Killam

SITE CHARACTERIZATION PLAN
FOR THE FORMER DIAMONDHEAD OIL REFINERY SITE
HUDSON MEADOWS URBAN RENEWAL DEVELOPMENT CORPORATION
KEARNY, NEW JERSEY

OCTOBER, 1988

KILLAM ASSOCIATES, INC.
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1.00 INTRODUCTION

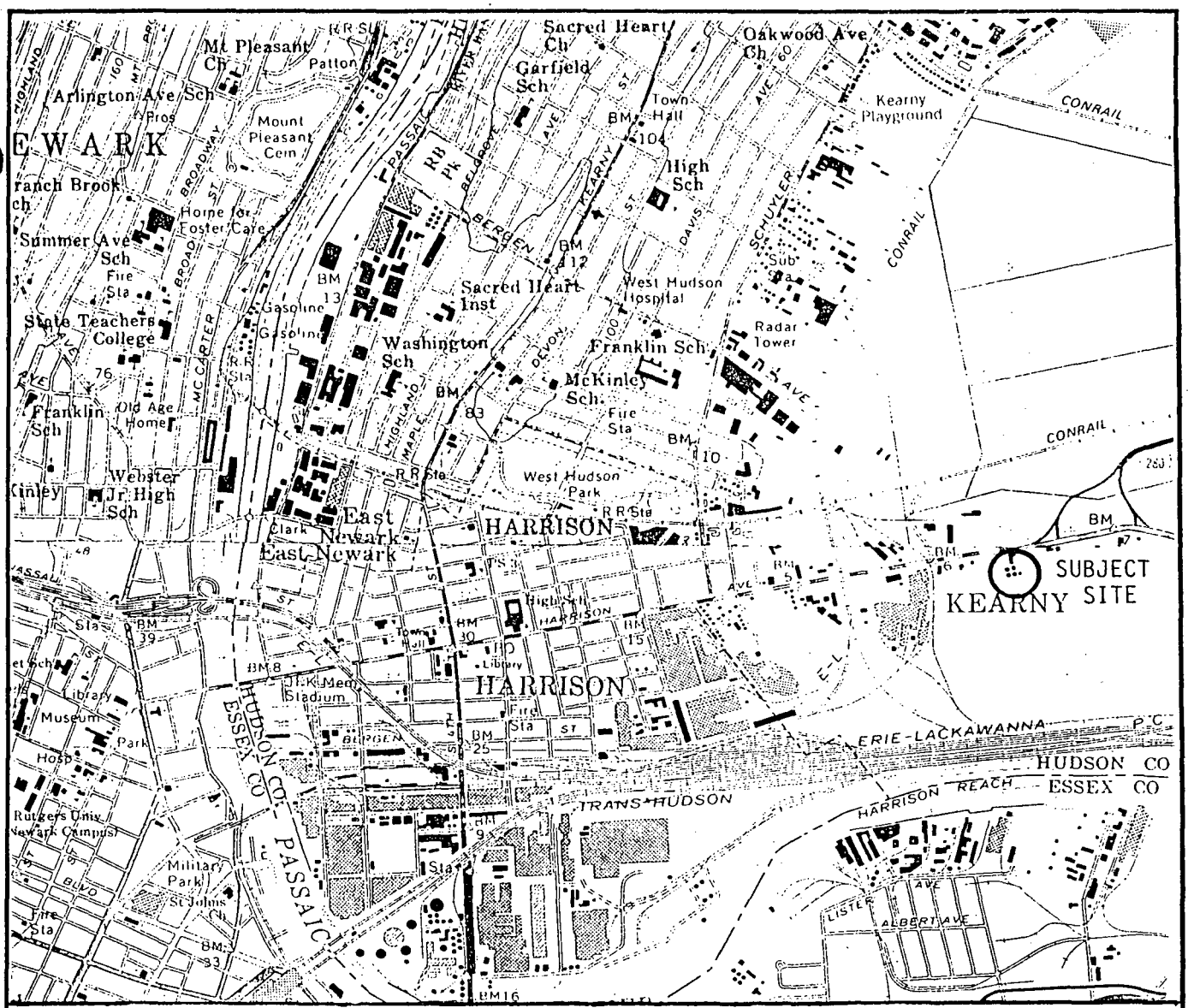
Killam Associates (Killam) has been retained by Hudson Meadows Urban Renewal Development Corporation (HMURDC) to investigate surface and subsurface environmental characteristics at the former site of the Diamondhead Oil Refinery (Diamondhead) and adjacent tracts of land in Kearny, New Jersey. This investigation of the site, requested by the Hackensack Meadowlands Development Commission (HMDC), requires characterization of site conditions with respect to potential contaminants. The purpose of this report is to present this Site Characterization Plan, which describes the minimum scope of work needed to characterize the contamination believed to be present at the subject site.

2.00 SITE DESCRIPTION

The subject property is situated at the intersection of Harrison Avenue and Ramp M of Route 280 Kearny, New Jersey (Figure 1), and consists of approximately 15 acres of land. This site is comprised of parcels known as Block 285, Lots 3, 14, and 15 on the municipal tax maps of the Town of Kearny. The site is bounded by Harrison Avenue to the north, Route 280-Ramp M to the east, Route 280 to the south, and a foundry to the west (Appendix A).

3.00 SCOPE OF INITIAL INVESTIGATION BY KILLAM

The initial phase of the services performed for HMURDC by Killam included the review of all available files held by the various government agencies and private consultants concerned with the site, and an inspection of the site by Killam personnel. A review of the data



SCALE: 1"=2000'

SOURCE: U.S.G.S. 7.5 MINUTE SERIES
ELIZABETH QUADRANGLE

FIGURE 1
Hudson Meadows Urban
Renewal Development Corp.
Kearny, New Jersey

SITE MAP

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available through these sources has produced some analytical data regarding the quality of surface water, groundwater, and soils on the site. Killam concluded, however, that no party has yet conducted a comprehensive empirical investigation of the environmental characteristics at the site.

4.00 ACTIONS PROPOSED FOR SITE CHARACTERIZATION

As a result of the preliminary investigative efforts conducted by Killam Associates, a phased approach towards characterization of the subsurface conditions of the site is recommended. These are described as follows.

4.10 Phase 1 - Physical Investigation

Initial efforts at site characterization would include the performance of terrain conductivity survey, and soil gas monitoring (Phases I). This survey is conducted by employing an EM-31 Terrain Conductivity Meter to examine the site on a grid pattern. The information gathered from terrain conductivity survey should serve to identify the presence of underground tanks, utilities, and other subsurface structures. Soil gas monitoring would utilize an Impact Probe and an Organic Vapor Analyzer to determine the presence of soil gases. This test would be conducted on a similar grid pattern to that utilized in the Terrain Conductivity Test. Soil gas monitoring at the site would provide information on the generation of methane and other gases which would be useful in design of a methane gas venting system, if required. This information would also prove useful in evaluating the presence or absence of hazardous working conditions at the site related

to the subsurface generation of gases.

4.20 Phase 2 - Subsurface and Surfacewater Investigation and Analysis

4.21 Soils Investigation

Five soil borings will be installed at the subject site in order to perform soil sampling at depth. The five borings will be installed five at areas exhibiting cause for environmental concern. The approximate locations of the soil borings are shown on the site plan found in Appendix A. Three of these borings are to be installed on the north, south, and west sides of the building complex proposed for this site. One boring will be installed near the remaining tank pads at the former Diamondhead facility. An additional boring will be installed between the existing pond and the drainage ditch at the south side of the site. The soil borings will be installed to a depth at which the apparent native soils are encountered, or to a minimum depth equal to 10 feet below the observed level of groundwater. Continuous split spoon soil samples will be obtained to ascertain site geology. Two soil samples per boring will be obtained for subsequent laboratory analysis; the first will be surficial, while the second will be collected from a depth six inches above the noted level of groundwater. The soils retrieved will be analyzed by a New Jersey certified laboratory for Petroleum Hydrocarbons (PHC), USEPA Priority Pollutants plus 40 searches, plus 30 library search compounds. The analytical methodology to be used is discussed below in Section 5.50. Please note that the surficial sample (0-6" interval) will be subject to PP+40 analysis

(minus the Volatile Organic (VO+15)/fraction). VO+15 analysis will be performed on soil from the 12 to 18 inches interval.

4.22 Groundwater Investigation

Groundwater monitoring wells will be installed at five locations at the subject site. One well will be installed near the center of the site, adjacent to the east side of the building complex proposed for the site. The remaining wells will be installed along the perimeter of the area to be developed. One well will be placed along the southeast property boundary, one well will be placed near the southwest corner of th site, one well will be placed in the northeast corner of the property, and the fifth well will be placed near the northeast corner of the proposed parking area. This pattern of well placement is proposed because the groundwater flow at this site is likely to be tidally influenced. As a result, groundwater flow patterns may vary. The approximate locations of the monitoring wells are shown on the site plan found in Appendix A. The details of the construction and sampling of the wells is given below in Section 5.22. Analytical parameters for the groundwater samples retrieved from the wells will include USEPA PP+40 and PHC. The analytical methodology to be used is discussed below in Section 5.50.

4.23 Surface Water Investigation

Samples of onsite surface water will be obtained from two locations, one from the pond in the center of the site, the other from the perimeter drainage ditch where it exists the site (Figure 2). Analytical parameters for these samples shall be USEPA PP+40, plus PHC.

The details of the sampling of these points are given below in Section 5.30.

5.00 SAMPLING METHODOLOGY

5.10 Soil Sampling Methodology and Equipment

In order to maintain the integrity of the soil samples, and to avoid the possibility of inadvertent sample contamination, the following procedures will be followed during the soil sampling episode:

1. Each split spoon will be cleaned onsite in accordance with the following NJDEP sampling equipment cleaning protocols prior to sample collection:

   a) Non-phosphate detergent and potable water wash;
   b) Potable water rinse
   c) Distilled/Deionized water rinse;
   d) 10% Nitric Acid rinse;
   e) Distilled/Deionized water rinse;
   f) Acetone rinse;
   g) Total air drying;
   h) Distilled/Deionized water rinse.

2. Other sample collection equipment, such as scoopulas, trowels, shovels, etc., will be laboratory precleaned in accordance with NJDEP sampling equipment protocol listed above.

3. Personnel performing the sampling of the subject soils will wear, in addition to any personal protection equipment (PPE) that may be necessary, a new pair of surgical gloves for each sample collected. This will assist in preventing samples cross-contamination.

The soil samples will then be collected by the following methods:

1. A trip blank will be collected for analysis for the Volatile Organic (VO) fraction of the USEPA P+40. This sample shall be poured prior to embarking on the sampling episode. A trip blank for VOs shall consist of two 40 ml. vials (with teflon lids) of deionized water, filled in such a manner as to eliminate air bubbles from the vial. The trip blank shall remain refrigerated or on ice throughout the sampling episode until the time it is analyzed in the receiving laboratory.

2. Prior to the collection of the first sample, field blanks shall be poured for the VO, Acid/Base/Neutral Extractable Organics (A/B/N), Pesticides and Polychlorinated Biphenyls (Pest./PCB), and Metals fractions of the PP+30 analysis, plus PHC. These shall be created by flowing deionized water through a precleaned split spoon into the sample jars. The sample jars shall be three 40 ml. vials with teflon lids for the VO fraction, and three 1000 ml. amber glass jars with teflon lids, one for each of the A/B/N, Pest./PCB, and PHC fractions. The sample for Metals analysis will be collected in a 1000 ml. plastic bottle preserved with 5 ml. nitric acid.

3. Soil samples will be retrieved by driving split spoons with a truck mounted rotary drill rig. The spoons will be driven in advance of hollow stem auger flights, which will be steam cleaned with potable water, inside and out, prior to use;

4. Samples will be retrieved at intervals corresponding to the depths noted above in Section 6.20. The samples will be taken from the opened spoon using a laboratory precleaned scoopula, and will be placed in appropriate glassware. Two 40 ml. vials will be filled for VO analysis, and one eight once glass jar will be collected for each of the A/B/N, Metals, Pest./PCB, and PHC parameters.

5. All samples collected will be preserved by placing it immediately on ice in a cooler. All of the sample bottles filled will be labelled and wrapped in clear plastic packaging tape. A Chain of Custody form will be implemented to document the possession and handling of the samples collected.

6. Upon the completion of sampling, the resultant boreholes will be filled with a cement-Bentonite mixture in order to prevent future intrusion of surface water into the lower strata encountered. Each boring will be permitted by the NJDEP Division of Water Resource prior to installation.

7. Duplicate soil samples will be collected for twenty percent of the samples scheduled.

8) If requested by the HMDC, a sufficient quantity of sample will be collected such that split samples will be made available for analysis by the HMDC.

5.20 Groundwater Sampling Methodology and Equipment

In order to more completely evaluate the environmental quality at the subject site, the HMDC has requested the implementation of groundwater monitoring program, which includes five groundwater monitoring wells to be installed at the site to allow for sampling of groundwater in the locations described previously. Data yielded by analysis of the samples of groundwater collected from the installed wells will be used to determine whether the former refinery facilities have had an impact on groundwater quality at the site.

5.21 Proposed Well Placement

A total of five (5) groundwater monitor wells are proposed for the subject site. The proposed locations of the wells are indicated in Appendix A. The first well, MW-1, shall be installed at the center of the site. The remaining four wells, MW-2, MW-3, MW-4, and MW-5 will be placed along the north, east, south, and west property boundaries. Water level data from these wells will serve to indicate the nature of groundwater flow at the site and develop a groundwater contour map for the site. Analytical data gained from these samples will serve to determine the impacts, if any, this site is having on groundwater quality.

5.22 Description of Well Installation

The five proposed groundwater monitoring wells will be installed by a well driller licensed by the State of New Jersey. Each

well will have a valid permit issued by the NJDEP Bureau of Water Allocation. Monitoring within the immediate area of the drilling will be performed with an HNU Photoionizer to ensure the safety of the workers onsite. If background levels of volatile components are exceeded, appropriate safety measures will be observed as outlined in Appendix B.

All five wells will be constructed of four inch diameter PVC Schedule 40 riser and four inch diameter PVC 10 slot well screen. The wells will be installed in eight inch diameter boreholes advanced through the overlying unconsolidated soils using hollow stem auger drilling techniques. The top of the PVC well screen will be installed in such a manner, if possible, as to ensure that the static water level will be below the top of the well screen. The reason for this detail of the installation is to document the presence or absence of non-aqueous phase-layering. The well screen will be a minimum of 15 feet in length, and, in general, will be set starting approximately 3 feet above the noted level of groundwater and will extend approximately 12 feet below the same. The typical details of the proposed wells are shown on Figure 2.

The completion procedure for the wells will consist of the following steps:

1) A sand pack of No. 1 Cape May sand extending a minimum of two feet above the well screen;

2) a layer of Bentonite pellets ranging in thickness from one to two feet;

3) a grout mixture of cement of and Bentonite;

4) a steel aboveground or flush-mount protective casing extending one foot below the surface grade, cemented in place with a locking cap.

The above specifications may require modifications at the time of installation due to actual field conditions. Any such modifications shall be made at the discretion of the Killam geologist onsite.

Following installation, the wells will be developed until clear, or for a minimum of one hour, using a centrifugal pump. After allowing the wells to equilibrate for a minimum of two weeks, the wells will be sampled in accordance with the procedures specified in Section 5.23 of this report.

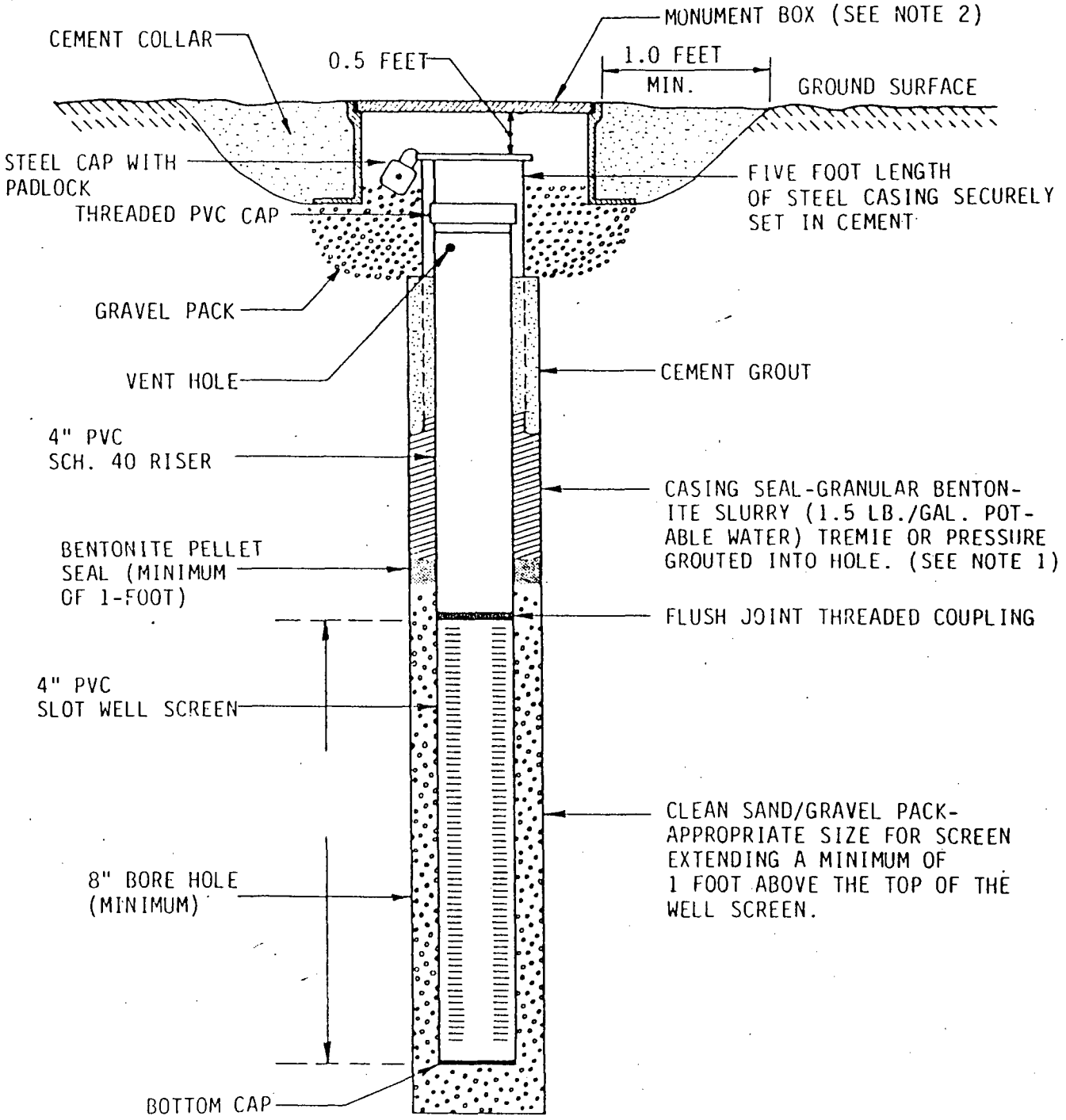
5.23 Groundwater Sampling Procedures

The installed wells described above in Section 5.22 will then be allowed to equilibrate for a period of at least two weeks. After this time, groundwater sampling will occur, and will be performed in accordance with the following methods:

1) A trip blank will be collected for VO analysis prior to embarking on the sampling episode. A trip blank for VOs shall consist of two 40 ml. vials (with teflon lids) of deionized water, filled in such a manner as to eliminate air bubbles from the vial. The trip blank shall remain refrigerated or on ice throughout the sampling episode until the time it is analyzed in the receiving laboratory.

2) Prior to the collection of the first sample, field blanks shall be poured for the VO, B/N, Pest./PCB, Metals, and PHC parameters. These shall be created by flowing deionized water through a precleaned teflon bailer into the sample jars. Sample jars for Metals shall be a plastic 1000 ml. bottle preserved with 5 ml. of sulfuric acid. The VO sample jars shall be three 40 ml. vials with teflon lids, and 1000 ml. amber glass jars with a teflon lids for each of the remaining samples.

TYPICAL FLUSH MOUNT WELL COMPLETION UNCONSOLIDATED FORMATIONS



NOT TO SCALE

FIGURE 2

NOTES:

1. IN SHALLOW WELLS OF DEPTH 15' OR LESS, BENTONITE PELLET SEAL WILL BE EXTENDED IN LIEU OF GRANULAR BENTONITE SLURRY.
2. SEE ATTACHED SHEET FOR SPECIFICATIONS ON MONUMENT BOX.

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3) The static groundwater level will be measured using a groundwater level meter and recorded. An oil/water interface probe will also be utilized to ascertain the presence of floating product.

4) The volume of water in the well will be estimated from the well depth, the static water level, and the casing diameter. A precleaned PVC bailer or pump will then be used to evacuate at least four well volumes of water from the well. The amount of water evacuated will be estimated by repeatedly filling buckets of a known volume, or by timing the duration of the pump discharge. If the particular well provides a low yield, a single complete evacuation will be performed, and the wells will then be allowed to recharge prior to sampling.

5) The well will be sampled within two hours of evacuation. Samples will be obtained using a precleaned teflon bailer suspended from a virgin nylon cord. A separate precleaned bailer will be used for each well sampled.

6) Upon recovery of a sample of the groundwater, pH, temperature and conductivity measurements will be taken and recorded. This water will then be discarded and the sample will be collected to fill the sample bottle set. Sample jars for Metals shall be a plastic 1000 ml. bottle preserved with 5 ml. of nitric acid. The VO sample jars shall be three 40 ml. vials with teflon lids, and 1000 ml. amber glass jars with a teflon lids will be utilized for each of the remaining samples. All of the sample bottles filled will be preserved on ice or refrigerated until the time that they are analyzed at the receiving laboratory.

7) All of the sample bottles filled will be labelled and wrapped in clear plastic packaging tape. All of the samples collected will be recorded on a Chain of Custody form.

8) A duplicate water sample will be collected from one well.

9) If requested by the HMDC, a sufficient quantity of sample will be collected such that split samples will be made available for analysis by the HMDC.

5.30 Surface Water Sampling Procedures

The following procedures will be employed to retrieve water samples from the surface waters to be sampled:

1) Precleaned bailers will be utilized to collect surface water samples from a depth of 18 inches, if possible. Field conditions may warrant appropriate changes in procedures at the discretion of the

Killam field personnel at the site. Methods for retrieval may include the use of a boat, waders, or sampling equipment which enables extended reach from the shoreline.

2) Remaining procedures for surface water sampling will be similar to the methods described in items 6 through 9 in Section 5.23.

5.40 Quality Assurance/Quality Control

The implementation of Quality Assurance/Quality Control (QA/QC) measures will be necessary to ensure the success of any sampling effort conducted at the subject site. The main concerns of QA/QC provisions involve the collection of sample blanks and duplicates and the performance of document control.

Quality Assurance measures will consist of several items that assist in the verification of the quality of the data collected. This will include the collection of sample blanks, the collection of duplicate samples, and the collection of split samples for analysis by the HMDC, if necessary.

Sample blanks are rinses of deionized water collected through the equipment which is to be used for sampling. The data yielded from the analysis of such a blank verifies the presence or absence of contaminants on the sampling equipment. Results indicating that the sample blank is clean for the parameters analyzed show that the sampling device is not likely to have contributed to the contamination of the sample. Sample blanks which exhibit the presence of contaminants can indicate sources of contamination during the sampling, handling, preservation, or transport phases of the sampling episode. Sample blanks have already been proposed within Sections 5.22 and 5.23 in the form of trip and field blanks. The method of collection for these blanks is discussed in those sections.

The collection of duplicate samples has also been proposed in the sections referenced above. The duplicate samples will be collected at the same time and in the same manner as the other samples, preserved, transported, and analyzed by the same methods. These samples will serve to verify the reproducibility of the resultant data.

Split samples shall be collected from the groundwater monitoring wells at the site if they are requested by the HMDC. This will allow the the NJDEP to verify the quality of the site data if the Department finds it necessary to do so.

The use of Chain of Custody (COC) forms will be implemented during the sampling episodes in order to document the sample identity, preservation, and shipping procedures. A sample COC form is attached as Appendix C.

5.50 Analytical Methodology

The soil samples collected from the borings installed onsite will be analyzed for the B/N, VO (including analysis for benzene, toluene, and xylene), Pest./PCB, and Metals fractions of the USEPA Priority Pollutants, plus searches and Petroleum Hydrocarbons (PHC), in accordance with the methods described in Manual SW-846. Groundwater samples will also be analyzed for the B/N, VO (including analysis for benzene, toluene, and xylene), Pest./PCB, and Metals fractions of the USEPA PP+40, plus searches and Petroleum Hydrocarbons (PHC). The B/N analysis will be conducted as per EPA Methods 624, VO analyses by EPA Method 625, and by EPA Method 418.1 for PHC. Pest./PCB will be run via EPA Method 608, and Metals will be analyzed via EPA Method 503. All analyses will be conducted by an NJDEP-certified laboratory.

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APPENDIX A

SITE PLAN

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APPENDIX B

HEALTH AND SAFETY PLAN

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HEALTH & SAFETY PLAN
FOR THE FORMER
DIAMONDHEAD OIL REFINERY
HUDSON MEADOWS URBAN RENEWAL DEVELOPMENT CORPORATION
KEARNY, NEW JERSEY

OCTOBER, 1988

Prepared by

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Section 1.0

INTRODUCTION

This health and safety program manual is intended to provide a basic framework for the safe conduct of site investigations at the Diamondhead Oil Refinery Site located in Kearny, New Jersey. It provides a guide for all contractor and subcontractor employees who will be involved in the performance of this investigation.

The primary objective of a Health & Safety (H&S) plan is to establish before site activities begin, work safety guidelines, requirements, and procedures. Every safety hazard associated with site investigations cannot be fully anticipated; consequently, contingency planning is essential. A practical safety program should include the following:

- Assessment of potential hazards for each site
- Development of required operating guidelines and procedures which mitigate identified hazards
- Health and safety training for all site personnel which is specific for all site activities
- Monitoring and enforcement of required safe operating procedures
- High level of hazard awareness and emergency preparedness.

All employees are required to adhere to and enforce the established rules and regulations as specified in the H&S Plan in the Killam Associates Corporate Health & Safety Manual. Additionally, they are required to foster a high level of safety consciousness. The latter involves constant vigilance

for unsafe or potentially hazardous conditions or practices and initiating immediate corrective action as necessary to ameliorate or avoid potentially threatening conditions or practices.

The Corporate Health & Safety Manual, which is issued to all Killam employees involved in site work, contains general policy and specific procedures to be followed when conducting on-site activities. All employees working with hazardous substances are required to be familiar with the contents of this document. All procedures contained in the manual are incorporated into this safety plan by reference.

Section 2

TEAM ORGANIZATION

The organization for this site investigation is as described in Figure 2-1. Responsibilities of each position are as described in the Corporate Health & Safety Manual.

Project Manager

Quality Manager

Occupational Health and Safety Officer

Sampling Task Managers

Field Personnel

Figure 2-1

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Section 3.0

HEALTH AND SAFETY PROCEDURES FOR FIELD EVALUATIONS

The Health and Safety Officer is responsible for establishing, and adjusting as necessary, the level of safety precautions appropriate to the site being evaluated, such as use of SCBA and other protective equipment. The Task Manager ensures that all participants conduct their work in accordance with the study plan and applicable safety rules. He/she is authorized to direct any assigned employee to leave the site if the employee fails to observe safety requirements or in any way creates a safety hazard.

It follows that the safety considerations in the design of the investigation require selection of investigative methods that will minimize safety requirements and meet project objectives, (i.e., enforcement or cleanup).

Before entering a site, all investigative personnel must know the locations and emergency telephone numbers for the nearest medical facility, ambulance, service, fire department, police department, and poison control centers (see Section 4.0).

3.1 PERSONNEL PROTECTION

All individuals participating in this investigation will be required to wear personal protective equipment as required by the Health and Safety Plan and the H&S officer.

The buddy system will apply to all on-site activities. Level D protection will be required for all work conducted down range.

Backup personnel are to notify emergency personnel in an emergency prior to their site entry for relief or rescue. All on-site workers must be capable of voice or radio contact with each other at all times.

Self-contained breathing apparatus (SCBA) will be available on site. If during sampling and/or well drilling operations, levels of toxic gases at the breathing level approach 50 ppm above background or, less than 19.5% oxygen is measured or, H_2S concentration exceed 15 ppm continuously for more than 15 minutes, personnel will exit the site. A team will then re-enter the site using SCBA (Level B) and will continue air monitoring. Sampling or drilling can continue under these conditions if SCBA is utilized. As conditions allow, the team will go back to using air purifying respirations (Level C) or to Level D based on decision by the H&S officer.

Remember:

1. Cartridge respirators should not be relied upon for protection from organic vapors for extended periods or from hydrogen sulfide for any length of time.

2. Respirator cartridges for organic vapors function as adsorbents. Once adsorptive capacity is reached the cartridge no longer functions.

3. Cartridge respirators do not supply oxygen and are of no use in oxygen-deficient atmospheres.

4. Cartridges are to be used only 1 day and then discarded.

The following personnel protection equipment will be utilized under:

Level B Conditions

a. Suit--One piece suite (with hood) made of: Polyurethane, PVC, or vinyl on nylon.

b. Respirator--NIOSH/MSA certified; self contained, positive pressure, breathing apparatus or tethered air supply. (escape mask as required)

c. Gloves
   (1) Inner glove
    - Surgical, synthetic rubber or PVC
   (2) Outer glove
    - Butyl, Neoprene, or Viton

d. Shoes--disposable neoprene boot with safety shoes underneath

e. Hard hat--ANSI approved, under hood, if required.

f. Prescription safety glasses required, if prescription glasses or contacts normally needed.

Level C Conditions

a. Suit--One piece suit (with hood) made of Saranex coated Tyvec or polyethylene coated Tyvec.

b. Respirator
   (1) Full face piece with pesticide cartridge or combination organic vapor/particulate cartridge (used 1 day only and discarded)
   -Will not handle acid gases
   -Have back up cartridges for SO_2, and chlorine gas.

c. Gloves
(1) Inner glove (optional)
   -Surgical, synthetic rubber, or PVC
   (2) Outer glove
   -Butyl, Neoprene, or Viton

d. Shoes--Disposable neoprene boot with safety shoes underneath

e. Hard hat--ANSI approved, if necessary (i.e., during well drilling).

f. Prescription safety glasses required if prescription glasses are normally needed.

Level D Conditions

a. Coveralls

b. Leather or chemical-resistant boots or shoes, steel toe, and shank

c. Hard hat (ANSI approved)

d. Options as required:
   (1) Gloves
   (2) Disposable outer boots
   (3) Safety glasses or chemical splash goggles
   (4) Escape mask or respirator

e. Prescription safety glasses required, if prescription glasses or contact lenses are normally used.

Safety shoes should be well fitting and fitted to the individual worker. Contact lenses are not permitted any where on-site. All respiratory equipment shall be individually assigned after qualitative fit testing and shall otherwise comply with the requirements of 29 CFR 1910.134.

3.2 FIELD ACTIVITY REQUIREMENTS

This section addresses various field activities that will occur in this investigation, including the development and setup of clean areas, the establishment of specific procedures for site entry, sampling, decontamination and exiting a site.

3.21 Clean Area

During operations on site, a "clean" area will be established in the support zone outside the area of suspected contamination. At least one backup team member* will remain in this area to:

1. Assist in emergency removal of team members from the site in the event of accident of injury. The backup must have readily available protective clothing, breathing apparatus, and first-aid equipment. The backup team under no circumstances enters a confined space until emergency medical help has arrived on the site and is prepared to assist.

2. Assist in moving equipment, samples, and supplies.

3. Provide communication to emergency units.

4. Assist in decontamination or removal of contaminated clothing from the individuals emerging from the contaminated area.

5. As appropriate, prevent entry of unauthorized persons to the site while operations are underway.

6. Provide other assistance as necessary, but with the primary objective of facilitating safe transfer of personnel and equipment to and from the contaminated area.

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* On-scene Task manager may exercise informed judgment regarding the need for off-site backup at active sites or at sites that have been repeatedly entered or occupied without apparent harm. In any case where doubt exists, the safe course of action must be taken.

3.22 Site Entry

All site entry (and exiting) will occur at a predesignated decontamination station, which will be located in the support area at the edge of the designated contamination reduction area. All personal protective clothing and respirators (when required) will be fit tested, condition checked, and donned prior to site entry.

3.23 Sampling

All personnel entering the site must be donned in protective clothing and equipment as called for based on actual site conditions and as specified in this manual. Health and safety procedures by task activity are discussed in Section 3.3. Sampling procedures are described in detail in the Sampling Plan. All sampling procedures will conform to protocol mandated in the established QA procedures manual.

3.24 Decontamination

At the completion of each day's field operation, all disposable clothing and equipment will be removed, cleaned, and then discarded in durable plastic bags and then placed in an appropriate waste container.

All decontamination procedures will be performed in designated areas. Decontamination run-off liquids will be allowed to be returned to the site but not allowed to enter the on-site storm system. Based on the nature of contaminants expected at the site, the following decontamination procedures will be used:

- Sampling equipment -- Decontaminate with successive washes of;
  ALCONOX detergent and water mixture
  Acetone
  Final rinse with water.
- Personnel -- Removal, decontaminate, and discard all disposable outer garmets. If contamination of other remaining garments is suspected. decontaminate with Alconox followed by a water rinse where feasible (e.g., rain suits, hard hat) or discard.

3.25 Leaving the Site

Procedures for leaving the suspect contaminated area must be planned before entry. In addition to decontamination, provision must be made for safe packing of reusable protective clothing; safe packing of disposable gear; handling of samples and preparation of samples for shipment; and transfer of equipment, gear, and samples from the contaminated area to the clean area.

3.3 TASK SPECIFIC FIELD ACTIVITY REQUIREMENTS

Provisions of this H&S Plan and the Corporate Health and Safety Manual will be strictly adhered to during field work activities and health and safety procedures followed for individual tasks. Any onsite changes in these procedures and requirements for protective clothing that are prescribed by either the Health and Safety Officer or the Project Manager, will be duly noted in writing.

3.31 Test Well Drilling, Split-Spoon Sampling

Test well drilling will be conducted using Level D protection; combustible and toxic gas and oxygen monitoring will be performed during the drilling. The release of H_2S gas from the borehole is considered possible, although improbable.

As a precaution, hydrogen sulfide monitoring will be conducted at the borehole. If H_2S concentrations at the borehole exceed 15 ppm continuously for more than 15 minutes or if personnel experience any discomfort, a decision will be made to temporarily halt drilling and continue monitoring, switch to mud rotary drilling to limit gas migration from the borehole, or to go directly to Level B protection. The permissible short term exposure limit for H_2S recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) is 15 ppm for a 15 minute period up to four times per eight hour shift with at least 60 minutes in between exposures (Sitting, 1981). If the H_2S concentration at the borehole exceeds 20 ppm, downwind perimeter monitoring will be initiated while boring continues. Subsequently, if H_2S levels exceed 20 ppm at the site perimeter, the well will be closed. An H_2S concentration of 20 ppm is the lower limit at which eye irritation may occur (Sax, 1984).

3.32 Groundwater Sampling

Monitoring wells will be evacuated by pumping or Teflon bailer and sampled by Teflon bailer. Level D protection will be required unless otherwise indicated by initial findings during the drilling of each well.

3.33 Surface Water Sampling

The surface water will be sampled directly. Level D protection with double gloves is required. Final decontamination procedures are as described

in Section 3.24. No additional monitoring will be required,.

3.34 Surface Soil Sampling

The surface soil will be sampled directly with disposable sampling tools, which will be used once and discarded. Level D protection with double gloves is required. Final decontamination procedures are as described in Section 3.24.

3.35 Training

All Elson T. Killam employees working on this site have experience and/or have undergone appropriate OHSA training for respirator usage (29 CFR 1910, 134) and working with toxic and hazardous substances (29 CFR 1910 Subpart 2). In addition personnel have been instructed in the proper usage of field sampling and laboratory equipment, personal protective gear, identification of contamination areas to determine proper levels of protection and the implementation of safe operating procedures and work practices.

All personnel including contractors or subcontractors prior to entering a site will be informed of all hazards, levels of protection required and emergency procedures to be followed to assure the proper safety and welfare of all personnel on site.

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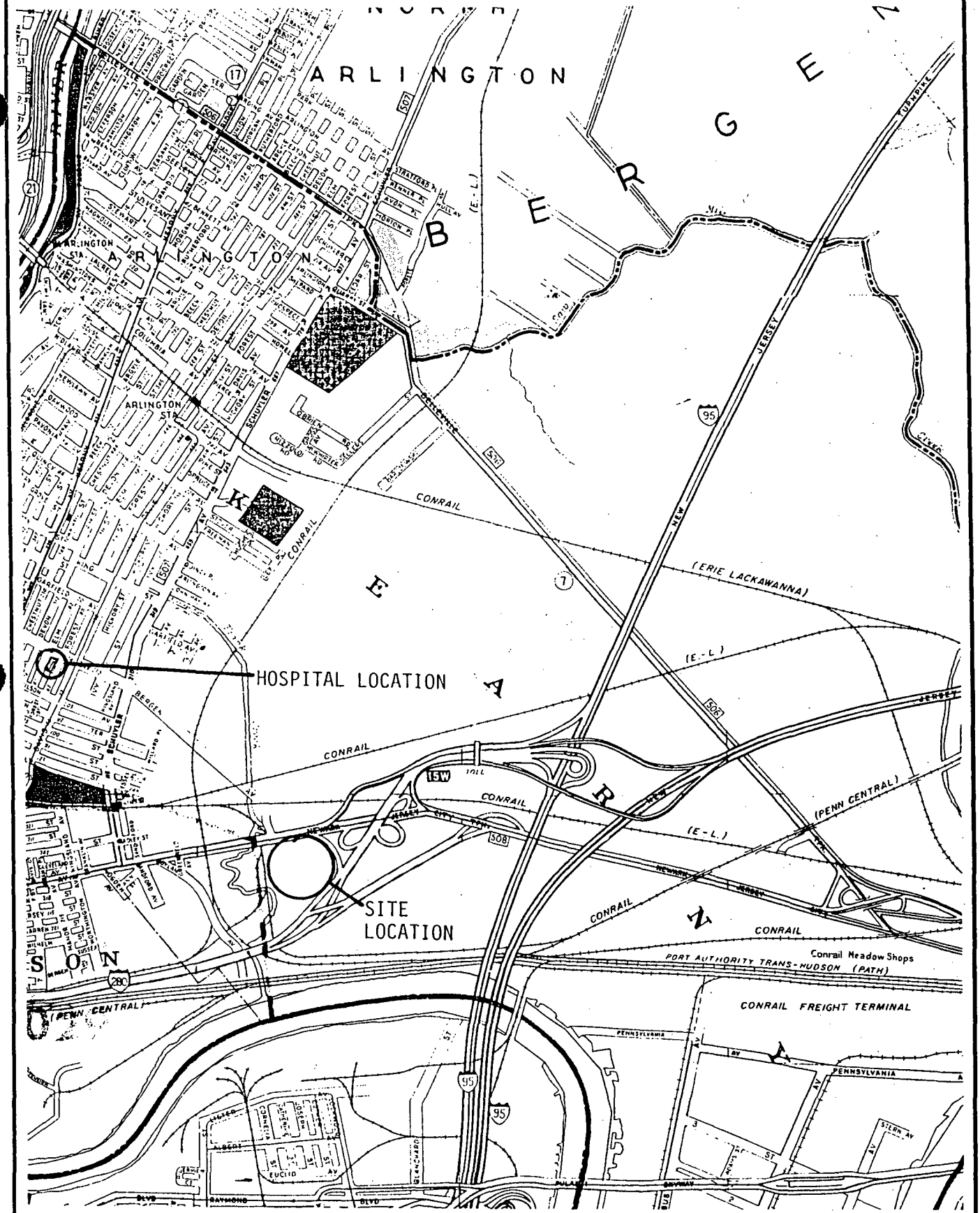
SECTION 4.0 EMERGENCY INFORMATION AND NUMBERS

SERVICE	TELEPHONE NUMBER	LOCATION
Ambulance	998-1313	-
Fire Department	991-1400	109 Midland Ave. Kearny, NJ
Hospital	955-7000	West Hudson Hospital 206 Bergen Avenue Kearny, NJ
NJDEP Emergency No.	(609) 292-7172	Trenton, NJ
Local Police	998-1313	402 Kearny Avenue Kearny, NJ
State Police	944-1704	Newark, NJ
Emergency Management	333-4477	Hudson County Civil Defense and Disaster Control 549 Duncan Ave. Jersey City, NJ

* Refer to site map on the following page for location and route to hospital.



O'Brien & Killam
Associates in Consulting Engineers

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APPENDIX C

CHAIN OF CUSTODY

D.B. Killam
Associates ◻ Consulting Engineers

27 Bleeker Street
P.O. Box 1008
Millburn, NJ 07041
Telephone: 201-379-3400
Fax: 201-376-1072
Telex: 64-2057

(Please read the instructions on the reverse side of this form before completing)

Site Name _____ Lab. Work Order ID No.:_____
Street Address _____ Project No.:_____
City/State _____ Project Manager:_____

Collected by: (print) _____ (signature) _____

Sample Containers Prepared By: _____
Preservative Added: To Empty Sample Containers ____ On Site ____ In Lab ____
Preserved By: _____

Lab No.	Sample Number	Sample Location	Collected Date	Collected Time	Analyses*	Comments/ Additional Analyses

Reporting Format Required: Results Only___ IA___ IB___ IIA___IIB___ DMR___ Other_____
Quality Assurance Reporting: Not Required____ Job Specific____ Run Specific____
**QA samples required by laboratory to fullfill internal QC requirements: _____
Turn Around Time Required: _____
Additional Comments: _____

Samples Relinquished By:	Samples Received By:	Date/Time

* All field data must be recorded (pH, conductivity, etc.)
Methods must be specified for all organic analyses (i.e. GC/MS 624, GC 601, GC/MS 503.1)

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