NOTICE

All drawings located at the end of the document.

RF/RMRS-97-059

Final Sampling And Analysis Plan for the Pre-Remedial Investigation of IHSS 118.1

September 9, 1997

Revision: 0

Final

Sampling And Analysis Plan for the Pre-Remedial Investigation of IHSS 118.1

September 9, 1997

Revision: 0

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Background 1
1.2 Prior Investigations 3
1.3 Contamination Data Summary 4
1.3.1 Groundwater Contamination 4
1.3.2 Extent of NAPL Contamination 5

2.0 PROJECT AND DATA QUALITY OBJECTIVES 7

3.0 SAMPLING AND ANALYSES 9
3.1 Field Preparation 9
3.2 Geoprobe Samples 10
3.3 NAPL and Groundwater Samples 10

4.0 DATA MANAGEMENT 12
4.1 Project Completion 13
4.2 Quality Assurance 13

5.0 PROJECT ORGANIZATION 13

6.0 REFERENCES 14

7.0 LIST OF ACRONYMS 15

8.0 APPROVALS 15

FIGURES

Figure 1. IHSS 118.1 Area 2
Figure 2. IHSS 118.1 Area Cross Section 6
Figure 3. Project Organization 14

TABLES

Table 1. Maximum Downgradient Groundwater Sampling Results Summary 5
Table 2. Analytical Sampling Requirements 8
Table 3. Applicable Field and Administrative Standard Operating Procedures 12

1.0 INTRODUCTION

The purpose of this Sampling and Analysis Plan (SAP) is to direct the collection of field data to identify and delineate the extent of the residual volatile organic compound (VOC) nonaqueous phase liquid (NAPL) in the subsurface derived from Individual Hazardous Substance Site (IHSS) 118.1 - Multiple Solvent Spills West of Building 730. This data will provide input for the potential remedial action to capture and remove the subsurface NAPL. While this potential action will not constitute a complete source removal, it will remove NAPL believed to be contributing to a plume of VOC contamination in groundwater in this area. The source area is ranked 8th on the Environmental Restoration (ER) Ranking and the associated groundwater plume is ranked 19th [revised Attachment 4 to the Rocky Flats Cleanup Agreement (RFCA) (DOE 1996a)]. Removal of the source material is consistent with the Rocky Flats Environmental Technology Site (RFETS) strategy for groundwater which is to prevent contamination of surface water by removal of contaminant sources.

The objective of the SAP is to describe the specific data needs, sampling and analysis requirements, data handling procedures, and associated Quality Assurance/Quality Control (QA/QC) requirements for this project. All work will be performed in accordance with the RMRS Quality Assurance Program Description (QAPD) (RMRS 1997). The SAP summarizes the existing data and describes the work required to better define the nature and extent of contamination at IHSS 118.1 sufficiently to design a remedial action.

1.1 Background

IHSS 118.1 is an area of known subsurface soil contamination resulting from leaks and spills associated with an underground storage tank containing carbon tetrachloride which was removed in 1981. This IHSS is located due north of Building 776 and near Building 730, in a highly developed area of the RFETS Industrial Area (Figure 1).

Surficial materials in the IHSS 118.1 area are predominantly artificial fill, composed mostly of reworked Rocky Flats Alluvium, along with some remaining undisturbed Rocky Flats Alluvium. The fill and undisturbed alluvium are primarily composed of clay with interspersed unconsolidated gravels and sands. Immediately underlying the surficial material is the weathered claystone bedrock of the Arapahoe Formation.

There are numerous underground and overhead utilities and structures in the IHSS 118.1 area. These include vitreous clay sanitary sewer lines, electrical lines and other utilities, tunnels between buildings, building footing drains, process waste lines and process waste tanks. Information from excavations in other areas and conversations with workers indicate that most of the buried utilities were backfilled using previously excavated native materials.

The contamination in the IHSS 118.1 area is primarily related to an underground storage tank which was installed in 1957 (Figure 1). This 5,000 gallon capacity steel tank was used to store carbon tetrachloride, and had a concrete containment structure on the south side around the intake area. Numerous surface spills occurred before 1970, some up to 200 gallons. The intake to the tank failed in June 1981 and released carbon tetrachloride into the containment structure. Carbon tetrachloride was pumped out of the containment structure onto the surrounding soil ground surface, and the tank was removed along with a limited amount of soil around the tank. It is assumed that the surrounding concrete containment structure was removed at this time, but this has not been verified (DOE 1992).

Immediately east and partially overlapping IHSS 118.1 is a group of four process waste tanks referred to as tank groups T-9 and T-10 which were part of the original process waste system. Tank T-9 consists of two 22,500 gallon concrete underground storage tanks. T-10 consists of two 4,500 gallon concrete underground tanks. Both sets of tanks were installed in 1955 but are no longer used as process waste tanks. T-9 is currently being utilized as plenum deluge catch tanks for Building 776. Tank 10 was closed as part of the Underground Storage Tank accelerated action in 1996 (RMRS 1996a). No releases from either set of tanks have been documented (DOE 1995).

1.2 Prior Investigations

The OU 9 Phase I Remedial Investigation found free-phase carbon tetrachloride in the subsurface soil and groundwater in the vicinity of IHSS 118.1. Soil borings were drilled near the four corners of Tanks T-9 and T-10 (Figure 1), and all four borings intercepted free-phase carbon tetrachloride (DOE 1995). Very high soil concentrations of VOCs were observed, and when a water sample was collected from one of the borings, the liquid separated into two distinct liquid phases. Other VOCs might be present, but could be masked by the high concentrations of carbon tetrachloride.

1.3 Contamination Data Summary

Carbon tetrachloride is present in the area in sufficient quantity to not only dissolve in the water, but also to remain as a dense NAPL. Because it has a higher specific gravity than water, carbon tetrachloride will tend to perch above low permeability capillary barriers such as the bedrock claystone. Furthermore, artificial fill and the Rocky Flats Alluvium have large clay fractions which will block the flow of NAPL and consequently lead to occurrences of NAPL in permeable sediments and utility backfill. Therefore, the bedrock surface, building footing drains, and subsurface structures probably control the extent of the NAPL as well as dissolved phase NAPL in groundwater.

1.3.1 Groundwater Contamination

Groundwater flow in this area is to the northeast towards Buildings 771 and 774. Portions of these buildings are constructed 20 to 30 feet below grade and have footing drains. The process waste tanks are directly beneath Building 730, and Building 701 is not believed to have subsurface structures. Carbon tetrachloride and other VOCs have been detected in the groundwater from nearby wells indicating that a dissolved phase plume is present in groundwater. This contaminated groundwater plume may eventually reach the North Walnut Creek drainage, especially after the removal of the surrounding buildings (RMRS 1996).

Downgradient well P210189, due east of IHSS 118.1 at the western edge of the Solar Ponds, was completed in the Arapahoe No. 1 Sandstone. Groundwater in this well contains carbon tetrachloride concentrations up to 21,000 ug/l and trichloroethene up to 8,000 ug/l together with other VOCs. The IHSS 118.1 carbon tetrachloride spill is believed to be the source of this contamination indicating that the dissolved phase of the groundwater plume has migrated in an eastward direction. The groundwater flow may be directed by preferential flow paths such as along utilities, and this investigation will provide information on these migration pathways.

Table 1. Maximum Downgradient Groundwater Concentrations

Contaminant	P210189	P209289	Well 2286	Groundwater Tier I Action Levels	Groundwater Tier II Action Levels
Carbon Tetrachloride	21,000 ug/l	1,300 ug/l	3,000 ug/l	500 ug/l	5 ug/l
Trichloroethene	8,600 ug/l	ND*	6,000 ug/l	500 ug/l	5 ug/l

Note: all values are maximum observed concentrations, regardless of date collected.
* ND = Not detected at the detection limit of 12 ug/l

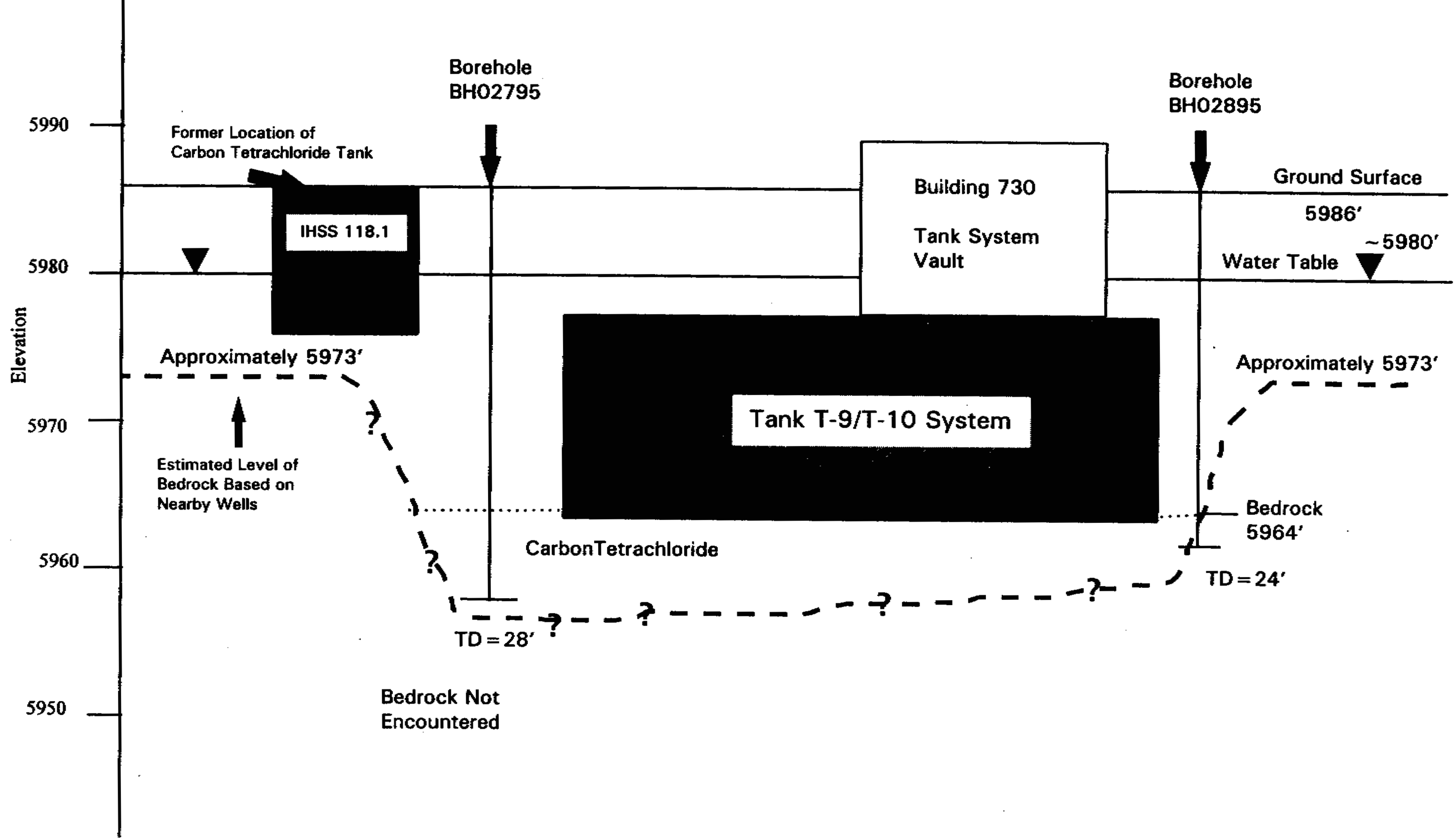
1.3.2 Extent of NAPL Contamination

The low permeability claystone bedrock limits the vertical migration of the nonaqueous phase carbon tetrachloride, and the relief on the bedrock surface controls the extent of the free-phase plume. Available data indicate that the top of bedrock surface prior to construction of Building 771 sloped to the northeast away from IHSS 118.1, and was approximately 10 to 15 feet below ground surface. Excavation during construction of this building apparently altered this surface, since recent field investigations encountered the claystone surface 10 feet or more below the depth expected. Excavation may have either increased the slope of the bedrock surface or created a depression in the bedrock next to the building. Installation of the carbon tetrachloride tank and the Tank T-9/T-10 system probably also created localized depressions in the bedrock surface. The east-west cross section for this area (Figure 2) shows the relative position of these tanks, and the expected elevation of the bedrock surface.

The extent of nonaqueous phase carbon tetrachloride cannot be accurately determined because the bedrock surface is poorly defined, and it is not known how much solvent was released into the area. However, the carbon tetrachloride released from surface spills and leakage from the underground storage tank is expected to have migrated downward towards the bedrock surface and most likely collected in depressions in the bedrock surface in the spill area and/or within the closed bedrock depression from the excavation of Tanks T-9 and T-10. The OU 9 drilling indicated that nonaqueous carbon tetrachloride is present in the bottom of the excavation (DOE 1995).

If sufficient carbon tetrachloride was released to freely flow along the bedrock surface, carbon tetrachloride would be expected to flow towards Buildings 771 and 774 along the bedrock surface created during construction of these buildings. Lateral movement of the carbon tetrachloride to the

Figure 2 - Schematic East-West Cross-Section Through IHSS 118.1 and the Tank T-9/T-10 System



north is expected to be controlled by the south walls of the buildings, and the contaminant might be slowly removed by seepage into these buildings' footing drain systems. It is not possible at this time to confirm whether this is a migration pathway from IHSS 118.1 due to the potential presence of carbon tetrachloride from other source areas.

There is a potential for the carbon tetrachloride to migrate along the numerous underground utility corridors in this area. The most likely utility pathway is a process waste line leaving the Tank System and running eastwards at a depth of 6 to 8 feet. In addition, a vitreous clay sanitary sewer line is found 20 feet north of the carbon tetrachloride spill also at a depth of 6 to 8 feet below surface. The slope of neither line is known; however, the process waste line must slope to the east as it leaves the tanks, and the sewer line should slope eastward towards the Sewage Treatment Plant.

2.0 PROJECT AND DATA QUALITY OBJECTIVES

The objective of this SAP is to better resolve the extent of the nonaqueous carbon tetrachloride in the vicinity of IHSS 118.1. Data quality objectives to support this project were developed using criteria established in *Guidance for the Data Quality Objective Process*, EPA QA/G-4 (EPA 1994). The data gaps, study boundaries, and decisions are described below.

The pre-remedial investigation has the following objectives:

- Better determine the extent of the potentially recoverable NAPL,
- Determine the bedrock topography in the area, and
- Obtain information for design of potential remedial actions.

Previous investigations found NAPL around the process waste tanks. This pre-remedial investigation will better define the extent of NAPL by installing an estimated 10 geoprobe holes in the vicinity of the process waste tanks. The placement of the geoprobe holes was based on the expected area of the excavation for the process waste tanks, data gaps, and accessibility for the geoprobe. Eight geoprobe holes will initially be pushed near the estimated area of excavation around the process waste tanks, the area near the former carbon tetrachloride tank, and downgradient (north and east) of the excavation. The geoprobe locations will be moved as necessary to avoid utilities. If indications of

NAPL are present, or high levels of VOCs are detected using a field photoionization detector/flame ionization detector (PID/FID), temporary wells will be installed to evaluate whether potentially recoverable NAPL, capable of flowing freely to a well, is present. If potentially recoverable NAPL is encountered, additional geoprobe holes will be pushed on an approximately twenty foot spacing to further define the extent of the contamination. It is estimated that two additional geoprobe holes will be needed; however, the actual number is dependent on the site conditions encountered and could be higher or lower. Additional geoprobe holes may also be added within the limits of the process waste tanks excavation.

Both subsurface soil samples and liquid samples will be collected as possible. Subsurface soil samples will be collected using Geoprobe push-type hydraulic equipment. Table 2 lists the projected number of samples to be collected, analyses, and sampling requirements. Sample containers will be provided by the Analytical Projects Office (APO).

Table 2. Analytical Sampling Requirements

Analysis Method	**Number of Samples**	**Number of QC Samples**	**Total Number Samples**	**Containers, Preservatives, Holding Times**
<u>Soils</u> SW846 Method 8260A	150	8 duplicate		120 ml wide mouth, Teflon lined, glass jar, 4° C, 14 days
Alpha Spectroscopy for Uranium 233/234, 234 & 238, Plutonium 239/240 and Americium 241	10	1 duplicate	169	250 ml glass jar, NA, 6 months
<u>Free Product/Groundwater</u> SW846 Method 8260A	10	1 duplicate 1 rinsate 5 trip blanks (1 per shipment)	17	Three 40 ml Teflon lined VOA vials per sample with septum lids, HCl* to pH < 2 and 4° C, 14 days

Note - For safety reasons, if there is any reason to believe the sample contains NAPL, acid will not be put into the sample jars, and contact between the sample and any form of acid will be avoided.

Core samples will be recovered continuously in two to five-foot increments and evaluated by a geologist familiar with the local stratigraphy. The geologist will determine the depth to bedrock. The geoprobe locations will be surveyed using Global Positioning System (GPS) equipment or other appropriate survey equipment so that data can be properly plotted.

Soil samples will be collected from the recovered soil cores and analyzed for a variety of contaminants to support the proper disposition of the soil removed during subsequent remediation activities. At locations where NAPL is suspected, temporary wells will be installed and samples will be collected if possible. Soil and liquid samples will be analyzed for VOCs and radionuclides as shown in Table 2.

3.0 SAMPLING AND ANALYSES

Data will be collected and combined with existing data to determine the appropriate remedial action. Ten geoprobe holes will be located within the area of suspected NAPL to refine the extent of NAPL, and to identify depth to bedrock.

Figure 1 shows the approximate location of the geoprobe holes. If locations need to be changed to avoid obstructions, these changes will be noted in the field logbook. The sampling requirements for each type of sample event to be performed under this SAP are described in Table 2 and in the following sections.

Samples will be handled according to FO.10 Receiving, Labeling, and Handling Environmental Material Containers, and FO.13 Containerization, Preserving, Handling and Shipping of Soil and Water Samples. All samples will have an identification number generated by the RFETS APO. If conditions are encountered in the field which make the use of a procedure unsafe or inappropriate for the task at hand, the specified procedures may be modified or replaced as long as the modification or replacement procedure is justified and modified in accordance with DC-06.01 Document Control Program.

3.1 Field Preparation

Before data collection begins, each geoprobe location will be established using tape and compass, and marked with a reference stake or flag with the unique number for that location. Locations will be cleared in accordance with Procedure GT.10 Borehole Clearance. The geoprobe location number will be obtained from the Water and Soil Database and correlated with sample analyses for that location. These locations will be surveyed for location and elevation using GPS receivers operated in accordance with the equipment manuals (Ashtech 1993), or other appropriate survey equipment.

3.2 Geoprobe Samples

All geoprobe boreholes will be advanced to a depth of two feet into weathered bedrock, or to a sufficient depth to confirm unweathered bedrock, a total depth expected not to exceed 30 feet. If refusal occurs prior to reaching bedrock, up to two offsets will be pushed to try and reach the sampling objectives. Geoprobe operations will be conducted as per GT.39 Push Subsurface Soil Sample.

Core samples will be collected continuously in two to five foot increments from the surface to approximately two feet into bedrock. These core samples will be monitored with a field instrument for the detection of low energy radiation (FIDLER), and in accordance with FO.15 Photoionization Detectors and Flame Ionization Detectors, visually inspected for signs of NAPL or other contaminant staining, and then visually logged by the field geologist per GT.01 Logging Alluvial and Bedrock Material. The depth and thickness of stained or saturated core will be described in detail; however, portions of Procedure GT.01 will not be used, e.g., sieving samples, investigation with a binocular microscope, and field estimates of plasticity.

Soil samples will be collected for analyses as described in Table 2 from every geoprobe hole to determine whether VOC source material is present in the subsurface soils. Samples will be collected for laboratory analysis of VOCs from every two foot interval, and will be collected where there are indications of contaminants, or from the base of the interval. If more than one discrete interval within a two-foot section shows sign of NAPL, then a sample will be taken from each interval. A radiological sample will be collected along with the first VOC sample which has indications of NAPL, or from the first interval of core collected at each location.

3.3 NAPL and Groundwater Samples

If PID/FID readings, visible staining of the core, or the presence of NAPL on downhole tools indicate that NAPL is present, temporary wells will be installed. After the geoprobe holes are completed to the required depth, 1/2" to 3/4" internal diameter, Number 10 slotted, stainless steel screen sufficient to reach from the bedrock surface to one foot above the projected depth of NAPL will be joined using stainless steel collars to sufficient steel casing to reach 6 inches or more above the ground surface. The screened section will have a threaded or a riveted stainless steel cap on the bottom.

This assembly will be inserted into the hole to allow for collection of groundwater samples. 10/20 filter sand will be poured around the casing to cover at least one foot above the slotted screen. Granular bentonite will be poured into the annular space to ground surface to prevent cross contamination. A slip-over steel cap will be loosely affixed to the top of the well assembly. A one and one-half foot section of 1.5 inch interior diameter, schedule 40 PVC casing will be manually installed around the above ground section of the well and granular bentonite will be poured around the outside of the completed well assembly. A screw-on schedule 40 PVC cap will be attached to the 1.5 inch casing for additional protection.

Each temporary well will be checked within three days of completion. The water/NAPL level will be measured according to GW.01 Water Level Measurements in Wells and Piezometers, and if sufficient liquid exists for sample collection (estimated as at least one foot of standing liquid), a sample will be collected using the methods specified in GW.06 Groundwater Sampling. However, the well will not be purged prior to sample collection. If the recovered liquid separates into two distinct phases, the amount of each phase will be estimated, and a sample will be collected from each phase.

If the geoprobe hole is dry or contains less than one foot of liquid, a notation will be made in the field notebook. Those temporary wells that are dry or contain insufficient liquid for sampling will be revisited after one week has passed; liquid levels will be measured, and the well will be sampled if possible. After measuring the liquid level, the measuring device will be examined to determine whether the liquid was water or NAPL.

Temporary wells that are still dry or contain insufficient liquid for sampling after one week will be visited weekly or until the field project ends. If sufficient liquid exists prior to completion of the field project, liquid level measurements will be taken and a sample will be collected. All liquid level determinations will be noted in the project logbooks. At the end of the field project, these temporary liners will be left capped in case they can be used during or after installation of the collection system.

If PID/FID readings remain near background levels, if there is no indication of free liquid, and if the core does not show indications of staining, the geoprobe hole will be abandoned as per GT.05 Plugging and Abandonment of Boreholes.

4.0 DATA MANAGEMENT

A field logbook will be created and maintained for the project by the project manager or their designee in accordance with ER-ADM-05.14 Use of Field Logbooks and Forms. The logbook will be used in conjunction with the appropriate field data forms required by the operating procedures (Table 3) governing the field activities occurring during this project. It is not necessary to duplicate items recorded on field data forms in the field notebook, but if additional clarification of entries on the forms is required, they should be recorded in the field notebook. The field notebook should include time and date information concerning the field activities and a sketch map of actual sample locations. Information not specifically required by the field data forms should be recorded in the field notebook.

Non-analytical data for this project will be collected, entered, and stored in a secure, controlled, and retrievable environment in accordance with 2-G18-ER-ADM-17.01 Records Capture and Transmittal. Analytical data will be stored in the APO records center.

Table 3. Applicable Field and Administrative Standard Operating Procedures

Procedure Number	Procedure Title
2-G18-ER-ADM-17.01	Records Capture and Transmittal
2-G32-ER-ADM-08.02	Evaluation of ERM Data for Usability in Final Reports
2-S47-ER-ADM-05.14	Use of Field Logbooks and Forms
5-21000-OPS-FO.3	General Equipment Decontamination
5-21000-OPS-FO.6	Handling of Personal Protective Equipment
5-21000-OPS-FO.7	Handling of Decontaminated Water and Waste Water
5-21000-OPS-FO.10	Receiving, Labeling, and Handling Environmental Material Containers
5-21000-OPS-FO.11	Field Communications
5-21000-OPS-FO.13	Containerization, Preserving, Handling and Shipping of Soil and Water Samples
5-21000-OPS-FO.14	Field Data Management
5-21000-OPS-FO.15	Photoionization Detectors and Flame Ionization Detectors
5-21000-OPS-FO.16	Field Radiological Measurements
5-21000-ER-OPS-GT.01	Logging Alluvial and Bedrock Material
5-21000-ER-OPS-GT.05	Plugging and Abandonment of Boreholes
5-21000-ER-OPS-GT.06	Monitoring Wells and Piezometer Installation
5-21000-ER-OPS-GT.10	Borehole Clearing
5-21000-ER-OPS-GT.39	Push Subsurface Soil Sample
5-21000-ER-OPS-GW.01	Water Level Measurements in Wells and Piezometers
5-21000-ER-OPS-GW.06	Groundwater Sampling

4.1 Project Completion

The results will be compiled into a brief data summary and map. The location and analytical data will be entered into the Water Database. At the end of the project, all records and field documentation will be turned over to the records center with the exception of analytical data which will be maintained by the APO record center. The results of this pre-remedial investigation will be utilized in developing a design for the NAPL collection system at this location.

4.2 Quality Assurance

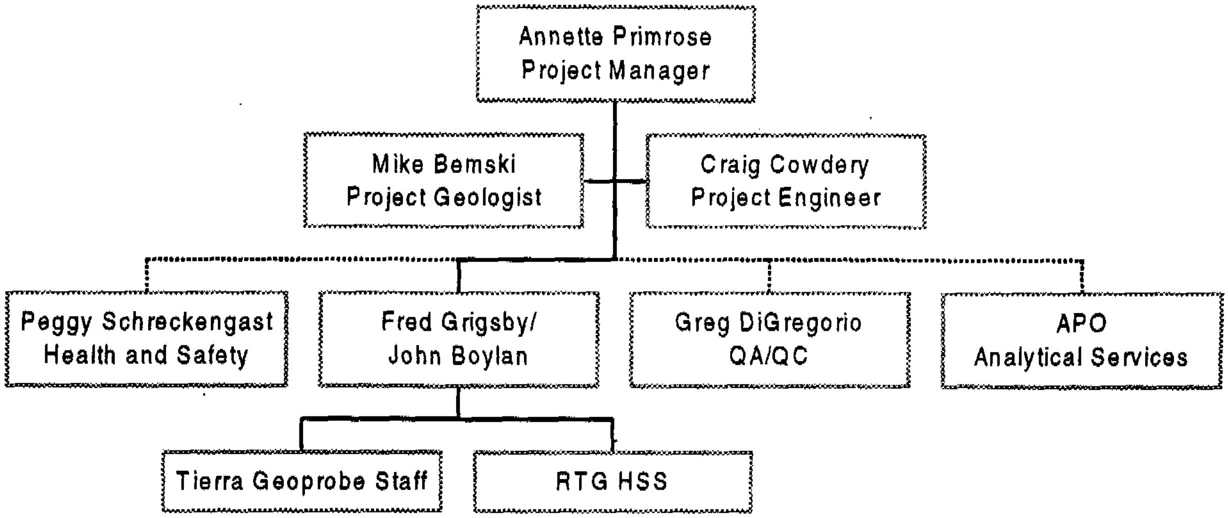
Analytical data collected in support of this investigation will be evaluated using the guidance established by the Rocky Flats Administrative Procedure 2-G32-ER-ADM-08.02 Evaluation of ERM Data for Usability in Final Reports. This procedure establishes the guidelines for evaluating analytical data with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters. Typically, for precision, the relative percent difference between samples and duplicates is less than or equal to 40% for soil. Accuracy of the laboratories will be obtained by using laboratories as directed by the Analytical Projects Office. Comparability will be evaluated by using standardized methods for the collection and analysis of samples. Completeness will be evaluated by comparing the proposed sampling program to the field program as completed. A goal of 90% is required.

Data validation will be required on 25% of the analytical data validation. Data validation will be performed by an independent third party subcontractor.

5.0 PROJECT ORGANIZATION

The project organization chart is presented in Figure 3. The ER Projects Group is responsible for management and coordination of resources dedicated to the project. Other organizations assisting with the implementation of this project are: RMRS Groundwater, RMRS Health and Safety, and RMRS Quality Assurance..

Figure 3. IHSS 118.1 Project Organization



6.0 REFERENCES

Ashtech, 1993 , *Ashtech XII GPS Receiver Operating Manual, Version 7,* March.

DOE, 1992, *Final Historical Release Report for the Rocky Flats Plant,* U.S. Department of Energy, Rocky Flats Plant, Golden, Colorado, June.

DOE, 1995, *Draft Data Summary 2, Operable Unit No. 9, Outside Tanks,* October 1995.

DOE, 1996a, *Final Rocky Flats Cleanup Agreement*, Rocky Flats Environmental Technology Site, Golden, CO.

EG&G, 1995a, *Geologic Characterization Report for the Rocky Flats Environmental Technology Site*, Volume I of the Sitewide Geoscience Characterization Study, EG&G Rocky Flats, Golden, Colorado, March.

EG&G, 1995b, *Hydrogeologic Characterization Report for the Rocky Flats Environmental Technology Site*, Volume II of the Sitewide Geoscience Characterization Study, EG&G Rocky Flats, Golden, Colorado, April.

EPA, 1992, *US EPA Test Methods for Evaluating Solid Waste*, Solid Waste-846, third edition, Method 8260A, Rev. 1., November.

EPA, 1994, *Guidance for the Data Quality Objectives Process*, EPA QA/G-4, September.

RMRS, 1996a, *Completion Report for the Underground Storage Tanks Source Removal Project*, RF/ER-96-0050.

RMRS, 1996b, *Final Revised Groundwater Conceptual Plan*, RF/ER-95-0121.UN.RMRS, 1997, *RMRS Quality Assurance Program Description*, RMRS-QAPD-001, Rev. 1, January.

7.0 LIST OF ACRONYMS

APO	Analytical Projects Office
DOE	Department of Energy
EPA	Environmental Protection Agency
ER	Environmental Restoration
FIDLER	Field instrument for the detection of low energy radiation
GPS	Global Positioning System
IHSS	Individual Hazardous Substance Site
NAPL	Nonaqueous Phase Liquid
OU	Operable Unit
PAM	Proposed Action Memorandum
PID/FID	Photoioniztion detector/flame ionization detector
QA/QC	Quality Assurance/Quality Control
QAPD	Quality Assurance Program Description
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RMRS	Rocky Mountain Remediation Services
SAP	Sampling and Analysis Plan
VOCs	Volatile organic compounds

8.0 APPROVALS

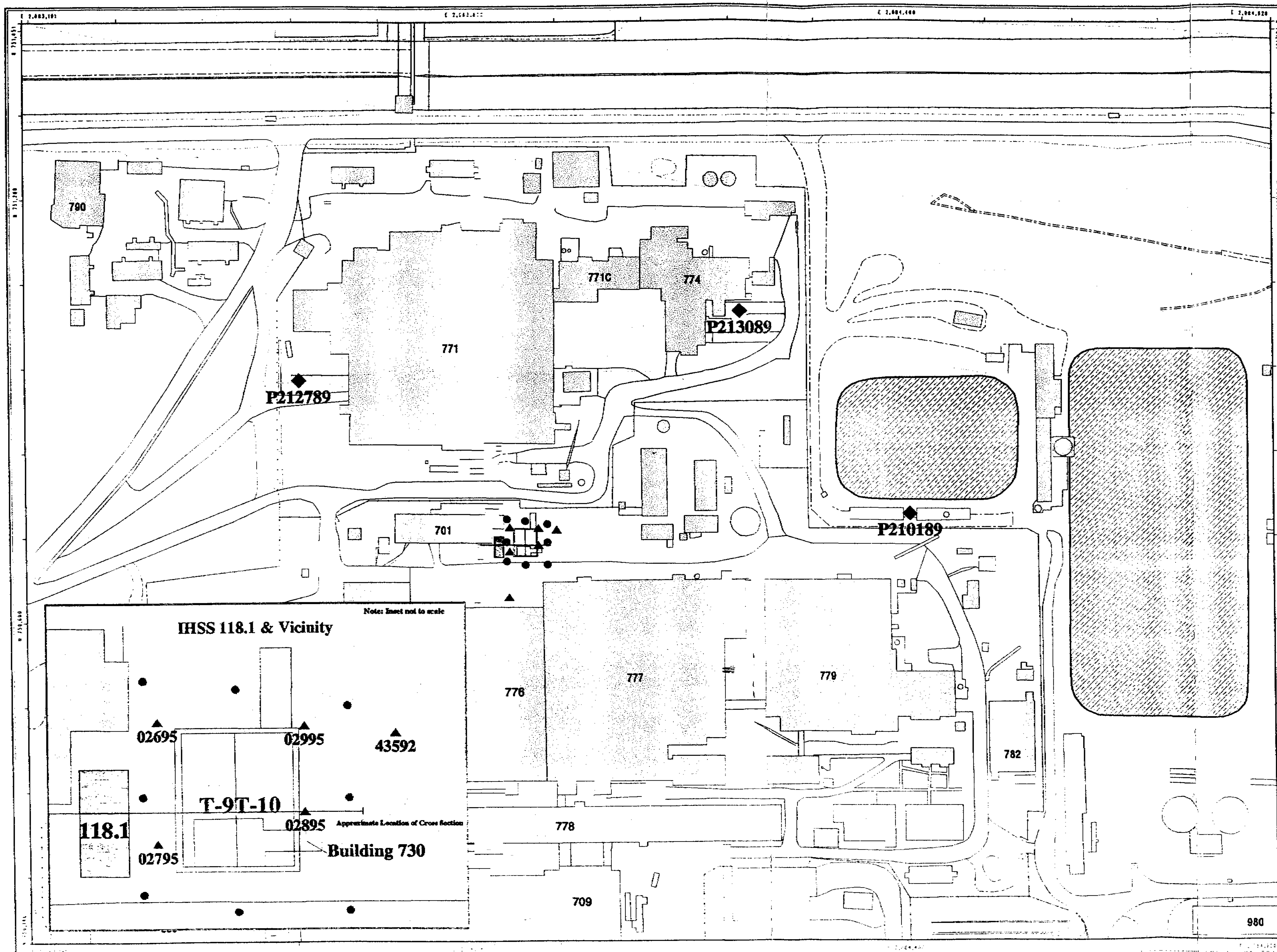
[signature] 9-9-97
Date

[signature] 9-9-97
Date

[signature] 9/9/97
Date

IHSS 118.1 Proposed Borehole Locations

Figure 1



EXPLANATION

- ● Proposed Boreholes
- ▲ Existing Borholes
- ◆ Monitoring Wells

Standard Map Features

- Buildings or other structures
- Solar evaporation ponds
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Contour (20-Foot)
- Paved roads
- Dirt roads

Scale = 1 : 1680
1 inch represents 140 feet

50 0 100 200 ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:
RMRS Rocky Mountain Remediation Services, L.L.C.
Geographic Information Systems Group
Rocky Flats Environmental Technology Site
P.O. Box 464
Golden, CO 80402-0464

MAP ID: 97-0180

September 08, 1997