cost Worksheet: CW6-8A**
Capital Cost Sub-Element
Hauling of Contaminated Materials for Offsite Disposal

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves hauling of excavated contaminated materials for offiste disposal at an permitted disposal facility. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Hauling of Contaminated Materials for Offsite Disposal (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A26E	Facility	139,544	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$19.26	$19.26	$2,687,715.12	8%	9%	$3,163,978	MII MII Assemblies	
												TOTAL UNIT COST:			$3,163,978		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-8B

Alternative 6 **Cost Worksheet: CW6-8B**
Capital Cost Sub-Element
Disposal Charges for Permitted Facility

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the disposal charges for the permitted facility.

Cost Analysis:
Cost for Disposal Charges for Permitted Facility (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
S2D	Permitted Authorized Disposal Facility Charges	186,744	TN	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$52.52	$52.52	$9,807,794.88	8%	9%	$11,545,736	V Vendor Quote	Lowest unit cost of disposal fees for 3 Oregon Permitted Authorized Disposal Facilities
												TOTAL UNIT COST:			$11,545,736		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-9

Alternative 6 — **Cost Worksheet: CW6-9**
Capital Cost Sub-Element
Excavation Backfilling

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves backfilling of excavations. The backfill would include a subsoil layer placed below a topsoil layer and organic amendment of the topsoil. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Excavation Backfilling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Clean Fill/Soil from Near Offsite Borrow Source																
A10A	Excavation - Borrow Source	62,406	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$132,993.43	8%	9%	$156,560	MII MII Assemblies	
A14A	Material Loading - Clean Fill	71,768	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$23,195.42	8%	9%	$27,306	MII MII Assemblies	
A23B	Hauling - Near Offsite Borrow Source	71,768	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.12	$2.12	$152,219.93	8%	9%	$179,193	MII MII Assemblies	
	Clean Fill/Soil from Distant Offsite Borrow Source																
A10A	Excavation - Borrow Source	62,406	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.13	$2.13	$132,993.43	8%	9%	$156,560	MII MII Assemblies	
A14A	Material Loading - Clean Fill	71,768	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.32	$23,195.42	8%	9%	$27,306	MII MII Assemblies	
A23A	Hauling - Distant Offsite Borrow Source	71,768	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.82	$2.82	$202,235.05	8%	9%	$238,071	MII MII Assemblies	
M49	Assumed Royalty Allowance for Soil	71,768	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.00	$3.00	$215,304.00	0%	0%	$215,304	A Allowance	
	Subsoil Replacement and Compaction																
A13A	Clean Fill Spreading/Grading	67,170	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.68	$2.68	$179,780.51	8%	9%	$211,638	MII MII Assemblies	
A21A	Clean Fill Compaction - Large Open Area	60,453	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$10,990.36	8%	9%	$12,938	MII MII Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	6,717	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.24	$2.24	$15,060.86	8%	9%	$17,730	MII MII Assemblies	Assume 10% of total fill
	Topsoil Replacement and Compaction																
A13B	Top Soil Spreading/Grading	76,365	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.68	$2.68	$204,390.92	8%	9%	$240,609	MII MII Assemblies	
A21A	Clean Fill Compaction - Large Open Area	68,729	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$12,494.84	8%	9%	$14,709	MII MII Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	7,637	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.24	$2.24	$17,122.56	8%	9%	$20,157	MII MII Assemblies	Assume 10% of total fill
	Organic Material for Topsoil Amendment																
A39B	Organic Delivery	2,100	TN	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.65	$8.65	$18,155.76	8%	9%	$21,373	MII MII Assemblies	
A40A	Organic Amendment and Processing	89	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,082.08	$1,082.08	$96,305.45	8%	9%	$113,371	MII MII Assemblies	
M25	Organic Material	2,100	TN	1.00	$0.00	$0.00	$0.00	$0.00	$25.25	$0.00	$25.25	$53,025.00	8%	9%	$62,421	V Vendor Quote	
												TOTAL UNIT COST:			$1,715,246		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:

FACTOR:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-10

Alternative 6 **Cost Worksheet: CW6-10**
Capital Cost Sub-Element
Revegetation of Disturbed Areas

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the revegetation of disturbed areas on the site. It includes hydro-seeding with fertilizer and hydomulch.

Cost Analysis:
Cost for Revegetation of Disturbed Areas (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Hydroseeding/Revegetation																
A30A	Hydro-Seeding Crew	89	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$113.57	$113.57	$10,108.13	8%	9%	$11,899	MII MII Assemblies	
M16	Seed Mix	8,900	LB	1.00	$0.00	$0.00	$0.00	$0.00	$2.02	$0.00	$2.02	$17,978.00	8%	9%	$21,164	V Vendor Quote	
M18A	Fertilizer (N2)	5,900	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.30	$0.00	$0.30	$1,770.00	8%	9%	$2,084	V Vendor Quote	
M18B	Fertilizer (P2O5)	9,700	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.23	$0.00	$0.23	$2,231.00	8%	9%	$2,626	V Vendor Quote	
M20	Hydomulching	267,000	LB	1.00	$0.00	$0.00	$0.00	$0.00	$0.27	$0.27	$0.54	$144,180.00	8%	9%	$169,729	P Previous Work	
												TOTAL UNIT COST:			$207,502		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW6-11

Alternative 6 **Cost Worksheet: CW6-11**
Capital Cost Sub-Element
Mobilization/Demobilization

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves mobilization and demobilization of all the required equipment to and from the site respectively.

Cost Analysis:
Cost for Mobilization/Demobilization (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A37A	Mobilization and Demobilization - Heavy Equipment	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,384.82	$2,384.82	$23,848.22	8%	9%	$28,074	MII MII Assemblies	
A37B	Mobilization and Demobilization - Medium-Sized Equipment	6	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$974.68	$974.68	$5,848.08	8%	9%	$6,884	MII MII Assemblies	
A37C	Mobilization and Demobilization - Small Equipment	5	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$605.12	$605.12	$3,025.61	8%	9%	$3,562	MII MII Assemblies	
A37D	Mobilization and Demobilization - Self-Propelled Equipment	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,469.12	$2,469.12	$24,691.17	8%	9%	$29,066	MII MII Assemblies	
												TOTAL UNIT COST:			$67,586		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-12

Alternative 6 — **Cost Worksheet: CW6-12**
Capital Cost Sub-Element
Surveying for Construction Control

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves cost for site surveying before and after the remedial alternative is implemented.

Cost Analysis:
Cost for Surveying for Construction Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A38B	Site Survey - Contaminated Area	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,002.24	$1,002.24	$12,026.92	8%	9%	$14,158	MII MII Assemblies	Assume 4 acres/day
A38A	Site Survey - Clean Area	8	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$464.52	$464.52	$3,716.15	8%	9%	$4,375	MII MII Assemblies	Assume 6 acres/day
M12A	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
												TOTAL UNIT COST:			$23,533		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW6-13

Alternative 6 **Cost Worksheet:** **CW6-13**
Capital Cost Sub-Element
Equipment Decontamination

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves decontamination of equipment used onsite.

Cost Analysis:
Cost for Equipment Decontamination (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Equipment Decon/Washing																
A3A	Equipment Decon/Washing	624	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$168.44	$168.44	$105,105.12	8%	9%	$123,730	MII MII Assemblies	Assume 8 months/yr, 3 yrs
M46	Poly Tank, 5,300 Gal	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$2,250.24	$0.00	$2,250.24	$2,250.24	8%	9%	$2,649	V Vendor Quote	
M47	Wash Rack w/ Solids Filtration Unit, Closed Loop	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$55,655.04	$0.00	$55,655.04	$55,655.04	8%	9%	$65,517	V Vendor Quote	
												TOTAL UNIT COST:			$191,896		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-14

Alternative 6 **Cost Worksheet: CW6-14**
Capital Cost Sub-Element
Site Maintenance and Control During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves site maintenance during construction. The annual costs for site maintenance during construction include labor, material, and equipment.

Cost Analysis:
Cost for Site Maintenance and Control During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Dust Control																
A1A	Dust Control/Washing	624	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$564.97	$564.97	$352,543.65	8%	9%	$415,014	MII MII Assemblies	
	Equipment Fueling																
A2A	Equipment Fueling	624	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$68.46	$68.46	$42,717.67	8%	9%	$50,287	MII MII Assemblies	
	Construction Safety and Traffic Control																
A33A	Barricade and Traffic Control Setup	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$987.96	$987.96	$1,975.92	8%	9%	$2,326	MII MII Assemblies	
M36	3" x 1,000' Yellow Caution Tape	10	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.61	$0.00	$10.61	$106.10	8%	9%	$125	V Vendor Quote	
M37	3" x 1,000' Red Danger Asbestos Haz Tape	10	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.61	$0.00	$10.61	$106.10	8%	9%	$125	V Vendor Quote	
M38	Reflecting Barricade with Light	15	EA	1.00	$0.00	$0.00	$0.00	$0.00	$72.55	$0.00	$72.55	$1,088.25	8%	9%	$1,281	V Vendor Quote	
M39	Orange Safety Fence with Posts	20	CLF	1.00	$0.00	$0.00	$0.00	$0.00	$53.52	$0.00	$53.52	$1,070.40	8%	9%	$1,260	V Vendor Quote	
												TOTAL UNIT COST:			$470,418		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-15

Alternative 6 **Cost Worksheet: CW6-15**
Capital Cost Sub-Element
Temporary Site Facilitites During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves rental cost for onsite office trailer, storage box, portable toilets, and utilities.

Cost Analysis:
Cost for Temporary Site Facilitites During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Site Trailer/Office																
M58	Site Office Trailer Installation - One Time Cost	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,060.40	$2,060.40	$2,060.40	8%	9%	$2,426	V Vendor Quote	
M59	Trailer Rental and Storage Box	24.0	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$80.80	$80.80	$1,939.20	8%	9%	$2,283	V Vendor Quote	
M60	Office Furniture	24.0	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$207.05	$207.05	$4,969.20	8%	9%	$5,850	V Vendor Quote	
M61	Portable Toilets	24.0	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$368.65	$368.65	$8,847.60	8%	9%	$10,415	V Vendor Quote	
M63	General Office Supplies Allowance	24.0	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$750.00	$750.00	$18,000.00	0%	0%	$18,000	A Allowance	
M64	Erosion Control Measures Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30,000.00	$30,000.00	$30,000.00	0%	0%	$30,000	A Allowance	
M62	Utilities (Phone, Internet, Electricity)	24.0	MO	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$156.55	$156.55	$3,757.20	8%	9%	$4,423	V Vendor Quote	
												TOTAL UNIT COST:			$73,397		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-16A

Alternative 6 **Cost Worksheet: CW6-16A**
Capital Cost Sub-Element
Cover, Backfill, and Access Controls O&M During Construction

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cover, backfill, and access controls O&M pertaining to the covered/backfilled areas during construction. It includes costs for on-site labor, equipment, materials and allowances for maintaining the cover and signage.

Cost Analysis:
Cost for Backfilled Area and Site O&M (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7C	Backfilled Area Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$530.94	$530.94	$6,371.24	8%	9%	$7,500	MII MII Assemblies	
M22B	O&M Allowance	30	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$100.00	$100.00	$2,966.67	0%	0%	$2,967	A Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
												TOTAL UNIT COST:			$10,467		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-16B

Alternative 6 **Cost Worksheet: CW6-16B**
Capital Cost Sub-Element
Cover, Backfill, and Access Controls O&M

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves the cover, backfill, and access controls O&M pertaining to the covered/backfilled areas. It includes costs for on-site labor, equipment, materials and allowances for maintaining the cover, backfill, and signage.

Cost Analysis:
Cost for Cover, Backfill, and Access Controls O&M (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7C	Backfilled Area Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$530.94	$530.94	$6,371.24	8%	9%	$7,500	MII MII Assemblies	
M22B	O&M Allowance	89	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$100.00	$100.00	$8,900.00	0%	0%	$8,900	A Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
												TOTAL UNIT COST:			$16,400		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW6-16C

Alternative 6 **Cost Worksheet: CW6-16C**
Capital Cost Sub-Element
Cover and Backfill Inspection

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This sub-element involves monitoring protocol for covered portions of privately owned and receiver-managed parcels would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers and backfill. The following includes the labor, material and equipment costs for inspection.

Cost Analysis:
Cost for Cover and Backfill Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6B	Visual Inspection - 2 Person Crew	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$640.91	$640.91	$3,204.53	8%	9%	$3,772	MII MII Assemblies	
M56	Per Diem for 2 People	5	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$288.00	$288.00	$1,440.00	0%	0%	$1,440	GSA www.gsa.gov	
												TOTAL UNIT COST:			$5,212		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:
MII (MII Assemblies), GSA (www.gsa.gov), SE (www.salaryexpert.com), A (Allowance), V (Vendor Quote), CW09 (Means CostWorks 2009), P (Previous Work), and FRTR (www.frtr.gov)

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 1.13 is used for Oregon, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Calculations

TABLE CA-3-1

Alternative 3
Calculation Worksheet
Required Materials Input Calculations

COST WORKSHEET

Site:	North Ridge Estates	**Prepared By:** AS	**Date:** 3/16/2010
Location:	Klamath County, Oregon		
Phase:	Final Feasibility Study	**Checked By:** GH	**Date:** 3/24/2010
Base Year:	2010		

Work Statement:
The spreadsheet also allow the user to change the amendment rates of the soil materials, quantities of earthwork and period of construction. Changes to the input fields on this calculation sheet will also change the quantities and types of materials for amendment of soils and cover construction, revegetation, and the resulting capital costs.

Signage	
Number of Warning Sings Required (EA)	69
Number of Signage over Steam Pipe (EA)	9
Total Number of Signage (EA)	**78**

Notes:
1. Warning signs placed at intervals of 300 ft or less along perimeter.

Temporary Gravel Construction	Length (FT)	Width (FT)	Thickness (IN)
Gravel Laydown Area	100	100	6.0

Number Borrow Area Samples (1/10,000 CY)
20

In-Place Capping/Cover	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Soil Required:	4,537,600	168,060	193,269
Total Common Backfill Required:	3,403,200	126,045	144,952
Total Topsoil Required:	1,134,400	42,015	48,318

Amendment Components	Amendment Rate (tons per acre-FT)	Application Rate (pounds per acre)
Compost for Topsoil Amendment	50	
Nitrogen Fertilizer for Topsoil Amendment		65
Phosphorus Fertilizer for Topsoil Amendment		
Hydromulching		3,000
Seed Mix for Topsoil Areas		100

109

Soil for Cover	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Soil Required from **Near Offsite Borrow**	2,268,800	84,030	96,635
Total Soil Required from **Distant Offsite Borrow**	2,268,800	84,030	96,635

Clearing and Grubbing	SF	Acre	Reduced (50%) Acre
Clearing and Grubbing [1]	602,375	14	7.0

Soil Cover	Area (SF)	Area (SY)	Area (ACR)
Total Surface Area to be Covered	2,268,800	252,089	53.0

Borrow Materials Assumptions		
Expansion Factor	1.15	
Cover Reduction	50%	
Cover - CY/Day	750	
Borrow Source - Near Offsite vs. Distant Offsite	50%	50%

Estimated Duration of the Project		
Number of Years to Complete:	1.3	years
Number of Months (April 1 to Nov 30):	10.0	months
4 Days off per month in 30 days months:	26	per month
Number of working days (500 cy/day)	258	days
Total number of working days:	258	days

Interior House Cleaning	
Number of Houses, (EA) [A]	24
Number of Residents per House, Assumed, (EA)	2
Number of Days Required for Cleaning, (DY)	5

Notes:
[A] Private developed parcels with houses within the site boundary, includes 3 apartment houses

Notes:
[1] Since the location of the remedy is undetermined, same percentage of in-place cover was used to calculate the clearing and grubbing area.
Input fields are denoted by a dashed line. Do not overwrite information not contained within the dashed lines.

TABLE CA-3-2

Alternative 3
Calculation Worksheet
Required Materials Output Calculations

COST WORKSHEET

Site: North Ridge Estates		**Prepared By:** AS	**Date:** 3/16/2010
Location: Klamath County, Oregon			
Phase: Final Feasibility Study		**Checked By:** GH	**Date:** 3/24/2010
Base Year: 2010			

Work Statement:
This calculation output sheet allows the user to calculate the volumes of various material required for cover construction, temporary access road and other material. Changes to the input fields on this calculation sheet will also change the quantities and types of materials for amendment of soils cover construction, revegetation, and the resulting capital costs.

Remedy Components	Seed Mix for Topsoil Areas (Pounds)	Nitrogen Fertilizer for Topsoil Areas (Pounds)	Phosphorus Fertilizer for Topsoil Areas (Pounds)	Hydromulching for Topsoil Areas (Pounds)	Compost for Topsoil Amendment (Tons)
In-Place Capping/Cover	5,300	3,500	5,800	159,000	1,400

Temporary Access Road Construction Components	Surface Area (SY)	Volume of Gravel (BCY)	Volume of Gravel (LCY)	Weight of Gravel (Ton)
Gravel Laydown Area	1,111	200	230	**334**

TABLE CA-4-1

Alternative 4
Calculation Worksheet
Required Materials Input Calculations

COST WORKSHEET

Site:	North Ridge Estates	**Prepared By:** AS	**Date:** 3/16/2010
Location:	Klamath County, Oregon		
Phase:	Final Feasibility Study	**Checked By:** GH	**Date:** 3/24/2010
Base Year:	2010		

Work Statement:
The spreadsheet also allow the user to change the amendment rates of the soil materials, quantities of earthwork, and period of construction. Changes to the input fields on this calculation sheet will also change the quantities and types of materials for amendment of soils and cover construction and revegetation and the resulting capital costs.

Signage	
Number of Signage over Steam Pipe (EA)	25
Total Number of Signage (EA)	**25**

Notes:
1. Warning signs placed at intervals of 300 ft or less along fenceline.

Amendment Components	Amendment Rate (tons per acre-FT)	Application Rate (pounds per acre)
Compost for Topsoil Amendment	50	
Nitrogen Fertilizer for Topsoil Amendment		65
Phosphorus Fertilizer for Topsoil Amendment	109	
Hydromulching	3,000	
Seed Mix for Topsoil Areas		100

In-Place Capping/Cover	Area (SF)	Area (SY)	Area (ACR)
Total Surface Area to be Covered	3,799,400	422,156	88

Borrow Materials Assumptions		
Expansion Factor	1.15	
Cover - CY/Day	750	
Borrow Source - Near Offsite vs. Distant Offsite	50%	50%

Temporary Gravel Construction	Length (FT)	Width (FT)	Thickness (IN)
Gravel Laydown Area	100	100	6.0

In-Place Capping/Cover	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Soil Required:	7,505,000	277,963	319,658
Total Common Backfill Required:	5,605,300	207,604	238,745
Total Topsoil Required:	1,899,700	70,360	80,914

Soil for Cover	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Soil Required from **Near Offsite Borrow**	3,752,500	138,982	159,829
Total Soil Required from **Distant Offsite Borrow**	3,752,500	138,982	159,829

Clearing and Grubbing	SF	Acre
Clearing and Grubbing	602,375	14

Estimated Duration of the Project		
Number of Years to Complete:	2	years
Number of Months (April 1 to Nov 30):	16.5	months
4 Days off per month in 30 days months:	26	per month
Number of working days (750 cy/day)	427	days
Total number of working days:	427	days

Number Borrow Area Samples (1/10,000 CY)
32

Notes:
Input fields are denoted by a dashed line. Do not overwrite information not contained within the dashed lines.

TABLE CA-4-2

Alternative 4
Calculation Worksheet
Required Materials Output Calculations

COST WORKSHEET

Site: North Ridge Estates
Location: Klamath County, Oregon
Phase: Final Feasibility Study
Base Year: 2010

Prepared By: AS **Date:** 3/16/2010
Checked By: GH **Date:** 3/24/2010

Work Statement:
This calculation output sheet allows the user to calculate the volumes of various material required for cover construction, access road and other material. Changes to the input fields on this calculation sheet will also change the quantities and types of materials for amendment of soils cover construction, revegetation, and the resulting capital costs.

Remedy Components	Seed Mix for Topsoil Areas (Pounds)	Nitrogen Fertilizer for Topsoil Areas (Pounds)	Phosphorus Fertilizer for Topsoil Areas (Pounds)	Hydromulching for Topsoil Areas (Pounds)	Compost for Topsoil Amendment (Tons)
In-Place Capping/Cover	8,800	5,800	9,600	264,000	2,200

Access Road Construction Components	Surface Area (SY)	Volume of Gravel (BCY)	Volume of Gravel (LCY)	Weight of Gravel (Ton)
Gravel Laydown Area	1,111	200	230	**334**

TABLE CA-5a-1

Alternative 5a
Calculation Worksheet
Required Materials Input Calculations

COST WORKSHEET

Site:	North Ridge Estates	**Prepared By:** AS	**Date:** 3/16/2010
Location:	Klamath County, Oregon		
Phase:	Final Feasibility Study	**Checked By:** GH	**Date:** 3/24/2010
Base Year:	2010		

Work Statement:
The spreadsheet also allow the user to change the amendment rates of the soil materials, quantities of earthwork, and period of construction. Changes to the input fields on this calculation sheet will also change the quantities and types of materials for amendment of soils, cover and backfill construction, revegetation, and the resulting capital costs.

Signage	Offset Distance (FT)	Total Perimeter or Length (FT)
Consolidation Area 1	50	2,700
Number of Warning Sings Required (EA)		10
Number of Signage over Steam Pipe (EA)		15
Total Number of Signage (EA)		**25**

Notes:

1. Warning signs placed at intervals of 300 ft or less along perimeter.

Amendment Components	Amendment Rate (tons per acre-FT)	Application Rate (pounds per acre)
Compost for Topsoil Amendment	50	
Nitrogen Fertilizer for Topsoil Amendment		65
Phosphorus Fertilizer for Topsoil Amendment		
Hydromulching		3,000
Seed Mix for Topsoil Areas		100

Contaminated Surface Materials Area	Area (SF)	Area (SY)	Area (ACR)
Contaminated Surface Materials Excavation Area	2,987,200	331,912	69
Buried Contaminated Materials Excavation Area	505,000	56,112	12
Total	3,492,200	388,023	81
Total Surface Area of Consolidation Area	310,494	34,500	8

Contaminated Surface Materials Volume	Volume (BCF)	Volume (BCY)	Volume (LCY)
Contaminated Surface Materials Volume	1,344,000	49,778	57,245
Buried Contaminated Materials Volume	932,300	34,530	39,710

Borrow Materials Assumptions		
Expansion Factor	1.15	
Borrow Source - Near Offsite vs. Distant Offsite	50%	50%

Temporary Gravel Construction	Length (FT)	Width (FT)	Thickness (IN)
Gravel Road Base - Temporary Access Road	5,500	15	6.0
Gravel Laydown Area	100	100	6.0

Consolidation/Landfill Area	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Excavated Soil:	2,276,300	84,308	96,955
Total Common Fill (Active Landfills):	569,075	21,077	24,239
Total Common Fill (Inactive Landfills):	620,989	23,000	26,450
Total Common Fill:	**1,190,064**	**44,077**	**50,689**
Total Topsoil (Inactive Landfills):	155,247	5,750	6,613

Soil for Cover for Consolidation/Landfill Area	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Soil Required from **Near Offsite Borrow**	672,656	24,914	28,651
Total Soil Required from **Distant Offsite Borrow**	672,656	24,914	28,651

Excavated Area/Full Site	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Excavated Soil:	2,276,300	84,308	96,955
Total Common Backfill Required:	739,600	27,393	31,502
Total Topsoil Required:	1,630,600	60,393	69,452

Soil for Backfilled Area	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Soil Required from **Near Offsite Borrow**	1,185,100	43,893	50,477
Total Soil Required from **Distant Offsite Borrow**	1,185,100	43,893	50,477

ABS Sampling	
Sample Density (SF)	40,000
Total Number of Samples	87

Arsenic Sampling at Power Plant	
Sample Density (SF)	2,500
Total Number of Samples	24

Clearing and Grubbing	SF	Acre
Clearing and Grubbing	602,375	14

Number Borrow Area Samples (1/10,000 CY)
16

Notes:
Input fields are denoted by a dashed line. Do not overwrite information not contained within the dashed lines.

TABLE CA-5a-2

Alternative 5a
Calculation Worksheet
Required Materials Output Calculations

COST WORKSHEET

Site:	North Ridge Estates	**Prepared By:** AS	**Date:** 3/16/2010
Location:	Klamath County, Oregon		
Phase:	Final Feasibility Study	**Checked By:** GH	**Date:** 3/24/2010
Base Year:	2010		

Work Statement:
This calculation output sheet allows the user to calculate the volumes of various material required for cover and backfill construction, temporary access roads, and other materials. Changes to the input fields on this calculation sheet will also change the quantities and types of materials for amendment of soils cover construction, reclamation and the resulting capital costs.

Remedy Components	Seed Mix for Topsoil Areas (Pounds)	Nitrogen Fertilizer for Topsoil Areas (Pounds)	Phosphorus Fertilizer for Topsoil Areas (Pounds)	Hydromulching for Topsoil Areas (Pounds)	Compost for Topsoil Amendment (Tons)
Consolidation/Landfill Area	800	500	900	24,000	200
Excavated Area/Full Site	8,100	5,300	8,900	243,000	1,900

Temporary Access Road Construction Components	Surface Area (SY)	Volume of Gravel (BCY)	Volume of Gravel (LCY)	Weight of Gravel (Ton)
Gravel Road Base - Temporary Access Road	9,167	1,500	1,725	**2,502**
Gravel Laydown Area	1,112	200	230	**334**

Estimated Offsite Landfill Disposal			
Assumed Density for ACM (LB/CF)	114		
Total Weight of ACM Excavated (LB) - Yr 1 to 10	21,803	**Total Weight of ACM (TN)**	**11**
Total Weight of ACM Excavated (LB) - Yr 11 to 20	13,253	**Total Weight of ACM (TN)**	**7**
Total Weight of ACM Excavated (LB) - Yr 21 to 30	4,703	**Total Weight of ACM (TN)**	**3**

TABLE CA-5b-1

Alternative 5b
Calculation Worksheet
Required Materials Input Calculations

COST WORKSHEET

Site:	North Ridge Estates	**Prepared By:**	AS	**Date:**	3/16/2010
Location:	Klamath County, Oregon				
Phase:	Final Feasibility Study	**Checked By:**	GH	**Date:**	3/24/2010
Base Year:	2010				

Work Statement:
The spreadsheet also allow the user to change the amendment rates of the soil materials, quantities of earthwork, and period of construction. Changes to the input fields on this calculation sheet will also change the quantities and types of materials for amendment of soils, cover and backfill construction, revegetation, and the resulting capital costs.

Signage	Offset Distance (FT)	Total Perimeter or Length (FT)
Consolidation Area 1	50	2,700
Number of Warning Sings Required (EA)		10
Number of Signage over Steam Pipe (EA)		15
Total Number of Signage (EA)		**25**

Notes:

1. Warning signs placed at intervals of 300 ft or less along fenceline.

Amendment Components	Amendment Rate (tons per acre-FT)	Application Rate (pounds per acre)
Compost for Topsoil Amendment	50	
Nitrogen Fertilizer for Topsoil Amendment		
Phosphorus Fertilizer for Topsoil Amendment		
Hydromulching	3,000	
Seed Mix for Topsoil Areas		100

65

100

Contaminated Surface Materials Area	Area (SF)	Area (SY)	Area (ACR)
Contaminated Surface Materials Excavation Area	2,987,200	331,912	69
Buried Contaminated Materials Excavation Area	505,000	56,112	12
Pipe Insulation Excavation Area	37,100	4,123	1
Total	3,529,300	392,145	82
Total Surface Area of Landfill	311,992	34,666	8

Contaminated Surface Materials Volume	Volume (BCF)	Volume (BCY)	Volume (LCY)
Contaminated Surface Materials	1,344,000	49,778	57,245
Buried Contaminated Materials Volume	1,487,800	55,104	63,370
Pipe Insulation Excavation Volume	227,500	8,426	9,690
Total Length of Pipe	14,125		

Borrow Materials Assumptions		
Expansion Factor	1.15	
Borrow Source - Near Offsite vs. Distant Offsite	50%	50%

Temporary Gravel Construction	Length (FT)	Width (FT)	Thickness (IN)
Gravel Road Base - Temporary Access Road	5,500	15	6.0
Gravel Laydown Area	100	100	6.0

Consolidation/Landfill Area	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Excavated Soil:	3,059,300	113,308	130,305
Total Common Fill (Active Landfills):	764,800	28,326	32,575
Total Common Fill (Inactive Landfills):	623,984	23,111	26,578
Total Common Fill:	**1,388,784**	**51,437**	**59,153**
Total Topsoil (Inactive Landfills):	155,996	5,778	6,645

Soil for Cover for Consolidation/Landfill Area	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Soil Required from **Near Offsite**	772,390	28,608	32,899
Total Soil Required from **Distant Offsite Borrow**	772,390	28,608	32,899

Excavated Area/Full Site	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Excavated Soil:	3,059,300	113,308	130,305
Total Common Backfill Required:	1,496,500	55,426	63,740
Total Topsoil Required:	1,656,700	61,360	70,564

Soil for Backfilled Area	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Soil Required from **Near Offsite Borrow**	1,576,600	58,393	67,152
Total Soil Required from **Distant Offsite Borrow**	1,576,600	58,393	67,152

ABS Sampling	
Sample Density (SF)	40,000
Total Number of Samples	88

Arsenic Sampling at Power Plant	
Sample Density (SF)	2,500
Total Number of Samples	24

Clearing and Grubbing	SF	Acre
Clearing and Grubbing	602,375	14

Sheet Piling - Length (FT)	Depth (FT)	Area (SF)
273	15	4,095

Number Borrow Area Samples (1/10,000 CY)
21

Notes:
Input fields are denoted by a dashed line. Do not overwrite information not contained within the dashed lines.

TABLE CA-5b-2

Alternative 5b
Calculation Worksheet
Required Materials Output Calculations

COST WORKSHEET

Site:	North Ridge Estates	**Prepared By:** AS	**Date:** 3/16/2010
Location:	Klamath County, Oregon		
Phase:	Final Feasibility Study	**Checked By:** GH	**Date:** 3/24/2010
Base Year:	2010		

Work Statement:
This calculation output sheet allows the user to calculate the volumes of various material required for cover construction, access road and other material. Changes to the input fields on this calculation sheet will also change the quantities and types of materials for amendment of soils, cover and backfill construction, revegetation, and the resulting capital costs.

Remedy Components	Seed Mix for Topsoil Areas (Pounds)	Nitrogen Fertilizer for Topsoil Areas (Pounds)	Phosphorus Fertilizer for Topsoil Areas (Pounds)	Hydromulching for Topsoil Areas (Pounds)	Compost for Topsoil Amendment (Tons)
Consolidation/Landfill Area	800	500	900	24,000	200
Excavated Area/Full Site	8,200	5,400	9,000	246,000	1,900

Temporary Access Road Construction Components	Surface Area (SY)	Volume of Gravel (BCY)	Volume of Gravel (LCY)	Weight of Gravel (Ton)
Gravel Road Base - Temporary Access Road	9,167	1,500	1,725	**2,502**
Gravel Laydown Area	1,112	200	230	**334**

TABLE CA-6-1

Alternative 6
Calculation Worksheet
Required Materials Input Calculations

COST WORKSHEET

Site:	North Ridge Estates	**Prepared By:** AS	**Date:** 3/16/2010
Location:	Klamath County, Oregon		
Phase:	Final Feasibility Study	**Checked By:** GH	**Date:** 3/24/2010
Base Year:	2010		

Work Statement:
The spreadsheet also allow the user to change the amendment rates of the soil materials, quantities of earthwork, and period of construction. Changes to the input fields on this calculation sheet will also change the quantities and types of materials for amendment of soils, cover and backfill construction, revegetation, and the resulting capital costs.

Signage	
Number of Signage over Steam Pipe (EA)	25
Total Number of Signage (EA)	**25**

Notes:

1. Warning signs placed at intervals of 300 ft or less along steam pipe.

Amendment Components	Amendment Rate (tons per acre-FT)	Application Rate (pounds per acre)
Compost for Topsoil Amendment	50	
Nitrogen Fertilizer for Topsoil Amendment		65
Phosphorus Fertilizer for Topsoil Amendment		109
Hydromulching		3,000
Seed Mix for Topsoil Areas		100

Contaminated Surface Materials Area	Area (SF)	Area (SY)	Area (ACR)
Contaminated Surface Materials Excavation Area	3,226,000	358,445	75
Buried Contaminated Materials Excavation Area	531,800	59,089	13
Pipe Insulation Excavation Area	42,400	4,712	1
Total	3,800,200	422,245	89

Contaminated Surface Materials Volume	Volume (BCF)	Volume (BCY)	Volume (LCY)
Contaminated Surface Materials Volume	1,463,400	54,200	62,330
Buried Contaminated Materials Volume	1,557,100	57,671	66,322
Pipe Insulation Excavation Volume	255,700	9,471	10,892
Total Length of Pipe	14,125		

Borrow Materials Assumptions		
Expansion Factor	1.15	
Borrow Source - Near Offsite vs. Distant Offsite	50%	50%

Temporary Gravel Construction	Length (FT)	Width (FT)	Thickness (IN)
Gravel Road Base - Temporary Access Road	5,500	15	6.0
Gravel Laydown Area	100	100	6.0

Excavated Area/Full Site	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Excavated Soil:	3,276,200	121,341	139,543
Total Common Backfill Required:	1,577,000	58,408	67,170
Total Topsoil Required:	1,792,900	66,404	76,365

Soil for Backfilled Area	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Soil Required from **Near Offsite Borrow**	1,684,950	62,406	71,768
Total Soil Required from **Distant Offsite Borrow**	1,684,950	62,406	71,768

Sheet Piling - Length (FT)	Depth (FT)	Area (SF)
273	15	4,095

Estimated Duration of the Project		
Number of Years to Complete:	3	years
Work from April 1 until November 30:	8	months
4 Days off per month in 30 days months:	26	per month
Number of working days:	208	days
Total number of working days:	624	days

Number Borrow Area Samples (1/10,000 CY)
14

Clearing and Grubbing	SF	Acre
Clearing and Grubbing	602,375	14

Landfill Disposal	
Assumed Density for Contaminated Materials (LB/CF)	114
Total Weight of Contaminated Materials Excavated (LB)	373,486,800
Total Weight of Contaminated Materials Excavated (TN)	**186,744**

ABS Sampling	
Sample Density (SF)	40,000
Total Number of Samples	95

Arsenic Sampling at Power Plant	
Sample Density (SF)	2,500
Total Number of Samples	24

Notes:
Input fields are denoted by a dashed line. Do not overwrite information not contained within the dashed lines.

TABLE CA-6-2

Alternative 6
Calculation Worksheet
Required Materials Output Calculations

COST WORKSHEET

Site: North Ridge Estates		**Prepared By:** AS	**Date:** 3/16/2010
Location: Klamath County, Oregon			
Phase: Final Feasibility Study		**Checked By:** GH	**Date:** 3/24/2010
Base Year: 2010			

Work Statement:
This calculation output sheet allows the user to calculate the volumes of various material required for cover and backfill construction, temporary access roads, and other materials. Changes to the input fields on this calculation sheet will also change the quantities and types of materials for amendment of soils, cover and backfill construction, revegetation, and the resulting capital costs.

Remedy Components	Seed Mix for Topsoil Areas (Pounds)	Nitrogen Fertilizer for Topsoil Areas (Pounds)	Phosphorus Fertilizer for Topsoil Areas (Pounds)	Hydromulching for Topsoil Areas (Pounds)	Compost for Topsoil Amendment (Tons)
Excavated Area/Full Site	8,900	5,900	9,700	267,000	2,100

Temporary Access Road Construction Components	Surface Area (SY)	Volume of Gravel (BCY)	Volume of Gravel (LCY)	Weight of Gravel (Ton)
Gravel Road Base - Temporary Access Road	9,167	1,500	1,725	**2,501**
Gravel Laydown Area	1,111	200	230	**334**

Cost Estimate Backup

COST INDICES FOR ESCALATION

Base Year for Work: **2010**

Year	Cost Index[1]
1990	398.34
1991	406.78
1992	415.22
1993	427.83
1994	439.45
1995	452.31
1996	462.16
1997	472.17
1998	478.10
1999	486.21
2000	497.07
2001	503.52
2002	517.46
2003	529.95
2004	571.29
2005	608.36
2006	641.91
2007	673.52
2008	716.54
2009	701.41
2010	706.49
2011	716.38
2012	728.56
2013	741.67
2014	755.02
2015	768.61
2016	782.45
2017	796.53
2018	810.87
2019	825.47
2020	840.33
2021	855.45
2022	870.85
2023	886.52
2024	902.48
2025	918.73

1 Yearly composite cost index (weighted average) from the U.S. Army Corps of Engineers Civil Works Construction Cost Index System (CWCCIS), EM 1110-2-1304, 31 March 2000. Revised as of 30 September 2009.

SalaryExpert Cost Sources

Base Year: 2010

COST CODES FOR LABOR AND UNIT COSTS

Cost Code	Description	Units	Unit Labor Cost	Unit Equipment Cost	Unit Material Cost	Unit Other Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Labor Cost	Adjusted Equipment Cost	Adjusted Material Cost	Adjusted Other Cost	PC OH	PC PF	Cost Source: Source	Cost Source: Source ID	Comments
L1	CAD Drafter	HR	**$25.70**	$0.00	$0.00	$0.00	2010	1	1	$25.70	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L2	Civil Engineer	HR	**$39.37**	$0.00	$0.00	$0.00	2010	1	1	$39.37	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L3	Clerks, Typist, Bookkeeper & Receptionist	HR	**$19.05**	$0.00	$0.00	$0.00	2010	1	1	$19.05	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L4	Electrical Engineer	HR	**$41.73**	$0.00	$0.00	$0.00	2010	1	1	$41.73	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L5	Environmental Engineer	HR	**$31.39**	$0.00	$0.00	$0.00	2010	1	1	$31.39	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L6	Environmental Lawyer	HR	**$71.06**	$0.00	$0.00	$0.00	2010	1	1	$71.06	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L7	Environmental Scientist	HR	**$27.87**	$0.00	$0.00	$0.00	2010	1	1	$27.87	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L8	Field Engineer	HR	**$22.94**	$0.00	$0.00	$0.00	2010	1	1	$22.94	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L9	Field Foreman	HR	**$19.13**	$0.00	$0.00	$0.00	2010	1	1	$19.13	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L10	Field Technician	HR	**$22.64**	$0.00	$0.00	$0.00	2010	1	1	$22.64	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L11	Geologist	HR	**$27.30**	$0.00	$0.00	$0.00	2010	1	1	$27.30	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L12	General Superintendent (P.M.)	HR	**$52.74**	$0.00	$0.00	$0.00	2010	1	1	$52.74	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L13	Project Manager	HR	**$46.53**	$0.00	$0.00	$0.00	2010	1	1	$46.53	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L14	Quality Control Engineer	HR	**$46.04**	$0.00	$0.00	$0.00	2010	1	1	$46.04	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L15	Paralegal	HR	**$37.29**	$0.00	$0.00	$0.00	2010	1	1	$37.29	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L16	Electrician	HR	**$26.60**	$0.00	$0.00	$0.00	2010	1	1	$26.60	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L17	Plumber	HR	**$19.37**	$0.00	$0.00	$0.00	2010	1	1	$19.37	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L18	Suveyor	HR	**$31.44**	$0.00	$0.00	$0.00	2010	1	1	$31.44	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L19	Suveyor Assistant	HR	**$26.85**	$0.00	$0.00	$0.00	2010	1	1	$26.85	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	

Base Year: 2010

COST CODES FOR MATERIAL AND UNIT COSTS

Cost Code	Description	Units	Unit Labor Cost	Unit Equipment Cost	Unit Material Cost	Unit Other Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Labor Cost	Adjusted Equipment Cost	Adjusted Material Cost	Adjusted Other Cost	PC OH	PC PF	Cost Source Source	Cost Source Source ID	Comments
M1	Gate, Chain Link, Double Swing, 4' High x 10' Wide	EA	$0.00	$0.00	**$252.55**	$0.00	2009	1.01	1	$0.00	$0.00	$255.08	$0.00	8%	9%	V	Vendor Quote	
M2	Gate Fittings and Accessories	EA	$0.00	$0.00	**$230.32**	$0.00	2009	1.01	1	$0.00	$0.00	$232.62	$0.00	8%	9%	V	Vendor Quote	
M3	Chain Link Fence, Galvanized 2" Mesh, 4' High	LF	$0.00	$0.00	**$2.64**	$0.00	2009	1.01	1	$0.00	$0.00	$2.67	$0.00	8%	9%	V	Vendor Quote	
M3A	Barbed Wire, 12 1/2 Gauge, 4 pt. Barbs, Galv.	LF	$0.00	$0.00	**$0.35**	$0.00	2009	1.01	1	$0.00	$0.00	$0.35	$0.00	8%	9%	V	Vendor Quote	5 strands of barb wire
M4	Pipe, Galvanized Pipe, 2 1/2" Dia, 6' High	EA	$0.00	$0.00	**$17.50**	$0.00	2009	1.01	1	$0.00	$0.00	$17.68	$0.00	8%	9%	V	Vendor Quote	
M4A	T-Post, 7' High Steel Post	EA	$0.00	$0.00	**$5.80**	$0.00	2009	1.01	1	$0.00	$0.00	$5.86	$0.00	8%	9%	V	Vendor Quote	Includes wire clips
M5	Fence Fittings & Accessories	EA	$0.00	$0.00	**$7.46**	$0.00	2009	1.01	1	$0.00	$0.00	$7.53	$0.00	8%	9%	V	Vendor Quote	
M9	Signs	EA	$0.00	$0.00	**$98.11**	$0.00	2009	1.01	1	$0.00	$0.00	$99.09	$0.00	8%	9%	V	Vendor Quote	
M10	Copy and Shipping Allowance	LS	$0.00	$0.00	$0.00	**$2,000**	2010	1	1	$0.00	$0.00	$0.00	$2,000.00	0%	0%	A	Allowance	
M10A	Copy and Shipping Allowance	LS	$0.00	$0.00	$0.00	**$1,500**	2010	1	1	$0.00	$0.00	$0.00	$1,500.00	0%	0%	A	Allowance	
M11	Copy and Shipping Allowance	LS	$0.00	$0.00	$0.00	**$1,000**	2010	1	1	$0.00	$0.00	$0.00	$1,000.00	0%	0%	A	Allowance	
M11A	Document Submission and Recording Allowance	LS	$0.00	$0.00	$0.00	**$5,000**	2010	1	1	$0.00	$0.00	$0.00	$5,000.00	0%	0%	A	Allowance	
M12	Surveying Report Allowance	LS	$0.00	$0.00	$0.00	**$15,000.00**	2010	1	1	$0.00	$0.00	$0.00	$15,000.00	0%	0%	A	Allowance	
M12A	Surveying Report Allowance	LS	$0.00	$0.00	$0.00	**$5,000.00**	2010	1	1	$0.00	$0.00	$0.00	$5,000.00	0%	0%	A	Allowance	
M13	Site Inspection Report Allowance	LS	$0.00	$0.00	$0.00	**$1,000.00**	2010	1	1	$0.00	$0.00	$0.00	$1,000.00	0%	0%	A	Allowance	
M15	Seed Mix	ACR	$0.00	$0.00	**$200.00**	$0.00	2009	1.01	1	$0.00	$0.00	$202.00	$0.00	8%	9%	V	Vendor Quote	
M16	Seed Mix	LB	$0.00	$0.00	**$2.00**	$0.00	2009	1.01	1	$0.00	$0.00	$2.02	$0.00	8%	9%	V	Vendor Quote	
M17A	Fertilizer (N2)	ACR	$0.00	$0.00	**$19.50**	$0.00	2009	1.01	1	$0.00	$0.00	$19.70	$0.00	8%	9%	V	Vendor Quote	
M17B	Fertilizer (P2O5)	ACR	$0.00	$0.00	**$25.07**	$0.00	2009	1.01	1	$0.00	$0.00	$25.32	$0.00	8%	9%	V	Vendor Quote	
M18A	Fertilizer (N2)	LB	$0.00	$0.00	**$0.30**	$0.00	2009	1.01	1	$0.00	$0.00	$0.30	$0.00	8%	9%	V	Vendor Quote	
M18B	Fertilizer (P2O5)	LB	$0.00	$0.00	**$0.23**	$0.00	2009	1.01	1	$0.00	$0.00	$0.23	$0.00	8%	9%	V	Vendor Quote	
M19	Hydomulching	ACR	$0.00	$0.00	**$810.00**	$0.00	2008	0.99	1	$0.00	$0.00	$801.90	$801.90	8%	9%	P	Previous Work	
M20	Hydomulching	LB	$0.00	$0.00	**$0.27**	$0.00	2008	0.99	1	$0.00	$0.00	$0.27	$0.27	8%	9%	P	Previous Work	
M21	Erosion Repair Material Allowance	LS	$0.00	$0.00	$0.00	**$5,000.00**	2010	1	1	$0.00	$0.00	$0.00	$5,000.00	0%	0%	A	Allowance	
M21A	Erosion Repair Material Allowance	LS	$0.00	$0.00	$0.00	**$2,000.00**	2010	1	1	$0.00	$0.00	$0.00	$2,000.00	0%	0%	A	Allowance	
M21B	Erosion Repair Material Allowance	LS	$0.00	$0.00	$0.00	**$3,000.00**	2010	1	1	$0.00	$0.00	$0.00	$3,000.00	0%	0%	A	Allowance	
M21C	Erosion Repair Material Allowance	LS	$0.00	$0.00	$0.00	**$4,000.00**	2010	1	1	$0.00	$0.00	$0.00	$4,000.00	0%	0%	A	Allowance	
M22	Fence and Sign Maintenance Allowance	LS	$0.00	$0.00	$0.00	**$1,000.00**	2010	1	1	$0.00	$0.00	$0.00	$1,000.00	0%	0%	A	Allowance	
M22A	Fence and Sign Maintenance Allowance	LS	$0.00	$0.00	$0.00	**$1,200.00**	2010	1	1	$0.00	$0.00	$0.00	$1,200.00	0%	0%	A	Allowance	$100 per month
M22B	O&M Allowance	ACR	$0.00	$0.00	$0.00	**$100.00**	2010	1	1	$0.00	$0.00	$0.00	$100.00	0%	0%	A	Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
M23	Geomembrane, 80 mil LLDPE	ACR	$0.00	$0.00	**$28,136.00**	$0.00	2008	0.99	1	$0.00	$0.00	$27,854.64	$0.00	8%	9%	V	Vendor Quote	
M24	Geotextile, 8 oz/sy, Polypropylene	ACR	$0.00	$0.00	**$4,894.64**	$0.00	2008	0.99	1	$0.00	$0.00	$4,845.69	$0.00	8%	9%	V	Vendor Quote	
M25	Organic Material	TN	$0.00	$0.00	**$25.00**	$0.00	2009	1.01	1	$0.00	$0.00	$25.25	$0.00	8%	9%	V	Vendor Quote	
M27	P100 Respirator Cassettes (North) 72 pr/cs (Hepa)	CS	$0.00	$0.00	**$302.40**	$0.00	2009	1.01	1	$0.00	$0.00	$305.42	$0.00	8%	9%	P	Previous Work	
M28	PPE Wipes	BX	$0.00	$0.00	**$5.00**	$0.00	2009	1.01	1	$0.00	$0.00	$5.05	$0.00	8%	9%	P	Previous Work	
M29	Nitrile Gloves 2XL Powderfree 50 pr/bx, 10 bx/cs	BX	$0.00	$0.00	**$10.95**	$0.00	2009	1.01	1	$0.00	$0.00	$11.06	$0.00	8%	9%	P	Previous Work	
M30	Tyvek Hoods 100/cs	CS	$0.00	$0.00	**$72.56**	$0.00	2009	1.01	1	$0.00	$0.00	$73.29	$0.00	8%	9%	P	Previous Work	
M31	Tyvek Booties High Top Shoe Covers 200 pr/cs	CS	$0.00	$0.00	**$188.85**	$0.00	2009	1.01	1	$0.00	$0.00	$190.74	$0.00	8%	9%	P	Previous Work	
M32	Tyvek Suits 4XL 25/cs	CS	$0.00	$0.00	**$131.60**	$0.00	2009	1.01	1	$0.00	$0.00	$132.92	$0.00	8%	9%	P	Previous Work	
M33	Poly Roll, Clear, 6 Mil, 10ft x 100ft	RL	$0.00	$0.00	**$24.98**	$0.00	2009	1.01	1	$0.00	$0.00	$25.23	$0.00	8%	9%	P	Previous Work	
M34	36 x 60 Clear I/W ACM Bag, 50 bgs/rl - Asbestos Dng	RL	$0.00	$0.00	**$38.40**	$0.00	2009	1.01	1	$0.00	$0.00	$38.78	$0.00	8%	9%	P	Previous Work	
M35	14 x 18 Paper Asbestos Danger Signs 200 /pk	PK	$0.00	$0.00	**$21.60**	$0.00	2009	1.01	1	$0.00	$0.00	$21.82	$0.00	8%	9%	P	Previous Work	
M36	3" x 1,000' Yellow Caution Tape	RL	$0.00	$0.00	**$10.50**	$0.00	2009	1.01	1	$0.00	$0.00	$10.61	$0.00	8%	9%	V	Vendor Quote	
M37	3" x 1,000' Red Danger Asbestos Haz Tape	RL	$0.00	$0.00	**$10.50**	$0.00	2009	1.01	1	$0.00	$0.00	$10.61	$0.00	8%	9%	V	Vendor Quote	
M38	Reflecting Barricade with Light	EA	$0.00	$0.00	**$71.83**	$0.00	2009	1.01	1	$0.00	$0.00	$72.55	$0.00	8%	9%	V	Vendor Quote	
M39	Orange Safety Fence with Posts	CLF	$0.00	$0.00	**$52.99**	$0.00	2009	1.01	1	$0.00	$0.00	$53.52	$0.00	8%	9%	V	Vendor Quote	
M39A	Marker Layer for Cover or Backfill Demarcation	SF	$0.00	$0.00	**$0.08**	$0.00	2009	1.01	1	$0.00	$0.00	$0.08	$0.00	8%	9%	V	Vendor Quote	Marker layer assumed to be orange construction fencing.
M40	Concrete, Delivered	CY	$0.00	$0.00	**$109.20**	$0.00	2009	1.01	1	$0.00	$0.00	$110.29	$0.00	8%	9%	V	Vendor Quote	
M41A	Asphalt for Road/Parking Lot, Delivered	TN	$0.00	$0.00	**$55.00**	$0.00	2009	1.01	1	$0.00	$0.00	$55.55	$0.00	8%	9%	V	Vendor Quote	
M41B	Asphalt for Road/Parking Lot, Delivered	CY	$0.00	$0.00	**$60.14**	$0.00	2009	1.01	1	$0.00	$0.00	$60.74	$0.00	8%	9%	V	Vendor Quote	
M42A	Sand, Delivered	TN	$0.00	$0.00	**$15.60**	$0.00	2009	1.01	1	$0.00	$0.00	$15.76	$0.00	8%	9%	V	Vendor Quote	
M42B	Sand, Delivered	LCY	$0.00	$0.00	**$24.18**	$0.00	2009	1.01	1	$0.00	$0.00	$24.42	$0.00	8%	9%	V	Vendor Quote	
M43A	Gravel, Delivered	TN	$0.00	$0.00	**$13.45**	$0.00	2009	1.01	1	$0.00	$0.00	$13.58	$0.00	8%	9%	V	Vendor Quote	
M43B	Gravel, Delivered	LCY	$0.00	$0.00	**$20.78**	$0.00	2009	1.01	1	$0.00	$0.00	$20.99	$0.00	8%	9%	V	Vendor Quote	
M44A	Riprap, Delivered	TN	$0.00	$0.00	**$20.75**	$0.00	2009	1.01	1	$0.00	$0.00	$20.96	$0.00	8%	9%	V	Vendor Quote	
M44B	Riprap, Delivered	LCY	$0.00	$0.00	**$41.50**	$0.00	2009	1.01	1	$0.00	$0.00	$41.92	$0.00	8%	9%	V	Vendor Quote	
M45	Clean Fill/Subsoil	LCY	$0.00	$0.00	**$8.72**	$0.00	2009	1.01	1	$0.00	$0.00	$8.81	$0.00	8%	9%	P	Previous Work	Includes purchase and delivery to the Site.
M46	Poly Tank, 5,300 Gal	EA	$0.00	$0.00	**$2,227.96**	$0.00	2009	1.01	1	$0.00	$0.00	$2,250.24	$0.00	8%	9%	V	Vendor Quote	
M47	Wash Rack w/ Solids Filtration Unit, Closed Loop	LS	$0.00	$0.00	**$55,104.00**	$0.00	2009	1.01	1	$0.00	$0.00	$55,655.04	$0.00	8%	9%	V	Vendor Quote	
M48	Weed Control Services	ACR	$0.00	$0.00	$0.00	**$62.64**	2009	1.01	1	$0.00	$0.00	$0.00	$63.27	8%	9%	P	Previous Work	Includes labor, equipment, and materials for application of weed control chemicals.
M49	Assumed Royalty Allowance for Soil	LCY	$0.00	$0.00	$0.00	**$3.00**	2010	1	1	$0.00	$0.00	$0.00	$3.00	0%	0%	A	Allowance	

Base Year: 2010

COST CODES FOR MATERIAL AND UNIT COSTS

Cost Code	Description	Units	Unit Labor Cost	Unit Equipment Cost	Unit Material Cost	Unit Other Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Labor Cost	Adjusted Equipment Cost	Adjusted Material Cost	Adjusted Other Cost	PC OH	PC PF	Cost Source: Source	Cost Source: Source ID	Comments
M50	Soil Sample Analysis (PLM-VE)	EA	$0.00	$0.00	$0.00	**$25.00**	2008	0.99	1	$0.00	$0.00	$0.00	$24.75	8%	9%	P	Previous Work	
M50A	Soil Sample Analysis (Stereomicroscopy)	EA	$0.00	$0.00	$0.00	**$25.00**	2008	0.99	1	$0.00	$0.00	$0.00	$24.75	8%	9%	P	Previous Work	
M51	ABS, Sample and Analysis	EA	$0.00	$0.00	$0.00	**$900.00**	2008	0.99	1	$0.00	$0.00	$0.00	$891.00	8%	9%	P	Previous Work	
M51A	Ambient Air Sample Analysis	EA	$0.00	$0.00	$0.00	**$400.00**	2008	0.99	1	$0.00	$0.00	$0.00	$396.00	8%	9%	P	Previous Work	Analyzed by TEM ISO Method 10312
M51B	Indoor Air Sample Analysis	EA	$0.00	$0.00	$0.00	**$225.00**	2008	0.99	1	$0.00	$0.00	$0.00	$222.75	8%	9%	P	Previous Work	Analyzed by TEM ISO Method 10312
M51C	Equipment/Indoor Air Sampling Event	LS	$0.00	$0.00	$0.00	**$5,000.00**	2010	1	1	$0.00	$0.00	$0.00	$5,000.00	8%	9%	P	Previous Work	
M52	Equipment/ABS Area/ABS Event	EA	$0.00	$0.00	$0.00	**$150.00**	2008	0.99	1	$0.00	$0.00	$0.00	$148.50	8%	9%	P	Previous Work	
M52A	Sampling Setup (Equipment and Utility)	LS	$0.00	$0.00	$0.00	**$4,200.00**	2010	1	1	$0.00	$0.00	$0.00	$4,200.00	8%	9%	P	Previous Work	Includes sampling equipments and electrical hook-up
M52B	Equipment/Ambient Air Sampling Event	EA	$0.00	$0.00	$0.00	**$150.00**	2010	1	1	$0.00	$0.00	$0.00	$150.00	8%	9%	P	Previous Work	
M53A	Sampling and Other Supplies/ABS Area/ABS Event	EA	$0.00	$0.00	$0.00	**$250.00**	2010	1	1	$0.00	$0.00	$0.00	$250.00	8%	9%	P	Previous Work	
M53B	Sampling/Other Supplies	LS	$0.00	$0.00	$0.00	**$1,500.00**	2010	1	1	$0.00	$0.00	$0.00	$1,500.00	8%	9%	P	Previous Work	
M53C	Sampling/Other Supplies/Ambient Air Sampling Event	LS	$0.00	$0.00	$0.00	**$1,500.00**	2010	1	1	$0.00	$0.00	$0.00	$1,500.00	8%	9%	P	Previous Work	
M53D	Sampling/Other Supplies	LS	$0.00	$0.00	$0.00	**$250.00**	2010	1	1	$0.00	$0.00	$0.00	$250.00	8%	9%	P	Previous Work	
M54A	Sample Shipping Allowance	LS	$0.00	$0.00	$0.00	**$3,000.00**	2010	1	1	$0.00	$0.00	$0.00	$3,000.00	0%	0%	A	Allowance	
M54B	Sample Shipping Allowance	LS	$0.00	$0.00	$0.00	**$1,500.00**	2010	1	1	$0.00	$0.00	$0.00	$1,500.00	0%	0%	A	Allowance	
M54C	Sample Shipping	EA	$0.00	$0.00	$0.00	**$120.00**	2010	1	1	$0.00	$0.00	$0.00	$120.00	8%	9%	P	Previous Work	15 Samples per shipment
M54D	Sample Shipping Allowance	LS	$0.00	$0.00	$0.00	**$500.00**	2010	1	1	$0.00	$0.00	$0.00	$500.00	0%	0%	A	Allowance	
M55	Per Diem for 3 People	DY	$0.00	$0.00	$0.00	**$432.00**	2010	1	1	$0.00	$0.00	$0.00	$432.00	0%	0%	GSA	www.gsa.gov	
M56	Per Diem for 2 People	DY	$0.00	$0.00	$0.00	**$288.00**	2010	1	1	$0.00	$0.00	$0.00	$288.00	0%	0%	GSA	www.gsa.gov	
M57	Per Diem for 1 Person	DY	$0.00	$0.00	$0.00	**$144.00**	2010	1	1	$0.00	$0.00	$0.00	$144.00	0%	0%	GSA	www.gsa.gov	
M57A	Interior Cleaning	LS	$0.00	$0.00	$0.00	**$15,000.00**	2004	1.24	1	$0.00	$0.00	$0.00	$18,600.00	8%	9%	P	Previous Work	
M57B	Per Diem for Resident Temporary Relocation- Lodging	DY	$0.00	$0.00	$0.00	**$88.00**	2010	1	1	$0.00	$0.00	$0.00	$88.00	0%	0%	GSA	www.gsa.gov	Per House
M57C	Per Diem for Resident Temporary Relocation - M&IE	DY	$0.00	$0.00	$0.00	**$56.00**	2010	1	1	$0.00	$0.00	$0.00	$56.00	0%	0%	GSA	www.gsa.gov	Per Person
M58	Site Office Trailer Installation - One Time Cost	LS	$0.00	$0.00	$0.00	**$2,040.00**	2009	1.01	1	$0.00	$0.00	$0.00	$2,060.40	8%	9%	V	Vendor Quote	
M59	Trailer Rental and Storage Box	MO	$0.00	$0.00	$0.00	**$80.00**	2009	1.01	1	$0.00	$0.00	$0.00	$80.80	8%	9%	V	Vendor Quote	
M60	Office Furniture	MO	$0.00	$0.00	$0.00	**$205.00**	2009	1.01	1	$0.00	$0.00	$0.00	$207.05	8%	9%	V	Vendor Quote	
M61	Portable Toilets	MO	$0.00	$0.00	$0.00	**$365.00**	2009	1.01	1	$0.00	$0.00	$0.00	$368.65	8%	9%	V	Vendor Quote	
M62	Utilities (Phone, Internet, Electricity)	MO	$0.00	$0.00	$0.00	**$155.00**	2009	1.01	1	$0.00	$0.00	$0.00	$156.55	8%	9%	V	Vendor Quote	
M63	General Office Supplies Allowance	MO	$0.00	$0.00	$0.00	**$750.00**	2010	1	1	$0.00	$0.00	$0.00	$750.00	0%	0%	A	Allowance	
M64	Erosion Control Measures Allowance	LS	$0.00	$0.00	$0.00	**$30,000.00**	2010	1	1	$0.00	$0.00	$0.00	$30,000.00	0%	0%	A	Allowance	
M65	Community Awareness Activities Allowance	EA	$0.00	$0.00	$0.00	**$2,000.00**	2010	1	1	$0.00	$0.00	$0.00	$2,000.00	0%	0%	A	Allowance	1 event per 5-yr review.
M66A	Analysis - Volatile Organic Compounds	EA	$0.00	$0.00	$0.00	**$104.73**	2009	1.01	1	$0.00	$0.00	$0.00	$105.78	8%	9%	V	Vendor Quote	
M66B	Analysis - Semivolatile Organic Compounds	EA	$0.00	$0.00	$0.00	**$213.34**	2009	1.01	1	$0.00	$0.00	$0.00	$215.47	8%	9%	V	Vendor Quote	
M66C	Analysis - Pesticides	EA	$0.00	$0.00	$0.00	**$151.28**	2009	1.01	1	$0.00	$0.00	$0.00	$152.79	8%	9%	V	Vendor Quote	
M66D	Analysis - Herbicides	EA	$0.00	$0.00	$0.00	**$131.33**	2009	1.01	1	$0.00	$0.00	$0.00	$132.64	8%	9%	V	Vendor Quote	
M66E	Analysis - TAL Metals	EA	$0.00	$0.00	$0.00	**$128.00**	2009	1.01	1	$0.00	$0.00	$0.00	$129.28	8%	9%	V	Vendor Quote	
M66F	Analysis - PCBs	EA	$0.00	$0.00	$0.00	**$131.88**	2009	1.01	1	$0.00	$0.00	$0.00	$133.20	8%	9%	V	Vendor Quote	
M66G	Analysis - TPH	EA	$0.00	$0.00	$0.00	**$87.55**	2009	1.01	1	$0.00	$0.00	$0.00	$88.43	8%	9%	V	Vendor Quote	
M66H	Analysis - Arsenic	EA	$0.00	$0.00	$0.00	**$26.45**	2009	1.01	1	$0.00	$0.00	$0.00	$26.71	8%	9%	V	Vendor Quote	

Base Year: 2010

COST CODES FOR SUBCONTRACTORS AND UNIT COSTS

Cost Code	Work or Material Description	Description for Cost Worksheets	Units	Unit Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Unit Cost	PC OH	PC PF	Cost Source		Comments
											Source	Source ID	
S1A	Landfill Disposal Charges (Subtitle D Only)	Subtitle D Landfill Disposal Charges	TN	**$43.00**	2009	1.01	1	$43.43	8%	9%	V	Vendor Quote	Averaged unit cost of disposal fees for 2 Subtitle D Disposal Facilities
S2A	Landfill Disposal Charges (Oregon Permitted Authorized Only)	Disposal Charges for Permitted Facility	TN	**$60.00**	2009	1.01	1	$60.60	8%	9%	V	Vendor Quote	Averaged unit cost of disposal fees for 3 Oregon Authorized Disposal Facilities
S2B	Landfill Disposal Charges	Disposal Facility Charges	EA	**$13,300.00**	2009	1.01	1	$13,433.00	8%	9%	V	Vendor Quote	
S2C	Landfill Disposal Charges (Oregon Non-Permitted Authorized Only)	Non-Permitted Authorized Disposal Facility Charges	TN	**$25.00**	2009	1.01	1	$25.25	8%	9%	V	Vendor Quote	Lowest unit cost of disposal fees for 3 Oregon Permitted Authorized Disposal Facilities
S2D	Landfill Disposal Charges (Oregon Permitted Authorized Only) - Weighted %	Permitted Authorized Disposal Facility Charges	TN	**$52.00**	2009	1.01	1	$52.52	8%	9%	V	Vendor Quote	Lowest unit cost of disposal fees for 3 Oregon Permitted Authorized Disposal Facilities
S2E	Landfill Disposal Charges (Subtitle D Cost)	Permitted Authorized Disposal Facility Charges	TN	**$118.90**	2009	1.01	1	$120.09	8%	9%	V	Vendor Quote	Lowest unit cost of disposal fees for 3 Oregon Permitted Authorized Disposal Facilities
S3A	Plasma/Thermal Treatment	Onsite Plasma/Thermal Treatment	TN	**$1,250.00**	2009	1.01	1	$1,262.50	8%	9%	V	Vendor Quote	
S4A	Thermo-Chemical Treatment	Offsite Thermo-Chemical Treatment	TN	**$400.00**	2009	1.01	1	$404.00	8%	9%	V	Vendor Quote	Offsite facility located at Tacoma, WA

COST CODES FOR MII ASSEMBLIES AND UNIT COSTS

Cost Code	Work or Material Description	Description for Cost Worksheets	Units	MII Unit Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted MII Unit Cost	PC OH	PC PF	Cost Source: Source	Cost Source: Source ID	Comments
A1A	Dust Control	Dust Control/Washing	DY	**$559.38**	2009	1.01	1	$564.97	8%	9%	MII	MII Assemblies	
A2A	Equipment Fueling	Equipment Fueling	DY	**$67.78**	2009	1.01	1	$68.46	8%	9%	MII	MII Assemblies	
A3A	Equipment Decon/Washing	Equipment Decon/Washing	DY	**$166.77**	2009	1.01	1	$168.44	8%	9%	MII	MII Assemblies	
A4A	Sampling - 2 Person Crew	Sampling - 2 Person Crew	DY	**$779.83**	2009	1.01	1	$787.63	8%	9%	MII	MII Assemblies	
A5A	Sampling - 3 Person Crew	Sampling - 3 Person Crew	DY	**$1,168.24**	2009	1.01	1	$1,179.92	8%	9%	MII	MII Assemblies	
A6A	Site Inspection - 2 Person Crew	Site Inspection - 2 Person Crew	DY	**$634.56**	2009	1.01	1	$640.91	8%	9%	MII	MII Assemblies	
A6B	Visual Inspection - 2 Person Crew	Visual Inspection - 2 Person Crew	DY	**$634.56**	2009	1.01	1	$640.91	8%	9%	MII	MII Assemblies	
A6C	Site Inspection - 1 Person Crew	Site Inspection - 1 Person Crew	DY	**$324.86**	2009	1.01	1	$328.11	8%	9%	MII	MII Assemblies	
A6D	Visual Inspection - 1 Person Crew	Visual Inspection - 1 Person Crew	DY	**$324.86**	2009	1.01	1	$328.11	8%	9%	MII	MII Assemblies	
A7A	Site Operations and Maintenance	Cover and Backfill Operations and Maintenance Crew	DY	**$525.68**	2009	1.01	1	$530.94	8%	9%	MII	MII Assemblies	
A7B	Site Operations and Maintenance	Fence Maintenance Crew	DY	**$525.68**	2009	1.01	1	$530.94	8%	9%	MII	MII Assemblies	
A7C	Site Operations and Maintenance	Backfilled Area Operations and Maintenance Crew	DY	**$525.68**	2009	1.01	1	$530.94	8%	9%	MII	MII Assemblies	
A8A	Excavation/Loading - Buried Contaminated Material/Steam Pipe	Excavation/Loading - Steam Pipe	BCY	**$10.39**	2009	1.01	1	$10.49	8%	9%	MII	MII Assemblies	
A8B	Excavation/Loading - Buried Contaminated Material/Steam Pipe	Excavation/Loading - Buried Contaminated Materials	BCY	**$10.39**	2009	1.01	1	$10.49	8%	9%	MII	MII Assemblies	
A9A	Excavation/Loading - Surficial Contaminated Material/Miscellaneous (Crawler Dozer)	Excavation/Loading - Surficial Contaminated Materials	BCY	**$8.90**	2009	1.01	1	$8.99	8%	9%	MII	MII Assemblies	
A9B	Excavation/Loading - Surficial Contaminated Material/Miscellaneous (Crawler Dozer)	Excavation/Loading	BCY	**$8.90**	2009	1.01	1	$8.99	8%	9%	MII	MII Assemblies	
A10A	Excavation - Borrow Source	Excavation - Borrow Source	BCY	**$2.11**	2009	1.01	1	$2.13	8%	9%	MII	MII Assemblies	
A11A	Grading - Contaminated Material Loading/Spreading/Grading	Contaminated Material Spreading/Grading	LCY	**$10.63**	2009	1.01	1	$10.74	8%	9%	MII	MII Assemblies	
A12A	Grading - Interim Cover Loading/Spreading/Grading	Interim Cover Spreading/Grading	LCY	**$12.30**	2009	1.01	1	$12.42	8%	9%	MII	MII Assemblies	
A12B	Grading - Interim Cover Loading/Spreading/Grading	Final CoverSpreading/Grading	LCY	**$12.30**	2009	1.01	1	$12.42	8%	9%	MII	MII Assemblies	
A12C	Grading - Interim Cover Loading/Spreading/Grading	Subsoil Spreading/Grading	LCY	**$12.30**	2009	1.01	1	$12.42	8%	9%	MII	MII Assemblies	
A13A	Grading - Clean Fill Loading/Spreading/Grading	Clean Fill Spreading/Grading	LCY	**$2.65**	2009	1.01	1	$2.68	8%	9%	MII	MII Assemblies	
A13B	Grading - Clean Fill Loading/Spreading/Grading	Top Soil Spreading/Grading	LCY	**$2.65**	2009	1.01	1	$2.68	8%	9%	MII	MII Assemblies	
A14A	Material Loading - Clean Fill	Material Loading - Clean Fill	LCY	**$0.32**	2009	1.01	1	$0.32	8%	9%	MII	MII Assemblies	
A14B	Material Loading - Contaminated Material	Material Loading - Contaminated Material Feed for Treatment	LCY	**$0.88**	2009	1.01	1	$0.89	8%	9%	MII	MII Assemblies	
A14C	Material Loading - Contaminated Material	Material Loading - Treated Contaminated Material	LCY	**$0.88**	2009	1.01	1	$0.89	8%	9%	MII	MII Assemblies	
A15A	Material Placement - Riprap	Riprap Placement	LCY	**$7.75**	2009	1.01	1	$7.83	8%	9%	MII	MII Assemblies	
A15B	Material Placement - Riprap	Riprap Placement	TN	**$3.87**	2009	1.01	1	$3.91	8%	9%	MII	MII Assemblies	
A16A	Material Placement - Fill/Subsoil/Topsoil - Clean Fill	Clean Fill/Subsoil/Topsoil Placement	LCY	**$1.79**	2009	1.01	1	$1.81	8%	9%	MII	MII Assemblies	
A17A	Material Placement - Sand/Gravel Placement	Sand/Gravel Placement	LCY	**$1.79**	2009	1.01	1	$1.81	8%	9%	MII	MII Assemblies	
A18A	Gravel Placement - Clean Area	Gravel Placement - Clean Area	SY	**$0.32**	2009	1.01	1	$0.32	8%	9%	MII	MII Assemblies	
A18B	Gravel Placement - Contaminated Area	Gravel Placement - Contaminated Area	SY	**$1.47**	2009	1.01	1	$1.48	8%	9%	MII	MII Assemblies	
A19A	Compaction - Large Open Area - Contaminated Material	Contaminated Material Compaction - Large Open Area	LCY	**$0.89**	2009	1.01	1	$0.90	8%	9%	MII	MII Assemblies	
A20A	Compaction - Small Area - Contaminated Material	Contaminated Material Compaction - Small Area	LCY	**$19.19**	2009	1.01	1	$19.38	8%	9%	MII	MII Assemblies	
A21A	Compaction - Large Open Area - Clean Fill	Clean Fill Compaction - Large Open Area	LCY	**$0.18**	2009	1.01	1	$0.18	8%	9%	MII	MII Assemblies	
A22A	Compaction - Small Area - Clean Fill	Clean Fill Compaction - Small Area	LCY	**$2.22**	2009	1.01	1	$2.24	8%	9%	MII	MII Assemblies	
A23A	Hauling - Offsite Borrow Source	Hauling - Distant Offsite Borrow Source	LCY	**$2.79**	2009	1.01	1	$2.82	8%	9%	MII	MII Assemblies	
A23B	Hauling - Onsite Borrow Source	Hauling - Near Offsite Borrow Source	LCY	**$2.10**	2009	1.01	1	$2.12	8%	9%	MII	MII Assemblies	
A23C	Hauling - Offsite Borrow Source	Hauling - Riprap Material	LCY	**$2.79**	2009	1.01	1	$2.82	8%	9%	MII	MII Assemblies	
A23D	Hauling - Offsite	Hauling - Debris Offsite	HR	**$385.10**	2009	1.01	1	$388.95	8%	9%	MII	MII Assemblies	Includes 5 trucks
A23E	Hauling - Offsite	Offsite Debris Disposal, Hauling to Permitted Authorized Landfill	HR	**$75.01**	2009	1.01	1	$75.76	8%	9%	MII	MII Assemblies	
A23F	Hauling - Offsite	Offsite Debris Disposal, Hauling to Permitted Authorized Landfill	HR	**$61.22**	2009	1.01	1	$61.83	8%	9%	MII	MII Assemblies	
A23G	Hauling - Offsite	Offsite Debris Disposal, Hauling to Permitted Authorized Landfill	HR	**$78.72**	2009	1.01	1	$79.51	8%	9%	MII	MII Assemblies	
A24A	Hauling - Onsite Debris Disposal	Hauling - Onsite Disposal	LCY	**$3.67**	2009	1.01	1	$3.71	8%	9%	MII	MII Assemblies	
A24B	Hauling - Onsite Debris	Hauling - Onsite Treatment	LCY	**$3.67**	2009	1.01	1	$3.71	8%	9%	MII	MII Assemblies	
A24C	Hauling - Onsite Debris	Hauling - Onsite Treated	LCY	**$1.54**	2009	1.01	1	$1.56	8%	9%	MII	MII Assemblies	
A25A	Hauling - Offsite Debris Disposal Subtitle D Landfill	Offsite Debris Hauling to Subtitle D Landfill	LCY	**$39.88**	2009	1.01	1	$40.28	8%	9%	MII	MII Assemblies	
A26A	Hauling - Offsite Debris Disposal Permitted Authorized Landfill	Offsite Debris Hauling to Permitted Disposal Facility	LCY	**$23.44**	2009	1.01	1	$23.67	8%	9%	MII	MII Assemblies	
A26B	Hauling - Offsite Debris, Thermo-Chemical Treatment Facility	Offsite Debris Hauling to Thermo-Chemical Treatment Facility	LCY	**$56.18**	2009	1.01	1	$56.74	8%	9%	MII	MII Assemblies	
A26C	Hauling - Debris, Thermo-Chemical Treatment Facility	Treated Debris Hauling from Thermo-Chemical Treatment Facility	LCY	**$56.18**	2009	1.01	1	$56.74	8%	9%	MII	MII Assemblies	
A26D	Hauling - Offsite Debris Disposal Non-Permitted Authorized Landfill	Offsite Debris Hauling to Non-Permitted Disposal Facility	LCY	**$8.14**	2009	1.01	1	$8.22	8%	9%	MII	MII Assemblies	
A26E	Hauling - Offsite Debris Disposal Permitted Authorized Landfill (Weighted %)	Offsite Debris Hauling to Permitted Disposal Facility	LCY	**$19.07**	2009	1.01	1	$19.26	8%	9%	MII	MII Assemblies	
A27A	Demolition - Pipe/Culvert	Steam Pipe Segmentation	LF	**$15.84**	2009	1.01	1	$16.00	8%	9%	MII	MII Assemblies	
A27B	Demolition - House	Onsite House Demolition	HR	**$566.28**	2009	1.01	1	$571.94	8%	9%	MII	MII Assemblies	
A28A	Geomembrane Cover System Installation	Geomembrane Cover System Installation	SF	**$0.69**	2009	1.01	1	$0.70	8%	9%	MII	MII Assemblies	
A28B	Geomembrane Cover System Installation	Geomembrane Cover System Installation	ACR	**$30,056.40**	2009	1.01	1	$30,356.96	8%	9%	MII	MII Assemblies	
A29A	Geotextile Cover System Installation	Geotextile Cover System Installation	SF	**$0.10**	2009	1.01	1	$0.10	8%	9%	MII	MII Assemblies	
A29B	Geotextile Cover System Installation	Geotextile Cover System Installation	ACR	**$4,356.00**	2009	1.01	1	$4,399.56	8%	9%	MII	MII Assemblies	
A30A	Hydro-Seeding Crew	Hydro-Seeding Crew	ACR	**$112.45**	2009	1.01	1	$113.57	8%	9%	MII	MII Assemblies	
A31A	Fence Installation	Fence Installation - Contaminated Area	LF	**$30.36**	2009	1.01	1	$30.66	8%	9%	MII	MII Assemblies	
A31B	Fence Installation	Fence Installation - Clean Area	LF	**$6.48**	2009	1.01	1	$6.54	8%	9%	MII	MII Assemblies	
A31C	Fence Installation	Signage Installation - Clean Area	DY	**$1,569.61**	2009	1.01	1	$1,585.31	8%	9%	MII	MII Assemblies	

Cost Code	Work or Material Description	Description for Cost Worksheets	Units	MII Unit Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted MII Unit Cost	PC OH	PC PF	Cost Source: Source	Cost Source: Source ID	Comments
A32A	Clearing and Grubbing	Clearing and Grubbing	ACR	**$9,045.89**	2009	1.01	1	$9,136.35	8%	9%	MII	MII Assemblies	
A33A	Barricade and Traffic Control	Barricade and Traffic Control Setup	DY	**$978.18**	2009	1.01	1	$987.96	8%	9%	MII	MII Assemblies	
A34A	Asphalt Work	Asphalt Work	SY	**$16.87**	2009	1.01	1	$17.04	8%	9%	MII	MII Assemblies	
A35A	Concrete Work	Concrete Work	SY	**$30.09**	2009	1.01	1	$30.39	8%	9%	MII	MII Assemblies	
A36A	Sheet Piling	Sheet Piling	SF	**$35.01**	2009	1.01	1	$35.36	8%	9%	MII	MII Assemblies	
A37A	Mobilization and Demobilization - Heavy Equipment	Mobilization and Demobilization - Heavy Equipment	EA	**$2,361.21**	2009	1.01	1	$2,384.82	8%	9%	MII	MII Assemblies	
A37B	Mobilization and Demobilization - Medium-Sized Equipment	Mobilization and Demobilization - Medium-Sized Equipment	EA	**$965.03**	2009	1.01	1	$974.68	8%	9%	MII	MII Assemblies	
A37C	Mobilization and Demobilization - Small Equipment	Mobilization and Demobilization - Small Equipment	EA	**$599.13**	2009	1.01	1	$605.12	8%	9%	MII	MII Assemblies	
A37D	Mobilization and Demobilization - Self-Propelled Equipment	Mobilization and Demobilization - Self-Propelled Equipment	EA	**$2,444.67**	2009	1.01	1	$2,469.12	8%	9%	MII	MII Assemblies	
A38A	Site Survey	Site Survey - Clean Area	DY	**$459.92**	2009	1.01	1	$464.52	8%	9%	MII	MII Assemblies	
A38B	Site Survey	Site Survey - Contaminated Area	DY	**$992.32**	2009	1.01	1	$1,002.24	8%	9%	MII	MII Assemblies	
A39A	Organic Delivery	Organic Delivery	LCY	**$6.42**	2009	1.01	1	$6.48	8%	9%	MII	MII Assemblies	
A39B	Organic Delivery	Organic Delivery	TN	**$8.56**	2009	1.01	1	$8.65	8%	9%	MII	MII Assemblies	
A40A	Organic Amendment and Processing	Organic Amendment and Processing	ACR	**$1,071.37**	2009	1.01	1	$1,082.08	8%	9%	MII	MII Assemblies	
A41A	ACM Surface Excavation/Pickup Crew	ACM Surface Excavation/Pickup Crew	DY	**$2,806.32**	2009	1.01	1	$2,834.38	8%	9%	MII	MII Assemblies	
A42A	Contaminated Material Loading/Spreading/Grading	Contaminated Material Loading/Spreading/Grading	DY	**$1,091.03**	2009	1.01	1	$1,101.94	8%	9%	MII	MII Assemblies	
A43A	Clean Fill Loading/Spreading/Grading	Clean Fill Loading/Spreading/Grading	DY	**$1,091.03**	2009	1.01	1	$1,101.94	8%	9%	MII	MII Assemblies	
A44A	Compaction - Contaminated Material	Compaction - Contaminated Material	DY	**$1,064.52**	2009	1.01	1	$1,075.17	8%	9%	MII	MII Assemblies	
A45A	Compaction - Clean Fill	Compaction - Clean Fill	DY	**$333.27**	2009	1.01	1	$336.60	8%	9%	MII	MII Assemblies	
A46A	Equipment Decon	Equipment Decon	DY	**$346.17**	2009	1.01	1	$349.63	8%	9%	MII	MII Assemblies	