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REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLANS

FIELD SAMPLING PLAN
QUALITY ASSURANCE PROJECT PLAN
HEALTH AND SAFETY PLAN

WORK ASSIGNMENT D003825-17

GOLDEN ROAD DISPOSAL SITE **SITE NO. 8-28-021**
CHILI (T) **MONROE (C), NY**

Prepared for:
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 Wolf Road, Albany, New York

John P. Cahill, Commissioner

DIVISION OF ENVIRONMENTAL REMEDIATION

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282 Delaware Avenue
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FINAL
June 1999

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REMEDIAL INVESTIGATION/FEASIBILITY STUDY
WORK PLANS

GOLDEN ROAD DISPOSAL SITE
SITE # 8-28-021
CHILI, NEW YORK

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JUNE 1999

PREPARED BY:

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FIELD SAMPLING PLAN

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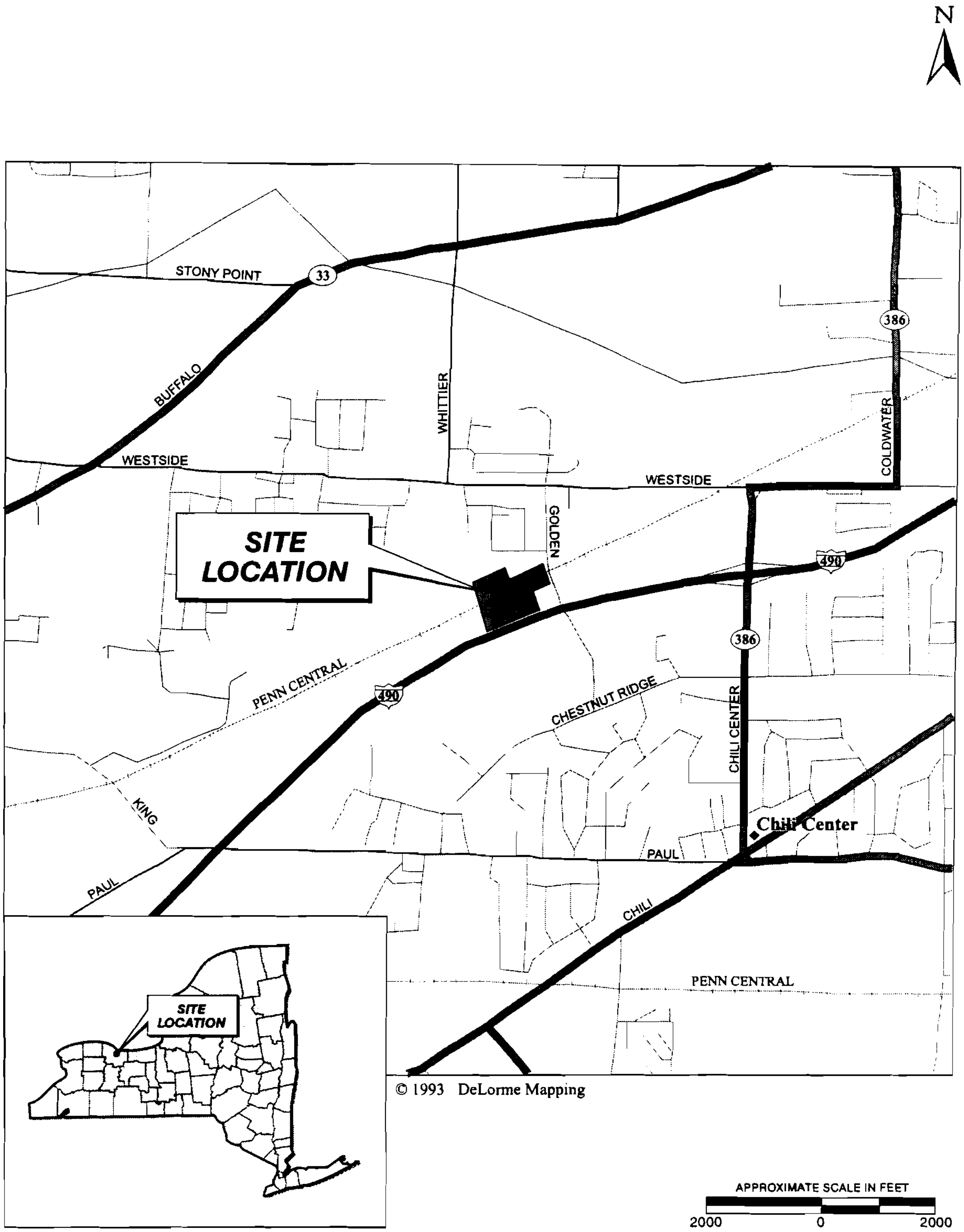
A1.0 INTRODUCTION

This Field Sampling Plan (FSP) is designed to provide detailed step-by-step procedures for the field activities outlined in the Project Management Plan for the Remedial Investigation (RI) at the Golden Road Disposal Site (Figure A1-1). It will serve as the field procedures manual to be strictly followed by all URSGWC personnel. Adherence to these procedures will ensure the quality and defensibility of the data collected in the field. In addition to the field procedures outlined in this document, all personnel performing field activities must do so in compliance with: (1) the Quality Assurance/Quality Control measures outlined in Part B; (2) the appropriate Health and Safety guidelines found in the Health and Safety Plan (Part C); and (3) the scope of work and time schedule, outlined in the Project Management Plan.



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URS Greiner Woodward Clyde	GOLDEN ROAD DISPOSAL SITE SITE LOCATION MAP	FIGURE A1-1

A2.0 MOBILIZATION

A centralized decontamination area with a decontamination pad will be constructed near the site entrance to decontaminate vehicles/heavy equipment/drill rigs entering and leaving the site. The decontamination area will be large enough to allow storage of cleaned equipment and materials prior to use, as well as to stage drums of investigation - derived waste (IDW). Drums of decontamination fluids will be stored on pallets covered with plastic sheeting in the decontamination area.

Proposed sampling locations will be staked, labeled and flagged prior to sampling. A survey crew will install and label the geophysical survey grid. Utilities in areas designated for intrusive activities will be cleared through the Underground Facilities Protective Organization (UFPO). Vehicle access routes to drilling/sampling/test pitting locations shall be determined and cleared prior to any field activities. A temporary staging area will be constructed on the south parcel of the site. This staging area will consist of earthen berms, lined with polyethylene sheeting. Any drums encountered during test pit excavation will be stored in overpacks on pallets in this staging area. The site plan is shown in Figure A2-1.

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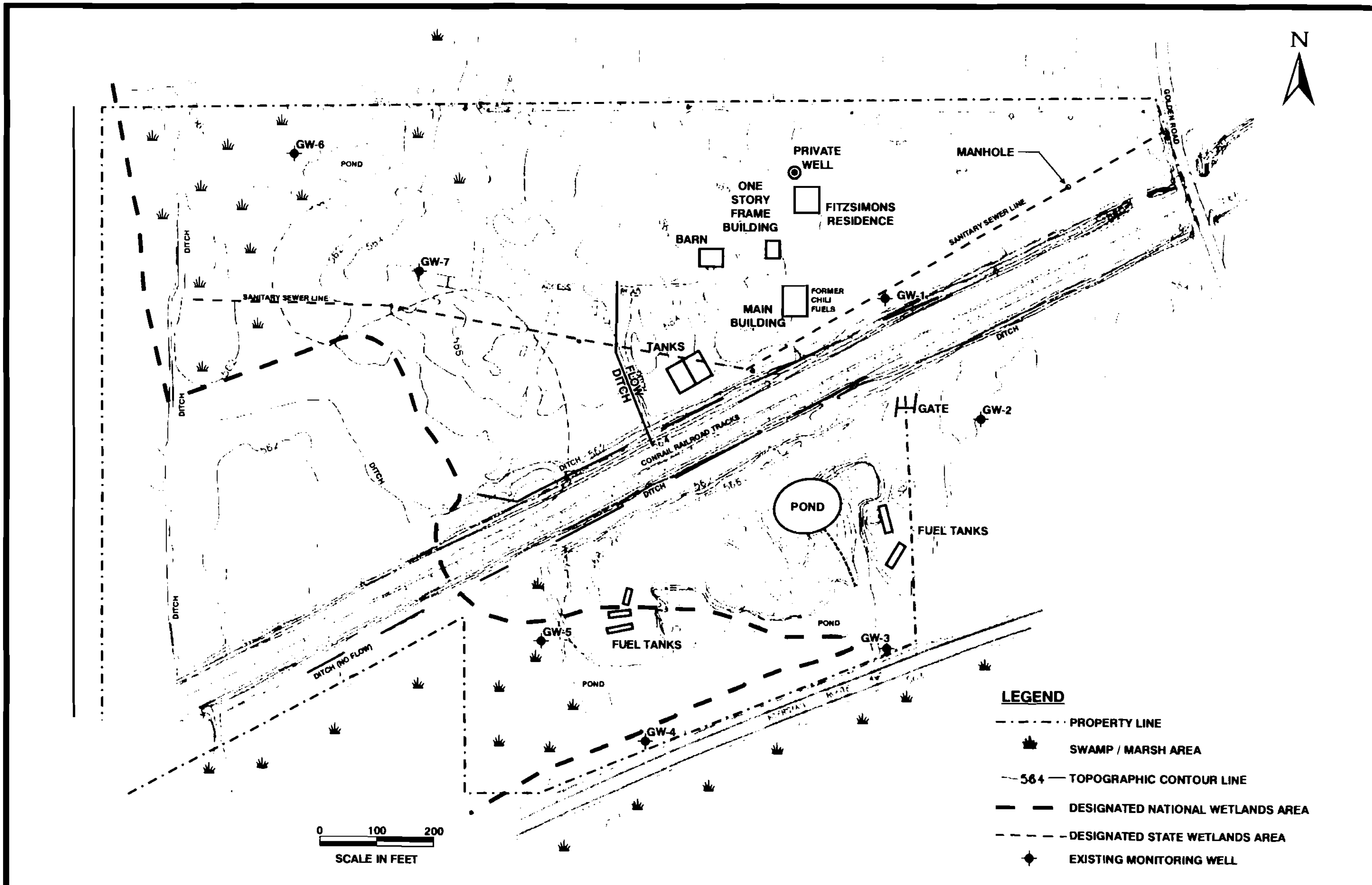

URS Greiner Woodward Clyde	GOLDEN ROAD DISPOSAL SITE SITE PLAN	FIGURE A2-1

A3.0 GEOPHYSICAL SURVEY

A geophysical survey will be performed using an EM-31 terrain conductivity meter and magnetometer to identify subsurface anomalies indicating the potential presence of buried waste (i.e., drums). The EM/magnetometer survey will be performed on the western portion of the north parcel and over the entire filled portion of the south parcel as shown in Figure A3-1. URSGWC surveyors will install a grid with north-south and east-west transect lines spaced 100-feet apart. The EM/magnetometer survey will be performed along perpendicular traverses. The data will be used to produce EM contour maps for interpretation regarding the limits of buried waste. Areas of anomalous conductivity readings will be delineated using surveying lath and flagging for future reference during test pit activities. The Standard Operating Procedure (SOP) for conducting an EM survey is presented in Appendix A-1. The geophysical survey will be performed in accordance with Section 2.2.3 of the Project Management Plan.

A3.1 Radiological Survey

In order to confirm that radioactive waste materials are not present at the site, a sitewide radiological survey will be performed using a Ludlum survey meter. The radiological survey will be conducted simultaneously with the EM survey using identical grid reference points. The main (junk yard) section of the north parcel will also be included. All data will be recorded in the field log book. Procedures for operating the radiation survey meter are discussed in Section A14.5.

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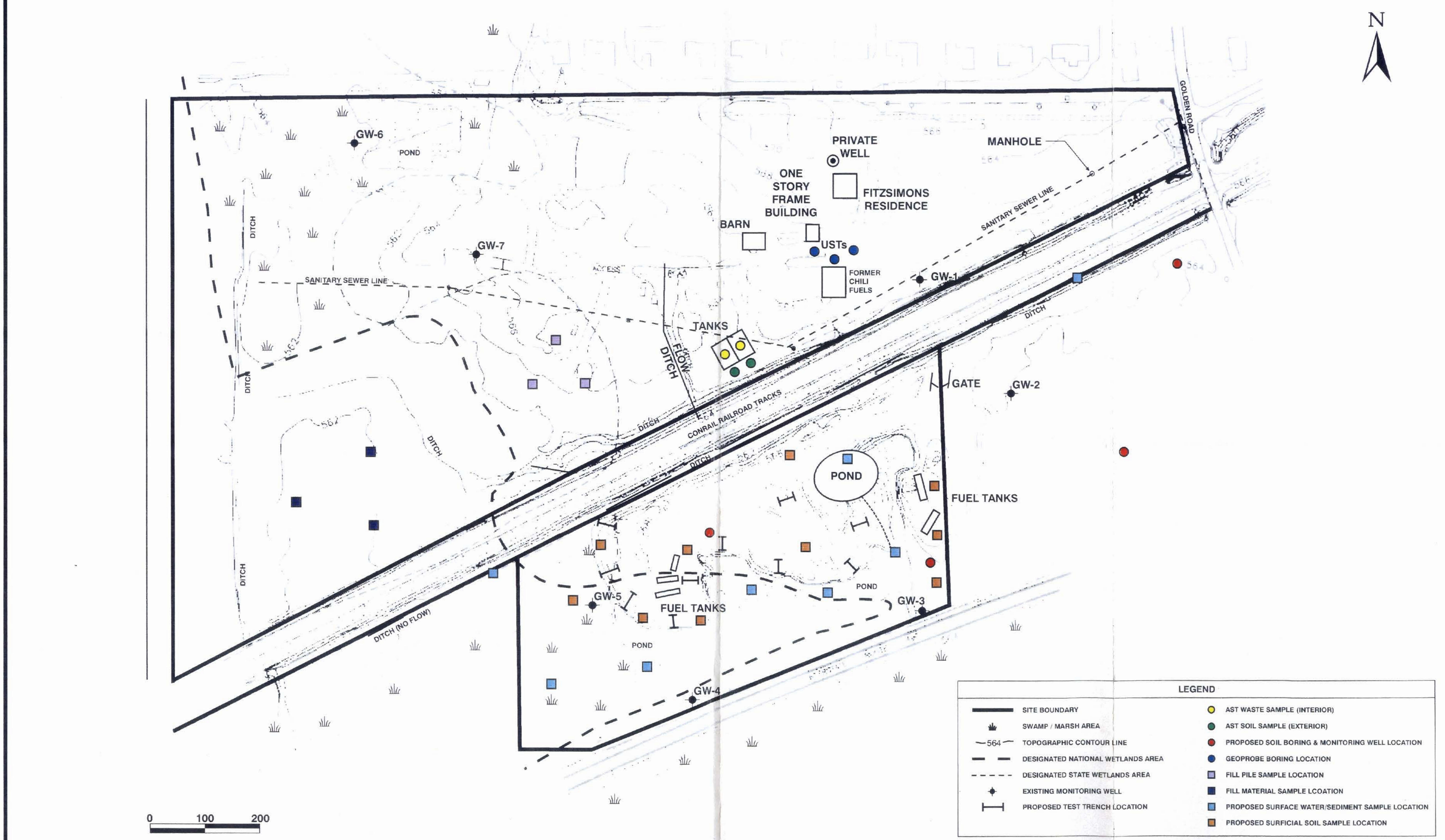

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PROPOSED SAMPLING LOCATIONS
GOLDEN ROAD DISPOSAL SITE

FIGURE A3-1

A4.0 SURFACE WATER SAMPLING

Eight (8) surface water samples will be collected from low-lying, wetland areas including the ponded area near the center of the site. Surface water sample locations are shown in Figure A3-1.

Summary: The surface waters on the site will be sampled by direct submersion of the sample container. The samples will be collected by submerging the sample container and capping underwater. Water samples will be collected as per Section 2.2.12 of the Project Management Plan and also analyzed for appropriate indicator parameters (pH, temperature, conductivity, dissolved oxygen, oxidation/reduction potential, and turbidity) at the time of collection. Surface water samples will be analyzed for the parameter identified in Table A9-1.

Procedure:

1) With proper protective garment and gear, take grab samples by slowly submerging the sample bottle into the surface water with minimal surface disturbance.
2) Cap the sample bottle (I-Chem Series 300 or equivalent) underwater when full.
3) In the same manner, fill all required sample bottles and preserve the sample as required.
4) Secure the appropriately lined (teflon or polyethylene) cap tightly.
5) Label the sample bottle with the appropriate sample tag (Section A12.0). Be sure to label the tag carefully and clearly, addressing all the categories or parameters.
6) Record flow conditions (if any) at each sample location.
7) Record all field data in the field notebook.

Reference: "Characterization of Hazardous Waste Sites Manual, Volume 2, Available Sampling Methods", 3rd Ed., USEPA, Nov. 1986.

A5.0 SURFICIAL SOIL/SEDIMENT SAMPLING

Ten (10) surface soil samples will be collected from the south parcel from points of potential contamination. Eight sediment samples will be collected at the eight surface water locations. Surficial soil and sediment sample locations are shown in Figure A3-1.

Summary: Surficial soil and sediment samples will be collected with a stainless-steel hand auger or scoops and bowls. Stainless steel is preferred over chrome-plated scoops or trowels. Chrome-plated equipment should be avoided where chromium contamination is suspected. This method is most appropriate for shallow samples to a depth of two feet or less. The locations and frequency of the samples are found in Section 2.2.10 and 2.2.12 of the Project Management Plan. Surface soil and sediment samples will be analyzed for the parameters identified in Table A9-1.

Procedures:

1) Using a pre-cleaned shovel, removes any vegetation from the area to be sampled. Using a precleaned stainless-steel hand auger or scoop, collect a sample from 0 to 2 inches in depth and place into a precleaned stainless steel bowl. Volatile samples will be placed directly into the sample vials. Homogenize the remainder of the sample and place in appropriate clean (I-Chem Series 300 or equivalent) sample containers.
2) Secure a teflon-lined cap onto the container and label the sample bottle with the appropriate sample tag (Section A12.0). Be sure to label the tag carefully and clearly, addressing all the categories or parameters. Complete all chain-of-custody documents (Section A12.0) and record in the field log book. Place the samples on ice in a cooler for shipment to the laboratory.
3) Decontaminate equipment after use and between sample locations using the procedure in Section A11.0.

A6.0 WASTE SAMPLING

Waste material encountered in drums, aboveground storage tanks (ASTs) and underground storage tanks (USTs) will require sample collection and analysis. Bulk asbestos (i.e., pipe/tank insulation) will also be sampled as part of the waste sampling program.

Drum and tank sampling will follow the sampling procedures outlined in Office of Solid Wastes and Emergency Response (OSWER) Directive 9360.4-07. When sampling waste materials, high levels of contaminants can be expected. Screening with a photoionization detector (PID) will be done to determine total organic vapor concentrations and appropriate levels of personal protection. At a minimum, Level C protection will be worn when opening any container. Waste samples will be collected as per Sections 2.2.5, 2.2.6 and 2.2.8 of the Project Management Plan and analyzed for the parameters identified in Table A9-1. Up to ten waste samples from drums will be collected for analysis in accordance with Table A9-1.

A6.1 <u>Drum Inventory and Sampling</u>

A field inspection/reconnaissance will be conducted by the URSGWC field team to locate and identify all exposed drums at the site. All available information concerning each drum will be recorded in the field notebook including the type of container, total capacity estimate, actual capacity (if container is open), markings, labels, color, origin, condition, etc. Photographs may be taken to provide a permanent record. The drums will then be marked with a unique identification number for present and future reference. Information obtained in the field will be recorded on a Drum Inventory Log (Figure A6-1). Up to ten (10) samples from drums will be collected for laboratory analysis in accordance with Table A9-1.

The procedure used to open a drum will depend directly upon the container's condition. The field coordinator should determine which containers should be opened using a remote opening device or penetrating apparatus. Only experienced personnel will open/sample drums and specific procedures for assuring health and safety will be clearly defined (see Section C15.0). All drums will

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DRUM INVENTORY LOG

DATE SAMPLED ____________________
TIME ____________________

DRUM ID# ____________________ SAMPLER'S NAME ____________________

ESTIMATED LIQUID QUANTITY ____________________ DRUM CONDITION ____________________

GRID LOCATION ____________________ SAMPLING DEVICE ____________________

STAGING LOCATION ____________________

PHYSICAL APPEARANCE OF THE DRUM/BULK CONTENTS ____________________

____

COLOR ____________________ ODOR ____________________

pH ____________________ % LIQUID ____________________

COMMENTS ____________________

____

____

LABORATORY ANALYTICAL DATA DATE OF ANALYSIS ____________________

____

____

COMPATIBILITY ____________________

HAZARD ____________________

WASTE ID ____________________

TREATMENT DISPOSAL RECOMMENDATIONS ____________________

APPROVAL

LAB ____________________ DATE ____________________

SITE MANAGER ____________________ DATE ____________________

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Figure A6-1

be opened with utmost care. During drum opening operations, organic vapor concentrations will be monitored with portable instrumentation and results will be recorded in the field notebook. Based on a data review from previous investigations, and a recent site walkover performed by URSGWC, it is anticipated that the drums to be sampled will be decomposed. This will allow for sample collection through an existing opening in the drum shell. Intact drums will be transported to the temporary staging area for sampling. Procedures for sampling containerized solids and liquids are described below.

A6.1.1 Sampling Containerized Solids

The sampling of containerized solid materials (sludges, granular, powder) is generally accomplished through the use of one of the following samplers:

- scoop or trowel
- waste pile sampler
- Veihmeyer sampler/corer
- sampling trier
- grain sampler

Once the container to be sampled is opened, insert the decontaminated sampling device into the center of the material to be sampled. Retrieve the sample and immediately transfer it into the sample bottle. If the sampling device is disposable, it may be left in the container sampled. Otherwise, decontaminate the device thoroughly before collecting the next sample. Each container should be sampled discretely. Depending on the objective of the sampling event (e.g., characterization or disposal) compositing of samples in the laboratory on a weight/weight or volume/volume basis prior to analysis may be permissible.

A6.1.2 Sampling Containerized Liquids

The sampling of containerized liquids is generally accomplished through the use of one of the following samplers:

- Coliwasa (Section 6.1.3)
- sample thief
- stratified sample thief
- liquids/sludge sampler

Once the container to be sampled is opened, insert the decontaminated sampling device into the center of the liquid contents to be sampled. Retrieve the sample and immediately transfer it into the sample bottle. If the sampling device is disposable, leave it in the container sampled. Otherwise decontaminate the device thoroughly before collecting the next sample. It should be noted that dedicated laboratory decontaminated samplers offer the least potential for cross contamination. Each container should be sampled discretely. The containers will be securely closed after sampling by appropriate methods dependent upon container condition.

A6.1.3 Coliwasa Sampling Procedures

Primarily used for drums and similarly constructed containers, the Coliwasa tube sampler allows for the collection of multi-phase liquid waste. Its basic construction consists of an inner (rod) and outer tube fabricated of a variety of materials including glass, teflon, or PVC. The inner tube is sealed with a round stop on one end which, when raised, allows liquid to enter the annulus between the tubes. When pushed down, the stop seals the hole in the outer tube and allows for sample extraction.

Procedure

1) After inspecting the drum, carefully open the drum or remove the lid. Some drums may be under pressure. If under` pressure, carefully and slowly vent. If opened quickly, there is a possibility that the liquid in the drum will spray out.

2) Slowly insert the Coliwasa in the open position to the bottom of the drum, allowing it to fill as it is lowered. The level of liquid inside the Coliwasa should be about the same as the level on the outside.

3) Lock the sampler in the closed position.

4) Complete the bottle label before filling with liquid. Bottles should be filled according to the volatility of the contaminants to be analyzed (volatiles first, semi-volatiles second, metals third, etc). Avoid getting liquid on the outside of the bottle.

5) Slowly raise the Coliwasa out of the drum or container. Place the lower end of the Coliwasa into the sample bottle (a wide-mouth bottle is necessary) and slowly release the liquid into the bottle. Make certain that the volume in the Coliwasa will not overfill the bottle. Repeat these procedures until each bottle is filled to the desired volume.

6) Fill the volatile vials until there is an inverted meniscus (convex) over the top. Place the septum cap on the vial at an angle over the meniscus, straighten the cap, then tighten onto the vial. Invert the vial and gently tap to verify that there are no bubbles entrapped in the sample. If air bubbles are present, resample using a new volatile vial. If volatile vials are to be filled, it is helpful to use a transfer device such as a clean stainless steel or glass breaker. Fill the other bottles to the desired volume. Assuming that the liquid is concentrated waste, small volumes of sample

should be sufficient for an analysis. Wide-mouth bottles should be used to ease the transfer of the liquid from the Coliwasa.

7) Clean the outside of the bottle or vial with water and/or paper towels. Check the legibility of the label (solvents often solubilize the ink on the label). Attach sample tags when needed.

8) Place the sample in an ice filled cooler as soon as possible after filling. Fifteen minutes after placing the volatile vials on ice, check and retighten caps to prevent the infiltration of air and other contaminants.

9) Chain-of-custody forms (Section A13.0) must be completed by the samplers before leaving the site.

10) Samples must be packaged and shipped according to USDOT and IATA regulations when applicable (Section A13.0). At a minimum, samples must be packaged to prevent breakage.

11) Sampling equipment may be decontaminated (Section A11.0), but because of the difficultly in cleaning the Coliwasa, disposable samplers will most likely be used.

Reference: *Test Methods for Evaluating Solid Waste,* SW-846, USEPA, November 1986

A6.2 <u>Aboveground/Underground Storage Tank Sampling</u>

Prior to the initiation of the sampling event, all ASTs and identified USTs will be inventoried. All available information concerning each AST/UST will be recorded in the field notebook including: type of container, total capacity estimate, actual capacity (if container is open), markings, labels, color, origin, and condition. Each AST/UST will be marked with an identification number for present and future reference.

AST Sampling

Waste samples will be collected within each of the two large ASTs on the north parcel in order to determine if the ASTs contain residual petroleum products. Additionally, surface soil samples will be collected on the ground surface below each of the two AST dispensers. AST sample locations are shown in Figure A3-1.

The procedure used to open a large containment vessel to provide access to its contents will vary with different containers. Most large tanks will have valves near the bottom of the tank and hatches near the top. It is most desirable to collect samples from the top of a tank for several reasons. The integrity of valves near the bottom of the tank cannot be assured. The valve may be immobile or may break or become jammed in the open position resulting in the uncontrolled release of the tank's contents. Secondly, the contents of a large vessel may become stratified. Collecting a sample from the bottom will not permit the collection of a sample of each strata. Instead, a cross-sectional sample of the tank's contents should be obtained from the top access.

When opening and sampling larger containment vessels, precautions must be considered to assure personal health and safety (see Section C15.0). Accessing storage tanks requires a great deal of manual dexterity. It usually requires climbing to the top of the tank while wearing protective gear and carrying sampling equipment. At least two people must perform the sampling: one to open the hatch and/or collect the actual samples, and the other to stand back, log field notes and assist the sampler.

Prior to opening the AST hatch, the sampler should check the tank for a pressure gauge (if present). If necessary, the release valve should be opened slowly to bring the tank to atmospheric pressure. If the tank pressure is too great or venting releases gases or vapors, discontinue venting immediately. Measure releases to the atmosphere with portable field instrumentation and record in the field notebook. Product samples will be collected as described in Section A6.1.3. AST samples will be analyzed in accordance with Table A9-1.

UST Sampling

Two waste samples will be collected from the two known USTs located on the north parcel of the site (Figure A3-1). Each UST will be sampled from the filler port exposed on the ground surface. The filler port caps will be carefully removed and PID readings will be taken. Product measurements will be taken using indicator paste and a steel measuring tape. Product samples will be collected as described in Section A6.1.3. UST samples will be analyzed in accordance with Table A9-1. Adjacent soil and groundwater samples will be collected as described in Section A8.2.

A6.3 Asbestos Sampling

Ten (10) bulk asbestos samples will be collected from suspected asbestos-containing material (ACM). The suspected ACM is associated with ASTs and pipe insulation on the southern portion of the site. Bulk asbestos samples will be analyzed in accordance with Table A9-1. Procedures for collecting bulk asbestos samples are described below:

Procedure:

1) Respiratory protection is required during all bulk asbestos sampling.
2) Wet the area to be sampled.
3) Using an aluminum plunger, carefully collect the sample. Be sure to penetrate any paint or protective coating and all layers of the material to be sampled.
4) Place the sample in an appropriately labeled (Section A12.0) container (I-Chem Series 300 or equivalent) and secure the cap with tape.
5) Complete the chain of custody form and pack the sample cooler for shipment to the laboratory (Section A13.0).
6) Fill in the small hole where the sample was collected with caulking compound and/or acrylic adhesive to seal the site and avoid any release of fibers.
7) Record all sampling data in the field notebook.

A6.4 Fill Material Sampling

Three (3) representative fill material samples will be collected from the western portion of the north parcel of the site. Fill material samples will be collected from areas where obvious soil staining/discoloration is present and/or from areas where surficial fill piles were previously located. The fill material samples will be collected to 2 feet in depth using a hand auger following the procedures described in Section A5.0.

Additionally, three (3) discrete samples form existing above-ground fill piles located on the north parcel will be collected. These samples will be collected using a hand auger by the procedures described in Section A5.0. Fill material and fill pile samples will be analyzed in accordance with Table A9-1. Fill sample locations are shown in Figure A3-1.

A7.0 TEST PIT EXCAVATION

Test pits shall be excavated by a subcontractor, under the supervision of a URSGWC geologist, using a track excavator or backhoe in the south parcel at locations shown in Figure A3-1 and described in Section 2.2.7 of the Project Management Plan. Up to five (5) subsurface soil samples will be collected at apparent or suspected areas of contamination. The samples will be analyzed for the parameters identified in Table A9-1. The subcontractor shall follow Occupational Safety and Health Administration (OSHA) rules for excavation. Excavated materials will be screened with a PID and samples will be collected from the excavator bucket (no personnel shall enter the test pits). Upon completion, the test pits will immediately be backfilled with excavated materials and compacted with the excavator bucket. Any obviously contaminated material or suspected hazardous waste will be placed in drums for transport to the staging area. If drums are encountered during test trenching, the drums will be removed and transported to the staging area for further evaluation and possible sampling (Section A6.0). Drums will be placed in 85 gallon overpacks prior to transport to the staging area, if necessary.

<u>Procedure</u>:

1. Decontaminate the track excavator or backhoe on the decontamination pad.

2. Maneuver the backhoe into position.

3. Commence excavation with the excavator positioned upwind of the excavation. Conduct continuous air monitoring with appropriate air monitoring equipment as indicated in the HASP. Screen the soil with a PID for volatile organic compounds as it is placed on plastic sheeting.

4. Upon completing the excavation of the test pit, visually inspect the horizons of the soil for discoloration or staining and photo document the test pit. The following information will be recorded in the field notebook for each test pit:

- The total depth, length, and width of the excavation
- The depth and thickness of distinct soil or lithologic units
- A lithologic description of each unit
- A description of any man-made materials or apparent contamination encountered

5. Soil samples will be collected directly from the excavator bucket. The excavator will collect a sample from a specific soil horizon and bring the sample to ground surface. **No personnel shall enter the excavation to collect samples.** The sampler will remove approximately two inches of soil from the outside of the soil to be sampled prior to collecting the sample to prevent cross contamination of the sample. Place the labeled jars in an ice-filled cooler for shipment to the laboratory. Label the sample container (Section A12.0) and fill out the chain-of-custody (Section A13.0). Later, a Test Pit Log sheet will be completed (Figure A7-1).

6. Backfill the test pit with excavated material if not visibly contaminated immediately after the required information has been recorded and the samples collected. The first soils out should be the last soils in when backfilling the test pit. No test pit shall be left open overnight unless barrier fencing and warning lights are set up. Compact the backfilled soil with the excavator bucket.

7. Decontaminate the sampling equipment and the excavator bucket between test pit locations (Section A11.0).

TEST PIT LOG

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PROJECT:	SHEET: OF
CLIENT:	JOB NUMBER:
CONTRACTOR:	LOCATION:
DATE STARTED:	GROUND ELEVATION:
DATE COMPLETED:	OPERATOR:
PIT NUMBER:	GEOLOGIST:
	GROUND WATER:

DEPTH (FT)	SAMPLE		DESCRIPTION
	NO.	TYPE	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

COMMENTS:

Figure A7-1

A8.0 SUBSURFACE INVESTIGATION

A8.1 General Drilling Program

The subsurface investigation program will provide information which will assist in geologic, geotechnical, hydrogeological, and chemical site interpretation. Four soil borings will be advanced and subsurface soil samples will be collected from two of the four borings exhibiting evidence (i.e. PID readings, fill, discoloration) of contamination. Monitoring wells will be installed in each of these borings. Additionally, three soil borings will be advanced using a Geoprobe direct push unit. Soil and groundwater samples will be analyzed for the parameters identified in Table A9-1.

A list of applicable investigation and monitoring well installation procedures, and the appropriate section where they are discussed are as follows:

- Geoprobe direct push procedures (Section A8.2)
- hollow-stem auger drilling procedures (Section A8.3);
- split-spoon sampling procedures (Section A8.4);
- disposal of drill cuttings (Section A8.5);
- plugging/abandonment of borehole procedures (Section A8.6);
- well construction procedures (Section A8.7);
- well development procedures (Section A8.8);
- slug testing (Section A8.9); and
- documentation (Section A8.10);

A8.2 Geoprobe Direct Push Procedures

A Geoprobe direct push unit will be used to obtain soil and groundwater samples. A 2-inch by 4-foot Macrocore sampler will be driven into the ground to the desired sample depth using the Geoprobe unit. Three soil and one groundwater samples will be collected adjacent to the USTs located on the north parcel (Figure A3-1) as described in Section 2.2.6 of the Project Management Plan.

Procedure:

1) Inspect the sampling equipment to ensure proper working condition.
2) Select additional components for the sampler as required (i.e., leaf spring core retainer for clays, or a sand trap for non-cohesive sands).
3) Lower the sampler to the ground surface, or bottom of the hole previously made by the sampler, and check the depth against length of the rods and the sampler.
4) Attach the drive head assembly to the sample rods.
5) Push the sampler in 4-foot increments into the subsurface up to the desired depth with a hydraulic press.
6) Rotate the sampling rods clockwise and remove the sampler.
7) One sample will be collected from each boring for chemical analysis. Extrude the sample, describe the soil, and collect any necessary samples into appropriate containers and label the containers (Section A12.0). The sample will be collected from the depth interval with obvious soil staining or the highest organic vapor concentration. One groundwater sample will be collected from one boring location using a micro-bailer. The sample will be obtained from the open borehole. If the borehole collapses, a new decontaminated PVC screen will be temporarily installed in the borehole to allow for groundwater sample collection.
8) Document all soil and groundwater descriptions and sample information in the field notebook.
9) Sample containers will be labeled as described in Section A12.0 and shipped to the laboratory under chain-of-custody as described in Section A13.0.
10) Abandon the Geoprobe hole by backfilling with unused sample and top off the borings with bentonite pellets and hydrate with potable water.

A8.3 Hollow-Stem Auger Drilling Procedures

Drilling with hollow-stem augers is a standard method of subsurface drilling which enables the recovery of representative subsurface samples for identification and laboratory testing.

Procedure:

1) Advance the boring by rotating and advancing the 4¼ inch hollow-stem augers the desired distance into the subsurface. The borings will be advanced incrementally to permit continuous or intermittent split-spoon sampling as required.

2) Remove the center plug from the augers and sample the subsurface soil per method stipulated by the project geologist or hydrogeologist. Sampling methods are presented in Section A8.4.

Reference: American Society of Testing Materials (ASTM) Standard Practice for Soil Investigation and Sampling by Auger Borings D1452-80.

A8.4 Split-Spoon Sampling Procedures

Split-spoon sampling is a standard method of soil sampling to obtain representative samples for identification and laboratory testing as well as to serve as a measure of resistance of soil to sampler penetration. Subsurface soil samples will be collected as described in Section 2.2.11 of the Project Management Plan.

Procedure:

1) Measure the sampling equipment lengths to ensure that they conform to specifications. Confirm the weight of the hammer (140 pounds.).

2) Clean out the auger flight to the bottom depth prior to sampling. Select additional components as required (i.e., leaf spring core retainer for clays or a sand trap for non-cohesive sands).

3) Lower the sampler to the bottom of the auger column and check the depth against length of the rods and the sampler.

4) Attach the drive head and hammer to the drill rods without the weight resting on the rods.

5) Lower the weight and allow the sampler to settle up to 6 inches. If it settles more than 6-inches, consider use of another sampler.

6) Mark four 6-inch intervals on the drill rods relative to a drive reference point on the rig. With the sampler resting on the bottom of the hole, drive the sampler with the 140 pound hammer falling freely over its 30-inch fall until 24 inches have been penetrated or 100 blows applied.

7) Record the number of blows per 6 inches. Determine the "N" value by adding the blows for the 6-to 12-inch and 12-to 18-inch interval of each sample attempt.

8) Open the sampler and describe the soil.

9) Document all soil properties and sample locations in the field notebook and later on the Test Boring Log (Figure A8-1).

10) The sample fraction with obvious soil staining or highest organic vapor reading will be collected for analysis. Place the sample in a suitable container (I-Chem Series 300 or equivalent), label the sample container (Section A12.0), and ship to the laboratory for analysis (Section A13.0).

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BORING LOG

BORING NO.:

PROJECT:					SHEET: OF
CLIENT:					JOB NO.:
BORING CONTRACTOR:					BORING LOCATION:
GROUNDWATER:				ENVIRONMENTAL SAMPLE	GROUND ELEVATION:
DATE	TIME	LEVEL	REFERENCE	Sample Type:	DATE STARTED:
					DATE FINISHED:
				Sample Analyses:	DRILLER:
					GEOLOGIST:
					REVIEWED BY:

DEPTH Meters	STRATA	SAMPLE				DESCRIPTION			REMARKS
		Number	Recovery	PID Readings (ppm)	Env. Sample Depth(m)	COLOR	MATERIAL DESCRIPTION	CLASS USCS	
1									
2									
3									
4									
5									
6									
7									
8									

COMMENTS: __________

PROJECT NO.: __________

BORING NO.: __________

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Figure A8-1

Reference: American Society of Testing Materials (ASTM) Standard Method for Penetration Test and Split Barrel Sampling of Soils D1586-84.

A8.4.1 Unified Soil Classification System

Soils are classified for engineering purposes according to the Unified Soil Classification System (USCS) adopted by the United States Army Corps of Engineers and United States Department of the Interior Bureau of Reclamation. Soil properties which form the basis for the USCS are:

- Percentage of gravel, sand, and fines;
- Shape of the grain-size distribution curve; and
- Plasticity and compressibility characteristics.

According to this system, all soils are divided into three major groups: coarse-grained, fine-grained, and highly-organic (peaty). The boundary between coarse-grained and fine-grained soils is taken to be the 200-mesh sieve (0.074 mm). In the field the distinction is based on whether the individual particles can be seen with the unaided eye. If more than 50% of the soil by weight is judged to consist of grains that can be distinguished separately, the soil is considered to be coarse-grained.

The coarse-grained soils are divided into gravelly (G) or sandy (S) soils, depending on whether more or less than 50% of the visible grains are larger than the No. 4 sieve (3/16 inch). They are each divided further into four groups:

W: Well graded; fairly clean (<5% finer than 0.074 mm)

P: Poorly graded (gap-graded); fairly clean (<5% finer than 0.074mm)

C: Clayey (>12% finer than 0.074mm); plastic (clayey) fines. Fine fraction above the A- line with plasticity index above 7.

M: Silty (>12% finer than 0.074 mm); nonplastic or silty fines. Fine fraction below the A- line and plasticity index below 4.

The soils are represented by symbols such as GW or SP. Borderline materials are represented by a double symbol, as GW-GC.

The fine-grained soils are divided into three groups: inorganic silts (M), inorganic clays (C), and organic silts and clays (O). The soils are further divided into those having liquid limits lower than 50% (L), or higher than 50% (H).

The distinction between the inorganic clays (C), the inorganic silts (M), and organic silts and clays (O) is made on the basis of a modified plasticity chart. Soils CH and CL are represented by points above the A-line, whereas soils OH, OL, and MH correspond to positions below the A-line. Soils ML, except for a few clayey fine sands, are also represented by points below the A-line. The organic soils O are distinguished from the inorganic soils M and C by their characteristic odor and dark color.

A8.4.2 Visual Identification

Soil properties required to define the USCS classification of a soil are the primary features to be considered in field identification. These properties and other observed characteristics normally used to describe soils are defined below:

a. Color
b. Moisture conditions
c. Grain size
   (1) Estimated maximum grain size
   (2) Estimated percent by weight of fines (material passing No. 200 sieve)
d. Gradation
e. Grain shape
f. Plasticity
g. Predominant soil type
h. Secondary components of soil
i. Classification symbol

j. Other features such as:

organic, chemical, or metallic content;

compactness;

consistency;

cohesiveness near plastic limit;

dry strength; and

source - residual, or transported (aeolian, water borne, glacial deposit, etc.)

evidence of contamination

A8.5 Disposal of Drill Cuttings

Disposal of drill cuttings will be performed in accordance with the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-89-4032, November 21, 1989. All drill cuttings generated during soil boring and monitoring well installation will be disposed of on-site. If organic vapor readings exceed 5 parts per million (ppm), the cuttings will be placed into 55-gallon drums for hazardous waste characterization sampling as described in Table A9-1. Based on previous sample results from site soils, it is not anticipated that containerization will be required.

A8.6 Plugging/Abandonment of Borehole Procedures

Boreholes that are not completed as monitoring wells will be sealed (plugged) prior to abandonment to prevent downhole contamination. Sealing can be achieved by backfilling the borehole with bentonite or with a cement/bentonite grout. The grout will be introduced from bottom to top using either a tremie pipe or the drill rods. Although each boring will have a monitoring well installed in it, abandonment procedures have been included in this FSP.

Procedures:

1) Determine most suitable seal materials. Grout specifications generally have mixture ratios as follows:

Grout Slurry Composition (% Weight)

1.5 to 3.0% - Bentonite (Quick Gel)

40 to 60% - Cement (Portland Type I)

40 to 60% - Water

Calculate the volume of the borehole based on the bit or auger head diameter plus 10% and determine the volume of grout to be injected. Generally, the total mixed volume is the borehole volume plus 20%.

3) Identify the equipment to be used for the preparation and mixing of the grout. Ensure the volume of the tanks to be used for mixing has been measured adequately. Document these volumes.

4) Identify the source of the water to be used for mixing the grout and determine its suitability for use. In particular, water with high sulfate or chloride levels, or heated water, should not be used. These types of waters can cause operational difficulties or modify the set-up time for the grout.

5) Identify the equipment to be used for injecting the grout. Ensure that the pump to be used has adequate pressure to enable complete return to surface.

6) Identify the volumes to be pumped at each stage or in total if only one stage is to be used.

7) Prepare the borehole plugging plan and discuss the plan and activities with the drilling contractor prior to beginning any mixing activities.

8) Begin mixing the grout to be injected.

9) Record the type and amount of materials used during the mixing operation. Ensure that the ratios are within specification tolerance.

10) Begin pumping the grout through the return line bypass system to confirm that all pump and surface fittings are secure.

11) Initiate downhole pumping. Record the times and grout injection volumes in the field notebook.

12) Document the return circulation of grout. This may be facilitated by using a colored dye or other tagging method if a mudded borehole condition exists prior to grout injection.

13) Identify what procedures will be used for grouting in the upper 3 feet. When casing exists in the borehole, decisions are required as to the timing for removal and final disposition of the casing Generally it will not be removed prior to grouting because of the potential for difficult access and loss of circulation in the upper soil or rock layers. Accordingly, when cement return is achieved at surface, the casing is commonly removed and the borehole is topped off with grout or soils. If casing removal is not possible or not desired, the casing left in place is cut off at or near the ground surface. If casing is not present during grouting, the grout level in the borehole is topped off after the rods or tremie pipe is removed.

14) Clear and clean the surface near the borehole. Level the ground to about the pre-existing grade Add grout or cement as necessary to the area near the borehole.

On occasion, there may be some settling of the grout which takes place over several days. If this settling occurs, additional bentonite/cement will be used to bring the borehole to existing grade. A follow-up check at each site should be made within one week to 10 days of completion. Document the visit and describe any action taken.

A8.7 Well Construction Procedures

Monitoring wells will conform to the program set forth in the Project Management Plan. Four monitoring wells will be installed on the south parcel to monitor groundwater in the uppermost overburden aquifer. Proposed monitoring well locations are shown in Figure A3-1.

Monitoring Well Construction

The well construction methodology described below is common for the construction of groundwater wells. It allows for monitoring of groundwater elevation and acquisition of groundwater samples for laboratory testing.

Procedure:

1) Advance the subsurface boring to the depth of penetration by means of hollow-stem auger drilling.

2) Remove the center plug from the augers and verify borehole depth using a weighted measuring tape.

3) Insert the 2-inch Schedule 40 polyvinylchloride (PVC) well screen (0.010-inch slot). Add 2-inch PVC riser pipe into borehole through the hollow stem augers as necessary. Cap the riser to prevent well construction materials from entering the well.

4) After grout has set for several hours add sand to screen section of well while slowly removing augers. The sand pack should extend at least two feet above the top of the screen section. Measure with a tape.

5) Slowly add bentonite pellets to the borehole as the augers are slowly removed. The bentonite seal should extend at least two feet above the top of the sand pack

section. Measure with a tape. The rate of removal of the augers from the borehole should closely follow the rate that the sand pack and bentonite pellets fill the borehole.

6) If the bentonite seal is placed above the groundwater level within the borehole, add water to the borehole to hydrate the bentonite pellets. Allow the pellets to hydrate for at least 30 minutes.

7) Mix the cement/bentonite grout per specifications presented in Section A8.6.

8) Add grout to borehole through a tremie pipe or hose from the top of the bentonite seal to the ground surface.

9) Remove the remaining augers from the borehole.

10) Top off the grout in borehole. The grout should extend to approximately two feet below the ground surface.

Cut the well riser pipe to about two feet above the ground surface.

11) Backfill the remaining two feet of the borehole with concrete.

12) Install the protective casing over the well riser pipe and set it into the concrete backfill.

13) Lock the protective casing cap.

14) Document well construction details in the field notebook and later on a Monitoring Well Construction Details diagram (Figure A8-2).

OVERBURDEN WELL CONSTRUCTION DETAILS	***URS Greiner Woodward Clyde***

DRILLING SUMMARY

Geologist:

Drilling Company:

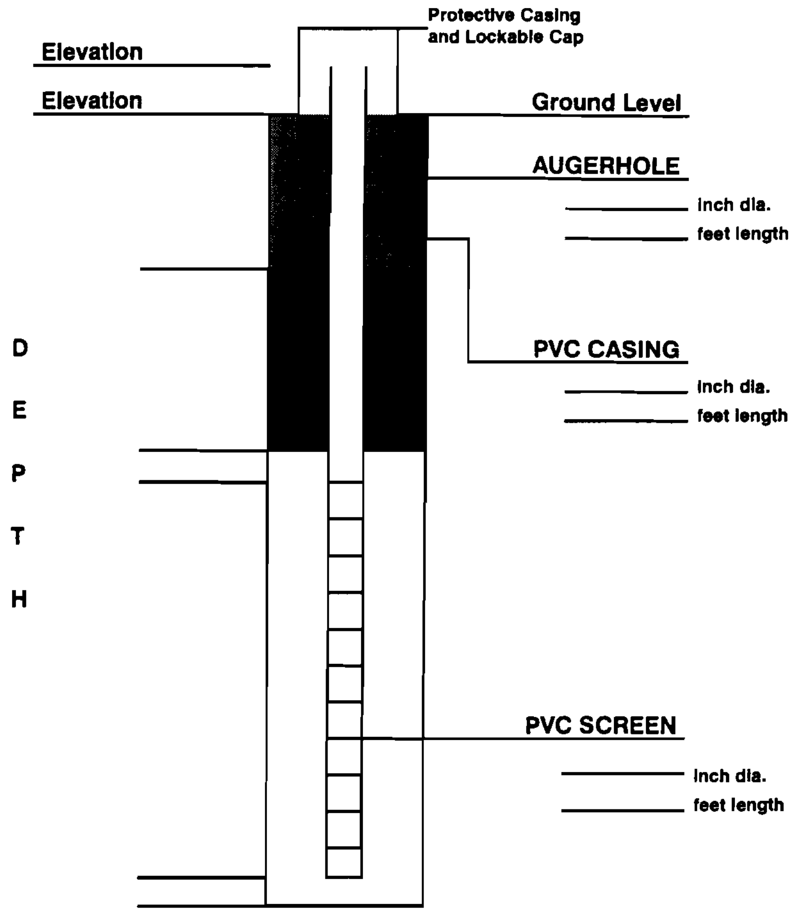
Driller:

Rig Make/Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description



WELL DESIGN

CASING MATERIAL	SCREEN MATERIAL	FILTER MATERIAL
Surface:	Type:	Type: Setting:
Monitor:	Slot Size:	SEAL MATERIAL
		Type: Setting:

COMMENTS	LEGEND
	Cement/Bentonite Grout
	Bentonite Seal
	Silica Sandpack
	Well No.

Client:	**Location:**	**Project No.**

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Figure A8-2

A8.8 Well Development Procedures

Following completion of drilling and well installation, each monitoring well will be developed by pumping until the discharged water is relatively sediment free and the water quality parameters (pH, temperature, and specific conductivity) have stabilized. Any existing wells proposed to be sampled, will be redeveloped using the procedures defined in this section. Developing the well not only removes any sediment but also may improve the hydraulic properties of the sand pack. The effectiveness of the development measures will be closely monitored in order to keep the volume of discharged water to the minimum necessary to obtain sediment-free samples. A portable turbidimeter will be used to monitor effectiveness of development. A turbidity reading of less than 50 nepheliomatic turbidity units (NTU) and steady state pH, temperature and specific conductivity readings will be used as a guide for discontinuing well development.

Procedure:

1) An appropriate well development method should be selected, depending on water level depth, well productivity, and sediment content of the water. Well development options include: (a) manual pumping; and (b) powered suction-lift or hydrolift pumping.

2) Equipment should be assembled, decontaminated (Section A11.0) if necessary, and installed in the well. Care should be taken not to introduce contaminants to the equipment during installation.

3) Well development should proceed by repeated removal of water from the well until the discharged water is relatively sediment-free. All development waters will be discharged directly to the ground at a rate which will allow for reinfiltration to occur. Effectiveness of development should be monitored at regular intervals using a portable turbidimeter. The volume of water removed, turbidity, pH, temperature

and specific conductivity measurements will be recorded on the Well Development/Purging Log (Figure A8-3).

4) Well development will be discontinued when the turbidity of the discharged water is below 50 NTU and the other water quality parameters have stabilized.

A8.9 Slug Testing Procedures

Slug testing is a rapid and inexpensive procedure for estimating the horizontal hydraulic conductivity of an aquifer material screened by a monitoring well. Equipment consists of dedicated/disposable nylon rope, decontaminated stainless steel slug and pressure transducer, a Hermit data logger, and a water level indicator.

Procedure (rising-head test):

1) Record the initial water level in the well (static water level).
2) Lower the pressure transducer into the well to the well bottom. Pull the transducer up one foot. Connect the transducer to the Hermit data logger.
3) Insert the stainless steel slug into the well, below the water table, with nylon rope. Allow the water level in the well to return to static conditions.
4) Simultaneously initiate the Hermit data logger and rapidly remove the slug from the well.
5) Monitor the water level recovery in the well with the Hermit data logger until the water level has returned to static conditions.
6) Download the data from the Hermit data logger and record the data in the field notebook. Review the data to verify that the slug test was successful.
7) Remove the equipment from the well and decontaminate.
8) Analyze the data in the office using a computer.

WELL DEVELOPMENT/ PURGING LOG

URS Greiner

PROJECT TITLE: ______________________

PROJECT NO.: ______________________

STAFF: ______________________

DATE: ______________________ START PURGE: ____________

______________________ END PURGE: ____________

WELL NO.: ______________________

1. TOTAL CASING AND SCREEN LENGTH (FT.): ____________

2. CASING INTERNAL DIAMETER (IN.): ____________

3. WATER LEVEL BELOW TOP OF CASING (FT.): ____________

4. VOLUME OF WATER IN CASING (GAL.): ____________

#1-#3 x #2 (Gal./Ft.)

VOLUME OF 3 CASINGS: ____________ GAL.

WELL ID.	VOL. (GAL./FT.)
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

	ACCUMULATED VOLUME PURGED (GALLONS)										
PARAMETERS	0										
pH											
SPEC. COND. (μmhos)											
TURBIDITY (NTU)											
TEMPERATURE (°C)											
DISSOLVED OXYGEN (mg/L)											

COMMENTS:

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Figure A8-3

A8.10 Documentation

A field notebook will be initiated at the start of onsite work and maintained by the Field Coordinator. The field notebook will include the following daily information regardless of what activity is being performed.

- Date
- Meteorological conditions
- Crew members
- Brief descriptions of proposed field activities
- Locations where work is performed
- Problems and corrective actions taken
- All field measurements or descriptions recorded
- Calibration of field equipment used
- All modifications of the FSP

Each subsurface boring will be logged in a bound field notebook during drilling by the supervising geologist. Field notes will include descriptions of subsurface materials encountered during drilling, sample numbers, and types of samples recovered from the borehole. Additionally, the geologist will note time and material expenditures for later verification of contractor invoices on the Daily Drilling Record (Figure A8-4).

Upon completion of daily drilling activities, the geologist will complete the daily drilling record and initiate chain-of-custody for any samples recovered for chemical laboratory testing. Following completion of the drilling program, the geologist will transfer field notes onto standard forms for the report.

The proper completion of the following forms/logs will be considered correct procedure for documentation during the drilling program:

DAILY DRILLING RECORD

URS Greiner

PROJECT: ______________________ DATE: ______________________

CLIENT: ______________________ CONTRACTOR: ______________________

FROM	TO	PRODUCTIVE HOURS	ACTIVITY / COMMENTS
TOTAL PRODUCTIVE HRS.			LEVEL B / LEVEL C / LEVEL D (circle selection)

LABOR:

UNITS	ACTIVITY

MATERIALS / SUPPLIES:

UNITS	ITEM

WEATHER:

______________________ *URS ON-SITE COORDINATOR*

______________________ *CONTRACTOR REPRESENTATIVE*

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Figure A8-4

- Test Boring Logs (Figure A7-1)
- Monitoring Well Construction Details (Figure A8-2)
- Well Development/Purging Log (Figure A8-3)
- Daily Drilling Record (Figure A8-4)
- Field Log Book - weather-proof, bound field book

A9.0 GROUNDWATER WELL PURGING/SAMPLING

Seven monitoring wells will be sampled; four from newly installed wells, and three from existing wells (Figure A3-1). Groundwater samples will be analyzed for parameters identified in Table A9-1. To collect representative groundwater samples, groundwater wells must be adequately purged prior to sampling. Low volume sampling equipment and procedures will be used to purge the wells and retrieve groundwater samples. Purging will require the removal of one to three volumes of standing water by pumping at a rate of less than one (1) liter per minute. Drawdown must not exceed ten percent of the standing water column. Sampling should commence immediately after purging.

Groundwater sampling frequency is defined in Section 2.2.13 of the Project Management Plan. The wells will be sampled following procedures found in Section A9.2. The samples will be labeled and shipped following procedures outlined in Sections A12.0 and A13.0 and analyzed for the parameters identified in Table A9-1.

A9.1 Well Purging Procedures

(1) The well cover will be unlocked and carefully removed to avoid having any foreign material enter the well. The interior of the riser pipe will be monitored for organic vapors using a photoionization detector (PID). If a reading of greater than 5 parts per million (ppm) is recorded, the well will be vented until levels are below 5 ppm before purging begins.

(2) Using an electronic water level detector, the water level below top of casing will be measured. Knowing the total depth of the well, it will be possible to calculate the volume of water in the well. The end of the probe will be soap-and-water-washed and deionized-water-rinsed between wells.

(3) Calibrate field instruments (e.g., pH, specific conductance, PID, turbidity).

(4) In all wells, a decontaminated submersible pump will be used to purge the required water volume (i.e., until stabilization of pH, temperature, specific conductivity, and turbidity). Dedicated new high density polyethylene (HDPE) discharge and intake tubing will be used for each well.

(5) Slowly install the well pump into the well and set the pump to about the midpoint of the well screen. Configure the dedicated HDPE tubing with a three-way gate valve with the discharge directed through the three-way valve and micropurge flow cell and into a calibrated bucket.

(6) Set the pump rate to less than 1 liter per minute and measure the water level continuously. Adjust the discharge rate until the water level does not drop beyond 10 percent of the screen length.

(7) Purge well until the water quality parameters have stabilized. The stabilization criteria are: specific conductivity - 3% full scale range; pH - 0.10 pH unit; temperature - 0.2°C, and turbidity <50 NTU.

(8) Purging of three well volumes is not necessary if the indicator parameters are stable. However, at least one (1) well volume must be purged before sampling can begin. During purging, it is permissible to by-pass the flow cell until the groundwater has cleared.

(9) Indicator parameters must be measured continuously using the flow cell.

(10) Well purging data are to be recorded in the field notebook and on the Well Development/Purging Log (Figure A8-3).

(11) Dispose of HDPE tubing as per Section A15.0.

A9.2 Groundwater Sampling Procedures

(1) After well purging is completed, a sample will be collected into the appropriate containers. The sampling order shall be volatiles, semivolatiles, then metals. Use an in-line filter (0.45 μm) if filtered metals analyses if required.

(2) Disconnect the flow cell during sampling and reduce pump rate to 100 milliliters per minute. Direct the discharge tubing toward the inside wall of the sample container to minimize volatilization. Fill volatile sample containers so no headspace (air bubbles) are present. Preserve as needed and cap all sample containers.

(3) All sample bottles will be labeled in the field using a waterproof permanent marker (Section A12.0).

(4) Samples will be collected into I-Chem Series 300 or equivalent sample bottles (containing required preservatives) and placed on ice in coolers for processing (preservation and packing) prior to shipment to the analytical laboratory. A chain-of-custody record will be initiated. The analytical laboratory will certify that the sample bottles are analyte-free prior to shipping.

(5) Remove pump and disconnect valves and tubing. Submersible pumps must be decontaminated prior to and between each use. Follow decontamination procedures (Section A11.0) and clean pump by flushing 10 gallons of potable water through the pump. Rinse with deionized water after flushing the pump.

(6) Well sampling data are to be recorded in the field notebook and on the Well Development/Purging Log (Figure A8-3).

A9.2.1 Private Well Sampling

Based on results of a private will survey, two samples will be collected for analysis in accordance with Table A9-1. Purging and sampling procedures will be determined based on an inspection of each in-service private well. Additional samples may be collected if more than two private wells are identified during the private well survey.

A9.3 Water Level Monitoring Procedures

Determination of groundwater surface elevations throughout a monitoring well network makes possible the construction of a potentiometric surface contour map and determination of groundwater flow patterns.

Water levels in all monitoring wells will be measured using an electronic water level indicator or weighted tape. Initially, measurements will be taken following well development until the well has recovered to anticipated static conditions. Water levels will also be measured prior to groundwater purging sampling. Water level measurement procedures are presented below.

Procedure:

1) Clean water level probe following the decontamination procedures (Section A11.0) and test water level meter to ensure that the batteries are charged.

2) Lower probe slowly into the monitoring well until audible alarm indicates the top of the water column.

3) Read the depth to the nearest hundredth of a foot, from the graduated cable using a set reference point on the riser pipe.

4) Repeat the measurement for confirmation and record the water level.

5) Remove the probe from the monitor slowly, drying the cable and probe with a clean "Chem Wipe" or paper towel.

6) Replace monitoring well cap and lock protective cap in place.

7) Decontaminate the water level indicator (Section A11.0) if additional measurements are to be taken.

A9.4 Sample Container, Preservation and Holding Time Requirements

Table A9-1 presents the summary of analytical parameters for all samples to be collected as part of this RI. Table A9-2 lists the sample container, volume, preservation and holding time requirements for samples to be collected at the site.

TABLE A9-1
SUMMARY OF LABORATORY ANALYSES
GOLDEN ROAD DISPOSAL SITE

A. NORTH PARCEL

Parameter	Method Number / Reference[1]	Estimated Number of Samples	QA/QC Samples MS/MSD/MD/MSB	Rinse Blanks	Trip Blanks
I. Groundwater					
Groundwater (Geoprobe)					
Target Compound List (TCL)					
Volatiles + TICs	ASP 95-1	1	0/0/0/0*	0	1
TCL Semivolatiles + TICs	ASP 95-2	1	0/0/0/0*	0	0
TCL Pesticides/PCBs	ASP 95-3	1	0/0/0/0*	0	0
TAL Metals - total	ASP CLP-M	1	0/0/0/0*	0	0
II. Soil					
Aboveground Storage Tanks (Hand auger)					
TCL Volatiles + TICs	ASP 95-1	2	0/0/0/0	0	0
TCL Semivolatiles + TICs	ASP 95-2	2	0/0/0/0	0	0
TCL Pesticides/PCBs	ASP 95-3	2	0/0/0/0	0	0
TAL Metals	ASP CLP-M	2	0/0/0/0	0	0
Underground Storage Tanks (Geoprobe)					
TCL Volatiles + TICs	ASP 95-1	3	0/0/0/0	0	0
TCL Semivolatiles + TICs	ASP 95-2	3	0/0/0/0	0	0
TCL Pesticides/PCBs	ASP 95-3	3	0/0/0/0	0	0
TAL Metals	ASP CLP-M	3	0/0/0/0	0	0
Fill Piles/Fill Materials					
TCLP Volatiles	8260B	3	1/0/0/0	0	0
TCLP Semivolatiles	8270C	3	1/0/0/0	0	0
TCLP Pesicides	8081A	3	1/0/0/0	0	0
TCLP Metals	ASP CLP-M	3	1/0/0/0	0	0
Ignitability	1030	3	0/0/1/0	0	0
Corrosivity	9045C	3	0/0/1/0	0	0
Reactivity	Chapter 7 Section 7.3	3	0/0/1/0	0	0
TCL Volatiles + TICs	ASP 95-1	6	1/1/0/1	1	0
TCL Semivolatiles + TICs	ASP 95-2	6	1/1/0/1	1	0
TCL Pesticides/PCBs	ASP 95-3	6	1/1/0/1	1	0
TAL Metals	ASP CLP-M	6	1/0/1/0	1	0
III. Waste					
Aboveground/Underground Storage Tanks					
Fuel Fingerprint Analysis	DOH 310-13 Modified	4	0/0/0/0	0	0

NOTES:
[1] NYSDEC Analytical Services Protocol, 10/95 edition.

TABLE A9-1 (Continued)
SUMMARY OF LABORATORY ANALYSES
GOLDEN ROAD DISPOSAL SITE

B. SOUTH PARCEL

Parameter	Method Number / Reference[1] [2]	Estimated Number of Samples	MS/MSD/MD/MSB	Rinse Blanks	Trip Blanks
I. Groundwater					
Monitoring Wells					
TCL Volatiles + TICs	ASP 95-1	7	1/1/0/1	0	1
TCL Semivolatiles + TICs	ASP 95-2	7	1/1/0/1	0	0
TCL Pesticides/PCBs	ASP 95-3	7	1/1/0/1	0	0
TAL Metals - total	ASP CLP-M	7	1/0/1/0	0	0
II. Soil					
Surface Soils					
TCL Volatiles + TICs	ASP 95-1	10	1/1/0/1	1	0
TCL Semivolatiles + TICs	ASP 95-2	10	1/1/0/1	1	0
TCL Pesticides/PCBs	ASP 95-3	10	1/1/0/1	1	0
TAL Metals	ASP CLP-M	10	1/0/1/0	1	0
Subsurface Soils - Test Pits					
TCL Volatiles + TICs	ASP 95-1	5	0/0/0/0	1	0
TCL Semivolatiles + TICs	ASP 95-2	5	0/0/0/0	1	0
TCL Pesticides/PCBs	ASP 95-3	5	0/0/0/0	1	0
TAL Metals	ASP CLP-M	5	0/0/0/0	1	0
Subsurface Soils - Monitoring Well Borings					
TCL Volatiles + TICs	ASP 95-1	2	0/0/0/0	1	0
TCL Semivolatiles + TICs	ASP 95-2	2	0/0/0/0	1	0
TCL Pesticides/PCBs	ASP 95-3	2	0/0/0/0	1	0
TAL Metals	ASP CLP-M	2	0/0/0/0	1	0
III. Sediment					
TCL Volatiles + TICs	ASP 95-1	8	1/1/0/1	1	0
TCL Semivolatiles + TICs	ASP 95-2	8	1/1/0/1	1	0
TCL Pesticides/PCBs	ASP 95-3	8	1/1/0/1	1	0
TAL Metals	ASP CLP-M	8	1/0/1/0	1	0
V. Surface Water					
TCL Volatiles + TICs	ASP 95-1	8	1/1/0/1	0	2
TCL Semivolatiles + TICs	ASP 95-2	8	1/1/0/1	0	0
TCL Pesticides/PCBs	ASP 95-3	8	1/1/0/1	0	0
TAL Metals	ASP CLP-M	8	1/0/1/0	0	0
IV. Waste					
Drums/Containers					
TCLP Volatiles	8260B	10	1/0/0/0	0	0
TCLP Semivolatiles	8270C	10	1/0/0/0	0	0
TCLP Pesicides	8081A	10	1/0/0/0	0	0
TCLP Metals	ASP CLP-M	10	1/0/0/0	0	0
TCL PCBs (total)	ASP 95-3	10	1/1/0/1	0	0
Ignitability	1030	10	0/0/0/0	0	0
Corrosivity	9045C	10	0/0/0/0	0	0
Reactivity	Chapter 7 Section 7.3	10	0/0/0/0	0	0
VI. Asbestos					
Asbestos (bulk) by PLM	NIOSH Method 9002, Issue 2	2	0/0/0/0	0	0

[1] NYSDEC Analytical Services Protocol, 10/95 edition.
[2] NIOSH. 1994. NIOSH Manual of Analytical Methods (NMAM), Fourth Edition. 15 August

TABLE A9-1 (Continued)
SUMMARY OF LABORATORY ANALYSES
GOLDEN ROAD DISPOSAL SITE

C. MISCELLANEOUS

Parameter	MethodNumber / Reference[1]	Estimated Number of Samples	MS/MSD/MD/MSB	Rinse Blanks	Trip Blanks
I. Private Well Water					
TCL Volatiles + TICs	ASP 524.2	2	0/0/0/0*	0	1
TAL Metals (total)	ASP CLP-M	2	0/0/0/0*	0	0
II.Drill Water Sample (Hydrant)					
TCL Volatiles + TICs	ASP 95-1	1	0/0/0/0	0	1
TCL Semivolatiles + TICs	ASP 95-2	1	0/0/0/0	0	0
TCL Pesticide/PCBs	ASP 95-3	1	0/0/0/0	0	0
TAL Metals	ASP CLP-M	1	0/0/0/0	0	0
III. Decon Water (steam cleaning)					
TCLP Volatiles	8260B	1	0/0/0/0*	0	0
TCLP Semivolatiles	8270C	1	0/0/0/0*	0	0
TCLP Pesticides	8081A	1	0/0/0/0*	0	0
TCLP Metals	ASP CLP-M	1	0/0/0/0*	0	0
Ignitability	1010	1	0/0/0/0*	0	0
Corrosivity	9040B	1	0/0/0/0*	0	0
Reactivity	Chapter 7 Section 7.3	1	0/0/0/0*	0	0
IV. Drill Cuttings (Soil)					
TCLP Volatiles	8260B	1	0/0/0/0*	0	0
TCLP Semivolatiles	8270C	1	0/0/0/0*	0	0
TCLP Pesticides	8081A	1	0/0/0/0*	0	0
TCLP Metals	ASP CLP-M	1	0/0/0/0*	0	0
TCL PCBs (total)	ASP 95-3	1	0/0/0/0*	0	0
Ignitability	1030	1	0/0/0/0*	0	0
Corrosivity	9045C	1	0/0/0/0*	0	0
Reactivity	Chapter 7 Section 7.3	1	0/0/0/0*	0	0

* Laboratory batch QC will be requested
[1] NYSDEC Analytical Services Protocol, 10/95 edition.

TABLE A9-2
SAMPLE CONTAINER, PRESERVATION AND HOLDING TIME REQUIREMENTS
GOLDEN ROAD DISPOSAL SITE

PARAMETER	ANALYTICAL METHOD	CONTAINER	SAMPLE VOLUME	PRESERVATION	HOLDING TIME*
Water					
TCL Volatiles	ASP 95-1	G	3-40ml VOA	HCl to pH<2, Cool 4° C	10 days preserved
	524.2	G	3-40ml VOA	HCl to pH<2, Cool 4° C	10 days preserved
TCL Semivolatiles	ASP 95-2	G	2-1 liter	Cool 4° C	5 days until extraction/40 days for analysis
TCL Pesicides/PCBs	ASP 95-3	G	2-1 liter	Cool 4° C	5 days until extraction/40 days for analysis
TAL Metals (total)	ASP CLP-M	P,G	1-1 liter	HNO_3 to pH<2, Cool 4° C	6 months; 26 days for mercury
TCLP Volatiles	8260B	G	3-40ml VOA	Cool 4° C	7 days to TCLP extraction; 7 days for analysis
TCLP Semivolatiles	8270C	G	2-1 liter	Cool 4° C	5 days to TCLP extraction/7 days until extraction/40 days for analysis
TCLP Pesticides	8081A	G	2-1 liter	Cool 4° C	5 days to TCLP extraction/7 days until extraction/40 days for analysis
TCLP Metals	ASP CLP-M	P,G	1-1 liter	Cool 4° C	6 months to TCLP extraction/ 6 months for analysis; mercury 26 days to TCLP extraction/ 26 days for analysis.
Ignitability	1010	G	1-1 liter	Cool 4° C	As soon as possible
Corrosivity	9040B				
Reactivity	Chapter 7 Section 7.3				
Soil/Sediment/Waste					
TCL Volatiles	ASP 95-1	G	2-4 oz. VOA	Cool 4° C	10 days
TCL Semivolatiles	ASP 95-2	G	1-8 oz.	Cool 4° C	10 days until extraction/40 days for analysis
TCL Pesticides/PCBs	ASP 95-3	G	1-8 oz.	Cool 4° C	10 days until extraction/40 days for analysis
TCL PCBs	ASP 95-3	G	1-8 oz.	Cool 4° C	10 days until extraction/40 days for analysis
TAL Metals	ASP CLP-M	P,G	1-8 oz.	Cool 4° C	6 months; 26 days for Mercury
TCLP Volatiles	8260B	G	2-4 oz. VOA	Cool 4° C	7 days to TCLP extraction; 7 days for analysis
	8021B	G	2-4 oz. VOA	Cool 4° C	7 days to TCLP extraction; 7 days for analysis
TCLP Semivolatiles	8270C	G	1-8 oz.	Cool 4° C	5 days to TCLP extraction/7 days until extraction/40 days for analysis
TCLP Pesticides	8081A	G	1-8 oz.	Cool 4° C	5 days to TCLP extraction/7 days until extraction/40 days for analysis
TCLP Metals	ASP CLP-M	P,G	1-1 liter	Cool 4° C	6 months to TCLP extraction/ 6 months for analysis; mercury 26 days to TCLP extraction/ 26 days for analysis.
Ignitability	1030	G	1-8 oz.	Cool 4° C	As soon as possible
Corrosivity	9045C				
Reactivity	Chapter 7 Section 7.3				
Fuel Fingerprint Analysis	NYSDOH 310-13 modified	G	1-8 oz.	Cool 4° C	14 days
Asbestos	NIOSH Method 9002, Issue 2	P,G	1-8 oz.	none	none

* All holding times begin with the Validated Time of Sample Receipt (VTSR) at the laboratory.

New York State Department of Environmental Conservation, Analytical Services Protocol (ASP), 10/95 Edition.

NIOSH Manual of Analytical Methods (NMAM), Fourth Edition. 15 August 1994.

P- Polyethylene ; G- Glass

A10.0 SURVEYING AND MAPPING

Project control surveying will provide for site topographic mapping and for location of sampling points. All surveying will be performed under the supervision of a New York State licensed land surveyor, following the requirements of the Project Management Plan and the HASP.

A10.1 Establishing Horizontal Primary Project Control

In order to determine the horizontal locations of site features, horizontal control will be established by surveying to/from established survey monuments in the New York State Plane Coordinate System, Transverse Mercator Projection, West Zone, North American Datum (NAD) of 1983. This information will be used for base map preparation.

Procedure:

1) Research for monuments.
2) Recover monuments in field.
3) Set and reference points on primary traverse.
4) Turn angles and measure distances.
5) Compute closures and adjust traverse.

A10.2 Establishing Vertical Primary Project Control

In order to determine site elevations, vertical control must be established by surveying to/from established survey monuments in the North American Vertical Datum (NAVD) of 1988.

Procedure:

1) Research for monuments.
2) Recover monuments in field.

3) Set project benchmarks.
4) Run level line from monuments to set project benchmarks and back.
5) Reduce notes and adjust benchmark elevations.
6) Prepare recovery sketches.

A10.3 Global Positioning System (GPS) Surveying

Most of the surveying will be performed using GPS systems methodologies. This data will be converted into the horizontal and vertical coordinate systems noted in Sections A10.1 and A10.2.

A11.0 SAMPLING EQUIPMENT CLEANING PROCEDURES

To assure that no outside contamination will be introduced into the samples/data, thereby invalidating the samples/data, the following cleaning protocols will apply for all equipment used to collect samples/ data during the field investigations. Drilling equipment and heavy machinery will be steam cleaned onsite on the decontamination pad located on the southern parcel of the site. Heavy equipment (i.e. drill rig, backhoe) will only be used on the southern parcel of the site. If it is necessary to use heavy equipment on the northern parcel, the equipment and associated tooling will be washed to remove gross contamination, then taken to the decontamination pad for steam cleaning. All water generated during washing will be containerized and transported to the drum staging area.

Procedures:

1) Thoroughly clean equipment with soap and tap water, until all visible contamination is gone.

2) Rinse with tap water, until all visible evidence of soap is gone.

3) Rinse with deionized water.

4) Rinse with 10% reagent grade nitric acid.

5) Rinse with pesticide grade methanol.

6) Air dry.

7) If equipment will not be used immediately, wrap in oil-free aluminum foil.

A12.0 SAMPLE LABELING

In order to prevent misidentification and to aid in the handling of environmental samples collected during the field investigation, sample labeling procedures listed below will be followed:

Procedure:

1) Affix a label to each sample container. The following information will be written on each label with permanent marker prior to wrapping label with cellophane tape:

Site name
Sample identification
Project number
Date/time
Sampler's initials
Sample preservation
Analysis required

2) Each sample of each matrix will be assigned a unique alpha-numeric identification code. An example of this code and a description of its components is presented below:

Examples

1. MW1-GW
MW1 =Monitoring Well 1
GW = Groundwater

2. SB1 - 2'-4'
SB1 = Soil Boring 1
2' - 4' =Two-foot to four-foot soil sample

List of Abbreviations

Monitor Type

MW = Monitoring Well

Sample Type

TP	=	Test Pit
DW	=	Drum Waste
ASB	=	Asbestos
SW	=	Surface Water
SED	=	Sediment
SS	=	Surface Soil
AST	=	Aboveground Storage Tank
UST	=	Underground Storage Tank
SB	=	Soil Boring
GW	=	Groundwater
EB	=	Equipment Rinse Blank
HW	=	Hydrant Water (Decon Water/Drilling Water)
TB	=	Trip Blank
RB	=	Rinse Blank
MS	=	Matrix Spike
MSD	=	Matrix Spike Duplicate
MD	=	Matrix Duplicate

A13.0 SAMPLE SHIPPING

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presentation of sample analytical chemistry results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with the samples.

The procedures used in this remedial predesign follow the chain-of-custody guidelines outlined in NEIC Policies and Procedures, prepared by the National Enforcement Investigations Center (NEIC) of the U.S. Environmental Protection Agency Office of Enforcement.

Procedure:

1) The chain-of-custody (COC) record (Figure A13-1) should be completely filled out, with all relevant information.

2) The original COC goes with the samples. It should be placed in a ziplock bag and taped inside the sample cooler. The sampler should retain a copy of the COC.

3) Place 2-inches of inert cushioning material such as vermiculite or bubble-wrap in bottom of cooler.

4) Place bottles in cooler in such a way that they do not touch (use cardboard dividers or bubble-wrap).

5) Wrap VOA vials securely in bubble-wrap and tape. Place them in the center of the cooler.

Figure A13-1

CHAIN OF CUSTODY RECORD

URS Greiner

PROJECT NO.	SITE NAME
SAMPLERS (PRINT/SIGNATURE)	

LAB ____________

COOLER ______ of ______

PAGE ______ of ______

TESTS

BOTTLE TYPE AND PRESERVATIVE

DELIVERY SERVICE: ____________ AIRBILL NO.: ____________

LOCATION IDENTIFIER	DATE	TIME	COMP/ GRAB	SAMPLE ID	MATRIX	TOTAL NO.# OF CONTAINERS									REMARKS	SAMPLE TYPE	BEGINNING DEPTH (IN FEET)	ENDING DEPTH (IN FEET)	FIELD LOT NO.# (IRPIMS ONLY)

MATRIX CODES

AA - AMBIENT AIR
SE - SEDIMENT
SH - HAZARDOUS SOLID WASTE
SL - SLUDGE
WP - DRINKING WATER
WW - WASTE WATER
WG - GROUND WATER
SO - SOIL
DC - DRILL CUTTINGS
WL - LEACHATE
GS - SOIL GAS
WC - DRILLING WATER
WO - OCEAN WATER
WS - SURFACE WATER
WQ - WATER FIELD QC
LH - HAZARDOUS LIQUID WASTE
LF - FLOATING/FREE PRODUCT ON GW TABLE

SAMPLE TYPE CODES

TB# - TRIP BLANK
SD# - MATRIX SPIKE DUPLICATE
RB# - RINSE BLANK
FR# - FIELD REPLICATE
N# - NORMAL ENVIRONMENTAL SAMPLE
MS# - MATRIX SPIKE
(# - SEQUENTIAL NUMBER (FROM 1 TO 9) TO ACCOMMODATE MULTIPLE SAMPLES IN A SINGLE DAY)

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME	SPECIAL INSTRUCTIONS
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LAB BY (SIGNATURE)	DATE	TIME	

Distribution: Original accompanies shipment, copy to coordinator field files

URSF-075C/1 OF 1/CofCR/GCM

6) Pack cooler with ice in doubled ziplock plastic bags.

7) Pack cooler with cushioning material.

8) Tape drain shut.

9) Wrap cooler completely with strapping tape at two locations securing the lid. Do not cover any labels.

10) Place lab address on top of cooler. For out-of-town laboratory, add the following: Put "This side up" labels on all four sides and "Fragile" labels on at least two sides. Affix numbered custody seals on front right and left of cooler. Cover seals with wide, clear tape.

11) Ship samples via overnight carrier the same day that they are collected, whenever possible.

A14.0 FIELD SAMPLING INSTRUMENTATION

Field sampling equipment, such as a split spoon, hand auger, etc., will require no maintenance beyond decontamination between sampling locations. Calibration procedures for electronic instruments are summarized on the following pages. More detailed procedures for instrument calibration and maintenance can be found in the equipment operating manuals.

Table A14-1 summarizes maintenance procedures for the common instrumentation that will be used during field investigations. Special maintenance procedures are discussed in the manufacturer's operating manual. A copy of the manufacturer's operating manual for each instrument will be kept at the command office. All field sampling equipment will be calibrated each day of use. The calibration procedures and results will be recorded in the field notebook.

A14.1 <u>Photoionization Detector (PID)</u>

The photoionization detector (PID) (HNu Model PI 101) is a portable instrument used to detect, measure, and provide a direct reading of the concentration of a variety of trace gasses. The detector employs the principle of photoionization. This process involves the absorption of ultraviolet light by a gas molecule leading to ionization.

<u>Calibration Procedure</u>

1) Turn function switch to BATT. The needle should be in the green region.

2) Turn function switch to STANDBY. Set the zero point with the zero set control.

3) Attach the ¼-inch tubing to the probe inlet and to the regulator on the tank of isobutylene and open the valve on the regulator. NOTE: If the pressure in the isobutylene tank is below 200 psi, consider the tank exhausted and use a full tank.

4) Turn the function switch to the 0-200 range.

5) Adjust the span setting so the meter gives a reading of 58 ppm.

A14.2 Combustible Gas Indicator (CGI)

The instructions listed below review the operation of the Bachrach Sentinel 44-Combustible/Toxic Gas and O_2 Deficiency Meter.

1) Press the POWER key.

2) Observe that the Liquid Crystal Display (LCD) backlight turns on. The backlight stays on for 30 seconds and then turns off.

3) Observe that the LCD sequences through the following messages:

Serial number and software version.

SERIAL xxxxxx VERSION yyy

Where xxxxxx = serial number of unit
yy = software version level

Battery voltage and its capacity

BATTERY TEST xx.xV yy% CAP

Where xx.x = battery voltage

yy = remaining battery capacity

If the dosimeter functions are turned on, the remaining number of dosimeter recording segments and hours for TWA and STEL calculations are displayed.

DOS CAPACITY
xx SGMNTS yy HR

Where xx = remaining number of recording segments

yy = remaining number of recording hours

Month, day, and year the instrument was last calibrated

LAST CAL DATE
mm/dd/yy

Alarm messages (e.g., "LOW BATTERY" "CALIBRATION EXPIRED", "MEMORY FULL", "ONLY x:x HOURS STORAGE REMAIN").

Real Time Gas display. A typical fresh-air four-gas display is shown below.

20.9	0	0	0
02	LEL	CO	H2S

5) The instrument now starts monitoring the surrounding air and provides readouts of the detected concentrations of oxygen and combustibles, plus carbon monoxide and/or hydrogen sulfide. A confidence beep is sounded once every minute to assure the user that the unit is on and monitoring the gas channels.

6) Allow the instrument to warmup for several minutes until the gas-display stabilizes. Then if one or more gas readings exceed the limits listed below while sampling fresh air, the sensors should be software zeroed.

Oxygen	20.9± 0.5%
Combustibles	± LEL
Carbon Monoxide	± 10 ppm
Hydrogen Sulfide	± 5 ppm

7) Before each day's usage, sensitivity must be tested on a known concentration of calibration gas specified on the instrument nameplate that is equivalent to 25 to 50% of full scale concentration. Accuracy must be within ±20% of actual.

A14.3 <u>Micropurge Flow Cell</u>

The Micropurge Flow Cell is a complete system for monitoring chemical parameters during groundwater purging and sampling. Discharge from the purging/sampling pump in routed through an engineered flow cell that contains a multi-parameter sensor probe. Readings from the probe are displayed on a hand-held meter which can also store readings for future recall or transfer to a personal computer. The flow cell measures:

- Temperature
- Conductivity
- Percent dissolved oxygen
- pH
- Oxidation/reduction potential (ORP)

Parameters which can be derived and displayed include:

- Specific Conductivity

- Salinity
- Dissolved oxygen in micrograms per liter (mg/L)
- Total Dissolved Solids
- Resistivity

Calibration procedures for the above-stated parameters are provided in the instrument user manual. The manual will be kept on site with the instrument for reference.

A14.4 Turbidity Meter

The turbidity meter is a portable water quality monitoring instrument which measures water clarity in nephelomatic turbidity units (NTU). Specifically, turbidity meters measure scattered light through water at 90 degrees from the light source. A reference beam passes through the sample and is measured at 180 degrees. The ratio of the two readings are electronically converted to NTU. Routine calibration is outlined below.

1) Fill the turbidity tubes with 1.0 NTU and 10.0 NTU standards and wipe the outer wall with a clean cloth.

2) Open the lid of the turbidimeter and insert the turbidity tube. Be sure to align the indexing arrow on the turbidity tube with the arrow on the meter.

3) Close the lid and press "Read". If the displayed value is not the same as the standard, proceed to Step 4. If the displayed value is the same as the standard, end calibration and the instrument is ready to be used.

4) Depress the "Cal" button for 5 seconds until cal is displayed. Adjust the flashing displayed value using the up/down arrow keys until the desired value is displayed.

5) Press "cal" button to store values to memory and end calibration. The meter is now ready for use. Place turbidity tubes with water samples into the meter and press "Read".

A14.5 Calibration of the Radiation Survey Meter

Factory calibration annually.

- Routine calibration as outlined below:

1) Detector Operating Point: Adjust the high voltage (HV) control for 900 volts at the instrument connector for G-N detectors.

NOTE: If an electrostatic voltmeter is not available, use an ordinary volt-ohm-milliammeter with an attenuator to provide at least 20,000 ohms-per-volt meter resistance. Select the appropriate scale and then adjust the high voltage to read 850 volts.

Do not use the instrument on X10. Expose the instrument to a calibrated gamma field and vary the range calibration adjustment control for proper reading.

2) Special Use Calibration: foe special G-M detector applications, the power supply may be adjusted for 450-volt and 1,200-volt G-M tubes. Follow the above procedure, except set the supply at the new operating voltage.

For scintillation counters, connect the scintillator. Expose the unit to a source and develop an operating voltage versus count-rate plot. Set the operating voltage at the flattest portion of this curve; then proceed to adjust each calibration control for the desired meter reading.

3) Calibrating CPM Scale: To calibrate CPM scale, a precision pulse generator is required. The pulse generator should be capable of providing a 40-millivolt or

greater negative pulse with a rise time of 1 microsecond and pulse-width of 5 microseconds.

Connect the pulse generator to the instrument and adjust the pulse frequency to provide 4/5-scale deflection on the X10 range (40,000 CPM). Adjust the X10 range calibration potentiometer as required. Decrease the pulse frequency by one decade and move the range multiplier switch to the X1 position. Adjust the X1 range calibration potentiometer as required (4,000 CPM). Decrease the pulse frequency by another decade. Move the range multiplier to X0.1 and adjust the calibration potentiometer as required (400 CPM).

(Reference: Taken directly from Ludlum Model 2 Instruction Manual; Ludlum Measurements, Inc., Sweetwater, TX).

A14.5 <u>Preventative Maintenance</u>

Table A14-1 presents the URSGWC field instrumentation preventative maintenance summary. In case of an emergency, other URSGWC offices, the instrument manufacturer, and/or an equipment rental vendor will be contacted. If necessary, instrumentation manufacturers will be contacted for unit repair/replacement. In addition, potential instrumentation rental vendors, which could provide overnight UPS/Federal Express service, are listed below.

<u>Vendors</u>
Response Rentals: Rochester, NY: 1-716-424-2140
Hazco Services: Dayton, OH 1-800-343-0256

TABLE A14-1

FIELD INSTRUMENTATION PREVENTATIVE MAINTENANCE SUMMARY

Instrument	Maintenance Details
HNU PI-101 Photoionization Detector	Initiate factory checkout and calibration, yearly or when malfunctioning or after changing UV light source. Wipe down readout unit after each use. Clean UV light source window every month or as use and site conditions dictate. Clean the ionization chamber monthly. Recharge battery after each use Service: 800-343-0256
Micropurge Flow Cell Model FC4000	Calibrate the required parameters using appropriate factory-supplied standards and buffers on a daily basis. Store the sonde (probe) in a 2M KCI solution at the end of each work day. Factory calibrate annually.
Bacharach Sentiniel 44 Combustible Gas Indicator	Calibrate LEL, O_2 and H_2S sensors daily. Replace foam pump filter monthly. Factory calibrate yearly.
Ludlum Survey Meter	Factory calibrate annually. Check against Cesium 137 source monthly. Replace batteries annually, or sooner if necessary.
Lamotte Turbidity Meter	Replace 9 volt battery when necessary. Clean lamp after each days use. Clean turbidity tubes after each reading and replace tubes when discoloration of glass occurs.

A15.0 IDW CHARACTERIZATION AND DISPOSAL

Fluids generated during steam cleaning and equipment decontamination, as well as drums encountered during test pit excavations will require offsite disposal. Sampling/waste hauling/disposal will be coordinated by URSGWC. A waste handling contractor will characterize, transport and dispose of the IDW. An estimated seven drums are assumed to require disposal for cost estimating. PPE and HDPE sampling equipment will be placed in trash bags for disposal at a municipal landfill.

APPENDIX A-1

ELECTROMAGNETIC CONDUCTIVITY SURVEYS STANDARD OPERATING PROCEDURE

STANDARD OPERATING PROCEDURE FOR ELECTROMAGNETIC CONDUCTIVITY SURVEYS (FP-104)

1 SCOPE AND APPLICATION

This document provides suggested procedures for conducting electromagnetic conductivity (EM) surveys to: (l) map conductive and possibly organic contaminant plume boundaries and a variety of subsurface features with contrasting electrical properties; (2) locate buried utilities, tanks, and drums; (3) determine subsurface profiles; and (4) locate abandoned wells.

2 METHOD SUMMARY

The EM uses a transmitter coil to generate an electromagnetic field that induces eddy currents in the earth below the instrument. Secondary electromagnetic fields created by the eddy currents are measured by a receiver coil that produces an output voltage that can be related to subsurface conductivity (see Figure la). Conductivity readings represent the weighted cumulative sum of the conductivity variations from the surface to the effective depth of the instrument, which is determined by the spacing of the transmitting and receiving coils (see Figure lb). Near-surface readings, where the two coils are in one unit, can be made continuously, whereas deeper readings using a wider coil spacing require station measurements. The EM can be used over water with the transmitter towed in a raft behind a tow boat containing the receiver coil. The depth of penetration depends on the coil separation and the orientation. Coil separations can be vertical or horizontal for commonly used equipment range from 3.7 meters (EM-31) to 40 meters (EM-34). Shifting the coil from horizontal to vertical orientation doubles the depth of penetration.

2.1 Use at Contaminated Sites

The EM has a number of advantages over other surface electromagnetic methods. Table 1 provides comparative information on EM, time domain EM, and electrical resistivity methods. For mapping of shallow, conductive, contaminant plumes (up to 15 meters) EM surveys can usually be done faster than DC resistivity because direct contact with the ground is not required, sometimes allowing continuous operation. EM equipment is readily available, has excellent capabilities for detection of buried bulk wastes with and without metal (to depths up to about 18 feet), has very good ability to detect single drums (6 to 8 feet) and metal tanks, and has rapid resolution and data interpretation.

The EM, however, is generally more susceptible to the presence of metal and power lines on the surface than DC resistivity (see Table 2). The EM lacks the vertical resolution and depth penetration of electrical resistivity, and data reduction is less refined than with electrical resistivity. Saline ground water can mask the presence of steel drums from the EM, and EM systems able to penetrate deeper than 60 meters are expensive.

3 INSTRUMENTATION

The instrument most commonly used by URS is the Geonics EM-31 which is a fixed-coil-spacing instrument (i.e. 3.7 meters) that can be used in either the vertical or horizontal dipole mode. Given the intercoil spacing, the dipole mode controls the effective exploration depth and also affects the sensitivity of response of the instrument. The units measure conductivity in millimhos/meter (mmhos/m) or synonymously, milliSiemans per meter (MS/m).

possible.

3.5 Linearity of Signal

At high conductivity values, apparent conductivity differs from true conductivity. Apparent conductivity begins to depart from true conductivity at readings greater than 100 mmhos/m (see Figure 3). Between 100 and 500 mmhos/m, the instrument is adequately sensitive to small changes in conductivity, but does not yield accurate values. At true conductivity greater than 1,000 mmhos/m, a decrease in apparent conductivity results.

3.6 Sensitivity

The EM-31 is extremely sensitive to buried pipe-like conductive structures. Significant meter deflections will occur within relatively short distances. The location and strike of the conductor is determined in the following way:

> A positive maximum reading is reached when the instrument is directly over the axis of the conductor and is pointing parallel to the axis.
>
> A very low reading, typically negatively off scale, occurs when the instrument is perpendicular to the conductor although high readings are obtained on either side of the negative reading.

Normal operation of the EM-31 uses the quadrature-phase component of the inducted magnetic field. The quadrature-phase component yields a detection depth of up to two meters for a single drum.

3.7 Lateral Readings

Where information on narrow lateral changes in conductivity is required, the instrument should be rotated through 90 degrees using the operator as a pivot. No change in conductivity would indicate a uniform subsurface, whereas a slight change might indicate the need for averaging the measurement in two perpendicular directions. The EM-31 should be rotated to obtain maximum and minimum values, and both values are recorded. If the values differ dramatically with rotation of the EM-31, then the possibility of a buried conductive structure should be considered, and the measurements should not be averaged.

4 PLANNING THE SURVEY

In planning an EM survey, local and regional geology and hydrogeologic conditions should be researched, as well as historic records on size of the site, past waste disposal practices, types of waste material disposed of at the site, and depth and orientation of waste material. Sites should be evaluated in terms of their hydrogeologic setting and the type of anticipated anomaly, and interferences from man-made objects (i.e., fences, power lines, metal debris on the surface, etc.). This evaluation will indicate the effectiveness of an EM survey, given site conditions.

4.1 Mapping Geophysical Characteristics

Hydrogeologic considerations include depth to ground water, aquifer quality, ground water flow directions and usage, and water quality. It is recommended that the conductivity of the material on site be estimated and measured prior to the EM survey by measuring the conductivity in bore holes or by resistivity soundings. Resistivity soundings can also help characterize the stratigraphic setting if geological logs are not available. In many cases, the presence of an identifiable conductive contrast is sufficient for mapping contaminant plumes and buried waste if the geology across the site is relatively uniform.

4.2 Researching the Site

The waste characteristics should be researched prior to site reconnaissance. Organic contaminant plumes and electrolytic contaminant plumes may be detectable based on site conditions. Site interviews and a records search may indicate the nature of the compounds buried at the site and their concentrations and volumes. Historical aerial photographs may indicate previous disposal areas and poor waste-disposal practices, and can also provide a base map for plotting data.

4.3 Choosing Instruments

Several factors are involved in the choice of EM instrumentation. The most obvious is exploration depth. Depending on the geological and hydrogeologic settings, types of waste and containerization, and length of time since disposal, an estimate may be made of the lateral and vertical extent of contamination. If the site is large and there is little time to cover it, the EM-31 is much faster to use than the EM-34-3. In most cases, the EM-31 will be most appropriate for general reconnaissance. The EM-31 is much easier to use than other EM instruments, but does not allow for exploration depth greater than approximately six meters. The EM-31 should almost always be used before other instruments because of its ease of use and its ability to detect waste in the near-surface, where most wastes are buried. Often a phased approach to geophysical surveying is required, in which each phase becomes more detailed as to its probing. A site walk over is generally recommended as the first step in conductivity surveying.

4.4 Checking Interferences

The layout of the site must be considered before survey lines are laid out. Current aerial photographs and site maps should be checked for buildings, railroad tracks, fences, power lines, scrap metal storage, buried utility lines, and rough terrain (i.e. steep slopes, heavily wooded or vegetated areas, etc.). Grid line locations should then be laid out based on the locations of these items. Safety and accessibility are other factors to consider when locating grid lines.

4.5 Setting up the Survey

The survey plan should allow for a minimum number of modifications to account for changes required by on-site conditions. The orientation or location of grid lines may require slight modifications to avoid obstacles not previously accounted for, but the basic survey plan should still be usable. Even with a few modifications, the survey can be set up in the field relatively quickly. Guidelines for the preparation of the site are as follows:

1. Determine the starting point for the first grid line and mark it using a stake or survey flag. Be sure that all grid lines begin and end in a "clean" area, usually 100 feet or more beyond the limit of the area of interest.

2. Define the orientation of the grid lines and, using a compass, turn 90 degrees from the grid line orientation. Along this perpendicular direction (at 50-foot intervals), mark the starting point for

each of the grid lines.

3. Prepare each grid line with known distance markers. Using a compass, shoot a line along the grid line orientation. At every fourth station along the grid line, place a marker (e.g., for 25-foot stations, markers should be placed every 100 feet). Be careful of magnetic sources causing erroneous compass readings. The markers help the EM operator move along a fixed line and maintain even spacing between stations Set up each grid line in a similar manner. Use a compass and tape for each grid line.

4. Define an off-site area that is free of any interference as a background station, and mark the location.

The site is now ready for the EM survey.

4.6 Recording Background Station Readings

Instrument batteries should be checked before fieldwork and periodically during the survey. Operating instructions for the EM-31 describe the procedures for functional checks of the instrument. These checks should be made at the background station. Calibration requires internal adjustments and should be the responsibility of an experienced technician.

After the EM-31 has warmed up, adjust the shoulder strap so the EM-31 is one meter off of the ground. Record the initial reading and pivot 90 degrees and record the second reading. If the readings are the same, the background area has a uniform subsurface. These readings define repeatability of results and natural electromagnetic fluctuations, as well as changes resulting from sensor orientation.

Logbook Entries

In the field logbook, enter the following data for the background reading and for each grid line as appropriate:

- o Location of background station;
- o Location and orientation of each grid line;
- o Weather conditions (note changes during survey);
- o Location and type of any interference sources;
- o Topographic changes along each grid line;
- o All EM readings obtained at each station; and
- o Time readings were taken at each station.

4.7 Recording Grid Line/Station Readings

Grid Line 1

Move directly to grid line l/station 1 (1-1). Orient the EM-31 along the grid line and record the reading. Pivot 90 degrees and record the second reading. Pace off the distance to grid line l/station 2 (1-2) and repeat. Adjust paces so that each fourth station coincides with the known distance previously marked. Continue until grid line 1 is completed. The marker stations provided control points. In the logbook designate each fourth station to show the distance from station 1-1, 1-2, etc. This will permit alignment of stations during interpretation.

Remaining Grid Lines and Stations

Grid line 2 may be started at station 2-1 or may be run in the opposite direction as long as every station is referenced from station 2-1. Complete each grid line in a similar manner.

If it is observed during the survey that an area warrants closer examination, the survey stations can be closed up, however remember to restart the survey at a 25-foot station and continue with the original spacing. It may be decided to conduct grid lines at 90 degrees to verify or clarify the EM-31 readings; this must be decided in the field and must be based on the logbook completed during the survey.

Background Station Checks

At one-hour intervals and at the completion of the survey, the EM-31 should be checked by returning to the background station and repeating the two readings. Make these returns to coincide with the completion of a grid line. The data will define any changes that have occurred in the background readings.

4.8 Establishing Validity of Readings

Most of the applications for EM-31 require that the operator be relatively free of magnetic or ferrous materials. During the field survey the operator should avoid carrying rock hammers, pocketknives, light meters in cameras, tape recorders, metal clip boards, and keys. Steel-shanked boots should also be avoided.

The establishment of the validity of the EM readings is an important field procedure. The simplest means of confirming that what is being observed is a magnetic field reading and not noise from other sources is to take several readings in succession in one location and note the repeatability of the results.

5 DATA REDUCTION AND INTERPRETATION

Upon completion of the EM survey, the data must be reduced and interpreted. Data reduction can be performed using available computer programs (e.g., DAT31 by Geoics Ltd, Surfer Program by Golden Software, etc.), or it can be reduced manually. Basic EM surveys require only qualitative analysis (e.g., to determine the location and relative size of the target). Quantitative data can best be estimated from background data collected before the survey.

5.1 Preparing a Contour Map

The software packages usually allow for one-dimensional contour plots and/or three-dimensional plots of the data (see Figures 4 and 5). These figures were created by the Surfer Program from conductivity data collected from a 575 foot by 300 foot area using the EM-31 in the horizontal dipole mode. The station and line spacing was 25 feet. Figure 6 illustrates the erratic nature of the vertical dipole mode when the EM-31 was run over a metal drainage culvert. The horizontal dipole mode data do not appear to reflect this narrow, near-surface feature.

5.2 Magnetometer/Historical Studies

Final interpretation of the anomalies shown in Figures 4 and 5 would be augmented by a magnetometer study of the area. Historical records may indicate the source of any wastes present in the area.

6 FINAL REPORT

The final report should include as a minimum the following:

- Introduction (objectives);
- Site History
- Physigraphic Setting;
- Geology;
- Methodologies (survey locations and instrumental procedures)
- Data Results and Discussion;
- Conclusions; and
- Recommendations.

This format can be modified to suit site requirements. The data and data plots may be included as an appendix to the report, especially if several exploration depths were used, requiring several data plots.

7 REFERENCES

Benson, R.C., and R.A. Glaccum. 1980. Site Assessment: Improving Confidence Levels with Surface Remote Sensing. Proceedings of National Conference on Management of Uncontrolled Hazardous Waste Sites, October 15-17, 1980, Washington, DC.

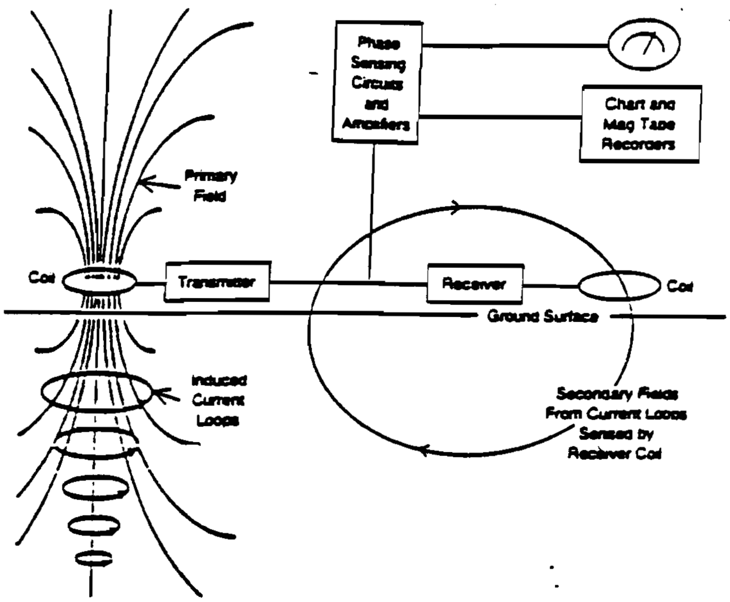
Benson, R.C., R.A. Glaccum, and M.R. Noel. 1982. The Use of Selected Geophysical Remote Sensing Methods in Hazardous Waste Site Investigations. EPA Contract No. Lockheed PO RS-141.

Cameron, D.R., et al. 1981. Mapping Salinity Using Resistivity and Electromagnetic Inductive Techniques. Canadian Journal of Soil Science, 61:67-68.

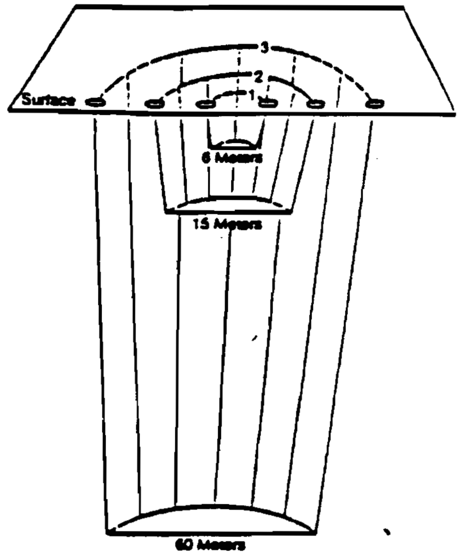
McNeill, J.D. 1979. Operating Manual for EM-31 Non-Contacting Terrain Conductivity Meter. Geonics Limited, Mississauga, Ontario.

McNeill, J.D. 1980. Electric Conductivity of Soils and Rocks. Geonics Limited, Mississauga, Ontario.

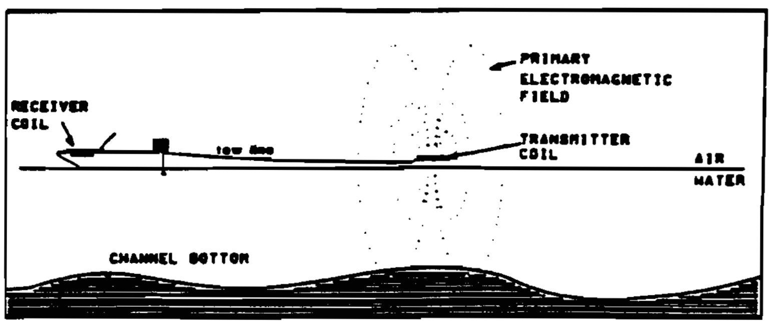
U.S. Environmental Protection Agency (EPA). 1993. Use of Airborne, Surface, and Borehole Geophysical Techniques at Contaminated Sites: A Reference Guide. EPA/625/R-92/007.



(a)



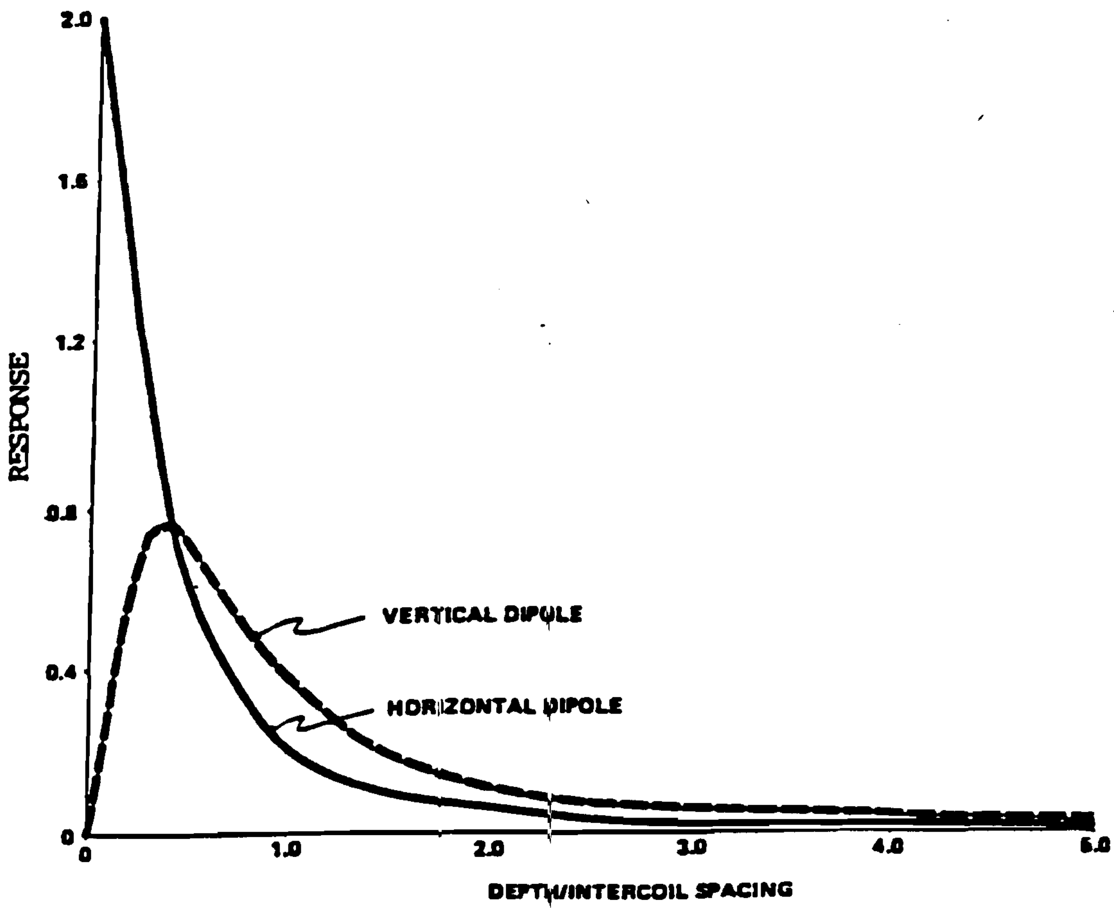
(b)



(c)

Electromagnetic induction: (a) Block diagram showing EMI principle of operation (adapted from Benson et al., 1984); (b) The depth of EMI soundings depends on coil spacing and orientation selected (Benson et al., 1984); (c) Use of EMI instrument over water with tow boat and raft (Duran, 1987

URS CONSULTANTS, INC.	STANDARD OPERATING PROCEDURE FOR ELECTROMAGNETIC CONDUCTIVITY SURVEYS FP-104	FIGURE 1

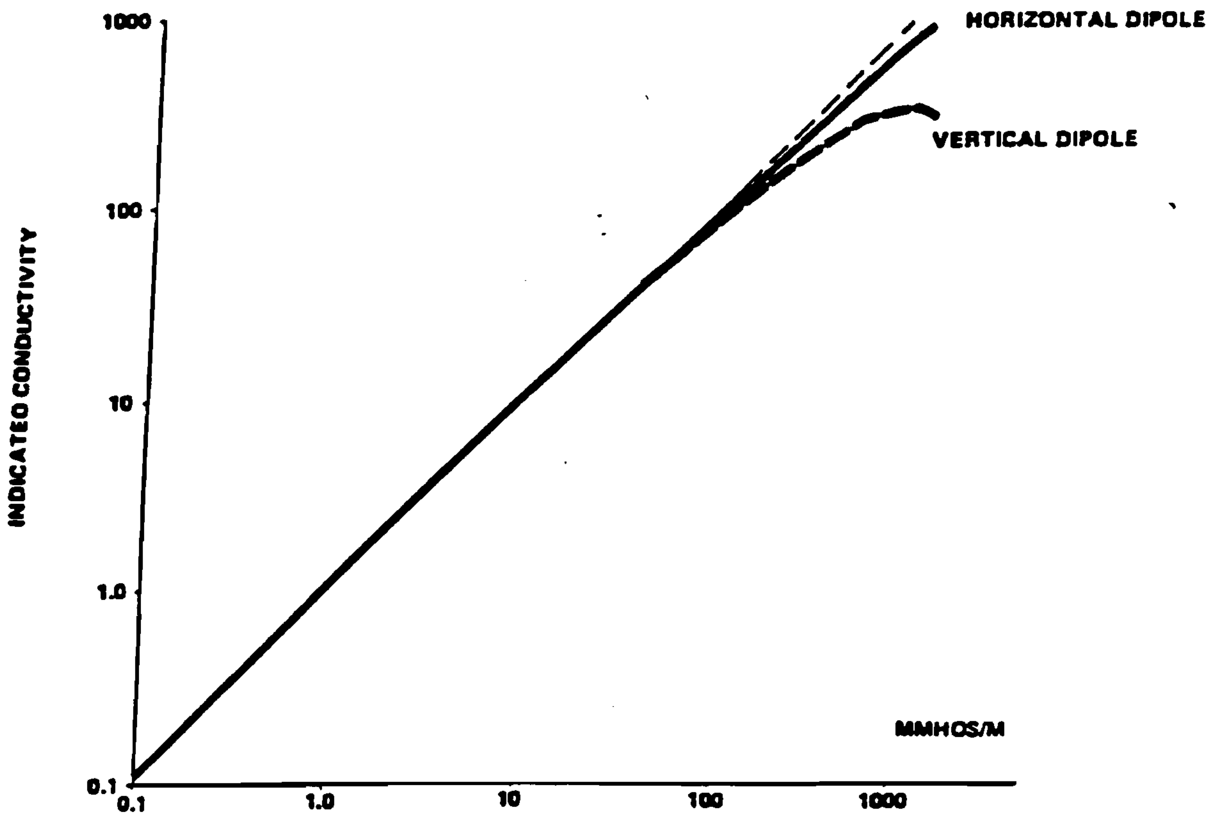


Relative Response vs. Depth for the Horizontal and Vertical Dipole Modes

URS CONSULTANTS, INC.

STANDARD OPERATING PROCEDURE FOR ELECTROMAGNETIC CONDUCTIVITY SURVEYS FP-104

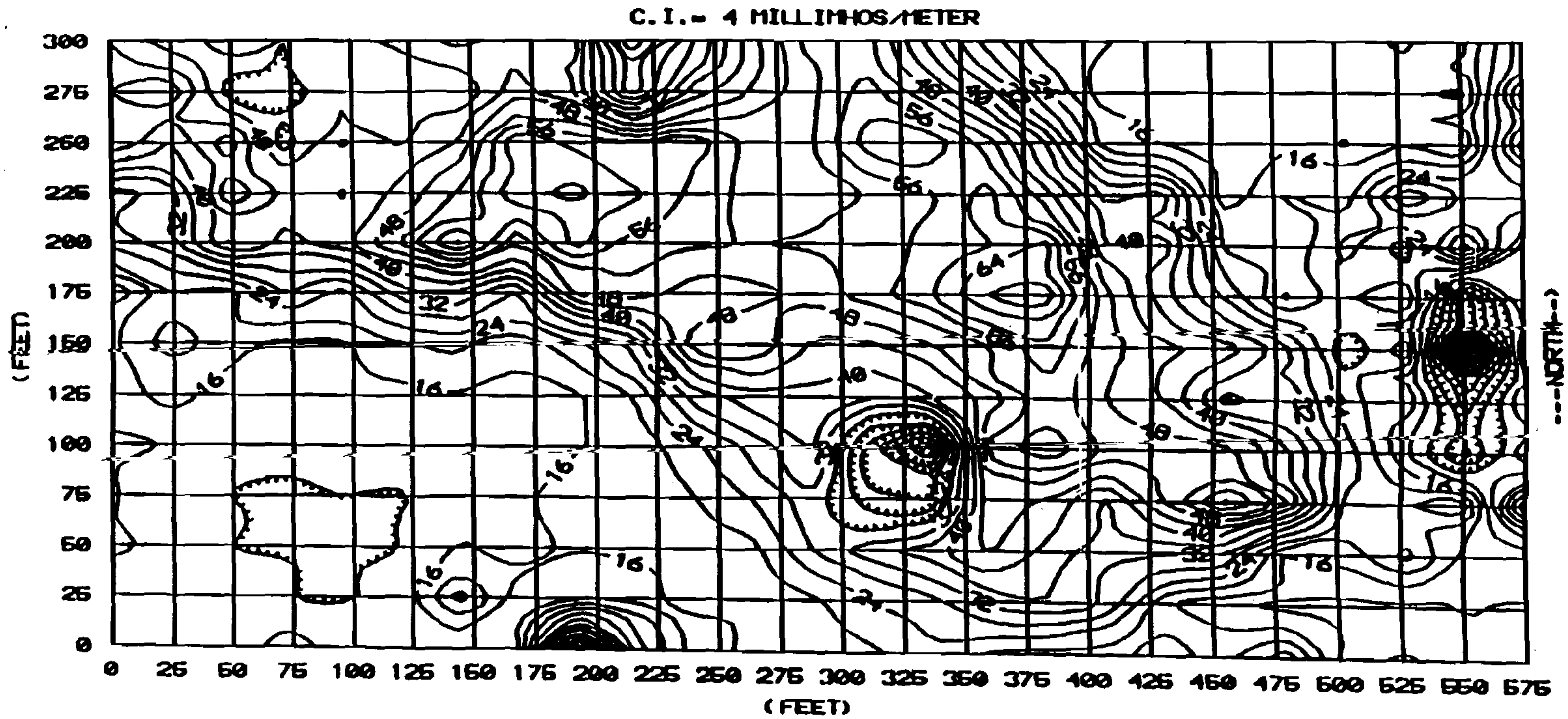
FIGURE 2



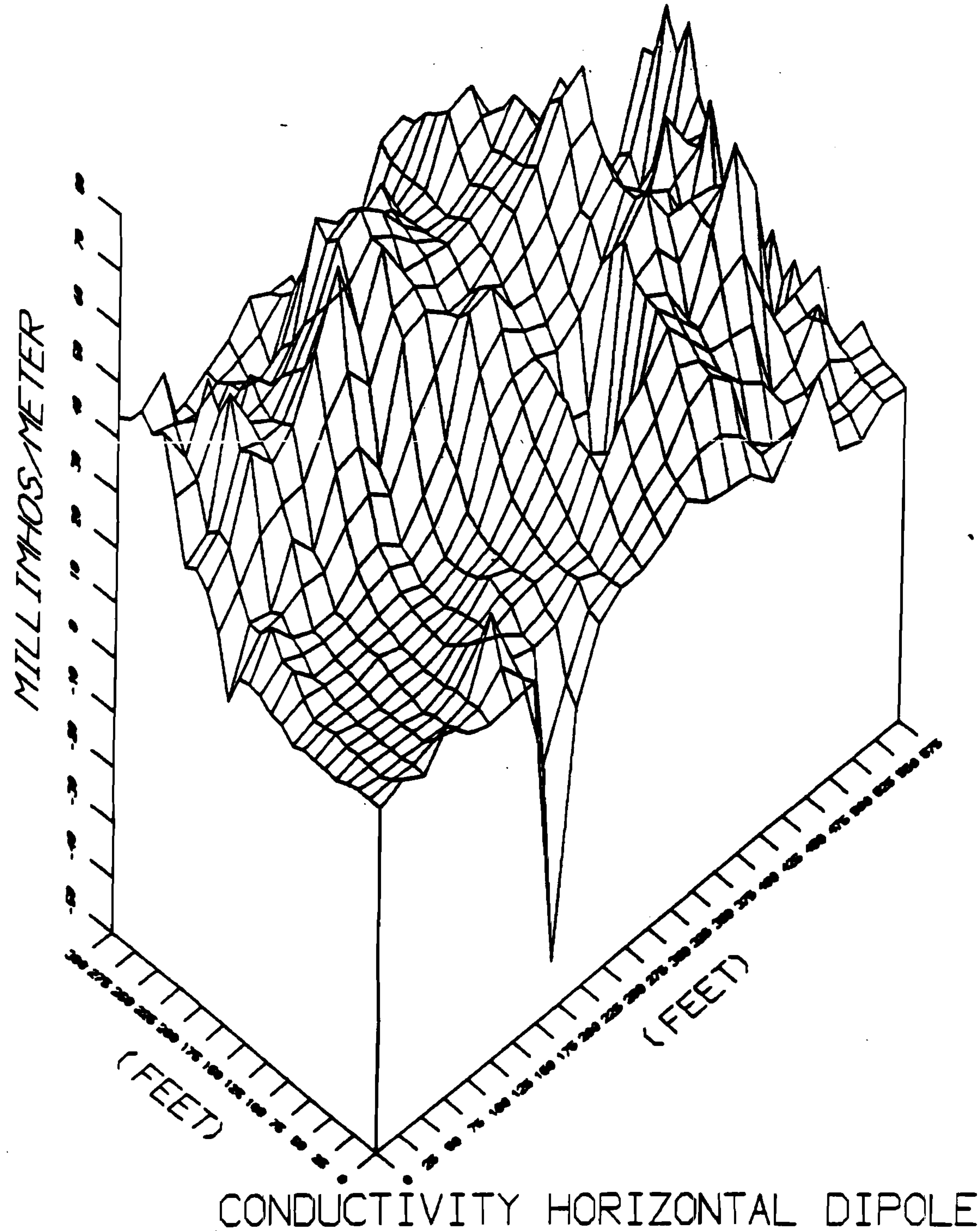
Linearity of Signal for the EM-31

URS CONSULTANTS, INC.	STANDARD OPERATING PROCEDURE FOR ELECTROMAGNETIC CONDUCTIVITY SURVEYS FP-104	FIGURE 3

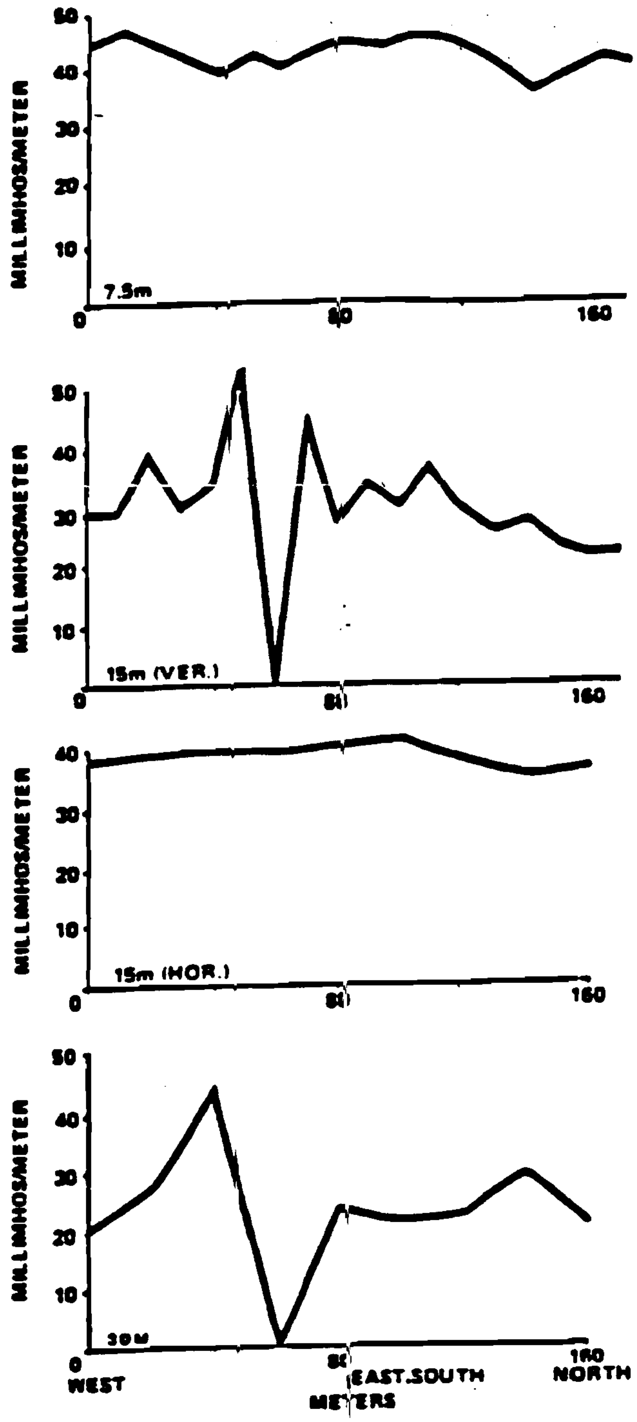
CONDUCTIVITY HORIZONTAL DIPOLE



Horizontal Dipole Conductivity Plot



Three Dimensional Plot of Horizontal Dipole



EM-31 Data Collected Over a Metal Drainage Culvert

URS CONSULTANTS, INC.	STANDARD OPERATING PROCEDURE FOR ELECTROMAGNETIC CONDUCTIVITY SURVEYS FP-104	FIGURE 6

Application	Ground Penetrating Radar	EM Induction	Electrical Resistivity	Seismic Refraction	Metal Detection	Magnetometry
<u>Natural Conditions</u>						
Layer thickness and depth of soil and rock	1	2	1	1	NA	NA[b]
Mapping lateral anomaly locations	1	1	1	1	NA	NA[b]
Determining vertical anomaly depths	1	2	1	1	NA	NA
Very high resolution of lateral or vertical anomalous conditions	1	1	2	2	NA	NA
Depth to water table and aquifer thickness	2	2	2	1	NA	NA
Water saturated fractures, shear and fault zones	2	2	2	2	NA	NA
Mapping clay layers	1	1	1	2	NA	NA
Cavity/sinkhole detection[d]	1	2	2	2	NA	NA
<u>Subsurface Contamination Leachates/Plumes</u>						
Existence of conductive contaminants Reconnaissance Surveys)	2[a]	1	1	NA	NA	NA
Mapping contaminant boundaries	2[a]	1	1	NA	NA	NA
Determining vertical extent of contaminant	2[a]	2	1	NA	NA	NA
Quantify magnitude of contaminants	NA	1	1	NA	NA	NA
Determine flow direction	2[a]	1	1	NA	NA	NA
Flow rate using two measurements at different times	NA	1	1	NA	NA	NA
Detection of organic contaminants above and floating on water table	2[a]	2[a]	2[a]	NA	NA	NA
Detection and mapping of conductive contaminants within unsaturated zone	2	1	1	NA	NA	NA
<u>Location and Boundaries of Buried Wastes</u>						
Bulk wastes	1	1	1	2	NA	NA
Nonmetallic containers	1	NA	NA	NA	NA	NA
Metallic containers						
- Ferrous	2	1	2	NA	1	1
- Nonferrous	2	1	2	NA	1	NA
Depth of burial	1	2	1	NA	2[a]	2[a]
<u>Utilities</u>						
Location of pipes, cables, tanks	1	1	2	NA	1	1
Identification of permeable pathways associated with loose fill in utility trenches	1	1	NA	NA	1	1
Abandoned well casings	2	2	2	NA	1	1
<u>Safety</u>						
Predrilling site clearance in order to avoid buried drums, breaching trenches, etc.	1	1	2	2	1	1
Typical Depth Range (meters)	<1-25	0.75-60[c]	0-100+	1-30+	0-3	0-5

1 - Denotes primary use.
2 - Denotes possible applications, secondary use; however, in some special cases, 2 may be the only effective approach due to circumstances.
NA - Not applicable.
+ - Actual depth only limited by sources and length of wire available.

[a]Limited applications.
[b]Not applicable in the context used in this document.
[c]Deeper if using transient EM.
[d]Other principle methods include microgravity (ground survey) and sonar (water bottom survey).

Source: Modified from Benson et al. (1984)

Typical Applications of Six Commonly Used Geophysical Methods

Source of Noise	Ground Penetrating Radar	EM Induction	Electrical Resistivity	Seismic Refraction	Metal Detection	Magnetometry
Buried pipes*	2 Will detect but may affect data	1 Only if within several coil spacings	1 Only if survey line is parallel and close by	2 Only if survey is directly over	1 Any metal pipes unless buried below detection	1 Steel pipes only
Metal fences	2 May affect unshielded antenna if close to fence	1 Only if within several coil spacings	2 Only if survey line is parallel and close to fence	NA	2 Only if nearby	1 Steel fences only
Overhead wires (powerline)	2 Only if unshielded antennas are used	1 Only if within several coil spacings	NA	2 60 Hz filter may be required	NA	2 Some mags respond
Ground vibrations	NA	NA	NA	1	NA	NA
Airborne electromagnetic noise	NA	2	2	NA	2	1 to 2 (Earth's field changed)
FM radio transmission	1 to 2 depending on frequency	NA	NA	NA	NA	NA
Ground currents/voltage	NA	NA	2	NA	NA	NA
Trees	2 Only if unshielded antennas are used	NA	NA	2 (wind noise)	NA	NA
Metal from buildings, vehicles, etc.	2 Only if nearby and unshielded antennas are used	2 Only if nearby	2 Only if nearby	NA	2 Only if nearby	2 Only if nearby
Small metallic debris on or near surface (nails, wire coathangers)	2	NA	NA	NA	1	1 Ferrous metal only
Large metallic debris on or near surface (drums, drum covers, etc.)	2	1	2	NA	1	1 Ferrous metal only
Ground contact/ electrode problems	2	NA	1	1 to 2	NA	NA

1 - Very susceptible; 2 - Minor problem; NA - Not applicable.

* A small diameter pipe (1") will have little influence if a large mass of conducting material is in the immediate area.

Source: Modified from Benson et al. (1984)

Susceptibility of Major Geophysical Methods to Ambient "Noise"

Specification	EM-31	EM 34-3
Required personnel	1 to 2 persons	2 to 3 persons
Data recording	Continuous or station	Station
Intercoil spacing (meters)	3.7	10, 20, 40
Effective exploration depth (meters)	Up to 6	7.5, 15, 30, and 60

Operational Data and Exploration Depths

PART B

QUALITY ASSURANCE PROJECT PLAN

(QAPjP)

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TABLES

APPENDICES

B1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPjP) is designed to provide an overview of quality assurance/quality control (QA/QC) procedures and programs which will be adhered to during the proposed Remedial Investigation/Feasibility Study (RI/FS) activities, as described in the State Superfund Work Assignment (WA) #D003825-17. The QAPjP will identify specific methods and QA/QC procedures for chemically testing environmental samples obtained from the Golden Road Disposal Site, located in the Town of Chili, Monroe County, NY.

B2.0 PROJECT/SITE DESCRIPTION

A complete project site description of the Golden Road Disposal site is provided in Sections 1 and 2 of the Project Management Work Plan.

B3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The URSGWC Project QA Officer is responsible for verifying that corporate QA procedures are followed. The Project Manager will be responsible for overseeing both the analytical and field QA/QC activities, coordinating the overall project, and maintaining quality throughout the project. The Remedial Investigation (RI) Coordinator will be responsible for coordinating all site investigation work.

The Onsite Coordinator is responsible for verifying that QA procedures are followed in the field so that valid, representative samples are collected. He also will be responsible for coordinating the activities of all personnel involved with implementing the project in the field, and will be in daily communication with the Project Manager. This person will verify that all field work is carried out in accordance with the approved project plans.

The Data Validation Chemist (or designee) will be in direct contact with the analytical laboratory to monitor laboratory activities so that holding times and other QA/QC requirements will be met. The analytical laboratory to be used for the analysis of groundwater, surface water, surface and subsurface soils, sediments, fill and waste samples will be H_2M Labs, Inc. located in Melville, New York. H_2M Labs, Inc. is a NYSDOH ELAP CLP certified lab and will maintain this certification throughout the project.

The QA Manager of the laboratory will be responsible for performing project-specific audits and for overseeing the quality control data generated. Also, the Laboratory Project Manager will be in daily communication with the Data Validation Chemist (or designee). The Data Validation Chemist will review the data packages submitted by the laboratory. The QA Officer proposed for this project is George Kisluk. The Data Validation Chemist is Jim Lehnen. A project organization chart is provided in Figure 5-1 of the Golden Road Disposal Project Management Work Plan.

B4.0 DATA QUALITY OBJECTIVES

B4.1 Background

Data quality objectives (DQOs) are qualitative and quantitative statements which specify the quality of data required to support the investigation for the Golden Road Disposal site. DQOs focus on the identification of the end use of the data to be collected. The project DQOs will be achieved utilizing definitive data categories, as outlined in *Guidance for the Data Quality Objectives Process,* EPA QA/G-4 (September 1994). The definitive data are generated using rigorous analytical methods, such as approved United States Environmental Protection Agency (USEPA) reference methods. A summary of the analytical methods to be used is presented in Table B4-1.

The project DQOs for data collected during this RI/FS investigation are to:

- Determine if the north parcel is a hazardous waste disposal site.
- Characterize contamination within the south parcel property.
- Evaluate the impact of the contamination upon human health and the environment, and determine the need for remediation.
- Maintain the highest possible scientific/professional standards for each analytical procedure to assure the ultimate defensibility of the data produced during the site remedial investigation.

B4.2 QA Objectives For Chemical Data Measurement

For the definitive data category described above, the data quality indicators of precision, accuracy, representativeness, comparability, and completeness will be measured during offsite chemical analysis.

TABLE B4-1
SUMMARY OF ANALYTICAL PARAMETERS
GOLDEN ROAD DISPOSAL SITE

A. NORTH PARCEL

Parameter	Method Number / Reference[1]	Estimated Number of Samples	QA/QC Samples		
			MS/MSD/MD/MSB	Rinse Blanks	Trip Blanks
I. Groundwater					
Groundwater (Geoprobe)					
Target Compound List (TCL)					
Volatiles + TICs	ASP 95-1	1	0/0/0/0*	0	1
TCL Semivolatiles + TICs	ASP 95-2	1	0/0/0/0*	0	0
TCL Pesticides/PCBs	ASP 95-3	1	0/0/0/0*	0	0
TAL Metals - total	ASP CLP-M	1	0/0/0/0*	0	0
II. Soil					
Aboveground Storage Tanks (Hand auger)					
TCL Volatiles + TICs	ASP 95-1	2	0/0/0/0	0	0
TCL Semivolatiles + TICs	ASP 95-2	2	0/0/0/0	0	0
TCL Pesticides/PCBs	ASP 95-3	2	0/0/0/0	0	0
TAL Metals	ASP CLP-M	2	0/0/0/0	0	0
Underground Storage Tanks (Geoprobe)					
TCL Volatiles + TICs	ASP 95-1	3	0/0/0/0	0	0
TCL Semivolatiles + TICs	ASP 95-2	3	0/0/0/0	0	0
TCL Pesticides/PCBs	ASP 95-3	3	0/0/0/0	0	0
TAL Metals	ASP CLP-M	3	0/0/0/0	0	0
Fill Piles/Fill Materials					
TCLP Volatiles	8260B	3	1/0/0/0	0	0
TCLP Semivolatiles	8270C	3	1/0/0/0	0	0
TCLP Pesicides	8081A	3	1/0/0/0	0	0
TCLP Metals	ASP CLP-M	3	1/0/0/0	0	0
Ignitability	1030	3	0/0/1/0	0	0
Corrosivity	9045C	3	0/0/1/0	0	0
Reactivity	Chapter 7 Section 7.3	3	0/0/1/0	0	0
TCL Volatiles + TICs	ASP 95-1	6	1/1/0/1	1	0
TCL Semivolatiles + TICs	ASP 95-2	6	1/1/0/1	1	0
TCL Pesticides/PCBs	ASP 95-3	6	1/1/0/1	1	0
TAL Metals	ASP CLP-M	6	1/0/1/0	1	0
III. Waste					
Aboveground/Underground Storage Tanks					
Fuel Fingerprint Analysis	DOH 310-13 Modified	4	0/0/0/0	0	0

NOTES:
[1] NYSDEC Analytical Services Protocol, 10/95 edition.

TABLE B4-1 (Continued)
SUMMARY OFANALYTICAL PARAMETERS
GOLDEN ROAD DISPOSAL SITE

B. SOUTH PARCEL

Parameter	Method Number / Reference[1] [2]	Estimated Number of Samples	MS/MSD/MD/MSB	Rinse Blanks	Trip Blanks
I. Groundwater					
Monitoring Wells					
TCL Volatiles + TICs	ASP 95-1	7	1/1/0/1	0	1
TCL Semivolatiles + TICs	ASP 95-2	7	1/1/0/1	0	0
TCL Pesticides/PCBs	ASP 95-3	7	1/1/0/1	0	0
TAL Metals - total	ASP CLP-M	7	1/0/1/0	0	0
II. Soil					
Surface Soils					
TCL Volatiles + TICs	ASP 95-1	10	1/1/0/1	1	0
TCL Semivolatiles + TICs	ASP 95-2	10	1/1/0/1	1	0
TCL Pesticides/PCBs	ASP 95-3	10	1/1/0/1	1	0
TAL Metals	ASP CLP-M	10	1/0/1/0	1	0
Subsurface Soils - Test Pits					
TCL Volatiles + TICs	ASP 95-1	5	0/0/0/0	1	0
TCL Semivolatiles + TICs	ASP 95-2	5	0/0/0/0	1	0
TCL Pesticides/PCBs	ASP 95-3	5	0/0/0/0	1	0
TAL Metals	ASP CLP-M	5	0/0/0/0	1	0
Subsurface Soils - Monitoring Well Borings					
TCL Volatiles + TICs	ASP 95-1	2	0/0/0/0	1	0
TCL Semivolatiles + TICs	ASP 95-2	2	0/0/0/0	1	0
TCL Pesticides/PCBs	ASP 95-3	2	0/0/0/0	1	0
TAL Metals	ASP CLP-M	2	0/0/0/0	1	0
III. Sediment					
TCL Volatiles + TICs	ASP 95-1	8	1/1/0/1	1	0
TCL Semivolatiles + TICs	ASP 95-2	8	1/1/0/1	1	0
TCL Pesticides/PCBs	ASP 95-3	8	1/1/0/1	1	0
TAL Metals	ASP CLP-M	8	1/0/1/0	1	0
V. Surface Water					
TCL Volatiles + TICs	ASP 95-1	8	1/1/0/1	0	2
TCL Semivolatiles + TICs	ASP 95-2	8	1/1/0/1	0	0
TCL Pesticides/PCBs	ASP 95-3	8	1/1/0/1	0	0
TAL Metals	ASP CLP-M	8	1/0/1/0	0	0
IV. Waste					
Drums/Containers					
TCLP Volatiles	8260B	10	1/0/0/0	0	0
TCLP Semivolatiles	8270C	10	1/0/0/0	0	0
TCLP Pesicides	8081A	10	1/0/0/0	0	0
TCLP Metals	ASP CLP-M	10	1/0/0/0	0	0
TCL PCBs (total)	ASP 95-3	10	1/1/0/1	0	0
Ignitability	1030	10	0/0/0/0	0	0
Corrosivity	9045C	10	0/0/0/0	0	0
Reactivity	Chapter 7 Section 7.3	10	0/0/0/0	0	0
VI. Asbestos					
Asbestos (bulk) by PLM	NIOSH Method 9002, Issue 2	2	0/0/0/0	0	0

[1] NYSDEC Analytical Services Protocol, 10/95 edition.
[2] NIOSH. 1994. NIOSH Manual of Analytical Methods (NMAM), Fourth Edition. 15 August

TABLE B4-1 (Continued)
SUMMARY OF ANALYTICAL PARAMETERS
GOLDEN ROAD DISPOSAL SITE

C. MISCELLANEOUS

Parameter	MethodNumber / Reference[1]	Estimated Number of Samples	MS/MSD/MD/MSB	Rinse Blanks	Trip Blanks
I. Private Well Water					
TCL Volatiles + TICs	ASP 524.2	2	0/0/0/0*	0	1
TAL Metals (total)	ASP CLP-M	2	0/0/0/0*	0	0
II.Drill Water Sample (Hydrant)					
TCL Volatiles + TICs	ASP 95-1	1	0/0/0/0	0	1
TCL Semivolatiles + TICs	ASP 95-2	1	0/0/0/0	0	0
TCL Pesticide/PCBs	ASP 95-3	1	0/0/0/0	0	0
TAL Metals	ASP CLP-M	1	0/0/0/0	0	0
III. Decon Water (steam cleaning)					
TCLP Volatiles	8260B	1	0/0/0/0*	0	0
TCLP Semivolatiles	8270C	1	0/0/0/0*	0	0
TCLP Pesticides	8081A	1	0/0/0/0*	0	0
TCLP Metals	ASP CLP-M	1	0/0/0/0*	0	0
Ignitability	1010	1	0/0/0/0*	0	0
Corrosivity	9040B	1	0/0/0/0*	0	0
Reactivity	Chapter 7 Section 7.3	1	0/0/0/0*	0	0
IV. Drill Cuttings (Soil)					
TCLP Volatiles	8260B	1	0/0/0/0*	0	0
TCLP Semivolatiles	8270C	1	0/0/0/0*	0	0
TCLP Pesticides	8081A	1	0/0/0/0*	0	0
TCLP Metals	ASP CLP-M	1	0/0/0/0*	0	0
TCL PCBs (total)	ASP 95-3	1	0/0/0/0*	0	0
Ignitability	1030	1	0/0/0/0*	0	0
Corrosivity	9045C	1	0/0/0/0*	0	0
Reactivity	Chapter 7 Section 7.3	1	0/0/0/0*	0	0

* Laboratory batch QC will be requested

[1] NYSDEC Analytical Services Protocol, 10/95 edition.

B4.2.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix, as well as by errors made in the field and/or laboratory handling procedures. Precision is evaluated using analyses of a laboratory matrix spike/matrix spike duplicate and matrix duplicates (inorganics), which not only exhibit sampling and analytical precision, but indicate analytical precision through the reproducibility of the analytical results. Relative Percent Difference (RPD) is used to evaluate precision. RPD criteria must meet the requirements for the methods identified in Table B4-1.

B4.2.2 Accuracy

Accuracy measures the analytical bias in a measurement system. Sources of error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis techniques. Sampling accuracy may be assessed by evaluating the results of rinse and trip blanks. These data help to assess the potential contamination contribution from various outside sources. The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on samples of the same matrix. The percent recovery criterion is used to estimate accuracy based on recovery in the matrix spike/matrix spike duplicate and matrix spike blank samples. The spike and spike duplicate, which will give an indication of matrix effects that may be affecting target compounds, are also a good gauge of method efficiency. For organic analyses, surrogate recovery results will also be measured. Acceptable ranges of recovery are reported in the referenced methods identified in Table B4-1.

B4.2.3 Representativeness

Representativeness expresses the degree to which the sample data accurately and precisely represent the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter which is most concerned with the proper design of the sampling program or subsampling of a given sample. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigative objectives. The sampling procedures, as described in the Field Sampling Plan have been selected with the goal of obtaining representative samples for the media of concern.

B4.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. This goal is achieved through using standard techniques to collect and analyze representative samples, and reporting analytical results in appropriate units. Complete field documentation using standardized data collection forms will support the assessment of comparability. Comparability is limited by the other parameters (e.g., precision, accuracy, representativeness, completeness, comparability), because only when precision and accuracy are known can data sets be compared with confidence. For data sets to be comparable, it is imperative that the analytical methods and procedures be explicitly followed.

B4.2.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is important that appropriate QA procedures be maintained to verify that valid data area and project needs are thereby met. For the data generated, a goal of 100% is required for completeness (or usability) of the analytical data. If this goal is not met, then NYSDEC and URSGWC project personnel will determine whether the deviations may cause the data to be rejected.

B5.0 SAMPLING LOCATIONS AND PROCEDURES

Sampling locations are discussed in Section 2.2 of the Golden Road Disposal Project Management Work Plan. Sampling procedures are discussed in the Remedial Investigation Work Plan, Part A - Field Sampling Plan.

B6.0 SAMPLE HOLDING TIMES

Table B6-1 identifies the analytical method and holding time requirements. All holding times begin with validated time of sample receipt (VTSR) at the laboratory.

TABLE B6-1
ANALYTICAL METHODS, PRESERVATION, AND HOLDING TIME REQUIREMENTS
GOLDEN ROAD DISPOSAL SITE

PARAMETER	ANALYTICAL METHOD	PRESERVATION	HOLDING TIME*
Water			
TCL Volatiles	ASP 95-1/524.2	HCl to pH<2, Cool 4° C	10 days preserved
TCL Semivolatiles	ASP 95-2	Cool 4° C	5 days until extraction/40 days for analysis
TCL Pesticides/PCBs	ASP 95-3	Cool 4° C	5 days until extraction/40 days for analysis
TAL Metals (total)	ASP CLP-M	HNO_3 to pH<2, Cool 4° C	6 months; 26 days for mercury
TCLP Volatiles	8260B	Cool 4° C	7 days to TCLP extraction; 7 days for analysis
TCLP Semivolatiles	8270C	Cool 4° C	5 days to TCLP extraction/7 days until extraction/40 days for analysis
TCLP Pesticides	8081A	Cool 4° C	5 days to TCLP extraction/7 days until extraction/40 days for analysis
TCLP Metals	ASP CLP-M	Cool 4° C	6 months to TCLP extraction/ 6 months for analysis; mercury 26 days to TCLP extraction/ 26 days for analysis.
Ignitability	1010	Cool 4° C	As soon as possible
Corrosivity	9040B		
Reactivity	Chapter 7 Section 7.3		
Soil/Sediment/Waste			
TCL Volatiles	ASP 95-1	Cool 4° C	10 days
TCL Semivolatiles	ASP 95-2	Cool 4° C	10 days until extraction/40 days for analysis
TCL Pesticides/PCBs	ASP 95-3	Cool 4° C	10 days until extraction/40 days for analysis
TCL PCBs	ASP 95-3	Cool 4° C	10 days until extraction/40 days for analysis
TAL Metals	ASP CLP-M	Cool 4° C	6 months; 26 days for Mercury
TCLP Volatiles	8260B	Cool 4° C	7 days to TCLP extraction; 7 days for analysis
TCLP Semivolatiles	8270C	Cool 4° C	5 days to TCLP extraction/7 days until extraction/40 days for analysis
TCLP Pesticides	8081A	Cool 4° C	5 days to TCLP extraction/7 days until extraction/40 days for analysis
TCLP Metals	ASP CLP-M	Cool 4° C	6 months to TCLP extraction/ 6 months for analysis; mercury 26 days to TCLP extraction/ 26 days for analysis.
Ignitability	1030	Cool 4° C	As soon as possible
Corrosivity	9045C		
Reactivity	Chapter 7 Section 7.3		
Fuel Fingerprint Analysis	NYSDOH 310-13 modified	Cool 4° C	14 days
Asbestos	NIOSH Method 9002, Issue 2	none	none

* All holding times begin with the Validated Time of Sample Receipt (VTSR) at the laboratory.
New York State Department of Environmental Conservation, Analytical Services Protocol (ASP), 10/95 Edition.
NIOSH Manual of Analytical Methods (NMAM), Fourth Edition. 15 August 1994.
P- Polyethylene ; G- Glass

B7.0 ANALYTICAL PROCEDURES

Table B4-1 identifies the specific methods to be performed on the individual matrices. All analyses will be performed in accordance with the following documents:

- *New York State Department of Environmental Conservation Analytical Services Protocol,* 10/95 Edition.

- NIOSH *Manual of Analytical Methods* (NMAM), NIOSH August 1994.

B8.0 CALIBRATION PROCEDURES AND FREQUENCY

In order to obtain a high level of precision and accuracy during sample processing procedures, laboratory instruments must be calibrated properly. Several analytical support areas must be considered so the integrity of standards and reagents is upheld prior to instrument calibration. The following sections describe the analytical support areas and laboratory instrument calibration procedures.

B8.1 Analytical Support Areas

Prior to generating quality data, several analytical support areas must be considered:

Standard/Reagent Preparation - Primary reference standards and secondary standard solutions shall be obtained from National Institute of Standards and Technology (NIST), or other reliable commercial sources to verify the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished per the methods referenced in Table B4-1. All standards and standard solutions are to be formally documented (i.e., in a bound logbook) and should identify the supplier, lot number, purity/concentration, receipt/preparation date, preparer's name, method of preparation, expiration date, and any other pertinent information. All standard solutions shall be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory shall continually monitor the quality of the standards and reagents through well documented procedures.

Balances - The analytical balances shall be calibrated and maintained in accordance with manufacture specifications. Calibration is conducted with two Class "S" weights that bracket the expected balance use range. The laboratory shall check the accuracy of the balances daily and properly document results in permanently bound logbooks.

Refrigerators/Freezers - The temperature of the refrigerators and freezers within the laboratory shall be monitored and recorded daily. This will verify that the quality of the standards and reagents is not compromised and the integrity of the analytical samples is upheld. Appropriate acceptance ranges (4 °C ± 2 °C for refrigerators) shall be clearly posted on each unit in service.

Water Supply System - The laboratory must maintain a sufficient water supply for all project needs. The grade of the water must be of the highest quality (analyte-free) in order to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis.

B8.2 Laboratory Instruments

Calibration of instruments is required to verify that the analytical system is operating properly and at the sensitivity necessary to meet established quantitation limits. Each instrument for organic and inorganic analyses shall be calibrated with standards appropriate to the type of instrument and linear range established within the analytical method(s). Calibration of laboratory instruments will be performed according to methods specified in Table B4-1.

In addition to the requirements stated within the analytical methods, the contract laboratory will be required to analyze an additional low level standard at or near the detection limits. In general, standards will be used that bracket the expected concentration of the samples. This will require the use of different concentration levels, which are used to demonstrate the instrument's linear range of calibration.

Calibration of an instrument must be performed prior to the analysis of any samples and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still calibrated. If the contract laboratory cannot meet the method-required calibration requirements, corrective action shall be taken as discussed in Section B11.0. All corrective action procedures taken by the contract laboratory are to be documented, summarized within the case narrative, and submitted with the analytical results.

B9.0 INTERNAL QUALITY CONTROL CHECKS

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as determining the effect sample matrix may have on data being generated. Two types of internal checks are performed-batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the laboratory will be determined by the specified analytical method and project specific requirements. Acceptable criteria and/or target ranges for these QC samples are presented within the analytical methods referenced in Table B4-1.

QC results which vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers, and/or an assessment of the impact these corrective measures have on the established data quality objectives. Quality control samples including any project-specific QC will be analyzed are discussed below.

B9.1 Batch QC

Method Blanks - A method blank is defined as laboratory-distilled water or that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Method blanks are analyzed at a frequency of one per analytical batch.

Matrix Spike Blank Samples - A matrix spike blank (MSB) sample is an aliquot of water spiked (fortified) with all the analytes being analyzed for calculation of precision and accuracy to verify that the analysis being performed is in control. A MSB will be performed for each matrix and organic parameters only, as indicated on Table B4-1.

B9.2 Matrix-Specific QC

Matrix Spike Samples - An aliquot of a matrix is spiked with known concentrations of specific compounds as stipulated by the methodology. The matrix spike (MS) [organics and inorganics] and matrix spike duplicate (MSD) [organics only] are subjected to the entire analytical procedure in order to assess both accuracy and precision of the method for the matrix by measuring the percent recovery and relative percent difference of the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs are analyzed at a frequency of one each per twenty samples per matrix. MS/MSDs will be performed for the parameters as listed in Table B4-1.

Matrix Duplicates - The matrix duplicate (MD) is two representative aliquots of the same sample which are prepared and analyzed identically. Matrix duplicate samples provide for the evaluation of precision both in the field and at the laboratory by comparing the analytical results of two samples taken from the same location. Every effort will be made to obtain replicate samples; however, due to interferences, lack of homogeneity the analytical results are not always reproducible. Matrix duplicate samples will be analyzed for inorganics only and are to be included at a frequency of one per twenty samples per matrix, as listed in Table B4-1.

B9.3 Additional QC

Rinsate (Equipment) Blanks - A rinsate blank is a sample of laboratory demonstrated analyte-free water passed over or through the cleaned sampling equipment. A rinsate blank is used to indicate potential contamination from sample instruments used to collect and transfer samples. The water must originate from one common source within the laboratory and must be the same water used by the laboratory performing the analysis. The rinsate blank should be collected, transported, and analyzed in the same manner as the samples acquired that day. Rinsate blanks will be performed at the rate listed in Table B4-1.

Trip Blanks - Trip blanks are not required for nonaqueous matrices. Trip blanks are required for aqueous sampling events. They consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte-free water. These samples then accompany the bottles that are prepared at the laboratory into the field and back to the laboratory, along with the collected samples for analysis. These bottles are never opened in the field. Trip blanks must return to the laboratory with the same set of bottles they accompanied to the field. Trip blanks will be analyzed for volatile organic parameters only. Trip blanks will be analyzed at the frequency of one per shipment of aqueous volatile organics.

B10.0 CALCULATION OF DATA QUALITY INDICATORS

B10.1 Precision

Precision is evaluated using analyses of a field duplicate and/or a laboratory MS/MSD which not only exhibit sampling and analytical precision, but indicate analytical precision through the reproducibility of the analytical results. Relative percent difference (RPD) is used to evaluate precision by the following formula:

$$\%RPD = \frac{(X_1 - X_2)}{[(X_1 + X_2)/2]} \times 100\%$$

where:

X_1 = *Measured value of sample or matrix spike*

X_2 = *Measured value of duplicate or matrix spike duplicate*

Precision will be determined through the use of MS/MSD (for organics) and matrix duplicates analyses. RPD criteria for this project must meet the method requirements referenced in Table B4-1.

B10.2 Accuracy

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. The closer the numerical value of the measurement comes to the true value or actual concentration, the more accurate the measurement is. Analytical accuracy is expressed as the percent recovery of a compound or element that has been added to the environmental sample at known concentrations before analysis. Analytical accuracy may be assessed through the use of known and unknown QC samples and spiked samples. Accuracy is presented as percent recovery. Accuracy will be determined from matrix spike, matrix spike duplicate, and matrix spike blank samples, as well as from surrogate compounds added to organic fractions (i.e., volatiles), and is calculated as follows:

$$\% R = \frac{(X_s - X_u)}{K} \times 100\%$$

where:

X_s - Measured value of the spike sample

X_u - Measured value of the unspiked sample

K - Known amount of spike in the sample

B10.3 Completeness

Completeness is calculated on a per matrix basis for the project and is calculated as follows:

$$\% \text{ Completeness} = \frac{(X_v - X_n)}{N} \times 100\%$$

where:

X_v - Number of valid measurements

X_n - Number of invalid measurements

N - Number of valid measurements expected to be obtained

B11.0 CORRECTIVE ACTIONS

Laboratory corrective actions shall be implemented to resolve problems and restore proper functioning to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. A discussion of the corrective actions to be taken is presented in the following sections.

B11.1 Incoming Samples

Problems noted during sample receipt shall be documented by the laboratory. URSGWC's Data Validation Chemist (or designee) shall be contacted immediately for problem resolution. All corrective actions shall be documented thoroughly.

B11.2 Sample Holding Times

If any sample extractions and/or analyses exceed method holding time requirements, URSGWC's Data Validation Chemist (or designee) shall be notified immediately for problem resolution. All corrective actions shall be documented thoroughly.

B11.3 Instrument Calibration

Sample analysis shall not be allowed until all initial calibrations meet the appropriate requirements. All laboratory instrumentation must be calibrated in accordance with method requirements. If any initial/continuing calibration standards exceed method QC limits, recalibration must be performed, and if necessary, reanalysis of all samples affected back to the previous acceptable calibration check.

B11.4 Reporting Limits

The laboratory must meet all method-required detection limits, which are referenced in the methods listed in Table B4-1. If difficulties arise in achieving these limits due to a particular sample matrix, the laboratory must notify URSGWC project personnel for problem resolution. To achieve those detection limits, the laboratory must utilize all appropriate cleanup procedures in an attempt to retain the method required detection limits. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory must document all initial analyses and secondary dilution results. Secondary dilution will be permitted only to bring target analytes within the linear range of calibration. If samples are analyzed at a secondary dilution with no target analytes detected, URSGWC's Data Validation Chemist (or designee) will be immediately notified so that appropriate corrective actions can be initiated.

B11.5 Method QC

All QC, including blanks, matrix duplicates, matrix spikes, matrix spike duplicates, surrogate recoveries, matrix spike blank samples, and other method-specified QC samples, shall meet the method requirements referenced in Table B4-1. Failure of method-required QC will result in the review and possible qualification of all affected data. If the laboratory cannot find any errors, the affected sample(s) shall be reanalyzed and/or re-extracted/redigested, then reanalyzed within method-required holding times to verify the presence or absence of matrix effects. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria as defined by the data validation guidelines identified in Section B12.2. If matrix effect is not confirmed, then the entire batch of samples may have to be reanalyzed and/or re-extracted/redigested, then reanalyzed at no cost to the URSGWC. URSGWC shall be notified as soon as possible to discuss possible corrective actions should unusually difficult sample matrices be encountered.

B11.6 Calculation Errors

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review calculation and/or reporting errors exist, the laboratory will be required to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

B12.0 DATA REDUCTION, VALIDATION, AND USABILITY

For all NYSDEC ASP analyses, NYSDEC ASP Superfund Category B deliverable requirements will be employed for documentation and reporting of all data. The standard NYSDEC Data Package Summary Forms (see Appendix B-1) will be completed by the analytical laboratory and included in the deliverable data packages.

B12.1 Data Reduction

Laboratory analytical data are first generated in raw form at the instrument. These data may be either graphic or printed tabular form. Specific data generation procedures and calculations are found in each of the referenced methods. Analytical results must be reported consistently. Data for aqueous samples will be reported in concentrations of micrograms per liter (μg/L). Data for soils will be reported in concentrations of micrograms per kilogram (μg/kg) or μg/L for TCLP results. All soil data will be reported on a dry weight basis. Asbestos will be reported as percent.

Identification of all analytes must be accomplished with an authentic standard of the analyte traceable to NIST or USEPA sources. Data reduction will be performed by individuals experienced with a particular analysis and knowledgeable of requirements.

B12.2 Data Validation

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use.

Data validation will be performed by environmental chemists under the supervision of the Data Validation Chemist. All analytical samples collected will receive a limited data review. This review will include a review of holding times, completeness of all required deliverables; review of QC results (surrogates, spikes, duplicates) to determine if the data is within the protocol-required limits and specifications; a determination that all samples were analyzed using established and agreed upon analytical protocols; an evaluation of the raw data to confirm the results provided in the data summary sheets; and a review of laboratory data qualifiers. The methods referenced in Table B4-1 as well as the general guidelines presented in the following document will be used to aide the chemist during the data review:

USEPA Region II CLP *Organic Data Review and Preliminary Review*, SOP HW-6, Revision 11, June 1996; and

USEPA Region II *Evaluation of Metals Data for the Contract Laboratory Program*, HW-2, Revision XI, January 1992.

Where possible, discrepancies will resolved by URSGWC's chemists (i.e., letters will be written to laboratories). A complete analytical data validation is not anticipated. However, if the initial limited data review reveals significant deviations and problems with the analytical data, URSGWC may recommend a complete validation of the data.

B12.3 Data Usability

A Data Usability Summary Report (DUSR) will be submitted to NYSDEC, and will describe the samples and the analytical parameters. Data deficiencies, analytical protocol deviations, and quality control problems are identified and their effect on the data will be discussed. The DUSR will also include recommendations on resampling/reanalysis.

B13.0 PREVENTIVE MAINTENANCE

The laboratory is responsible for maintaining its analytical equipment. Preventive maintenance is provided on a regular basis to minimize down-time and the potential interruption of analytical work. Instruments are maintained in accordance with the manufacturer's recommendations. If instruments require maintenance, only trained laboratory personnel or manufacturer-authorized service specialists are permitted to do the work. Maintenance activities will be documented and kept in permanent logs. These logs will be available for inspection by auditing personnel.

B14.0 PERFORMANCE AND SYSTEM AUDITS

Audits are a careful evaluation of both field and laboratory quality control procedures, and are performed before or shortly after systems are operational. Performance audits are conducted by introducing control samples into the data production process. These control samples may include performance evaluation samples, or field samples spiked with known amounts of analytes.

Systems audits are onsite qualitative inspections and reviews of the quality assurance system used by some part of or the entire measurement system. They provide a quantitative measure of the quality of the data produced by one section or the entire measurement process. The audits are performed against a set of requirements, which may be a quality assurance project plan or work plan, a standard method, or a project statement of work. The primary objective of the systems audits is to verify that the QA/QC procedures are being followed.

B14.1 <u>Performance and External Audits</u>

In addition to conducting internal reviews and audits, as part of its established quality assurance program, the laboratory is required to take part in regularly-scheduled performance evaluations and laboratory audits from state and federal agencies. They are conducted as part of the certification process and to monitor the laboratory performance. The audits also provide an external quality assurance check of the laboratory, and provide reviews and information on the management systems, personnel, standard operating procedures, and analytical measurement systems. Acceptable performance on evaluation samples and audits is required for certification and accreditation. The laboratory shall use the information provided from these audits to monitor and assess the quality of its performance. Problems detected in these audits shall be reviewed by the QA Manager and Laboratory Management, and corrective action shall be instituted as necessary.

B14.2 <u>Systems/Internal Audits</u>

As part of its Quality Assurance Program, the Laboratory Quality Assurance Manager shall conduct periodic checks and audits of the analytical systems. The purpose of these is to verify that the analytical systems are working properly, and that personnel are adhering to established procedures and documenting the required information. These checks and audits also assist in determining or detecting where problems are occurring.

The QA Manager periodically will submit laboratory control samples. These samples will serve to check the entire analytical method, the efficiency of the preparation method, and the analytical instrument performance. The results of the control samples are reviewed by the QA Manager who reports the results to the analyst and the Laboratory Director. When a problem is indicated, the QA Manager will assist the analyst and laboratory management in determining the reason and in developing solutions. The QA Manager will also recheck the systems as required.

REFERENCES

Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Quality Assurance Manual, Final Copy , Revision I, October 1989.

National Enforcement Investigations Center of USEPA Office of Enforcement. *NEIC Policies and Procedures.* Washington: USEPA.

New York State Department of Environmental Conservation (NYSDEC). 1995. Analytical Services Protocol, 10/95 Edition.

NIOSH. 1994. NIOSH Manual of Analytical Methods (NMAM), Fourth edition. 15 August.

NYSDEC. 1997. Division of Environmental Remediation, *Guidance for the Development of Data Usability Summary Reports*, Revised 9/97

USEPA. 1987. *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87-001, (OSWER Directive 9355.0-14). December. Cincinnati, OH: USEPA.

USEPA. 1992. *Evaluation of Metals Data for the Contract Laboratory Program (CLP) based on SOW 3/90, HW-2 (SOP Revision XI).* January 30, USEPA Region II.

USEPA. 1994. *Guidance for the Data Quality Objective Process*, EPA QA/G-4. September. Washington: USEPA.

USEPA. 1996. *Contract Laboratory Program Organic Data Review, SOP No. HW-6, Revision 11.* June. USEPA Region II.

APPENDIX B-1

NYSDEC DATA PACKAGE SUMMARY FORMS

To be included with all lab data and with each workplan

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE IDENTIFICATION AND ANALYTICAL REQUIREMENT SUMMARY

Customer Sample Code	Laboratory Sample Code	Analytical Requirements					
		*VOA GC/MS Method #	*BNA GC/MS Method #	*VOA GC Method #	*Pest PCBs Method #	*Metals	*Other

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
SEMIVOLATILE (BNA)
ANALYSES

Laboratory Sample ID	Matrix	Date Collected	Date Rec'd at Lab	Date Extracted	Date Analyzed

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
VOLATILE (VOA)
ANALYSES

Laboratory Sample ID	Matrix	Date Collected	Date Rec'd at Lab	Date Extracted	Date Analyzed

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
PESTICIDE/PCB
ANALYSES

Laboratory Sample ID	Matrix	Date Collected	Date Rec'd at Lab	Date Extracted	Date Analyzed

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
SEMIVOLATILE (BNA)
ANALYSES

Laboratory Sample ID	Matrix	Analytical Protocol	Extraction Method	Auxiliary Cleanup	Dil/Conc Factor

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
INORGANIC ANALYSES

Laboratory Sample ID	Matrix	Metals Requested	Date Rec'd at Lab	Date Analyzed

PART C

HEALTH AND SAFETY PLAN
(HASP)

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C1.0 INTRODUCTION

This Health and Safety Plan (HASP) includes appropriate health and safety procedures to be followed during investigative activities at and in the vicinity of the Golden Road Disposal Site, Site # 8-28-021 in the Town of Chili, Monroe County, New York, under New York State Department of Environmental Conservation (NYSDEC) State Superfund Work Assignment No. D003825-17 to URS Greiner Woodward Clyde, Inc. (URSGWC). Anticipated field activities at the site will include:

- setting up of support facilities/mobilization
- radiological survey
- drilling (drill rig and Geoprobe)
- above ground and underground storage tank sampling
- surface and subsurface soil, surface water, and sediment sampling
- groundwater monitoring well installation, development, and sampling
- test pit excavation and staging of drums
- land surveying
- real-time air monitoring
- drum/container inventory and sampling
- asbestos sampling

The procedures presented in this plan comply with the following regulatory or guidance documents:

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH-0028	1998 TLVs and BEIs - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
ACGIH-0376	Guide to Occupational Exposure Values - 1998.
ACGIH-0460	Guidelines for the Selection of Chemical Protective Clothing, 3rd Edition.

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR Part 1904	Recording and Reporting Occupational Injuries and Illnesses.
29 CFR Part 1910	Occupational Safety and Health Standards, especially Part 1910.120-Hazardous Waste Site Operations and Emergency Response.
29 CFR Part 1926	Safety and Health Regulations for Construction, especially Part 1926.65-Hazardous Waste Site Operations and Emergency Response.
49 CFR Part 171	General Information, Regulations, and Definitions.
49 CFR Part 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (USEPA)

No Publication No.	(1984) Standard Operating Safety Guides, Office of Emergency and Remedial Response.
USEPA Order 1440.2	(1981) Health and Safety Requirements for Employees Engaged in Field Activities.

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH Pub. No. 85-115	(October 1985) NIOSH/OSHA/USCG/USEPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.
NIOSH Pub. No. 97-140	(June 1997) NIOSH Pocket Guide to Chemical Hazards.

URSGWC personnel who will be involved in intrusive activities on site have completed the appropriate waste site worker training as required by OSHA 1910.120(e)(2), 1910.120(e)(3), and 1910.120(e)(8), as applicable, and the required medical surveillance as required by OSHA 1910.120(f). Copies of training certificates and medical surveillance certification for all URSGWC field personnel will be maintained on site.

C2.0 RESPONSIBILITIES

The following is a summary of the health and safety responsibilities of various project personnel.

C2.1 Project Health and Safety Officer

The responsibilities of the Project Health and Safety Officer (HSO) are to develop and coordinate the Site Health and Safety Program, and to provide necessary direction and supervision to the Site HSO. He/she will contact the local health department, hospital, police, and fire departments prior to the initiation of work at the sites. The Project HSO will conduct the initial site-specific training session (Onsite Health and Safety Briefing), and will review and confirm changes in personal protection requirements when site conditions are found to be different from those originally anticipated.

The Project HSO will be involved in all discussions on health and safety matters with NYSDEC, OSHA, local health authorities, or other governmental or labor representatives. In addition, this individual will provide the Site HSO with details concerning the task-specific health and safety considerations. The Project HSO reports directly to the Project Manager and the Corporate Health and Safety Director.

C2.2 Site Health and Safety Officer

The responsibilities of the Site HSO are as follows:

- Implement this HASP
- Enforce day-to-day health and safety protocols in effect on the site
- Require that all URSGWC workers who will be involved in intrusive activities on the site have had appropriate waste site worker training and medical examinations, and review and maintain training and medical certifications on site
- Require that all personnel entering the site understand the provisions of this HASP

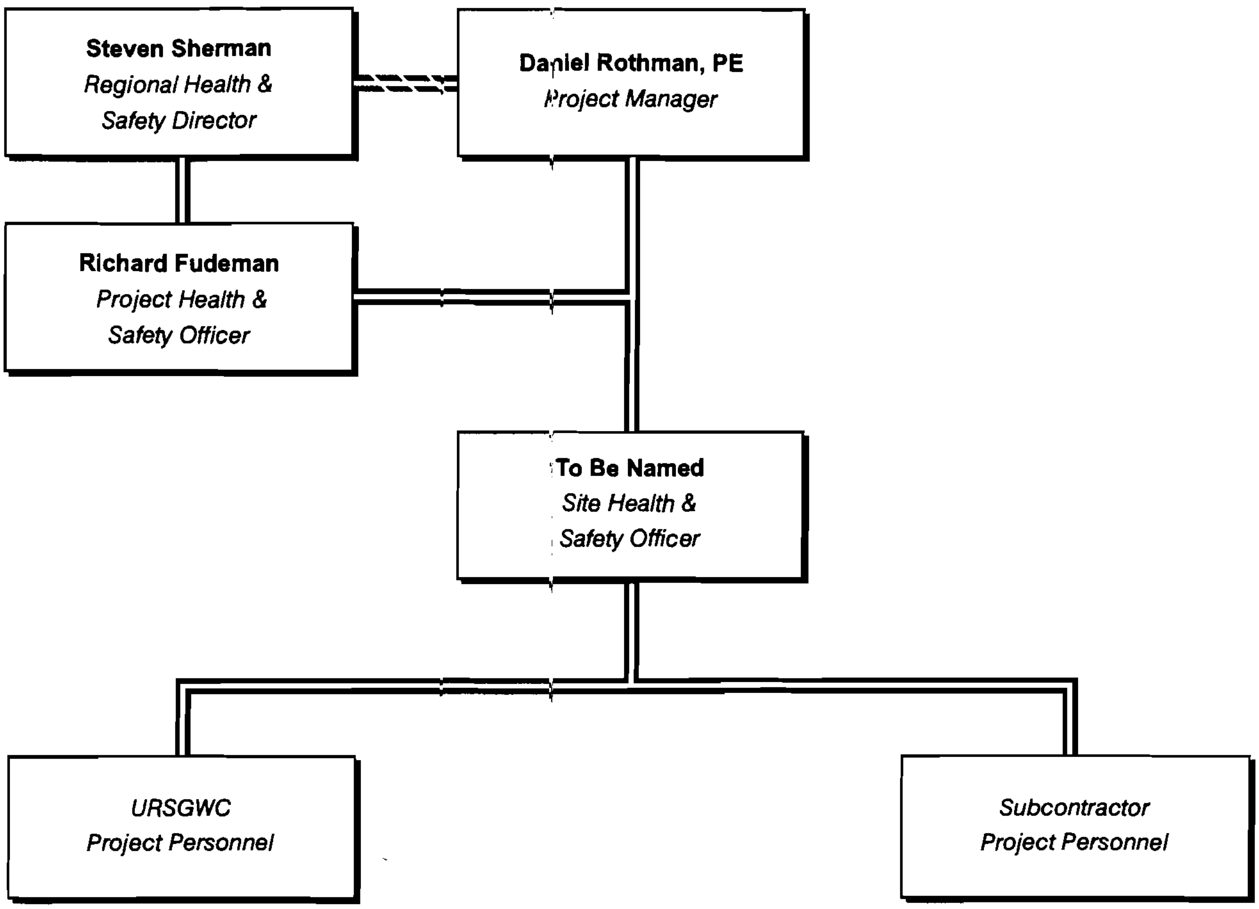
- Conduct periodic training sessions in proper use and maintenance of personal protective equipment and safety practices
- Conduct periodic emergency response drills
- Conduct daily health and safety meetings each morning
- Direct and advise onsite URSGWC personnel, visitors, and subcontractor HSO on all aspects, especially changes, related to health and safety requirements at the site
- Conduct necessary health and safety monitoring
- Administer the air monitoring program
- Monitor site conditions and determine all necessary changes in levels of personal protection and, if warranted, execute work stoppages
- Report changes in site conditions and changes in personal protection requirements to the Project HSO
- Prepare accident/incident reports

The Site HSO reports directly to the Project HSO. URSGWC will designate a qualified backup for the Site HSO prior to the initiation of onsite activities.

C2.3 Field Team Personnel

Field team personnel will be responsible for understanding and complying with site health and safety requirements. Field team personnel on site will be trained in first aid and CPR, and will be certified by the American Red Cross. Field team personnel will have completed the required waste site worker training to comply with 29 CFR, Part 1910.120.

A chain-of-command chart for implementation of this Health and Safety Plan is presented in Figure C2-1.



URS Greiner Woodward Clyde

GOLDEN ROAD SITE
HEALTH & SAFETY CHAIN-OF-COMMAND

FIGURE C2-1

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C3.0 SITE DESCRIPTION AND BACKGROUND

C3.1 Site Description

The Golden Road Disposal Site is located on the west side of Golden Road, north of Interstate Route 490 in the Town of Chili, Monroe County, New York (Figure C3-1). The site is divided into two parcels, a north parcel and a south parcel, separated by Conrail tracks running southwest to northeast through the site (Figure C3-2). Total area is about nineteen acres. Designated wetlands lie southwest of the site. The entire area is characterized by poor drainage and a high water table.

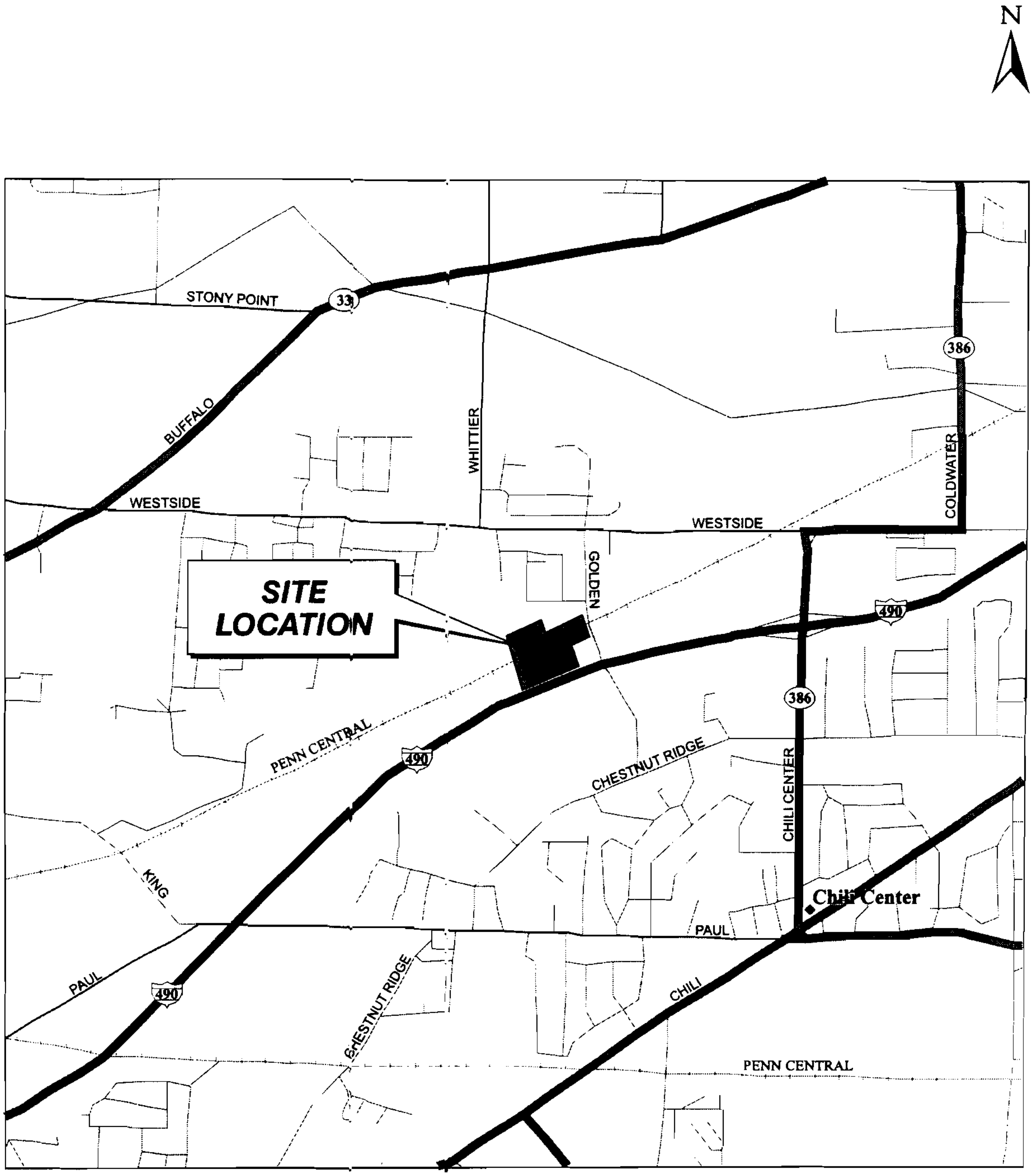
C3.2 Background

The north parcel can be characterized primarily as a junk yard, with several underground storage tanks (USTs) and above-ground storage tanks (ASTs) for petroleum products.

The south parcel can be characterized as a hazardous waste disposal site. The fill material placed at this site, including large volumes placed within the wetlands, consisted of foundry sands, slag, 55-gallon drums (560 of which were removed in 1985 as part of an emergency removal action), and various other waste materials.

The Golden Road Disposal Site was privately run by Howard Fitzsimons, Jr. from 1955 through 1976. It received a wide variety of wastes, including artillery shell casings, household refuse, metal slag, fly ash, foundry sand and junked vehicles. A portion of the wetland area to the west and south of the site was filled in during operation of the site.

During the initial site inspection in 1983, about 200 drums in various stages of decay were identified at two locations on the south side of the tracks. Fly ash and foundry sand were exposed on the south side of the tracks as well.



APPROXIMATE SCALE IN FEET
2000 0 2000

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URS Greiner Woodward Clyde	GOLDEN ROAD SITE SITE LOCATION MAP	FIGURE C3-1

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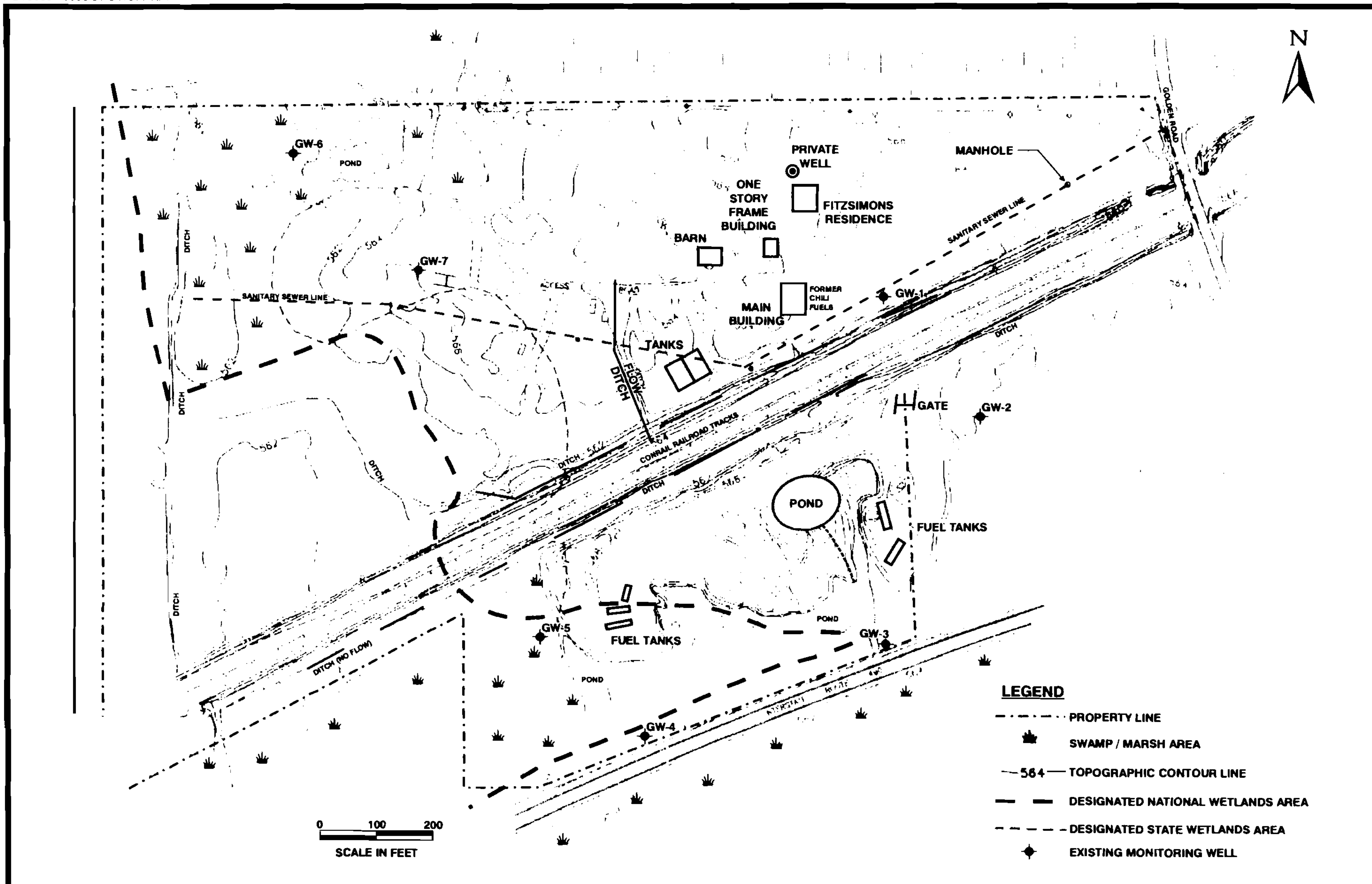


URS Greiner Woodward Clyde	GOLDEN ROAD DISPOSAL SITE SITE PLAN	FIGURE C3-2

A Phase I Investigation was completed at the site in November 1983. Results indicated elevated levels of cadmium, benzene, and toluene in surface water, and cadmium and lead in groundwater.

An emergency drum removal and surficial soil and debris removal was carried out in 1985 under the direction of the USEPA. A total of 562 drums and containers and 75 cubic yards of contaminated soil and debris were removed from the site. Analytical results showed the presence of chlorinated and nonchlorinated solvents, organic solids with low flash points, polychlorinated biphenyls and waste oils.

A Phase II Investigation was conducted at the site from 1989 through 1992. The Phase II included an EM survey, installation of monitoring wells, and sampling of surface and subsurface soil, groundwater, surface water and sediment and waste. Analytical results show low levels of organic compounds in groundwater and surface water, sediments, and surface soil. Elevated levels of heavy metals including cadmium, lead, and nickel were identified in sediment and groundwater. In addition, much structural steel, fuel tanks, and partially buried drums remain at the site.

A northwest portion of the site was removed from the NYS Registry of Inactive Hazardous Waste Sites in 1995. This action was based on additional sampling conducted by a prospective developer that showed no hazardous waste disposal occurred in that area.

C4.0 TRAINING REQUIREMENTS

All personnel conducting field activities on site are required to be certified in health and safety practices for hazardous waste operations as specified in the Federal OSHA Regulations (29 CFR 1910.120) (revised March 6, 1990). Paragraph (e) (2) of the above-referenced regulations requires that each employee, at the time of job assignment, receive a minimum of 40 hours of initial instruction off the site, and a minimum of three days of supervised field experience.

Paragraph (e) (3) of the above-referenced regulations requires that all onsite management and supervisory personnel directly responsible for, or who supervise employees engaged in hazardous waste operations, must initially receive eight hours of additional specialized training. Management and supervisory training must emphasize health and safety practices related to managing hazardous waste work.

Paragraph (e)(8) of the above-referenced regulations requires that workers and supervisors receive eight hours of refresher training annually on the items specified in Paragraph (e)(1) and/or (e)(3).

Additionally, all personnel must receive adequate site-specific training, in the form of an Onsite Health and Safety Briefing given by the Project HSO prior to participating in onsite field work. This will involve a review of this Health and Safety Plan with emphasis on the following:

- Protection of the adjacent community from hazardous substances which may be released during intrusive activities,
- Attention to health effects and hazards of substances known to be present on site,
- Attention to physical hazards on site, and the importance of knowing proper means of avoiding these hazards,

- Health hazards, protective measures, emergency and first aid measures, fire and explosion information, reactivity, incompatible materials, and emergency procedures for spills of hazardous chemicals brought onto the site for use during normal field operations,

- Hazards and protection against heat/cold,

- The need for vigilance in personal protection, and the importance of attention to proper use, fit, and care of personal protective equipment,

- The effectiveness and limitations of personal protective equipment,

- Prescribed decontamination procedures,

- Site control, including work zones, access, and security,

- The proper observance of daily health and safety practices, such as the entry and exit of work zones and site, proper hygiene during lunch, break, etc.,

- Recognition in oneself or in others of physical conditions requiring immediate medical attention, and application of simple first aid measures, and

- Emergency procedures to be followed (with rehearsals) in cases of fire, explosion, or sudden release of hazardous gases.

The NYSDEC shall be notified when such site-specific training sessions are to be conducted.

Health and Safety Meetings will be conducted daily by the Site HSO and will cover protective clothing and other equipment to be used that day, potential chemical and physical hazards, emergency procedures, and conditions and activities from the previous day.

All visitors entering the Exclusion Zone or Contamination Reduction Zone will be required to receive the necessary site-specific training from the Site HSO and must be equipped with the proper personal protective equipment.

C5.0 MEDICAL SURVEILLANCE REQUIREMENTS

All URSGWC personnel who engage in onsite activities for 30 days or more per year participate in the Medical Surveillance Program which involves undergoing a medical examination once every year. The examination must be conducted by a physician who is board-certified in occupational medicine. The physician will have been made familiar with the job-related duties of each worker examined. All URSGWC project personnel involved in onsite activities in the Exclusion Zone at the site participate in the Medical Surveillance Program.

Components of the Medical Surveillance Program are shown in Table C5-1. The physician must state whether the individual is fit to conduct work on hazardous waste sites using personal protection, or whether he or she must work within certain restrictions. Personnel may be excluded from this site for medical reasons. Copies of medical examination reports are given to each employee who are encouraged to forward copies to their personal physician.

Any person exposed to high levels of hazardous substances will be required to undergo a repeat medical exam at or before the conclusion of the project to determine possible health impacts. Any person suffering a lost-time injury or illness must have medical approval prior to returning to work on site. When employment is terminated for any reason, the employee must receive an exit medical examination.

All medical records will be held by the employer for the period of employment plus at least 30 years, in accordance with OSHA regulations on confidentiality and any other applicable regulations and will be made available to OSHA upon request.

TABLE C5-1

COMPONENTS OF MEDICAL SURVEILLANCE PROGRAM

- Medical and occupational history

- Physical examination, with particular attention to the cardiopulmonary system, general physical fitness, skin, blood-forming, hepatic, renal, and nervous systems

- Urinalysis, to include:

  - color
  - appearance
  - specific gravity
  - pH
  - ketones
  - protein
  - glucose
  - blood
  - bilirubin
  - leukocyte esterase
  - nitrite
  - WBC
  - RBC
  - casts
  - bacteria
  - epithelial cells
  - crystals
  - yeasts

- Blood analysis, to include:

  - complete blood count
  - hemoglobin
  - albumin, globulin, total protein
  - bilirubin - direct and total
  - g-glutamyl transpeptidase
  - serum glutamic oxalacetic transaminase
  - lactic dehydrogenase
  - alkaline phosphatase
  - sodium
  - potassium
  - chloride
  - magnesium
  - calcium
  - phosphorus
  - uric acid

TABLE C5-1 (Continued)

- BUN (blood urea nitrogen)
- creatinine
- cholesterol
- triglycerides
- glucose
- iron
- heavy metals - arsenic, lead, mercury, and zinc protoporphyrin

● Pulmonary function test

● Additional tests as appropriate, including:

- chest X-ray
- electrocardiogram
- stress test

C6.0 SITE HAZARD EVALUATION

C6.1 Chemical Hazards

The primary chemicals of concern on site are volatile aromatic hydrocarbons, polynuclear aromatic hydrocarbons (PAHS), and metals (i.e., chromium, lead, zinc) based on detections of these compounds in soil and water samples from previous investigations. The health and safety characteristics and occupational exposure values of these and other chemicals potentially present on site are summarized in Table C6-1. The risk of exposure to these contaminants can be by the dermal or respiratory route, depending on the type of compound and activity being conducted.

C6.2 Physical Hazards

Physical hazards range from the dangers of tripping and falling on uneven ground to those associated with the operation of heavy equipment such as drill rigs and backhoes. Physical hazards also include scattered debris, scrap metal, exposed rusted drums, water hazards (i.e., ponds, wetlands)

Use or occupancy of the site buildings should be limited, since their structural integrity is uncertain. It is not expected that any tasks will require entrance into the buildings.

During site activities, workers may have to work on drilling equipment by climbing the mast. The drilling subcontractor will conform with any applicable OSHA and NIOSH recommendations for climbing activities. These activities will be overseen by the subcontractor drilling supervisor and URSGWC field geologist.

Field activities that involve drilling usually involve contact with various types of machinery. At least two people on site must be currently American Red Cross-certified in first aid and CPR. Personnel trained and certified in first aid should be prepared to take care of cuts and bruises as well as other minor injuries. A first aid kit approved by the American Red Cross will be present and available during all field activities.

TABLE C6-1

HAZARD CHARACTERISTICS OF CONTAMINANTS OF CONCERN POTENTIALLY PRESENT AT THE GOLDEN ROAD SITE

SUBSTANCE	TOXICITY/CARCINOGENICITY	OCCUPATIONAL EXPOSURE VALUES*
Benzene	Confirmed human carcinogen. Moderately toxic by ingestion, inhalation, and skin adsorption. Irritant to eyes, nose, and throat.	0.5 ppm (TLV-TWA) (Skin) (1) 2.5 ppm (STEL) (2) (TLV) 1 ppm (PEL) 5 ppm (STEL) (2) (PEL)
2-Butanone (Methyl Ethyl Ketone)	Narcotic by inhalation. Experimental teratogen. Moderately toxic by ingestion and dermal routes. Strong irritant. Affects CNS.	200 ppm (TLV-TWA and PEL) 300 ppm (STEL)(2)(TLV)
Chloroethane	Moderately toxic. Irritant to eyes. Confirmed animal carcinogen.	100 ppm (TLV-TWA) 1,000 ppm (PEL)
1,1-Dichloroethane	Moderately toxic.	100 ppm (TLV-TWA and PEL)
1,2-Dichloroethene	Moderately toxic by ingestion, inhalation, and skin contact. Irritant and narcotic in high concentrations.	200 ppm (TLV-TWA and PEL)
Tetrachloroethene (Perchloroetheylene)	Moderately toxic. Irritating to skin and eyes. Confirmed animal carcinogen.	25 ppm (TLV-TWA) 100 ppm (STEL)(2)(TLV) 100 ppm (PEL) 200 ppm (Ceiling) (3) (PEL)
Toluene	Moderate toxicity via the oral, inhalation, and intraperitoneal routes, low toxicity via the dermal route.	50 ppm (Skin) (1) (TLV-TWA) 200 ppm (PEL) 300 ppm (Ceiling)(3)(PEL)
1,1,1-Trichloroethane	Irritating to eyes and tissue.	350 ppm (TLV-TWA and PEL)
Polynuclear Aromatic Hydrocarbons (PAHs)	Many PAHs are toxic by inhalation and easily absorbed by the skin. Prolonged exposure may result in tissue injury, dermatitis, and chemical burns. Inhalation of high concentrations can result in bronchial irritation, cough, hoarseness, and pulmonary edema. Acute doses are toxic to many tissues, but the thymus and spleen are particularly sensitive. Some PAHs are confirmed human carcinogens.	There are no established TLVs or PELs for PAHs as a group. Some PAH compounds have no TLVs or PELs while some have a TLV and/or PEL of 0.2 mg/m^3.

TABLE C6-1 (Continued)

SUBSTANCE	TOXICITY/CARCINOGENICITY	OCCUPATIONAL EXPOSURE VALUES*
Chromium (Dusts and salts)	Highly toxic, especially by inhalation of dust or fume. Ingestion usually induces a strong emetic action. Hexavalent chromium is a confirmed human carcinogen.	0.5 mg/m^3 (Trivalent) (TLV-TWA and PEL) 0.05 mg/m^3 (Hexavalent) (TLV-TWA) 0.1 mg/m^3 (Hexavalent) (Ceiling) (3) (PEL)
Copper (Dusts and mists)	Respiratory and skin irritant.	1 mg/m^3 (TLV-TWA and PEL)
Lead (Elemental and inorganic compounds)	Toxic by ingestion and inhalation of dust or fumes. Three types of lead poisoning include alimentary, neuromotor, and encephalic. Confirmed animal carcinogen	0.05 mg/m^3 (TLV-TWA and PEL)
Mercury (Inorganic Compounds)	Most compounds are highly toxic by skin adsorption, inhalation, and ingestion.	0.025 mg/m^3 (Skin) (1) (TLV-TWA) 0.1 mg/m^3 (Ceiling) (3) (PEL)
Nickel	Poison by ingestion, intratracheal and intravenous routes. May cause dermatitis. Experimental carcinogen.	0.1 mg/m^3 (Soluble compounds) (TLV-TWA) 0.2 mg/m^3 (Insoluble compounds) (TLV-TWA) 1 mg/m^3 (PEL)
Zinc (Zinc oxide dust)	Low toxicity. Zinc chromates are confirmed human carcinogens	10 mg/m^3 (TLV-TWA) 5 mg/m^3 (Respirable dust) (PEL) 15 mg/m^3 (Total dust) (PEL)
Asbestos	The potential for disease caused by exposure to asbestos fibers is related to the physical and chemical characteristics of asbestos fibers as well as the concentration of fibers in the air. Once inhaled, asbestos fibers can cause a number of diseases, including asbestosis, a debilitating lung disease where asbestos fibers that come in contact with lung tissue form fibrous, scar-like growths that spread and make the lungs unable to provide enough oxygen to the body. Exposure to asbestos fibers can also cause a rare cancer of the chest and abdominal lining called mesothelioma, as well as other cancers of the lung, esophagus, stomach, colon, and other organs.	0.1 fibers/cc

*Occupational Exposure Values (TLVs and PELs) are 8-hour Time-Weighted Averages (TWAs) unless otherwise noted.

TABLE C6-1 (Continued)

NOTES:

(1) Skin-Listed substances followed by the designation "skin" refer to the potential significant contribution to the overall exposure by the cutaneous route, including mucuous membranes and the eyes, either by contact with vapors or, of probable greater significance, by direct contact with the substance.

(2) STEL - 15 minute TWA exposure which should not be exceeded at any time during a work day.

(3) Ceiling - The concentration that should not be exceeded during any part of the working exposure.

Definitions

Threshold Limit Values (TLVs) - Refers to airborne concentrations of substances as issued by the American Conference of Governmental Industrial Hygienists (ACGIH) and represents conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect.

Threshold Limit Value - Time-Weighted Average (TLV-TWA) - The Time-Weighted Average concentration as issued by ACGIH for a normal 8-hour work day and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

Threshold Limit Value - Short-Term Exposure Limit (TLV-STEL) - The maximum concentration as issued by ACGIH to which workers can be exposed continuously for a short period of time (up to 15 minutes) without suffering from 1) irritation, 2) chronic or irreversible tissue damage, or 3) narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue, or materially reduce work efficiency.

Permissible Exposure Limits (PELs) - Exposure limits that are enforceable by the Occupational Safety and Health Administration (OSHA) as legal standards and cannot be exceeded over an 8-hour exposure.

References

- American Conference of Governmental Industrial Hygienists. *Guide to Occupational Exposure Values-1998.* Cincinnati, Ohio.
- American Conference of Governmental Industrial Hygienists. *1998 TLVs and BEIs - Threshold Limit Values for Chemical Substances and Physical Agents,* Cincinnati, Ohio.

TABLE C6-1 (Continued)

- 29 CFR, Part 1910.1000, Tables Z-1 and Z-2, Limits for Air Contaminants, July 1, 1995.
- National Institute for Occupational Safety and Health. *NIOSH Pocket Guide to Chemical Hazards*. Publication No. 97-140, June 1997. Cincinnati, Ohio.
- Hawley, Gessner G. *The Condensed Chemical Dictionary*, Tenth Edition, New York: Van Nostrand Reinhold, 1981.
- Sax, R. Irving. *Dangerous Properties of Industrial Materials*, Sixth Edition, New York: Van Nostrand Reinhold, 1984.

Animals and some insects may bite and thereby pose a health hazard in the form of irritation, illness, or poisoning. Anyone bitten should be given immediate first aid as necessary, and shall be transported to the nearest medical facility (if necessary). Members of the field investigation team will be properly briefed regarding the potential for encountering insects and animals. The potential threat of the deer tick and the possibility of contracting Lyme disease is a serious matter. The likelihood of contracting Lyme disease will be greatly decreased by field personnel wearing long pants, long sleeved shirts, and hard hats. All field personnel will be instructed to take a shower daily upon returning to the hotel or place of residence to further decrease the likelihood of contracting Lyme disease.

Improper lifting by workers is one of the leading causes of industrial injuries. Field workers in the drilling program will often be required to lift heavy objects (drill casings, auger flights, etc.). Therefore, all members of the field crew should be trained in the proper methods of lifting heavy objects. All workers should be cautioned against lifting objects too heavy for one person.

C6.3 Temperature Stress

A Heat/Cold Stress Log will be kept and maintained on a daily basis for all personnel wearing protective ensembles on site.

C6.3.1 Heat Stress

The combination of high ambient temperature, high humidity, physical exertion, and personal protective apparel which limits the dissipation of body heat and moisture can cause heat stress. The Site HSO is responsible for monitoring heat stress in the field team personnel.

The following prevention, recognition, and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress, and to apply the appropriate treatment.

A. Prevention

1. Provide plenty of liquids. Available in the Support Zone will be a 50% solution of fruit punch in water, or the like, or plain water.

2. Provide cooling devices. A portable, pump-activated sprayer and containers of tap water will be available in the Contamination Reduction Zone to reduce body temperature, cool protective clothing, and/or act as a quick-drench shower in case of an exposure incident.

3. Adjustment of the work schedule. During the hot summer days, labor intensive tasks which pose a high potential risk of heat stress can be performed during the coolest part of the day.

B. Recognition and Treatment

Any person who observes any of the following forms of heat stress, either in themselves or in another worker, will report this information to the Site HSO immediately after implementing treatment, if possible.

1. Heat Rash (prickly heat):

Cause:	Continuous exposure to hot and humid air, aggravated by chafing clothing.
Symptoms:	Eruption of red pimples around sweat ducts, accompanied by intense itching and tingling.
Treatment:	Remove source of irritation and cool the skin with water or wet cloths.

2. Heat Syncope (fainting):

Cause:	Sun rays beating down on victim's head and prolonged upright position can lead to mild dehydration and contraction of the blood vessels resulting in a temporary deficiency of blood to the brain.
Symptoms:	Brief loss of consciousness.
Treatment:	Worker should assume a horizontal position and drink ½ liter to one liter of fluid (not alcohol). Elevate the legs and cover the head.

3. Heat Cramps (heat prostration):

Cause:	Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.
Symptoms:	Sudden development of pain and/or muscle spasms in the abdominal region.
Treatment:	Move the worker to the Contamination Reduction Zone. Remove protective clothing. Provide fluids orally. Decrease body temperature and allow a period of rest in a cool location.

4. Heat Exhaustion (heat toxemia, sunstroke):

Cause:	Overexertion in a hot environment and profuse perspiration accompanied by inadequate replenishment of body water and electrolytes. A serious condition.
Symptoms:	Muscular weakness, tiredness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.

Treatment: Perform the following while simultaneously making arrangements for transport to a medical facility: Move the worker to the Contamination Reduction Zone. Remove protective clothing. Lie the worker down on his or her back, in a cool place, and raise the feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of a salt water solution using one teaspoon of salt in 12 ounces of water. Transport the worker to a medical facility.

5. Heat Stroke:

Cause: Same as heat exhaustion. An extremely serious condition.

Symptoms: Dry, red, hot skin, dry mouth, dizziness, nausea, headache, rapid pulse. Temperature continues to rise unless treatment is implemented.

Treatment: The basic principle is to lower the body temperature rapidly.

1. Move the victim out of the sun.
2. Remove clothes.
3. Soak victim completely with water, wet hair as well.
4. Place victim in front of a fan or in a breeze, if possible.
5. If ice is available, apply directly to the victim, especially under the arms and on the head.
6. Monitor body temperature with available thermometers. Temperature should start to decrease within minutes.

7. As temperature approaches 101°F, stop cooling measures and initiate transport to a hospital or declare an emergency response. The temperature should continue to fall, often to subnormal, during this period.

Other considerations in treating heat stroke are:

1. Rub skin briskly during cooling process.
2. If cardiac arrest occurs, perform CPR (ONLY IF CERTIFIED) and continue cooling.
3. If a seizure occurs, continue cooling; the seizure will stop.
4. No drugs of any kind are to be given to the victim.

D. Heat Stress - Predisposing Factors

Preventing heat stress is clearly preferred to treatment. The following factors increase the individual's risk of heat stress:

- Physically unfit
- Age
- Not accustomed to heat
- Sunburn
- Alcohol and drugs
- Dehydration
- Heavy or non-breathable clothing
- Not covering one's head

C6.3.2 Cold Stress

Personnel can be susceptible to cold stress while conducting field work during cold weather months. To guard against cold stress and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be previously identified and readily available, rest periods should be adjusted as needed, and the physical conditions of onsite field personnel should be closely monitored. All personnel working onsite must be able to recognize the signs and symptoms of cold stress and apply first aid as needed. The Site HSO is responsible for monitoring the signs and symptoms of cold stress among field personnel.

The development of cold stress and cold injuries is influenced by three factors: the ambient temperature, the velocity of the wind, and the amount of sunshine. Fingers, toes, and ears are the most susceptible parts of the body affected by cold.

A. Frost Nip: Frost nip is the first sign of frost bite and is the only form of local cold injury that can be definitively treated in the field.

Symptoms: A whitened area of the skin which is slightly burning or painful.

Treatment: Rewarming the affected part.

B. Frost Bite: Local damage is caused by exposure to low temperature environmental conditions. It results at temperatures when ice crystals form, either superficially or deeply, in the fluids and underlying soft tissues of the skin. The nose, cheeks, ears, fingers, and toes are most commonly affected.

Symptoms: Skin is cold, hard, white, and numb. There may also be blisters. The affected parts will feel intensely cold; however, there may not be any pain. The victim may not know that he or she is frost-bitten.

As time goes on, the victim may experience mental confusion and impairment of judgment. The victim may stagger and eyesight may fail. The victim may fall and become unconscious. Shock is evident and breathing may cease. If death occurs, it is usually due to heart failure.

Treatment: Generally, definitive thawing should not be performed in the field, because if re-freezing occurs, it could result in severe damage. The victim should be transported to a medical facility after the following measures are instituted:

Do Not:

- Do not walk on a thawed foot or toes or use thawed hands.
- Do not allow victim to smoke or drink alcohol.
- Do not rub affected area with anything.
- Do not break any blisters.
- Do not apply heat of any kind.

Do:

- Do place victim in protected environment.
- Do prevent further heat loss (warmer clothes).
- Do protect from further damage (warm covering).

C. Mild Hypothermia

Symptoms: The single most important sign of mild hypothermia is a change in behavior. Some signs that can be observed are:

- Decrease in work efficiency
- Decreased level of communication
- Forgetfulness
- Poor judgment
- Poor motor skills (difficulty in handling objects, dropping tools)

The target organ of mild hypothermia is the brain. During mild hypothermia, most of the body's protective mechanisms for temperature control are intact. Shivering is usually present and "goose flesh" and pale skin persist. When asked directly, the victim will usually say that he feels cold. A worker impaired by mild hypothermia can be a danger to himself and co-workers.

Treatment:

- The victim should be moved indoors or into a heated vehicle.
- Remove all wet or damp clothing, dry skin, and apply dry clothing.
- The head should be covered with a hat or blanket.
- Blankets should be put on the victim.
- The victim should be given hot fluids (no alcohol).
- If possible, monitor the victim's temperature at 15 minute intervals.

D. Moderate Hypothermia: For field purposes, this may be defined as the stage at which the patient is clearly incapable of functioning effectively, but is conscious.

Symptoms: The victim's body temperature is well below normal and some mental changes may occur which include:

- Disorientation to people, place, and time

- Hallucinations
- Inappropriate laughing or crying
- Bizarre behavior for that individual

During moderate hypothermia, shivering is absent, "goose flesh" disappears, and the heart rate may slow down. The victim does not "feel" cold.

Treatment:

- First, treat the patient for mild hypothermia.
- Provide warming with hot blowers or heaters.
- Use human body heat.
- Watch for signs of returning to normal (e.g., shivering, goose flesh, teeth chattering).
- Monitor mental status.

After these steps are initiated, the victim should be taken to a medical facility. The patient should not return to work for at least 48 hours.

E. Severe Hypothermia:

Symptoms: Characterized by a decrease in the body temperature which results in a deep coma in which even vital signs become very weak and finally undetectable. Most occupational cases occur when the victim is alone or lost. These victims, for all practical purpose, appear to be dead, but the saying "not dead until warm and dead" applies to severe hypothermia. Many of these victims can survive.

Treatment:

1. The patient is not to be considered dead.
2. Remove wet clothes, dry skin, and apply dry clothes.

3. Activate rewarming.
4. Prepare to transfer the victim to a medical facility.
5. If the patient is pulse-less and is not breathing, perform CPR (ONLY IF CERTIFIED), while enroute to the medical facility.
6. Very cold victims often tolerate long periods of arrest, even without CPR. The victim must be handled very carefully because of extreme susceptibility to even minor trauma.

C7.0 SITE CONTROL

In order to keep unauthorized personnel from entering the work area during drilling, test pit excavation, or environmental sampling activities, and for good control of overall site safety, three work zones will be established. The three work zones are the Support Zone, the Contamination Reduction Zone, and the Exclusion Zone Actual Exclusion Zone size will be determined by optimal size of work area and by local obstructions.

C7.1 <u>Support Zone</u>

The Support Zone for the Golden Road Site will be the area where support facilities will be located.

The support facilities will contain personal protective equipment (disposable suits, gloves, boots, etc.), a first aid kit, a fire extinguisher, a stretcher, sampling equipment, sample containers, and 50% solution of fruit punch or the like in water (or plain drinking water).

C7.2 <u>Contamination Reduction Zones</u>

A Mobile Contamination Reduction Zone will lie adjacent to each active drilling or excavation Exclusion Zone as described below.

During drilling or excavation operations, materials brought to the surface may come in contact with workers' boots or protective clothing and equipment. A mobile decontamination area will be set up adjacent to the active drilling or excavation area. All personnel in the active drilling or excavation area will be required to decontaminate themselves and light equipment prior to leaving the active drilling or excavation Exclusion Zone.

C7.3 Exclusion Zone

The Exclusion Zone is the area around each active drilling, excavation, or sampling location. The exact size of this active Exclusion Zone will be determined by optimal size of work area and by local obstructions. All personnel leaving the active or Exclusion Zone will be required to do so via the Mobile Contamination Reduction Zone, and to carry out proper decontamination procedures.

C7.4 Site Visitation

It is expected that officials from NYSDEC and other regulating bodies and jurisdictions will visit the site during operations. It is also possible that an OSHA representative will wish to inspect the operations. All such officials must meet the same requirements as onsite workers (OSHA-approved training, site-specific training, and medical surveillance) before going into any Exclusion Zone. All visitors must read this HASP prior to entering an Exclusion Zone. Visitors other than NYSDEC, OSHA, New York State Department of Health (NYSDOH), or Town or County government representatives will be subject to the additional requirement of having to receive written permission from NYSDEC to enter an Exclusion Zone. A Daily Site Visitors Log will be kept and all visitors to the site will sign in and provide their affiliation, the date of visit, affirmation that they have read and understood the HASP, arrival time, departure time, and purpose of visit.

C8.0 PERSONAL PROTECTION

Since personnel working on site may be exposed to chemical contaminants released during intrusive activities, or may come in contact with contaminants in wastes, drill cuttings, or soils, various levels of protection must be available. Components of all levels of personal protection that will be available are listed in Table C8-1. The anticipated levels of protection for various field activities are given in Table C8-2.

In the event that unexpected levels of organic vapors are encountered, any personnel working at Level D or D+ protection will don their respirators (change to Level C). The Site HSO will consult with the Project HSO to decide if and when Level D or D+ protection may be resumed, or if a higher level of personal protection is required.

Some modification in safety equipment (e.g., switching from poly-coated disposable coveralls to standard disposable coveralls) may be implemented in order to balance concerns for full contaminant protection against concerns for the possibility of heat stress resulting from the need to wear more restrictive protective equipment. Such modifications may be implemented only if approved in advance by the Site HSO, following consultation with the Project HSO. Protective equipment which fully complies with the requirements of all required levels of protection will be immediately available at all times on the site.

Level C respiratory protection will normally be provided using NIOSH-approved full-face respirators, with high efficiency particulate air (HEPA) combination filter cartridges approved for removal of organic vapors, particulates, gases, and fumes. The HEPA filter cartridges will be changed at the end of each work day or when breakthrough occurs, whichever comes first. All URSGWC field team members will have been fit-tested for respirators using irritant smoke prior to project assignment. Due to difficulties in achieving a proper seal between face and mask, persons with facial hair will not be allowed to work in areas requiring respiratory protection.

TABLE C8-1

COMPONENTS OF PERSONAL PROTECTION LEVELS

Level D Protection	Level D+ Protection	Level C Protection
• Safety glasses with side shields (or goggles)	• Safety glasses with side shields (or goggles)	• Hard hat
• Hard hat	• Hard hat	• Disposable poly-coated coveralls (Tyvek or equivalent)
• Ordinary coveralls	• Face shield (optional)	• Inner gloves of snug-fitting latex or vinyl
• Ordinary work gloves	• Disposable poly-coated coveralls (Tyvek or equivalent)	• Outer gloves of neoprene or nitrile
• Steel-toe, steel-shank work shoes or boots (chemical resistant)	• Inner gloves of snug-fitting latex or vinyl	• Steel-toe, steel-shank work shoes or boots (chemical resistant)
• Outer boots of neoprene or butyl rubber (optional)	• Outer gloves of neoprene or nitrile	• Outer boots of neoprene or butyl rubber
	• Outer boots of neoprene or butyl rubber	
	• Steel-toe, steel-shank work shoes or boots (chemical resistant)	• Full-face air-purifying respirator (to be worn)
	• Full-face air-purifying respirator (immediately available)	• Taping of gloves and boots to disposable coveralls
	• Disposable outer "booties" (optional)	• Disposable outer "booties" (optional)

1. The use of optional equipment is dependent upon site conditions.
2. Respirator to be fitted with NIOSH approved high-efficiency filter (HEPA) combination respirator cartridges approved for organic vapors, particulates, gases, and fumes.

TABLE C8-2

PLANNED LEVELS OF PERSONAL PROTECTION FOR EACH MAJOR ACTIVITY

Field Activity	Level of Protection*
A. Non-Intrusive Activities	
1. Setting up Support Facilities/Mobilization	D
2. Land Surveying, Magnetic Survey, Radiological Survey	D
3. Staging of Drummed IDW	D
4. Support Zone Activities	D
B. Intrusive Activities	
1. Drilling/Monitoring Well Installation	D+/C
2. Environmental Sampling	D+/C
3. Test Pit Excavation	D+
4. Equipment Decontamination	D+

* These are the levels of protection at which work will commence during the various activities on the site. Due to onsite conditions, and as directed by the Site Health and Safety Officer, it may become necessary to upgrade, or it may be possible to downgrade, the level of personal protection.

C9.0 AIR MONITORING

Real-time air monitoring will be performed during all intrusive activities (e.g., geoprobe borings, test pit excavation and monitoring well installation) by trained URSGWC personnel. While sampling activities are in progress, monitoring frequencies will be as summarized in Table C9-1. Air monitoring equipment will be calibrated daily and all data will be recorded in the field notebook and transferred to Instrument Reading Logs (Appendix B). Each day, intrusive work will not begin until the instruments are calibrated and background levels are taken and recorded. Air will be monitored for total volatiles with a photoionization detector (PID) (HNu Model PI 101, or equivalent). Explosive atmosphere, oxygen content, and hydrogen sulfide will be monitored with an explosimeter (Bacharach Sentinel 44, or equivalent). Particulates will be monitored only during test pit excavation using a MIE PDM-2 Miniram dust/aerosol monitor, or equivalent. All real-time air monitoring results and meteorological data (e.g., temperature range, wind speed, wind direction, etc. obtained from onsite measurements and/or national weather service, radio, or airport) will be recorded in the field notebook and will be transferred to Instrument Reading Logs.

C9.1 Total Volatiles

Air monitoring for total volatiles (organic vapors) will be performed using a PID (HNu Model PI 101, or equivalent) equipped with the standard probe which contains a 11.7 eV lamp. When readings less than 1 part per million (ppm) above background in the breathing zone are observed consistently, monitoring will take place at least every 10 minutes or for every sample retrieved and Level D protection will be utilized. When readings between 1 ppm and 5 ppm above background in the breathing zone are observed consistently, monitoring will be continuous and Level D+ protection will be utilized. If readings from 5 to 10 ppm above background in the breathing zone are observed, and all other action levels indicate that intrusive activities can proceed, monitoring will be continuous and Level C protection will be utilized. If organic vapor readings exceed 10 ppm above background in the breathing zone, or other instrument readings necessitate work suspension, intrusive activities will be halted and the level of protection used by onsite personnel will be reassessed. Monitoring frequencies during intrusive activities will be as summarized in Table C9-1.

TABLE 9-1

ACTION LEVELS DURING INTRUSIVE ACTIVITIES

Organic Vapors (PID)	**Combustibles**	**Oxygen**	**Hydrogen Sulfide**	**Particulates**	**Responses**
0-1 ppm Above Background, Sustained Reading	0-10% LEL	19.5-23.5%	0-5 ppm	<0.10 mg/m^3	• Continue intrusive activities. • Level D protection. • Continue monitoring every 10 minutes/every sample retrieved in work area.
1-5 ppm Above Background, Sustained Reading	0-10% LEL	19.5-23.5%	5-10 ppm	0.10- 0.15 mg/m^3	• Continue intrusive activities. • Level D+ protection. • Continuous monitoring for organic vapors in the work area and at the Exclusion Zone perimeter. • ~~Continuous monitoring for LEL, O_2, and H_2S in the work area.~~
5-10 ppm Above Background, Sustained Reading	0-10% LEL	19.5-23.5%	5-10 ppm	>0.15 mg/m^3	• Continue intrusive activities. • Level C protection. • Continuous monitoring for organic vapors in the work area and at the Exclusion Zone perimeter. • Continuous monitoring for LEL, 0_2, and H_2S in the work area. • Employ dust suppression measures if particulate readings > 0.15 mg/m^3 above background are sustained over 15 minute period.
>10 ppm Above Background, Sustained Reading	>10% LEL	<19.5% or >23.5%	>10 ppm	>0.15 mg/m^3	• Temporarily suspend intrusive activities. • Withdraw from area; shut off all engine ignition sources. • Continuous monitoring for organic vapors at Exclusion Zone perimeter if organic vapor readings >10 ppm. • Continuous LEL monitoring in breathing zone if LEL reading >10% in boring. • Employ dust suppression measures if particulate readings > 0.15 mg/m^3 above background are sustained over 15 minute period. • Consult with Project HSO.

Notes:

Air monitoring for action levels will occur in the breathing zone.

If action levels for any one of the monitoring parameters is exceeded , the appropriate responses listed in the right hand column should be taken.

C9.2 Explosive Atmosphere/Oxygen Content/Hydrogen Sulfide Gas

A Bacharach Sentinel 44 combustible gas indicator (CGI), or equivalent, will be used to monitor for explosive atmosphere, percent oxygen, and hydrogen sulfide content. Readings greater than 10% LEL, less than 19.5% oxygen, greater than 23.5% oxygen, or greater than 10 ppm hydrogen sulfide will require temporary suspension of intrusive activities until the Project SHO determines a safe re-entry level.

C9.3 Particulates

Particulate monitoring will be conducted during excavation of test trenches. Particulates will be monitored in the active work area upwind and downwind from the trench. If particulate levels, integrated over a period not to exceed two minutes under windy conditions or 10 minutes under calm conditions, at the downwind location are in excess of 0.15 mg/m^3, the upwind station will be monitored immediately using the same monitor. If the downwind measurement exceeds the background measurement by more than 0.15 mg/m^3, operations will be temporarily suspended and water may be used to suppress the dust. Operations will be continued once ambient conditions improve, as determined by the Site HSO.

C9.4 Radiation Levels

Background radiation levels will be established each day that the radiological survey is being performed, but are expected to be approximately 0.01 – 0.02 mRem/hr. A radiological survey will be performed prior to commencement of field activities and will include the above ground storage tanks located on the parcel. Readings above background will be reported to the Project Manager and Project SHO. Areas showing readings greater than 1.0 mRem/hr above background will be clearly marked to prevent onsite personnel from entering the area.

C9.5 Work Stoppage Responses

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage is exceeded:

- The Site HSO will be consulted immediately.
- All personnel (except as necessary for continued monitoring and contaminant mitigation, if applicable) will be cleared from the work area (e.g., from within the Exclusion Zone).

Any chemical release to air, water, or soil must be reported to the Site HSO at once. Any exposure resulting from protective equipment failure must be immediately reported to the Site HSO and to the Project HSO in writing within 24 hours.

C9.6 Calibration of Air Monitoring Instruments

Photoionization Detector: The photoionization detector will be calibrated to a benzene surrogate daily (prior to field activities) and the results will be recorded in the field notebook and transferred to Instrument Reading Logs.

Explosimeter: Once a day, the explosimeter will be calibrated to a methane gas and hydrogen sulfide gas standard. Prior to each use, the oxygen sensor will be air-calibrated at an upwind location. This calibration involves adjusting the meter to read 20.9%, the concentration of oxygen in ambient air.

Particulate Monitor: All instrument operation checks will be performed prior to use each day according to manufacturer specifications.

Radiation Survey Meter: All instrument operation checks will be performed prior to use each day according to manufacturer specifications.

C9.7 Community Air Monitoring Plan

Real-time air monitoring for volatile organic compounds will be conducted at the perimeter of the Exclusion Zone during the drilling and test pit excavation programs as follows:

- Volatile organic compounds and dust particulates will be monitored at the downwind perimeter of the exclusion zone on a periodic basis. If total organic vapor levels exceed 5 ppm above background, work activities will be halted and monitoring continued under the provisions of a Vapor Emission Response Plan (Section C9.7.1). All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review if requested.

- If particulate levels at the downwind station exceed particulate levels at the upwind station by more than 0.15 mg/m^3, work activities will be halted and appropriate dust suppression measures will be employed.

C9.7.1 Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the Exclusion Zone, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the Exclusion Zone, activities can resume provided the organic vapor level 200 feet downwind of the Exclusion Zone or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If the organic vapor level is above 10 ppm at the perimeter of the Exclusion Zone, activities must be shut down. When work shutdown occurs, downwind air monitoring as directed by the Site Health and Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Response Plan (Section C9.7.2).

C9.7.2 Major Vapor Emission Response Plan

If any organic vapor levels greater than 5 ppm over background are identified 200 feet downwind from the Exclusion Zone or half the distance to the nearest residential or commercial property, whichever is less, all work activities will be halted.

If, following the cessation of work activities, or as the result of an emergency, organic vapor levels persist above 5 ppm above background 200 feet downwind from the Exclusion Zone or half the distance to the nearest residential or commercial property, then the air quality will be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20-foot zone).

If efforts to abate the emission source are unsuccessful and organic vapor levels approaching 5 ppm persist for more than 30 minutes in the 20-foot zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect. Also, the Major Vapor Emission Response Plan shall be immediately placed into effect if 20-foot zone organic vapor levels are greater than 10 ppm above background.

Upon activation of the Major Vapor Emission Response Plan, the following activities will be undertaken:

- All Emergency Response authorities will immediately be contacted by the Site Health and Safety Officer and advised of the situation.

- Air monitoring will be conducted at 30 minute intervals within the 20-foot zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site HSO.

C10.0 HANDLING OF SAMPLES

The collection and analysis of environmental samples will require caution, not only to ensure safety of site sampling and support personnel, but also to ensure accuracy of results. To minimize hazards to lab personnel, sample volumes will be no larger than necessary, and the outside of all sample containers will be wiped clean prior to shipment.

C11.0 DECONTAMINATION PROCEDURES

C11.1 Decontamination of Personnel

Protective clothing, boots, and gloves, will be decontaminated before entering the Support Zone by a thorough soap-and-water wash prior to leaving the Exclusion Zone. Personnel performing intrusive tasks in potentially contaminated areas (e.g., drilling, excavation, environmental sampling) will be advised that all clothing worn under protective clothing (i.e., underwear, shirts, socks, trousers) should be laundered separately from street clothing before re-wearing. If protective clothing is breached and personal clothing becomes contaminated, the personal clothing will be disposed.

C11.2 Decontamination of Equipment

Decontamination of sampling equipment is described in the Field Sampling Plan (FSP). Other light equipment (such as tools, containers, monitoring instruments, radios, clipboards, etc.) will be segregated and deposited on plastic drop cloths or in plastic-lined containers placed in the Contamination Reduction Zone and will be wiped off with damp cloths.

Decontamination of drilling and excavation equipment, such as auger flights, heavy equipment, and vehicles, will be carried out by high-pressure water in the Contamination Reduction Zone.

C12.0 EMERGENCY PROCEDURES

The most likely incidents for which emergency measures might be required are:

- an exposure-related worker illness
- a sudden release of hazardous gases/vapors during drilling or excavation
- an explosion or fire occurring during drilling or excavation
- a heavy equipment-related accident, or other accident resulting in personal injury
- slipping, tripping, or falling resulting in personal injury
- spill of contaminated liquid or solid

Emergency procedures established to respond to these incidents are covered under the sections that follow.

C12.1 Communications

Communications will be centered in the field vehicle, one of which will contain a cellular telephone for direct outside communications with emergency response organizations. The support facilities will also contain two-way radios for contact with personnel working on site. If the site Health and Safety Officer or his designee leaves the immediate area, a radio will be carried by him at all times. A radio will be maintained at the drill rig and/or backhoe and with any groups of personnel who are performing tasks on site (e.g., environmental sampling).

C12.2 Escape Routes

Flags will be positioned near drill rigs and backhoes to indicate wind direction. In the event of a sudden release of hazardous gases, or a fire, all personnel will be required to move upwind or at 90 degrees away from the location of the release or fire, toward the site exit point. This may require personnel to move from the Exclusion Zone directly into an offsite area without proper decontamination. At the conclusion of the emergency, they should perform proper decontamination.

C12.3 Evacuation Signal

In the event of a sudden release or fire requiring immediate evacuation of the site, three quick blasts will be sounded on an air horn. Sounding the air horn will be the responsibility of the drill rig operator, backhoe operator, or the supervising personnel. The horns will be kept in a conspicuous place for quick access by personnel. The person will also contact the Site HSO via the two-way radio to report the incident and request aid if necessary. An air horn will also be kept in the Contamination Reduction Zone. The NYSDEC and the Project HSO will be notified by telephone, and later by written report, whenever a site evacuation is executed.

C12.4 Other Signals

Emergency hand signals for use by personnel wearing air-purifying respirators are summarized in Table C12-1.

C12.5 Fire

In the event of a fire that cannot be controlled with available equipment, the local fire department will be summoned immediately by the Onsite Coordinator or his designee, who shall apprise them of the situation upon their arrival. NYSDEC will also be notified. (See Table C12-2 for telephone numbers of emergency response agencies).

C12.6 First Aid

At the startup of field activities, the Project HSO will contact hospital personnel regarding the potential hazards at the site. First aid for personal injuries will be administered, if possible, at the field vehicle by the Onsite Coordinator or his designee. If a site worker should require further treatment, he or she will be transported to the hospital in the URSGWC vehicle located on site or an ambulance will be summoned. The onsite vehicle will carry written directions to the hospital as well as a copy of Figure C12-1 showing the route.

TABLE C12-1

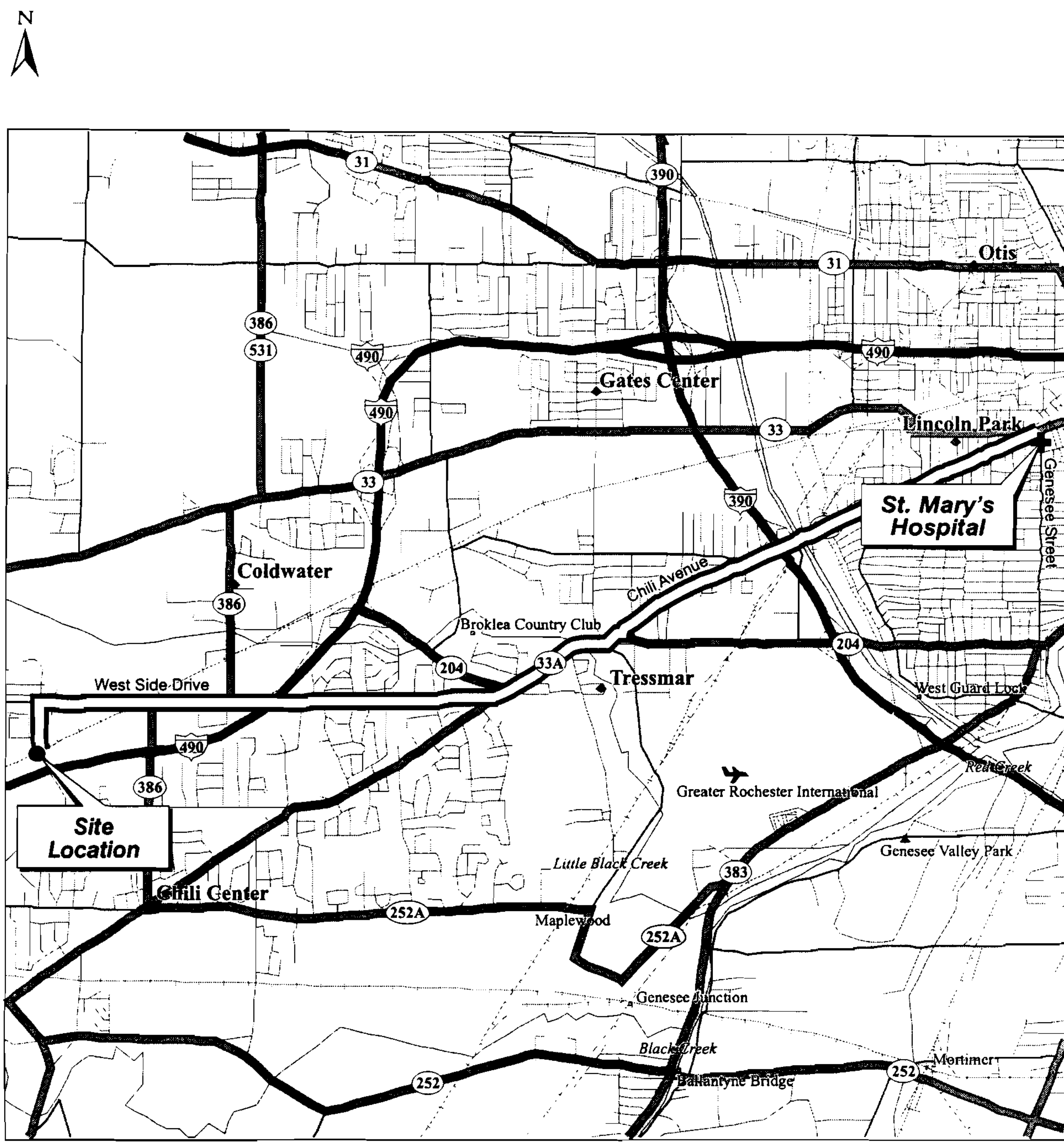
EMERGENCY HAND SIGNALS

• Hand gripping throat	- Can't breathe.
• Grip partner's wrist, or place both hands around wrist	- Leave area immediately, no debate!
• Hands on top of head	- Need assistance.
• Thumbs up	- I am all right, OK, I understand.
• Thumbs down	- No, negative.

TABLE C12-2

EMERGENCY TELEPHONE NUMBERS

Emergency Response Agencies	
Chili Fire Department	911 or (716) 889-3760
Monroe County Sheriff	911 or (716) 428-5432
New York State Police (Henrietta)	(716) 334-4510
Medical Facilities	
St. Mary's Hospital	
89 Genesee Street	General (716) 464-3000
Rochester, New York 14611	Emergency (716) 464-3050
Environmental and Health Agencies	
New York State Department of Environmental Conservation (Karen Maiurano)	(518) 457-0414
New York State Department of Health (Michael J. Kadlec)	(518) 458-6305
USEPA National Response Center (Chemical spills, oil spills, pollutant discharges)	1-800-424-8802
URS Greiner Woodward Clyde, Inc.	
Daniel Rothman, P.E.	(716) 856-5636
Richard Fudeman	(716) 856-5636



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APPROXIMATE SCALE IN MILES

1 0 1

From site location head north on Golden Road for approximately ¼ miles and turn right onto West Side Drive. Head East on West Side Drive for approximately 2 miles and turn left onto Chili Avenue (Route 33A). Head northeast on Route 33A for approximately 2 ½ miles. The hospital will be on the right.

St. Mary's Hospital
89 Genesee Street
Rochester, New York 14611

General - 464-3000
Emergency - 464-3050

AG13893-35650.01-041999-NPV

URS Greiner Woodward Clyde	ROUTE TO THE HOSPITAL GOLDEN ROAD SITE	FIGURE C12-1

All accidents, however insignificant, will be reported to the Site HSO, who will report the accident to the Project HSO. All personnel designated to administer first aid will have received a minimum of eight hours training in first aid and CPR, and be certified by the American Red Cross.

In the event of a serious personal injury requiring offsite medical attention, the injured person will first be moved to the Contamination Reduction Zone, where an attempt will be made to go through the decontamination procedures, including removal of protective clothing. If the injury is life-threatening, decontamination will be of secondary importance, and the injured party will be taken directly to the hospital. If a head, neck, back, or spinal injury is suspected, the injured person will not be moved and an ambulance will be summoned to the site.

C12.7 <u>Emergency Assistance</u>

The name, telephone number, and location of police, fire, hospital, and other agencies whose services might be required, or from whom information might be needed, will be kept in the field vehicle. The list is presented in Table C12-2.

If an ambulance should have to be called to the site, the injured person should meet the ambulance outside the Exclusion Zone if possible. If a head or spinal injury is suspected or the person is unconscious for any reason, medical personnel may have to come into the Exclusion Zone.

C12.8 <u>Spills</u>

The potential for spills to occur during onsite work at the site is minimal, since the direct handling of hazardous waste containers (drums, tanks, etc.) is not expected to be part of the scope of work. In the event that residual materials are spilled on site, the following procedures will be implemented:

C12.8.1 Liquid Spills

If a liquid (decontamination water, well development water, etc.) is spilled on a permeable surface, 2 inches of surface soil will be removed where the spill occurred and drummed. The area will later be either backfilled with clean soil or regraded. If liquid is spilled on an impermeable surface, a sorbent material will be applied to the spill area. The sorbent material will be swept up and drummed, and the spill area washed down with clean water.

C12.8.2 Soil Spills

Contaminated soil spilled on a permeable surface will be shoveled into a drum, and the top 2 inches of soil where the spill occurred will also be removed and drummed. The area will then be either backfilled with clean topsoil or regraded. If soil is spilled on an impermeable surface, the material will be shoveled (or swept) back into a drum, and the area washed with clean water.

All spills will be reported to the Project HSO within 24 hours. The Project HSO in turn will inform NYSDEC of the incident.

C12.9 Reports

Any emergencies, spills, or releases that occur on the site will be reported to the Project HSO and NYSDEC within one hour and will be followed by written notification within 24 hours.

C12.10 Accident Investigation and Reporting

C12.10.1 Accident Investigations

All accidents requiring first aid which occur incidental to activities on site will be investigated. Standard OSHA formats will be used for reporting any accidents/injuries/illness that occur on the site. The investigation format will be as follows:

- interviews with witnesses,
- pictures, if applicable, and
- necessary actions to alleviate the problem.

C12.10.2 <u>Accident Reports</u>

In the event that an accident or some other incident such as an explosion or exposure to toxic chemicals occurs during the course of the project, the Project HSO and NYSDEC will be telephoned within one hour and receive a written notification within 24 hours. The report shall include the following items:

- Name, telephone number, and location of the contractor, if not URS Greiner Woodward Clyde personnel.
- Name and title of person(s) reporting.
- Date and time of accident/incident.
- Location of accident/incident, (i.e., building number, facility name).
- Brief summary of accident/incident giving pertinent details including type of operation ongoing at the time of the accident/incident.
- Cause of accident/incident.
- Casualties (fatalities, disabling injuries).
- Details of any existing chemical hazard or contamination.
- Estimated property damage, if applicable.
- Nature of damage; effect on contract schedule.
- Action taken by contractor/URS Greiner Woodward Clyde to ensure safety and security.
- Other damage or injuries sustained (public or private).

C13.0 SAFETY CONCERNS AND CONTINGENCY MEASURES DURING DRILLING OPERATIONS

Drilling at this site will be conducted under the OSHA Safety and Health Standards (29 CFR 1926/1910) relative to heavy equipment operation. The following sections describe site-specific safety measures to be implemented during various phases of drilling activities.

General precautionary measures that should be taken to prevent accidents and injuries during drilling activities are:

- The driller or the driller's helper are the only people who should operate the drill rig.
- Keep hands away from moving parts.
- Do not wear loosely-fitting clothing when working near the drill rig to avoid entanglement in cables, ropes, etc.
- Personnel working near the drill rig should look upward from time to time and generally be aware of what is overhead.
- Personnel should not stand directly behind the drill rig to avoid falling or projected objects.

An active drilling Exclusion Zone is established by the opening of a borehole. A photoionization detector calibrated to a benzene surrogate, an explosimeter calibrated to methane, and a particulate meter will be used in this zone. As described in Table C9-1, readings will be made at the borehole at timed intervals or every time a sample is retrieved from the borehole. Monitoring with real-time instrumentation will be performed at the borehole and around the drill rig. Action levels will be considered to have been reached when a continuous, steady reading at or above an action level has been observed.

If at any time during the drilling program, buried drums, cylinders, metal, or concrete are encountered, drilling activities will cease immediately. After obtaining instrument readings, the project geologist and the Site HSO will decide whether to continue or discontinue drilling.

C14.0 SAFETY CONCERNS AND CONTINGENCY MEASURES DURING EXCAVATION OPERATIONS

During the excavation of test trenches, several health and safety concerns usually arise and control the method of excavation. All excavations must be sloped for stabilization. Personnel near the excavation may be exposed to toxic or explosive gases and oxygen-deficient environments. Due to these potential hazards, real-time air monitoring will be conducted. No person will enter an excavation for any reason except if absolutely necessary for a rescue. URSG personnel will maintain a safe distance at all times to avoid interference with the operation of heavy equipment.

Excavation at this site will be conducted under the safety regulations specified herein, which are based upon OSHA Health and Safety Standards (29 CFR 1926 - Subpart P, 1910.120, and 1910.134). The following sections describe site-specific safety measures to be implemented during excavation activities.

C14.1 <u>Excavation Operations</u>

A temporary barrier will be established prior to test pit excavation. Access to the test pit site, via a single entrance in the barrier, will be closely controlled. The temporary barrier will be erected about 20 feet away from the working area. Excavation will be timed so as to not permit any test pits to remain open overnight. URSGWC personnel will regularly police the outside of the temporary barrier during the excavation of test pits.

Excavated materials will be stored and retained at least two feet from the anticipated edge of the test pit to prevent excessive loading on the face of the excavation and possible cave-in. If at any time during the test pit excavation program, buried metal or concrete objects are encountered, excavation activities will cease immediately. After obtaining instrument readings, the supervising field geologist and Site HSO will decide whether to continue or discontinue excavation at that location.

If a drum containing waste materials is accidentally ruptured during test pit excavation, the following equipment will be readily available to control the situation if necessary:

Class ABC fire extinguishers
Canvas tarps
Sorbent materials

C14.2 Inspection Methodologies

Test pit excavation will proceed in 12-inch lifts using a backhoe. Between each lift, a visual inspection will be made for solids objects such as drums. If an intact drum is found, it will be inspected for the following:

- Symbols, words, or other marks on the drum indicating that its contents are hazardous

- Symbols, words, or other marks on the drum indicating that it contains discarded laboratory chemicals, reagents, or other potentially dangerous materials in small-volume individual containers

- Signs of deterioration, such as corrosion, rust, and leaks

- Signs that the drum is under pressure, such as swelling and bulging

- Drum type such as polyethylene or PVC-lined drums, exotic metal drums, single-walled drums used as a pressure vessel, and laboratory packs

- Configuration of the drum head (e.g., whole lid removable, has a bung, or contains a liner)

Monitoring around the drums will be conducted using a PID for organic vapors and an explosimeter/0_2/H_2S detector.

While excavating, the test pit will be visually inspected after each 12-inch lift, and instrument readings will be taken. If waste materials, discoloration, or elevated instrument readings are detected, the material will be brought to the surface and a sample may be collected from the backhoe bucket. The material, exclusive of drums or other materials with obvious potential to contain hazardous wastes, will then be returned to the excavation.

C15.0 SAFETY CONCERNS AND CONTINGENCY MEASURES DURING CONTAINER SAMPLING ACTIVITIES

Both small containers (i.e., drums) and large containers (i.e., ASTs) will be sampled during this investigation. Although most of the containers are significantly decomposed, the potential for encountering unopened containers does exist. Any unopened containers to be sampled will require specific opening procedures. The procedures for opening both small and large containers are presented below.

15.1 Small Containers

- All personnel involved in container sampling will be required to do so in Level C.
- Containers will be opened with non-sparkling tools by removing the top access bung or by loosening the drum ring and removing the cover.
- Carefully remove the access lid and place the lid on polyethylene sheeting with the bottom of the lid facing up.
- Air monitoring will be performed using a PID continuously throughout the entire sampling process. If elevated PID readings (>25 ppm) are encountered, sampling will be discontinued to allow for venting prior to sample collection.
- Upon completion of sampling activities, properly secure and stage the container in the appropriately designated staging area.
- **UNDER NO CIRCUMSTANCES WILL BULDGING CONTAINERS BE MOVED OR OPENED.**

15.2 Large Containers

When opening and sampling large containment vessels, precautions must be considered to assure personal health and safety. Accessing storage tanks requires a great deal of manual dexterity. It usually requires climbing to the top of the tank with a ladder while wearing protective gear and carrying sampling equipment. At least two people must perform the sampling: one to open the hatch and/or collect the actual samples, and the other to log field notes and assist the sampler. Large containers will be sampled using the safety procedures listed below.

- All personnel involved in container sampling will be required to do so in Level C.

- Prior to opening the access hatch, check the container for a pressure gauge (if present). If necessary, the release valve should be opened slowly to bring the tank to atmospheric pressure. If the tank pressure is too great or venting releases gases or vapors, discontinue venting. Measure releases to the atmosphere with a PID and CGI.

- If the container is completely closed and has no accessible means of venting, the top access hatch will be slowly opened to allow for venting to occur. Vapor releases to the atmosphere will be measured with a PID and CGI.

- Once the container has been adequately vented, open the access hatch and collect the sample

- **UNDER NO CIRCUMSTANCES WILL UNOPENED CONTAINERS BE PUNCTURED OR CUT OPEN WITH PORTABLE ELECTRICAL EQUIPMENT.**

C16.0 CONFINED SPACE ENTRY

Because it is not presently part of the scope of work, confined space entry requirements will not be necessary. If it does become necessary, the NYSDEC will be notified prior to any confined space entry and all confined space entry will be performed in accordance with 29 CFR 1910.146.

APPENDICES

APPENDIX C-1

WASTE SITE WORKER TRAINING PROGRAMS

APPENDIX C-1

TABLE 1

WASTE SITE WORKER TRAINING PROGRAM (40 HOURS)

Introduction to Program
Sources of Reference
Hazardous Waste Operations and Emergency Response (29 CFR 1910.120)
Heat Stress/Cold Exposure
Chemical & Physical Hazards
Chemical Protective Clothing (CPC)

Toxicology
Respiratory Protection Principles
Air-Purifying Respirators (APR)
APR Inspection, Donning, and Doffing
Self Contained Breathing Apparatus (SCBA)
SCBA Checkout
SCBA Field Exercise
Review of SCBA Lab and Field Exercise
Air-Line Respirators (ALR)

Site Safety
Site Control
Decontamination
Air Monitoring Equipment
Permit Required Confined Spaces (29 CFR 1910.146)
Entry Permit Development
Confined Space Entry
Review of Confined Space Lab and Field Exercise
Material Handling and Spill Containment

Health and Safety Plans (HASP)
Emergency Response Plans (ERP)
HASP & ERP Development

Level A/B Field Exercise
Level B/C Field Exercise
Air Monitoring Equipment Lab
SCBA Proficiency Checkout

Review of Lab & Field Exercises
Review of Air Monitoring Equipment Lab
Medical Monitoring
Hazard Communication (29 CFR 1910.120)
Risk Assessment
APR Fit Test Demonstration and Certification
Written Test

APPENDIX C-1

TABLE 2

WASTE SITE WORKER SUPERVISORY TRAINING PROGRAM (8 HOURS)

Record keeping Requirements Under Standard 29 CFR 1910.120
OSHA Inspections
Establishing Community Relations
Employee Training and Motivation
Management Traits
Dermal Protection Program
Respiratory Protection Program
Preventative Heat Stress and Cold Exposure Management
Medical Monitoring Requirements
Reporting and Recording Occupational Injuries, Illnesses, and Exposures
Accident Prevention
Spill Containment Program
Permit Required Confined Spaces (29 CFR 1910.146)
Determining the Effectiveness of Decontamination Procedures
Implementation of Site Health and Safety Plans
Implementation of Emergency Response Plans
Implementation of the Hazard Communication Standard (29 CFR 1910.120)
Responsibilities of the Site Safety and Health Supervisor and Project Manager
Personnel Sampling
Interpretation of Air Monitoring Data

APPENDIX C-1

TABLE 3

WASTE SITE WORKER ANNUAL REFRESHER TRAINING PROGRAM (8 HOURS)

OSHA Requirements
Hazardous Wastes
Toxicology
Exposure Limits
Chemical Hazards
Temperature Stress
Other Physical Hazards
Radiation
Site Control at Hazardous Waste Sites
Decontamination Procedures
Personal Protective Equipment
Confined Spaces
Air Monitoring Equipment
Field Exercises

APPENDIX C-2

FIELD ACTIVITY FORMS

URS Greiner Woodward Clyde
282 Delaware Avenue
Buffalo, New York 14202
(716) 856-5636

HAZARDOUS WASTE ACTIVITIES HEALTH & SAFETY CHECKLIST

Project: ______________________________

Project Manager: ______________________________

Onsite Health & Safety Officer: ______________________________

The Project manager, or onsite health and safety officer will signify the completion of the following items by initialing and dating each item.

	Initial	Date
Site health and safety plan prepared and approved by health and safety manager	________	________
All employees who will be onsite:		
. Have received initial (24 or 40 hr.) Training	________	________
. Have received annual 8 hr. refresher training	________	________
. Have reviewed the site health & safety plan and received pre-job briefing	________	________
. Have received respiratory protective equipment training including SCBA if required	________	________
. Have received negative pressure respirator fit test	________	________
. Have had a medical exam within the past 12 months	________	________

This form is to be submitted to the health and safety director prior to onsite work which may involve exposure to hazardous materials.

EMPLOYEE/VISITOR REGISTER

URS Greiner Woodward Clyde
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Buffalo, New York 14202
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PROJECT: ______________________

PROJECT MANAGER: ______________________

ONSITE HEALTH & SAFETY OFFICER: ______________________

NAME/SIGNATURE	AFFILIATION	PURPOSE	ONSITE SAFETY BRIEFING	PPE	TIME IN	TIME OUT
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

URS Greiner Woodward Clyde
282 DELAWARE AVE.
BUFFALO, NEW YORK 14202-1805
PHONE: (716) 856-5636
E-MAIL: URSCONS@URS-BUFFALO.COM

RESPIRATOR FIT TEST

TODAY'S DATE ____________________
TESTED BY: ____________________

EMPLOYEE NAME ____________________ SEX ____________________

DATE OF BIRTH ____________________ MEDICAL APPROVAL DATE ____________________

RESTRICTIONS ____________________

____

TYPE OF RESPIRATOR(S) SELECTED

MODEL ____________________

SIZE ____________________

COMPLETE ONE FORM FOR EACH TYPE OF RESPIRATOR USED

ENTER A CHECK (✓) FOR "ACCEPTABLE" OR "U" FOR "UNACCEPTABLE" FOR EACH OF THE FOLLOWING:

_______ CHIN PROPERLY PLACED

_______ STRAP TENSION

_______ ROOM TO TALK

_______ RESPIRATOR SLIPPAGE

_______ ROOM FOR SAFETY GLASSES

_______ FIT ACROSS NOSE BRIDGE

ENTER "T" (TRUE) OR "F" (FALSE) FOR EACH OF THE FOLLOWING. (IF "F" TO ANY ONE, SUBJECT FAILS FIT TEST.)

_______ EMPLOYEE HAS COMPLETED REQUIRED TRAINING PROGRAM

_______ EMPLOYEE IS CLEAN SHAVEN IN AREA WHERE RESPIRATOR CONTACTS SKIN

_______ GLASSES AND/OR TEMPLE BARS DO NOT INTERFERE WITH SEAL

_______ FACIAL SCARS DO NOT INTERFERE WITH SEAL

_______ OTHER FACIAL FEATURES DO NOT INTERFERE WITH SEAL

_______ EMPLOYEE DOES NOT COMPLAIN OF DISCOMFORT DUE TO RESPIRATOR

_______ EMPLOYEE IS ABLE TO "SEAT" RESPIRATOR PROPERLY

_______ EMPLOYEE IS ABLE TO DEMONSTRATE ADEQUATE POSITIVE PRESSURE TEST

_______ EMPLOYEE IS ABLE TO DEMONSTRATE ADEQUATE NEGATIVE PRESSURE FIT TEST

_______ EMPLOYEE HAS WORN RESPIRATOR FOR THE TEN MINUTES PRIOR TO INITIATING THE "TEST ATMOSPHERE FIT TEST".

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ONSITE SAFETY BRIEFING

DATE: ______________________ PROJECT: ______________________

MEETING CONDUCTED BY: ______________________

NAME: ______________________

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DAILY SAFETY MEETING

DATE: ______________________ CUSTOMER: ______________________

SPECIFIC: ______________________

____

SAFETY TOPICS PRESENTED:

PROTECTIVE CLOTHING/EQUIPMENT: ______________________

____

CHEMICAL HAZARDS: ______________________

____

PHYSICAL HAZARDS: ______________________

____

EMERGENCY PROCEDURES: ______________________

____

HOSPITAL/CLINIC: ______________________ PHONE: ______________________

PARAMEDIC PHONE: ______________________

HOSPITAL ADDRESS: ______________________

SPECIAL EQUIPMENT: ______________________

____

OTHER: ______________________

____

ATTENDEES:

NAME PRINTED:	SIGNATURE:

MEETING CONDUCTED BY:

______________________ ______________________

Name Printed *Signature*

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INSTRUMENT READING LOG

PROJECT: ____________________ JOB NO.: ____________________

OPERATOR: ____________________ DATE: ____________________

INSTRUMENT: ____________________ CALIBRATION: ____________________
Amt. Component. Date

SAMPLING TECHNIQUE: ____________________

____

SAMPLING INTERVAL: ____________________

BACKGROUND READING: ____________________

ACTION LEVEL RESPONSE: ____________________

TIME	LOCATION	READING (UNITS)	DETECTION LIMIT (SCALE)

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METEOROLOGICAL DATA LOG

DATE ___/___/___ ________ TIME ________

B.P. _______._____ mm Hg

TEMP. _____.____ °C

WIND ________ AT _____ MPH

DESCRIPTION ____________________

Precip. since last reading ____________ in.

DATE ___/___/___ ________ TIME ________

B.P. _______._____ mm Hg

TEMP. _____.____ °C

WIND ________ AT _____ MPH

DESCRIPTION ____________________

Precip. since last reading ____________ in.

DATE ___/___/___ ________ TIME ________

B.P. _______._____ mm Hg

TEMP. _____.____ °C

WIND ________ AT _____ MPH

DESCRIPTION ____________________

Precip. since last reading ____________ in.

DATE ___/___/___ ________ TIME ________

B.P. _______._____ mm Hg

TEMP. _____.____ °C

WIND ________ AT _____ MPH

DESCRIPTION ____________________

Precip. since last reading ____________ in.

DATE ___/___/___ ________ TIME ________

B.P. _______._____ mm Hg

TEMP. _____.____ °C

WIND ________ AT _____ MPH

DESCRIPTION ____________________

Precip. since last reading ____________ in.

DATE ___/___/___ ________ TIME ________

B.P. _______._____ mm Hg

TEMP. _____.____ °C

WIND ________ AT _____ MPH

DESCRIPTION ____________________

Precip. since last reading ____________ in.

DATE ___/___/___ ________ TIME ________

B.P. _______._____ mm Hg

TEMP. _____.____ °C

WIND ________ AT _____ MPH

DESCRIPTION ____________________

Precip. since last reading ____________ in.

DATE ___/___/___ ________ TIME ________

B.P. _______._____ mm Hg

TEMP. _____.____ °C

WIND ________ AT _____ MPH

DESCRIPTION ____________________

Precip. since last reading ____________ in.

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Buffalo, New York 14202
(716) 856-5636

HEAT / COLD STRESS LOG

PROJECT: ______________________________

PROJECT MANAGER: ______________________________

ONSITE HEALTH & SAFETY OFFICER: ______________________________

EMPLOYEE NAME: ______________ TODAY'S DATE: ______________

DATE OF BIRTH: ______________ HEIGHT: ________ WEIGHT: ________

MEDICAL APPROVAL DATE: ______________ RESTRICTIONS: ______________

LEVEL OF PROTECTION: ______________________________

TEMPERATURE: ______________ HUMIDITY: ________ WIND SPEED: ________

OTHER: ______________________________

____

HEAT STRESS MONITORING:

HEART RATE AT BEGINNING OF REST PERIOD: ______________

BODY TEMPERATURE AT BEGINNING OF REST PERIOD: ______________

SYMPTOMS: ______________ TREATMENT: ______________

COLD STRESS MONITORING:

BODY TEMPERATURE AT BEGINNING OF REST PERIOD: ______________

WARM CLOTHING WORN: ______________ WARM SHELTER USED: ______________

LENGTHS OF REST PERIOD: ______________

SYMPTOMS: ______________ TREATMENT: ______________

URS Greiner Woodward Clyde
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REPORT OF ACCIDENT/INJURY

PROJECT: ______________________ DATE OF OCCURRENCE: ______________

LOCATION: (be specific) ____

____

TYPE OF OCCURRENCE: (check all that apply)

- ☐ DISABLING INJURY
- ☐ OTHER INJURY
- ☐ PROPERTY DAMAGE
- ☐ EQUIPMENT FAILURE
- ☐ CHEMICAL EXPOSURE
- ☐ FIRE
- ☐ EXPLOSION
- ☐ VEHICLE ACCIDENT
- ☐ OTHER (explain) ____

____

WITNESSES TO ACCIDENT / INJURY: (and office)

______________________ ______________________

______________________ ______________________

______________________ ______________________

______________________ ______________________

INJURIES:

NAME OF INJURED: ______________________ OFFICE: ______________________

WHAT WAS BEING DONE AT THE TIME OF THE ACCIDENT/INJURY? ______________________

____

____

____

____

____

____

____

NATURE OF THE ACCIDENT/INJURY: ______________________________

____

____

WHAT CAUSED THE ACCIDENT/INJURY? ______________________________

____

____

____

____

WHAT CORRECTIVE ACTION WILL BE TAKEN TO PREVENT RECURRENCE? ______________________________

____

____

____

____

SIGNATURES:

HEALTH & SAFETY OFFICER: ______________________________ DATE: ______________

PROJECT MANAGER: ______________________________ DATE: ______________

REVIEWER: ______________________________ DATE: ______________

COMMENTS BY REVIEWER: ______________________________

____

____

____

____

____

____

____

____

____

Bureau of Labor Statistics
Supplementary Record of
Occupational Injuries and Illnesses

U.S. Department of Labor

This form is required by Public Law 91-596 and must be kept in the establishment for *5 years.* Failure to maintain can result in the issuance of citations and assessment of penalties.

Case or File No.

Form Approv
O.M.B. No. 1220-00

Employer

1. Name

2. Mail address *(No. and street, city or town, State, and zip code)*

3. Location, if different from mail address

Injured or Ill Employee

4. Name *(First, middle, and last)* — Social Security No.

5. Home address *(No. and street, city or town, State, and zip code)*

6. Age

7. Sex: *(Check one)* Male ☐ Female ☐

8. Occupation *(Enter regular job title, not the specific activity he was performing at time of injury.)*

9. Department *(Enter name of department or division in which the injured person is regularly employed, even though he may have been temporarily working in another department at the time of injury.)*

The Accident or Exposure to Occupational Illness

If accident or exposure occurred on employer's premises, give address of plant or establishment in which it occurred. Do not indicate department or division within the plant or establishment. If accident occurred outside employer's premises at an identifiable address, give that address. If it occurred on a public highway or at any other place which cannot be identified by number and street, please provide place references locating the place of injury as accurately as possible.

10. Place of accident or exposure *(No. and street, city or town, State, and zip code)*

11. Was place of accident or exposure on employer's premises? Yes ☐ No ☐

12. What was the employee doing when injured? *(Be specific. If he was using tools or equipment or handling material, name them and tell what he was doing with them.)*

13. How did the accident occur? *(Describe fully the events which resulted in the injury or occupational illness. Tell what happened and how it happened. Name any objects or substances involved and tell how they were involved. Give full details on all factors which led or contributed to the accident. Use separate sheet for additional space.)*

Occupational Injury or Occupational Illness

14. Describe the injury or illness in detail and indicate the part of body affected. *(E.g., amputation of right index finger at second joint; fracture of ribs; lead poisoning; dermatitis of left hand, etc.)*

15. Name the object or substance which directly injured the employee. *(For example, the machine or thing he struck against or which struck him; the vapor or poison he inhaled or swallowed; the chemical or radiation which irritated his skin; or in cases of strains, hernias, etc., the thing he was lifting, pulling, etc.)*

16. Date of injury or initial diagnosis of occupational illness

17. Did employee die? *(Check one)* Yes ☐ No ☐

Other

18. Name and address of physician

19. If hospitalized, name and address of hospital

Date of report | Prepared by | Official position

OSHA No. 101 (Feb. 1981)

SUPPLEMENTARY RECORD OF OCCUPATIONAL INJURIES AND ILLNESSES

To supplement the Log and Summary of Occupational Injuries and Illnesses (OSHA No. 200), each establishment must maintain a record of each recordable occupational injury or illness. Worker's compensation, insurance, or other reports are acceptable as records if they contain all facts listed below or are supplemented to do so. If no suitable report is made for other purposes, this form (OSHA No. 101) may be used or the necessary facts can be listed on a separate plain sheet of paper. These records must also be available in the establishment without delay and at reasonable times for examination by representatives of the Department of Labor and the Department of Health and Human Services, and States accorded jurisdiction under the Act. The records must be maintained for a period of not less than five years following the end of the calendar year to which they relate.

Such records must contain at least the following facts:

1) ***About the employer***—name, mail address, and location if different from mail address.

2) ***About the injured or ill employee***—name, social security number, home address, age, sex, occupation, and department.

3) ***About the accident or exposure to occupational illness***—place of accident or exposure, whether it was on employer's premises, what the employee was doing when injured, and how the accident occurred.

4) ***About the occupational injury or illness***—description of the injury or illness, including part of body affected; name of the object or substance which directly injured the employee; and date of injury or diagnosis of illness.

5) ***Other***—name and address of physician; if hospitalized, name and address of hospital; date of report; and name and position of person preparing the report.

SEE *DEFINITIONS* ON THE BACK OF OSHA FORM 200.

U.S. GOVERNMENT PRINTING OFFICE: 1987 — 181-504

APPENDIX C-3

STANDARD OPERATING SAFETY PROCEDURES

APPENDIX C-3 - STANDARD OPERATING SAFETY PROCEDURES

Rules for onsite personal safety are shown in Appendix C-3, Table 1; rules for operational safety appear in Appendix C-3, Table 2.

APPENDIX C-3

TABLE 1

PERSONAL SAFETY RULES

- Visual contact must be maintained between crew members on site.

- Any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in any area designated as contaminated. These practices include as a minimum, eating, drinking, chewing gum or tobacco, and smoking.

- Hands and face must be thoroughly washed upon leaving the work area, and before engaging in any other activities, especially eating or drinking.

- Due to interference of facial hair with the mask-to-face seal on air-purifying respirators, personnel working on site will not be permitted to wear facial hair that interferes with the seal.

- Contact with contaminated surfaces or surfaces suspected of contamination should be avoided. Site personnel should avoid walking through puddles, mud, or other discolored areas, and should not kneel or sit on the ground.

- Field personnel shall be familiar with the physical characteristics of the site, including:
  - wind direction in relation to the working area
  - accessibility to associates, equipment, and vehicles
  - communications
  - work zones
  - site access

- Medicine and alcohol can exacerbate the effect from exposure to toxic chemicals. Prescribed drugs should not be taken by field personnel where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Alcoholic beverage and controlled substance intake is strictly forbidden during onsite operations.

APPENDIX C-3

TABLE 2

OPERATIONAL SAFETY RULES

- No visitors shall be allowed into any Exclusion Zone without the permission of the New York State Department of Environmental Conservation.

- Onsite personnel must use the buddy system when wearing respiratory protective equipment. A third person, suitably equipped, is required as a safety backup during initial site entries.

- During day-to-day operations, onsite workers will act as a safety backup to each other. Offsite personnel will provide emergency assistance.

- Wind indicators will be set up so as to be visible from the Exclusion Zone.

- Daily briefings will be held to review site hazards, changes in level of personal protection required, special safety precautions for assigned work activities, and emergency response.

- All personnel going on site must be thoroughly briefed on anticipated hazards, and trained on equipment to be worn, safety procedures, emergency procedures, and communications.