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LIVERMORE ARCADE SHOPPING CENTER
SOIL AND GROUND-WATER INVESTIGATION

WORK PLAN FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Prepared For:

Grubb & Ellis Realty Income Trust
and
California Regional Water Quality Control Board

Prepared By:

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2200 Powell Street, Suite 880
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January 1992

Project No. 48016.08
Grubb & Ellis/Livermore Arcade/RI/FS Work Plan

H+GCL
Environmental Scientists and Engineers

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1.0 EXECUTIVE SUMMARY

H^+GCL (formerly known as Hygienetics, Inc.) has been retained by Grubb and Ellis Realty Income Trust (Grubb and Ellis) to perform a Remedial Investigation/Feasibility Study (RI/FS) at the Livermore Arcade Shopping Center (the Arcade) in Livermore, California. A work plan for an RI/FS that addresses the new ground-water conditions at the Arcade site was requested by the CRWQCB at a December 6, 1991, meeting with representatives of Grubb & Ellis. This work plan responds to that request.

Mike's One Hour Cleaners, at the Livermore Arcade Shopping Center, has been identified as the source of tetrachloroethylene (also referred to as perchloroethylene or PCE) contamination which has moved through the soil and into the ground water. Fifteen ground-water monitoring wells were installed to characterize the contamination. In 1990, the ground-water plume was defined to extend approximately 900 feet to the north in the direction of ground-water flow.

H+GCL discovered a significant decrease in the ground water table in the latter half of 1991. Ground water had previously been measured at depths of approximately 40 feet, but during the November 1991 quarterly monitoring, the ground-water elevation was determined to be below the depths of the deepest monitoring wells at the site, which were screened to 65 feet. The CRWQCB requested that Grubb & Ellis submit a work plan to characterize the new ground-water conditions at the Arcade site.

Potential exposure pathways were evaluated, and the only significant threat to human health and the environment is the possibility of PCE and its degradation products impacting the drinking water aquifers used by the city of Livermore.

A work plan has been developed to characterize the distribution of the contaminants in relation to changing ground-water conditions allowing remedial action to be implemented. The work plan tasks will generate data to be evaluated in the RI/FS process. Soil and ground-water sampling and analyses will verify the distribution of the PCE in the unsaturated zone and in the saturated zone. One boring will be positioned near the source of the PCE release at Mike's One Hour Cleaners. The second boring will be positioned down-gradient from the source, on the north side of Miller's Outpost store. Both borings will be completed as screened wells in anticipation of implementing a vapor extraction system as the chosen remedial action. City water supply wells in the vicinity of the site will be sampled periodically to verify that PCE is not entering the lower aquifers in significant concentrations.

1. A Quality Assurance/Quality Control document, a Sampling and Analysis Plan (SAP) and a Health and Safety Plan have been prepared.

A Baseline Public Health Evaluation (BPHE) will determine the potential public health effects of soil and ground-water contamination from the Arcade site. The BPHE will determine the health risks associated with the present concentration of contaminants in the soil and ground water at the site.

General response actions will be developed in the feasibility study. A review of all remedial action alternatives will then be conducted. The review will identify potential technologies that could be applied at the site. The specific technologies will be evaluated on the basis of effectiveness, feasibility of implementation, and cost. A detailed analysis of the remedial alternatives will then be developed, and final alternative choices will be refined. Pilot tests may be required to complete the study. The feasibility study report will be presented as support for the Record of Decision (ROD).

Three preliminary remedial action alternatives have been identified and will be evaluated in the feasibility study. These are No Action, Ground-Water Treatment, and Soil Vapor Extraction

A combined RI/FS report will be prepared to document the results of the feasibility study. The combined RI/FS report will be circulated for comment, in draft form, in accordance with the community relations plan. The work plan and draft RI/FS will be completed within a maximum time frame of eleven weeks from the date of this report's approval.

2.0 INTRODUCTION

H$^+$GCL (formerly known as Hygienetics, Inc.) has been retained by Grubb and Ellis Realty Income Trust (Grubb and Ellis) to perform a Remedial Investigation/Feasibility Study (RI/FS) at the Livermore Arcade Shopping Center (the Arcade) in Livermore, California. This work plan is a supplement to previous investigations and addresses recent changes in the ground-water conditions beneath the Arcade site.

The results of the previous investigations were presented in a series of reports and correspondence that began October 12, 1990, and have been submitted to the California Regional Water Quality Control Board (CRWQCB) and Alameda County Environmental Health, Hazardous Materials Division (Alameda County). These reports are listed in Section 9.0.

A work plan for an RI/FS that addresses the new ground-water conditions at the Arcade site was requested by the CRWQCB at a December 6, 1991, meeting with representatives of Grubb & Ellis. This work plan responds to that request. A supplemental work plan will accompany the RI/FS Report to address post-RI/FS activities, including enforcement, cost recovery, design, implementation, operation, and maintenance of the selected remedial action.

3.0 SITE BACKGROUND AND PHYSICAL SETTING

The City of Livermore, California is located approximately 25 miles east of San Francisco Bay along Highway 580 (Figure 1). The Livermore Arcade Shopping Center is located at the northwest corner of First Street and South P Street in downtown Livermore. Railroad Avenue borders the Arcade site to the north. South S Street borders the site to the west.

The Livermore Arcade Shopping Center was constructed in 1972. The property covers approximately 11.75 acres, including large asphalt parking areas. The topography is relatively flat with runoff moving to the north and west. Twelve retail stores and two restaurants occupy the tenant spaces. Ornamental vegetation on the property consists of grass, bushes and small trees.

As presented in H$^+$GCL's report, dated October 12, 1990, Mike's One Hour Cleaners at the Livermore Arcade Shopping Center has been identified as the source of tetrachloroethylene (also referred to as perchloroethylene or PCE) contamination which has moved through the soil and into the ground water. Statements made by the current operator of Mike's One Hour Cleaners indicated that the former operator routinely discharged PCE waste into the floor drain. The floor drain leads to a broken four-inch diameter sewer line which released the PCE into the soil. A constant flow of water through the line washed the PCE through the soil and dissolved it. The dissolved phase PCE entered the ground water and spread north in the direction of ground-water movement.

Alameda County became the lead agency, and, along with the CRWQCB, directed Grubb & Ellis to install monitoring wells to determine the hydrogeological conditions beneath the site and the vertical and horizontal extent of the PCE contamination. The soil and ground-water investigation (Hygienetics, October 12, 1990) found dissolved phase PCE contamination in the shallow ground water (40 - 65 feet). In addition, no detectable levels of PCE or other organic contaminants were found in the California Water Service (CWS) wells[1] screened in the deeper aquifers (120 - 400 feet) and located adjacent to the PCE plume originating at Mike's Cleaners. In historical CWS well boring logs, several clay

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[1] California Water Service well #10, which is located approximately one mile north of the Arcade site, was shut down for several years due to PCE contamination detected above regulatory action levels. Several investigations were conducted but the source of the PCE contamination was never verified. The PCE concentrations eventually decreased but the well remained closed because of increased nitrate concentrations.

acquitters were found to exist between the depths of 75 and 110 feet in the site vicinity. The acquitters separate the surface ground water from the deeper production zones. All fifteen ground-water monitoring wells installed at the Arcade site by H+GCL were completed above the clay aquitard, in order to avoid the risk of damaging this natural protective layer

An interim ground-water remediation plan proposing ground-water extraction and carbon treatment of the contaminated shallow ground water was submitted by Grubb & Ellis and preliminarily approved by Alameda County and the CRWQCB (Wistar, December 6, 1990, CRWQCB, December 14, 1990). In quarterly monitoring throughout 1991, H+GCL detected very little change in the contaminant levels but discovered a significant decrease in the ground-water table in the last quarter of 1991. The November 1991 quarterly monitoring of the ground-water elevation at the Arcade site showed that the ground water had fallen below the depth of the deepest ground-water monitoring well, MW-7, which is screened to 65 feet. The ground water had previously been measured at depths of between 40 and 44 feet.

The Arcade site is located in the Mocho sub-basin, which is a natural recharge area for the Livermore ground-water basin. Mr. David Lunn, Water Resources Engineer of Alameda County Flood Control Zone 7, monitors ground-water levels in the Livermore area and directs the ground-water artificial recharge program. Mr. Lunn informed H+GCL that due to the drought conditions the artificial recharge program had been temporarily discontinued. In addition, CWS, who operates many high volume water supply wells in the Livermore area, had recently doubled production. Mr. Lunn stated that he had seen a drop in the shallow ground-water table of up to 35 feet in the Livermore area.

H+GCL informed Alameda County and the CRWQCB of the changes in the ground-water level and explained that previously planned approaches for ground-water remediation are probably no longer be applicable. At this time, due to relative staffing levels, the CRWQCB decided to take over as the lead agency. In a meeting with the CRWQCB and representatives of Grubb & Ellis on December 6, 1991, the changing ground-water conditions were discussed as well as several new remedial action alternatives. The CRWQCB requested that Grubb & Ellis submit a work plan to characterize the new ground-water conditions at the Arcade site.

4.0 INITIAL EVALUATION

The subsurface conditions were evaluated by reviewing information acquired from previous studies of the Livermore Ground-Water Basin and subsurface investigation reports of the Arcade site. The distributions of PCE in the ground water and in the soil were defined prior to the significant decrease in the ground-water elevation. To explain the behavior of the PCE contamination under the changing subsurface conditions, three hypothetical scenarios were developed. Threats to human health were also evaluated.

4.1 Types and Volumes of Waste Present

The locations of the highest concentrations of contaminants discovered in the ground water during previous investigations are listed in Table I.

Tetrachloroethylene (PCE), cis-1,2-dichloroethene, and trichloroethene were detected in the ground water, with the highest concentrations found in monitoring well MW-7 at Mike's One Hour Cleaners. The volume of PCE that has leaked into the soil and reached the ground water is unknown. However, the concentration and distribution of contaminants in the ground water was defined to the satisfaction of the CRWQCB and Alameda County. The PCE plume in 1990 was defined to be approximately 900 feet in length, extending north of Mike's One Hour Cleaners.

The ground water along the eastern edge of the Arcade site has been impacted with gasoline. Components of gasoline (i.e. benzene, toluene, ethylbenzene and total xylene isomers) were detected in the ground water in monitoring well MW-1, located on the southeast corner of the Arcade property. There is significant evidence that the gasoline leaked from underground storage tanks at a Beacon Oil Service Station located just southeast and up-gradient of the site. Activities related to verifying the source of the gasoline release and determining the extent of contamination have not been addressed in this investigation

Chloroform, bromodichloromethane and bromoform were detected in the ground water, with the highest concentrations found in monitoring well MW-9. These chemicals are common products of chlorine degradation in drinking water disinfection processes and have also been detected as remnants of analytical processes.

TABLE I

Ground-Water Contaminants
Livermore Arcade Shopping Center

Contaminant	Maximum Concentration (ug/l)	Location
TPH-gasoline	84,000	MW-1
Benzene	11,000	
Ethyl Benzene	3,400	
Toluene	22,000	
Total Xylene Isomers	20,000	
Tetrachloroethylene (PCE)	900	MW-7
cis 1,2 - Dichloroethene	140	
Trichloroethene	26	
Chloroform	20	MW-9
Bromodichloromethane	10	
Bromoform	2	

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ug/l: micrograms per liter
MW: Monitoring Well
TPH: Total Petroleum Hydrocarbons

4.2 Potential Pathways of Contaminant Migration

The decline of the ground-water table at the site has been documented (H+GCL, January 8, 1992). The ground water dropped from 42 feet to below the screened interval of the deepest monitoring well at the site (65 feet), which is at least a 23-foot decline. It is unknown how far below screened interval the groundwater has dropped, although Alameda County reported that ground water has fallen 35 feet in the Livermore area.

Soil and ground-water sampling was performed to a depth of 65 feet during previous site investigation activities. Analyses indicated that PCE contamination was limited to the the upper portion of the shallow aquifer and was present only in a dissolved phase form (Hygienetics, October 12, 1990).

Hypothetical Scenarios for Ground-Water Movement

The reduction in the ground-water table presents several potential migration paths for ground-water contaminants. Based upon an analysis of subsurface conditions at the site, the following possible ground-water contaminant migration scenarios have been developed:

1. As much as 15% of the ground water may now be retained within the soil as vadose water. This soil may contain a significant amount of the most highly contaminated ground water in its pore spaces. The soil column contains a significant amount of clay. PCE contaminated water will tend to sorb to clay particles in the unsaturated zone as the ground-water table is reduced. The transfer of contaminated ground water would rid the aquifer of a significant portion of its contaminants, which would now become susceptible to volatilization and biological processes.

2. Contaminated ground water that has not been retained in the soil may have followed vertical pathways downwards through the aquifer and PCE concentrations may have been reduced as the ground water percolated through the soil. The PCE concentrations in the ground water at the lower position may no longer exceed regulatory action levels.

3. Contaminated ground water that has not been retained in the soil may have followed vertical pathways downwards through the aquifer and

moved into the lower portion of the shallow aquifer in concentrations exceeding regulatory action levels.

4.3 Potential Exposure Pathways

Potential pathways for contaminants to impact human health are ingestion, inhalation and dermal exposure. No human exposures of any kind have been reported at the Arcade site.

The significant threat to human health and the environment is the possibility of PCE and its degradation products impacting the drinking water aquifers used by the city of Livermore. Several water supply wells operated by CWS are located in close proximity to the Arcade site. The wells pump ground water from several deep (200-400 feet) aquifers. These wells (if improperly installed) can act as conduits for vertical migration, allowing the PCE to enter the deeper aquifers. These wells have been sampled periodically and no PCE or other organic contaminants have been detected.

No significant PCE contamination has been discovered in the soil at the source of the PCE release. The contaminated ground water was previously located at an average depth of 40-feet and is now considerably lower. Much of the surface area overlying the PCE contamination is paved with asphalt and concrete. The risk of human exposure by inhalation of PCE vapors is considered insignificant.

Dermal exposure to PCE contamination would be limited to field personnel involved with drilling and sampling programs at the site. All personnel involved with those activities will be trained in hazardous materials handling procedures and will be equipped with the appropriate protective gear.

4.4 Work Plan Rationale

Additional subsurface information must be collected to characterize the distribution of contaminants due to the changing ground-water conditions at the Arcade site. A soil boring will be placed near the source of the PCE release. Soil samples collected at 5-foot intervals from a depth of 40-feet to the bottom of the aquifer will be analyzed for solvent and gasoline compounds. The analytical results will verify the distribution of the PCE concentrations, and any other related compounds, in the soil and in the ground water, allowing the development of remedial alternatives.

Soil sampling and analysis will verify the distribution of PCE (and other previously identified compounds) in the unsaturated soil zone. The bottom of the aquifer can be defined by a prominent clay unit located at depth of 70 to 90 feet. The borings will be completed as monitoring wells, screened to the deepest portion of the shallow aquifer to allow for future ground-water monitoring under the changing ground-water conditions. These wells may also be used as vapor extraction wells if a significant amount of PCE contamination has been retained in the unsaturated zone. Ground-water sampling and analysis will verify the thickness of the saturated zone and will document the change of PCE concentrations in the ground water in the lower portion of the aquifer.

The first boring will be near the source of the PCE release at Mike's One Hour Cleaners (Figure 2). This is the location of the highest levels of PCE contamination previously detected in the ground water beneath the site (Figure 2). Soil and ground-water sampling results should indicate the vertical distribution of the highest PCE concentrations in the site subsurface.

The second boring will be located down-gradient from the source on the north side of the Miller's Outpost store (Figure 3). The levels of PCE contamination previously detected in the ground water beneath this area are representative of the down-gradient portion of the plume (Figure 2). Soil and ground-water sampling results should indicate the vertical distribution of lower PCE concentrations in the site subsurface at the site.

One soil and one ground-water sample from each of the two borings will be analyzed for California metals and a full gas chromatograph (GC) scan will be performed for semi-volatile organics (including PCBs and pesticides). These tests will identify any contaminants, other than halogenated and aromatic volatile organics, that may be present in the PCE contaminated zone. This information is necessary to design an effective remediation system and assure regulatory compliance.

Two CWS wells (CWS-3 and CWS-8) are located adjacent to the PCE plume area (figure 3). Continued periodic sampling from these wells will assure the Livermore community that detectable concentrations of PCE are not entering one of their drinking water sources. The analysis will be performed by EPA Method 524.2 for purgeable organics. This method is used to determine compliance to the Safe Drinking Water Act and provides a lower detection level than other similar analyses.

5.0 REMEDIAL INVESTIGATION WORK PLAN

The RI/FS will be consistent with requirements presented in the National Contingency Plan (NCP) as codified in 40 CFR Part 300 with revisions effective February 6, 1990; "Guidance for Conducting Remedial Investigations and Feasibility Studies" (OSWER Directive 9355.3-01, October 1988); Section 25356.1 of the California Health and Safety Code; and the State Water Resource Control Board Resolution No. 68-16. The RI/FS will also conform to the Expenditure Plan for the Hazardous Substance Cleanup Bond Act of 1984, originally published January 1985, as revised.

The following work plan tasks will resolve which ground-water migration scenario (as outlined in Section 3.2) presently exists at the site. The data acquired will provide supplemental information needed to conduct a Baseline Public Health Evaluation (BPHE) and to evaluate the remedial action alternatives in the feasibility study. Additional work may be required upon completion of the work plan tasks and the analysis of the acquired data.

5.1 Data Requirements

Due to the declining ground-water table beneath the Arcade site, soil and ground-water sampling must be performed to determine whether contaminated ground water is being held in the pore spaces of the soil and to verify whether the shallow ground water has remained contaminated at levels exceeding regulatory standards.

An HNu photoionization detector with a 10.2 electron-volt ionization source lamp will be used to field screen soil samples at the down-gradient boring location and to help select the samples to be sent to the laboratory for analysis. The HNu will also be used to monitor the breathing zone during all drilling activities.

Soil and ground-water samples will be analyzed for aromatic and halogenated hydrocarbons using approved EPA Methods 8020 and 8010 as referenced in EPA Publication SW-846. One soil sample from each boring location will be analyzed for Title 26 Metals and for semi volatiles (including PCBs and pesticides) by EPA Method 8270.

As noted in Section 4.4, deeper aquifer zones will be monitored through periodic sampling of the CWS water supply wells. The analysis will be by EPA Method 524.2 for purgeable organics. This method is used for compliance to the Safe Drinking Water Act and provides a lower detection limit than other comparable analyses.

5.2 Subsurface Investigation Tasks

All work performed at the Arcade site under this work plan will be conducted according to the H+GCL Standard Operating Procedures outlined in appendix 1. A Quality Assurance/Quality Control document has been developed for the Arcade site work and is presented in appendix 2. A Sampling and Analysis Plan (SAP) has been developed for the Arcade site work and is attached in appendix 3.

The Health and Safety Plan is presented in appendix 4. All field personnel involved with the subsurface investigation tasks will be familiar with the contents of the H+GCL Health and Safety Plan (HSP) specifically designed for the Arcade site. One copy of the HSP will be kept on-site at all times for the duration of the field investigation. All on-site personnel will read, sign, and agree to adhere to the plan.

The following subsurface investigation tasks will be performed:

1) Drill one soil boring at the source and one in the down-gradient portion of the previously documented PCE plume area.

   Advance the boring through the extended unsaturated zone and through the saturated zone to the bottom of the aquifer.

   Utilize a core soil sampler to document the depth of lithologic contacts and to identify the depth of the clay aquitard. Take precautions to prevent penetrating the clay acquitters.

   Collect soil samples every five feet for laboratory analyses in the interval between a 40 foot depth and the clay aquitard to establish a PCE distribution profile in the unsaturated zone.

Deliver soil samples to an EPA and California certified environmental laboratory under strict chain-of-custody protocols .

Analyze the soil for halogenated volatile organic compounds by EPA Method 8010 and aromatic volatile organic compounds by EPA Method 8020.

Analyze one soil sample from each boring location for Title 26 Metals

Analyze one soil sample from each boring location for for semi-volatiles (including PCBs and pesticides) by EPA Method 8270. If other contaminants not previously identified are discovered, the SAP may be expanded

2) Stop each boring upon entry into the clay aquitard; complete the hole as a screened well.

Survey the new wells to determine the relative ground-water elevations.

Develop each well by the surge/bail method or by the bail/pump method.

Sample ground water from each well.

Deliver ground-water samples to a California certified environmental laboratory under strict chain-of-custody protocols.

Analyze the ground water for halogenated volatile organics by EPA Method 8010 and aromatic volatile organics by EPA Method 8020.

Analyze one ground-water sample from each of the new wells for Title 26 Metals.

Analyze one ground-water sample from each of the new wells for semi-volatiles (including PCBs and pesticides) by EPA Method 8270. If other contaminants not previously identified are discovered, the SAP may be expanded

3) Perform monthly sampling of California Water Service wells CWS-3 and CWS-8 for six months and monitor quarterly for one year thereafter.

Deliver ground-water samples to a California certified environmental laboratory under strict chain-of-custody protocols.

Analyze the ground water for purgeable organics by EPA Method 524.2.

5.3 Baseline Public Health Evaluation

A Baseline Public Health Evaluation (BPHE) will determine the potential public health effects of soil and ground-water contamination from the Arcade site. The BPHE will utilize all site-related data including the results from the proposed RI, and the physical, chemical and toxicological properties of the chemicals detected at the site. The BPHE will determine the health risks associated with the present concentration of contaminants in the soil and ground water at the site. The results may influence the choice of remedial action.

5.4 Remedial Investigation Report

A combined RI/FS Report will be prepared, setting out the results of the remedial investigation. The RI portion of the RI/FS report will provide a discussion of previous studies performed at the site and will present the latest data acquired from the performance of the tasks described in this work plan. The results of these subsurface investigations will be compiled and evaluated to characterize the site and to develop the BPHE. Prior to the completion of the RI/FS report, further sampling may be required to evaluate the potential remedial action alternatives in the FS.

6.0 FEASIBILITY STUDY

The feasibility study processes and objectives will be presented, and remedial action alternatives will be evaluated to provide data for final remedy selection.

6.1 Feasibility Study Process and Objectives

The RI/FS will be consistent with requirements presented in the National Contingency Plan (NCP) as codified in 40 CFR Part 300 with revisions effective February 6, 1990; "Guidance for Conducting Remedial Investigations and Feasibility Studies" (OSWER Directive 9355.3-01, October 1988); Section 25356.1 of the California Health and Safety Code; and the State Water Resource Control Board Resolution No. 68-16. The RI/FS will also conform to the Expenditure Plan for the Hazardous Substance Cleanup Bond Act of 1984, originally published January 1985, as revised.

General response actions will be developed after sufficient data are available, then a review of all remedial action alternatives will be conducted. The review will identify potential technologies that could be applied at the site. The specific technologies will be evaluated on the basis of effectiveness, feasibility of implementation, and cost. A detailed analysis of the remedial alternatives will then be developed, and final alternative choices will be refined. Pilot tests may be required to complete the study. The feasibility study report will be presented as support for the Record of Decision (ROD).

The general remedial objective of the FS process is to develop a remedy with the following characteristics:

a. Protects public health and the environment

b. Satisfies applicable, relevant and appropriate requirements (ARARs)

c. Provides practical, cost-effective remediation

d. Utilizes permanent remedies, completed in the shortest feasible time frame

e. Addresses contamination resulting from on-site sources only

Site specific remedial objectives include:

a. Prevent the near term and future exposure of human receptors to contaminated ground water on- and off-site

b. In soil and ground water emanating from the site, reduce contaminant levels to those which protect human health and environment. Restore contaminated aquifer for future use

c. Control contaminant migration to prevent further spreading

d. Monitor ground water to verify effectiveness of the remedial measures

6.2 Preliminary Remedial Action Alternatives

Three preliminary remedial action alternatives have been identified that will be evaluated in the feasibility study. Upon completion of the subsurface investigation activities outlined in Section 4.2, detailed review of the current site conditions will be performed and a study of all proven and available remedial action alternatives will be presented. Each alternative will be fully evaluated and discussed.

Three preliminary remedial action alternatives have been identified considering the scenarios discussed in Section 3.2.

- **No Action Alternative**

  The no action alternative would be the most appropriate if site soil and ground-water contamination are demonstrated to be significantly reduced as a result of the decline in the ground-water table. The soil column contains a significant amount of clay. PCE contaminated water will tend to sorb to clay particles in the unsaturated zone as the ground-water table is reduced. If PCE is found in the unsaturated soil zone at concentrations below or near action levels, natural biodegradation and volatilization would eventually reduce PCE concentrations to below detection limits.

  The Baseline Public Health Evaluation can verify whether there would be a significant impact to human health and the environment.

- **Ground-Water Treatment**

Ground-water treatment, as originally reviewed by Alameda County and the CRWQCB, may not be appropriate if there is not enough ground water above the clay aquiclude to allow pumping. If a sufficient quantity of contaminated ground water is present and must be remediated, there are two possible remedial action alternatives. The soil can be vented near the saturated zone to promote insitu volatilization of the contaminants, or ground-water can be extraction and treated.

- **Vapor Extraction of Contaminated Soil**

If the majority of the contaminated ground water is bound in the soil pores, vapor extraction of the most highly contaminated zones may be appropriate. Vapor extraction in the vicinity of Mike's One Hour Cleaners would prevent recontamination of the ground water if the ground water eventually rises to its previous position. All of the monitoring wells at the site can be considered potential extraction wells.

Table 2

Alternatives Matrix

Condition	No Action	GW Remediation	Vapor Extraction
Soil Contamination Significant			X
Soil Contamination Not Significant	X		
Ground-Water Contamination Not Significant	X		
Ground-Water Contamination Significant		X	
• GWT approaches aquiclude	X		
• GWT does not approach aquiclude		X	

6.3 Feasibility Study Report

A combined Remedial Investigation/Feasibility Study Report will be prepared to document the results of the feasibility study. Petroleum hydrocarbons previously identified at the site were released from an off-site source. It is anticipated that the remedial alternatives will not address the remediation of these petroleum hydrocarbons. The combined RI/FS report will be circulated for public comment in draft form, in accordance with the Community Relations Plan (appendix 5). Following the receipt of public comment on the draft RI/FS, a final RI/FS will be prepared in conjunction with a ROD memorializing the selection of a remedial action .

7.0 SCHEDULES

The work plan tasks outlined in Section 4.2 could be performed within two to six weeks of client approval of this plan.

Completion of the Feasibility Study and the draft RI/FS report would require an additional three to five weeks. In accordance with the Community Relations Plan, it is anticipated that a 30-day public comment period will then be provided on the draft RI/FS. Following the receipt of public comments, the final RI/FS and ROD will be adopted within approximately two to four weeks.

A Supplemental Community Relations Plan may be implemented upon completion of the Feasibility Study if sufficient public interest is expressed during the RI/FS process.

Approval of the ROD and the eventual completion of the Remedial Action Plan may be affected by agency response time.

8.0 PROJECT MANAGEMENT

H^+GCL - Principal Consultants

The staffing requirements for this work plan shall be as follows:

- Principal in Charge: Randy Hicks, R.G.
  Mr. Hicks is a Principal Hydrogeologist with extensive experience in ground-water investigations and remediation. He will provide quality control and review of all plans and reports.

- Project Manager: Karl Novak, P.E., R.E.A.
  Mr. Novak will direct daily operations, coordinate activities and prepare investigation findings and feasibility study results.

- Project Geologist: Mike Wright, R.E.A.
  Mr. Wright will perform field sampling, log borings, and monitoring well installation. He will assist with preparation of the report and coordination of field activities.

All H^+GCL personnel employed to the Arcade site will be appropriately trained and qualified to perform their assigned tasks.

Grubb & Ellis Realty Income Trust - Current Owner

Owner's Representative: John Hyjer

Mr. Hyjer is responsible for overall project management, including the hiring, direction and coordination of consultants, supervision of cost recovery activities, and the ultimate selection and implementation of remedial action.

Consulting Attorney: Alan C. Waltner

Mr. Waltner (formerly a supervising attorney at EPA, Region IX) is providing legal review of RI/FS activities and will be responsible for pursuing cost recovery litigation against the responsible parties, if necessary.

9.0 REFERENCES

1. "Environmental Site Assessment, Livermore Arcade Shopping Center", Hygienetics, Inc., February 27, 1990

2. "Phase II Subsurface Investigation, Livermore Arcade Shopping Center", Hygienetics, Inc., April 3, 1990

3. "Phase III Subsurface Investigation, Livermore Arcade Shopping Center", Hygienetics, Inc., April 13, 1990

4. "Subsurface Investigation, Livermore Arcade Shopping Center", Hygienetics, Inc., October 12, 1990

5. Letter to CRWQCB, Hygienetics, Inc. November 11, 1990

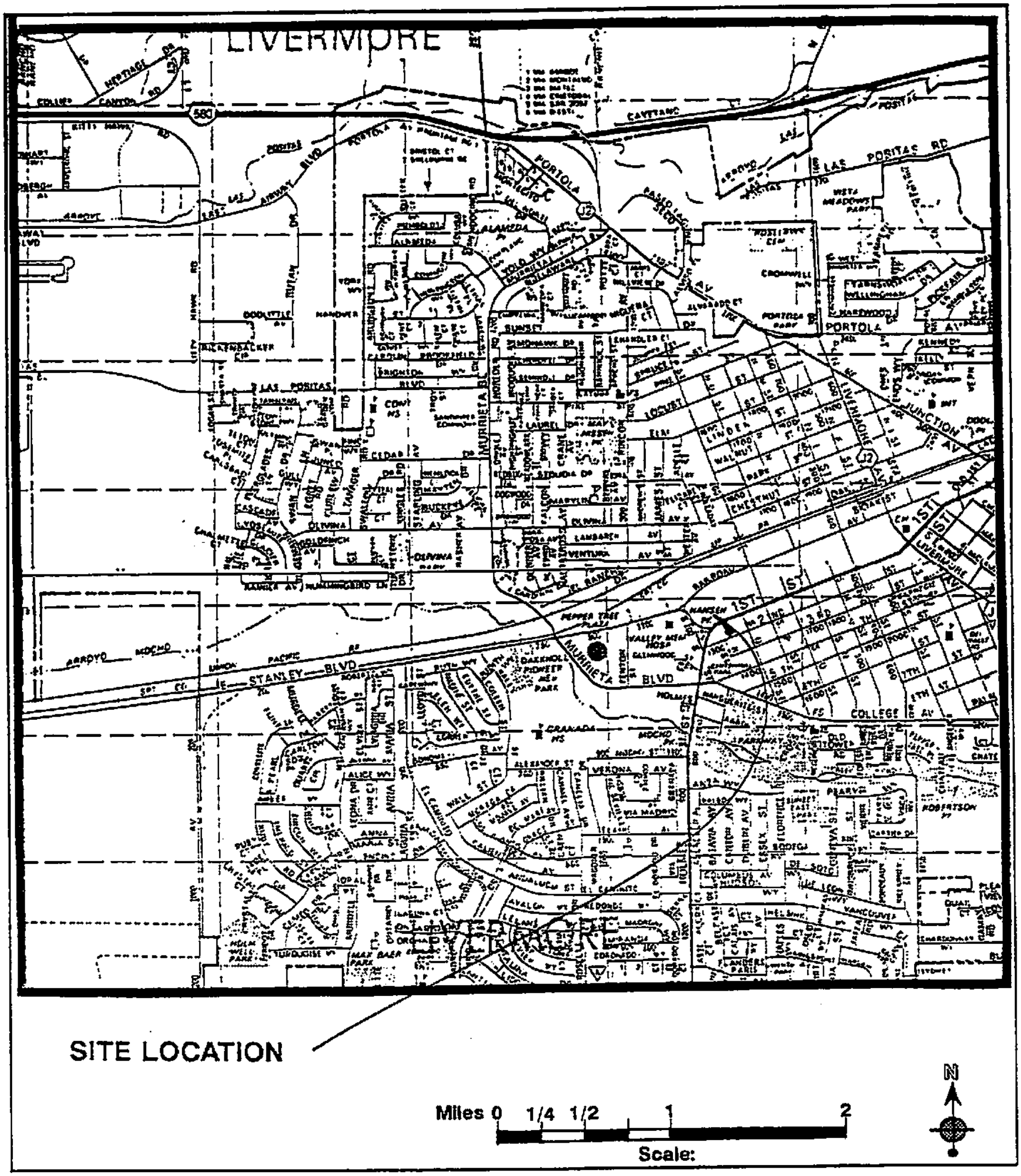
6. Letter to Gil Wilstar, Department of Environmental Health, Alameda County, December 4, 1990

7. Letter to Hygienetics, Inc., CRWQCB, December 14, 1990

8. "Quarterly Ground-Water Monitoring, March 1991, Livermore Arcade Shopping Center", Hygienetics, Inc., March 18, 1991

9. "Quarterly Ground-Water Monitoring, July 1991, Livermore Arcade Shopping Center", Hygienetics, Inc. , September 19, 1991

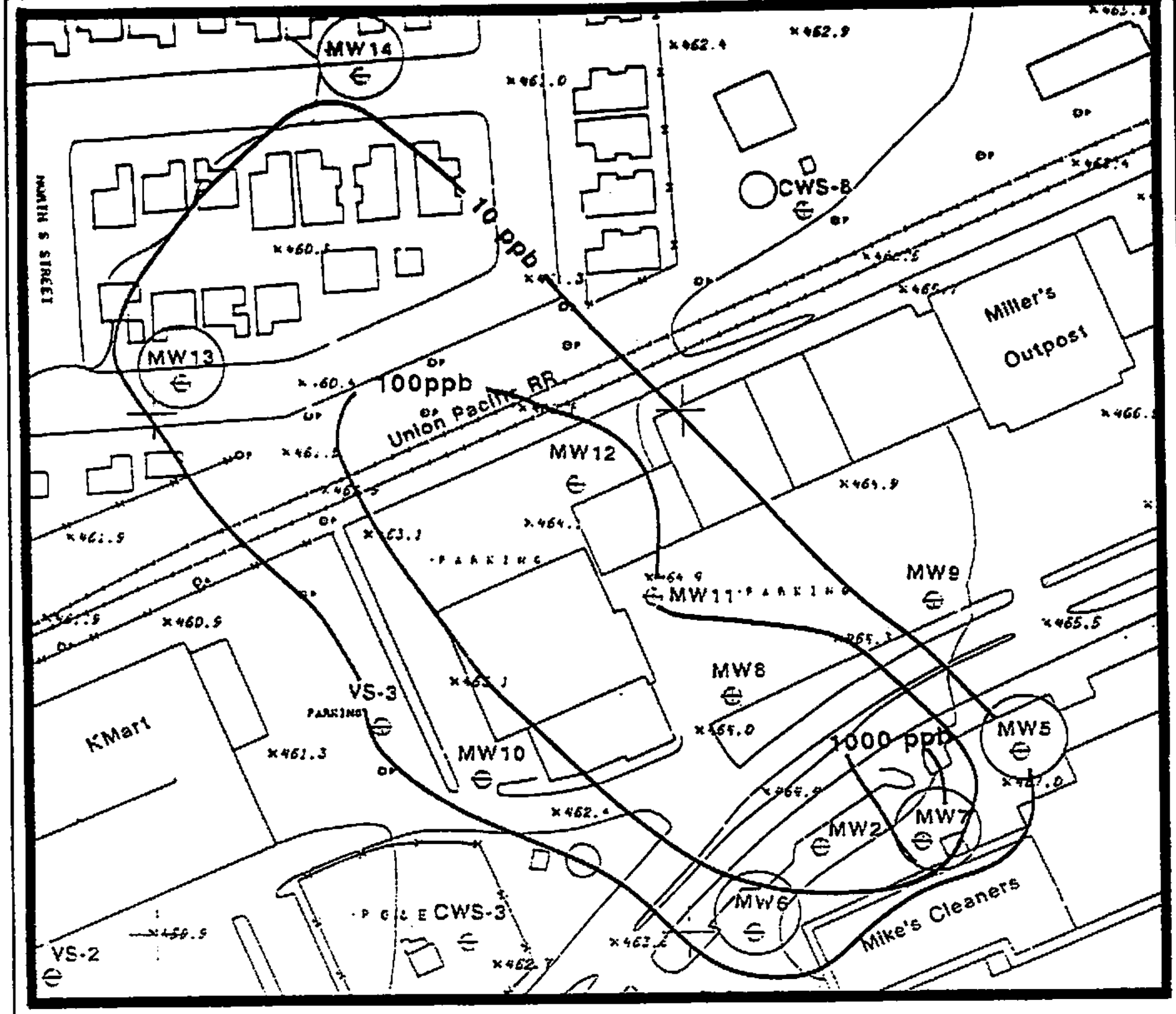
10. Quarterly Ground-Water Monitoring, November 1991, Livermore Arcade Shopping Center", Hygienetics, Inc., January 8, 1992



SITE LOCATION	Hygienetics/GCL	PROJECT NO.	SITE MAPS	DATE
ARCADE SHOPPING CENTER Livermore, California	GCL Environmental Partners Industrial Hygienists Architecture / Engineers Environmental Consultants	48016.04 DRN BY. Dlo		Jan. 1992
		REV.	DATE	DESCRIPTION
				FIGURE 1

FIGURE 2

PCE GROUND-WATER PLUME



LEGEND

MW10 ⊕ H+GCL Monitoring Well

VS-1 ⊕ Versar Monitoring Well

CWS-3 ⊕ California Water Service Well

(MW7 ⊕) Sampled Monitoring Well

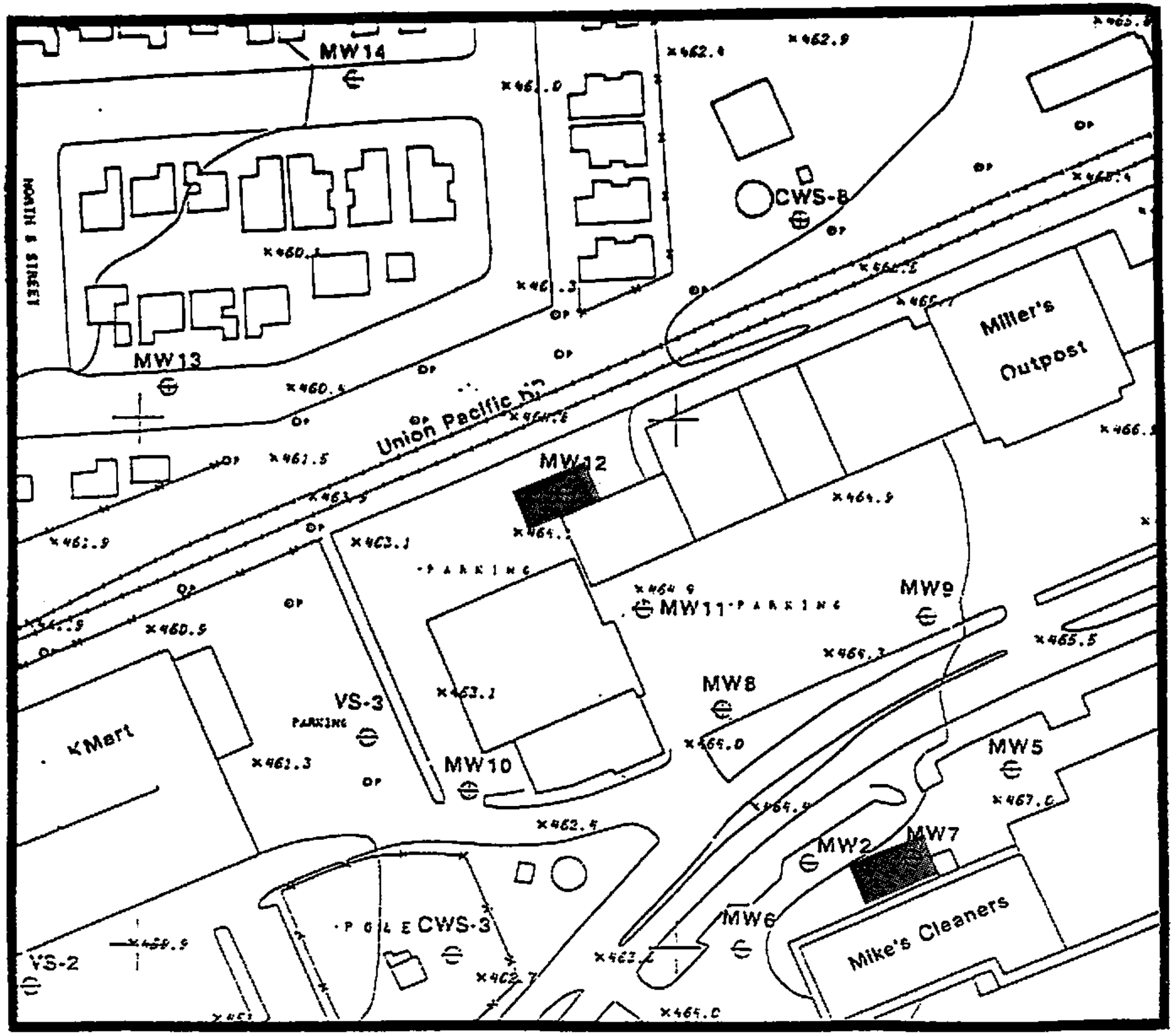
0 100 200 Feet
Scale

N

SITE LOCATION		PROJECT NO.		DATE
ARCADE SHOPPING CENTER Livermore, California	Hygienetics/GCL H+GCL Environmental Partners Industrial Hygienists Architecture / Engineers Environmental Consultants	48016.04 DRN BY. Dio	PCE DISTRIBUTION	Jan. 1992
		REV. | DATE	DESCRIPTION	FIGURE 2

FIGURE 3

PROPOSED DRILLING AND SAMPLING LOCATIONS



LEGEND

MW10 ⊕ H+GCL Monitoring Well

▨ **Proposed Sampling Locations**

VS-1 ⊕ Versar Monitoring Well

CWS-3 ⊕ California Water Service Well

0 100 200 Feet
Scale

N

SITE LOCATION		PROJECT NO.	WELL LOCATIONS	DATE
ARCADE SHOPPING CENTER Livermore, California	Hygienetics/GCL H+GCL Environmental Partners Industrial Hygienists Architecture / Engineers Environmental Consultants	48015.04 DRN BY. Dlo		Jan. 1992
		REV. DATE	DESCRIPTION	FIGURE 3

APPENDIX 1

STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURES
FOR
THE LIVERMORE ARCADE SHOPPING CENTER
LIVERMORE, CALIFORNIA

Prepared for:

Grubb & Ellis Realty Income Trust
One Montgomery Street
San Francisco, California 94103

Prepared by:

H+GCL, INC.
2200 Powell Street, Suite 880
Emeryville, CA 94608

JANUARY 1991

Project No. 48016-08
LivermoreArcade/SOP

Rev. 1/08/92

TABLE OF CONTENTS

2.0 STANDARD OPERATING PROCEDURES FOR HOLLOW-STEM AUGER DRILLING AND MONITORING WELL INSTALLATION

2.1 Purpose

To describe the work to be performed during monitoring well installation using hollow-stem auger drilling techniques.

2.2 Scope

To assure that consistent and comparable ground water data are acquired, consistent techniques must be used for performing monitoring well installation and sampling.

2.3 Procedures

The well casing for the wells will be composed of 4-inch, flush joint, polyvinyl chloride (PVC) pipe, precleaned and prepackaged by the manufacturer. The casing will be installed by connecting individual sections while they are lowered into the borehole through the hollow center of the auger column.

After the well casing has been installed, the auger flights will be retrieved in 5-foot intervals. Precleaned and prepackaged 8/12 or 10/20 silica sand will be poured down the auger annulus to fill the void left as each 5-foot flight is removed. This sand, combined with a small volume of formational sand that may slough into the borehole during retraction of the auger column, will provide the filter pack for the well screen. The sand will be placed to a level of 2 to 5 feet above the top of the screen.

A 2-to 3-foot bentonite seal will be placed on top of the filter pack to form an impervious barrier and prevent downward migration of moisture. The remainder of the well annulus up to the ground surface will be grouted with a cement/bentonite slurry. The grout will be inserted from the surface after all remaining auger flights have been removed. The well head will be completed with the installation of a flush-to-grade christie box. The locations and elevations of the monitor wells will be surveyed by a certified land surveyor.

2.4 Well Development

Well development will be conducted in one or two phases: bailing and pumping. In the first phase, water will be bailed from the well in order to remove gross amounts of clay and silt. Bailing will also be served as a verification of proper well alignment. During the second phase of well development, a 4-inch submersible pump will be installed in the well and operated from several different levels within the screened interval. If low well yields are encountered in a well, then an air-driven ejector pump may be used to develop the wells. The well will be determined to be fully developed when the indicator parameters of pH, temperature and electrical conductance of water sampled from the well have stabilized over three consecutive measurements.

1.0 PROCEDURES FOR SOIL BORINGS AND SAMPLING UTILIZING CORE BORING TECHNIQUES

1.1 Purpose

To describe the Standard Operating Procedures used for soil boring and soil sampling activities.

1.2 Scope

To assure that consistent and comparable data are acquired through implementation of a soil boring and soil sampling program, consistent techniques must be utilized for performing soil boring activities, logging boreholes, and obtaining soil samples.

1.3 Procedures

1.3.1 Field Drilling

All boreholes will be advanced using a CME-75 or similar hollow stem auger drill rig equipped with a core sampling device and one of three different types of drill bits depending upon drilling conditions. Generally, a four-tooth, carbide-tipped bit will be used and the borehole will be advanced either to the target depth or to auger refusal. Refusal conditions are those for which a standard split-spoon sampler, driven by a 140 pound weight dropped 2.5 feet, will not penetrate six inches in 50 impacts.

At the outset of the soil boring program, the drilling rig and all auger flights and associated down-hole sampling equipment will be thoroughly steam-cleaned using pressurized water with a temperature of 180°F or greater. Auger flights and all tools will be steam-cleaned prior to the advancement of each borehole, and continuous-core barrels, end caps, and sampling tools will be steam-cleaned prior to each borehole entry. See the Standard Operating Procedure for Steam Cleaning of Sampling Equipment.

1.3.2 Lithologic Description

Subsurface materials recovered from each run will be systematically described in detail and will include, at a minimum, the following information:

- USCS Classification (ASTM 2487)
- Depth Interval
- Lithology, by fraction in %
- Color
- Roundness
- Stratification
- Cementation/Consolidation
- Distinguishing features

At each borehole location, a surface sample will be collected prior to initiation of drilling. Following the advancement of an auger flight to the appropriate interval, the core barrel (continuous-core sampler) will be removed and samples will be obtained for description and, if appropriate, laboratory analysis.

All information will be entered into field notes and onto lithologic bore logs, as appropriate.

1.3.3 Sampling For Chemical Analysis

Appropriate analytical suites and sample containers will be specified in the sampling plan. All physical-chemical samples taken from the cores will be removed using steam-cleaned stainless steel sampling instruments. All samples will be stored in an ice chest at 4°C or colder after collection, unless otherwise specified in the sampling plan. Samples will be collected in the following order:

- Samples to be analyzed for volatile organic compounds will be collected first
- Samples to be analyzed for semi-volatile organic constituents will be collected next
- Samples to be analyzed for metals will be collected next
- Samples to be analyzed for other constituents will be collected next (unless otherwise specified in the sampling plan)

1.3.4 Plugging/Closing Boreholes After Conclusion Of Sampling

Unless otherwise specified in the sampling plan, each borehole is to be plugged by installing a bentonite plug from the total depth (T.D.) to approximately two feet above T.D., backfilling with about 15 feet of clean sand, installing another two-foot bentonite plug, and continuing with this bentonite/sand sequence to within four feet of the ground surface. Finally, the borehole will be completed with two feet of bentonite overlain by two feet of concrete, or asphalt if the boring is located in an area of asphalt paving.

2.0 STANDARD OPERATING PROCEDURES FOR HOLLOW-STEM AUGER DRILLING AND MONITORING WELL INSTALLATION

2.1 Purpose

To describe the work to be performed during monitoring well installation using hollow-stem auger drilling techniques.

2.2 Scope

To assure that consistent and comparable ground water data are acquired, consistent techniques must be used for performing monitoring well installation and sampling.

2.3 Procedures

The well casing for the wells will be composed of 4-inch, flush joint, polyvinyl chloride (PVC) pipe, precleaned and prepackaged by the manufacturer. The casing will be installed by connecting individual sections while they are lowered into the borehole through the hollow center of the auger column.

After the well casing has been installed, the auger flights will be retrieved in 5-foot intervals. Precleaned and prepackaged 8/12 or 10/20 silica sand will be poured down the auger annulus to fill the void left as each 5-foot flight is removed. This sand, combined with a small volume of formational sand that may slough into the borehole during retraction of the auger column, will provide the filter pack for the well screen. The sand will be placed to a level of 2 to 5 feet above the top of the screen.

A 2-to 3-foot bentonite seal will be placed on top of the filter pack to form an impervious barrier and prevent downward migration of moisture. The remainder of the well annulus up to the ground surface will be grouted with a cement/bentonite slurry. The grout will be inserted from the surface after all remaining auger flights have been removed. The well head will be completed with the installation of a flush-to-grade christie box. The locations and elevations of the monitor wells will be surveyed by a certified land surveyor.

2.4 Well Development

Well development will be conducted in one or two phases: bailing and pumping. In the first phase, water will be bailed from the well in order to remove gross amounts of clay and silt. Bailing will also be served as a verification of proper well alignment. During the second phase of well development, a 4-inch submersible pump will be installed in the well and operated from several different levels within the screened interval. If low well yields are encountered in a well, then an air-driven ejector pump may be used to develop the wells. The well will be determined to be fully developed when the indicator parameters of pH, temperature and electrical conductance of water sampled from the well have stabilized over three consecutive measurements.

3.0 PROCEDURES FOR GROUND-WATER SAMPLING

3.1 Purpose

The purpose of this document is to describe the standard operating procedures (SOP) for purging and sampling wells. The procedures described in this document are consistent with Federal regulations and are specifically designed to comply with ground water monitoring requirements under RCRA.

3.2 Procedures

3.2.1 Preparations for Sampling

Before proceeding to the field, be sure that all necessary equipment and supplies are on hand. To the extent possible, all equipment and supplies should be decontaminated in the laboratory before being taken to the site. Equipment decontamination procedures are described in a separate SOP.

Equipment and supplies needed for collecting representative ground water samples include:

- Electronic water-level indicator or steel tape and chalk
- Distilled water and wash bottles
- Brushes and laboratory soap
- Heavy plastic bags
- Paper towels or clean rags
- Zip-lock plastic bags
- Rubber gloves
- Several 500 ml beakers
- A submersible pump (at some sites there is a dedicated pump or bailer for each well) with appropriate attachments to enable purging and sampling the well
- A hose to direct any pump discharge several feet away from the well and containers to receive the discharge
- Plastic sheet film
- A graduated bucket
- A bottom-filling teflon or stainless steel bailer with sufficient cord and/or cable
- All necessary sample containers with the appropriate volume of preservatives added to the containers by the laboratory
- pH meter

- Thermometers
- Specific conductance meter
- Field log book and sample forms
- Ice and ice chest for samples
- Strapping tape and shipping labels
- Waterproof marking pen
- Chain-of-Custody labels
- Watch or stopwatch for determining pumping rates

Locate the steam cleaner nearby to avoid long delays in cleaning equipment between sampling of individual wells.

3.2.2 Determine Water Level

Using an electronic sounder ("water level probe") or other suitable device, measure the depth to water (DTW) in the well. If approximate total depth (TD) of the well is not known, it will also be necessary to measure total depth with the sounder. If approximate total depth is known, defer the measurement until after sampling has been completed. Procedures for using the electronic sounder are described in a separate SOP.

3.2.3 Determine the Volume of Water to be Purged from the Well

Normally at least 3 casing volumes are purged from the well. These volumes are determined as follows:

1) Measure the true inside diameter of the casing using a steel tape or ruler; convert this measurement to feet.
2) Find the true inside radius (r) of the casing by dividing the diameter of the casing by 2.
3) Determine 1 casing volume in cubic feet (V_{cf}) by calculating:

$$V_{cf} = 3.14 \times (r)^2 \times (TD - DTW).$$

4) Determine 1 casing volume in gallons by multiplying $V_{cf} \times 7.48$ gals/ft^3.
5) Multiply the casing volume calculated in step 4 by 3 to determine total volume of water to be pumped from the well.

The exception to this standard (other than program requirements) is in the case of low yield wells. When purging low yield wells, pump the well once to dryness. Samples should be collected as soon as the well recovers. When full recovery exceeds three hours, samples should be collected as soon as sufficient water volume is available.

3.2.4 Purge the Well

Currently, standards allow the use of several types of equipment for purging wells. They are:

- Teflon or stainless steel bailers
- Existing dedicated equipment - use of these devices must be approved by on-site representatives
- Peristaltic pumps - use of these devices, suitable for shallow wells only, must be approved by the on-site representative
- Positive displacement bladder pump or air lift pump capable of being completely disassembled and cleaned before use in each well. Air used to operate the pump must not come in contact with the ground water.

At no time during purging should the pump evacuation rate be such that the ground water cascades back into the well thus causing excessive aeration and potential stripping of volatile constituents.

The actual volume of purged water can be measured by several acceptable methods.

- When bailers are used to purge the well, the actual volume of each bailer can be measured using a calibrated bucket.
- If a pump is used for purging, the pump rate can be determined by using a bucket and stopwatch and the duration of pumping timed until the necessary volume is purged. A totalizing flow meter may be used, if available.

Monitor the pH, temperature, and specific conductance of the water purged to ensure that these parameters have stabilized by the time three casing volumes have been withdrawn. If stabilization has not been achieved after the volumes, continue purging until it is achieved.

3.2.5 Disposal of Purged Water

Dispose of pumped water in a manner which poses no threat of contamination to soil or ground water. If the water is determined to be hazardous, it must be contained and disposed of according to appropriate regulations.

3.2.6 Initial Sampling for Field Parameters

Begin sampling by withdrawing water from the well in accordance with the procedures of Section 3.8. Place the first water withdrawn in a 500 ml or larger flask or beaker that has been properly cleaned, then rinsed three times with the well water being recovered. Use this sample for field measurement of temperature, specific conductance, and pH. Procedures for these field measurements are described in a separate SOP document.

3.2.7 Sample Collection

3.2.7.1 General Considerations

The technique used to withdraw a ground water sample from a well should be selected based on the parameters to be analyzed. To ensure the ground water samples' representativeness, it is important to avoid physically altering or chemically contaminating the sample during collection, withdrawal, and containerization.

The preferred sampling device is a double check valve stainless steel or Teflon bailer.

To the extent possible, no sampling device constructed of or containing neoprene, PVC, Tygon, silicone, polyethylene, or Viton will be used to collect ground water samples.

In some cases, it may be necessary to use equipment already in the well to collect samples. This is particularly true of high volume, deep wells (>150 feet) where bladder pumps are ineffective and bailing is impractical. If existing equipment must be used, determine the make and model of the pump and check with the manufacturer concerning component construction materials.

General sampling procedures include the following:

- Clean sampling equipment should not be placed directly on the ground. Use a drop cloth or feed line from clean reels. If reels are used, avoid placing contaminated lines back on reels.
- Lower sampling equipment slowly into the well to avoid degassing the water and damaging the equipment.
- If bailer cable is to be decontaminated and reused, it should be Teflon-coated or made of stainless steel. Braided polypropylene is also acceptable.
- Check the operation of the bailer check valve assemblies to confirm they are operating freely.
- Bladder pump flow rates should be adjusted to eliminate intermittent or pulsed flow. The settings should be determined during the purging operations. Flow rate should be less than 100 ml/minute when sampling for volatile organic compounds (VOCs). Air-lift pumps <u>should not</u> be used for sample collection.
- Samples should be collected and put in a container in the order of the parameter's volatilization sensitivity. Table 3-1 lists the preferred collection order for some common ground water parameters.

3.2.7.2 Collection of Volatile Organics Samples (VOAs)

VOAs should be collected from the first bailer removed from the well after purging immediately following collection of the sample for field analyses. Two people are needed to collect a sample. One person should retrieve the bailer from the well and place the bottom of the bailer over a VOA container (40-ml septum vial) held by the second person. The second person should insert the Teflon bottom-emptying device into the bailer, bring the vial to the tip of the bottom-emptying device, and tilt the vial to approximately 60° from the vertical.

Table 3-1

Preferred Order of Sample Collection

1. Volatile organics (VOA)
2. Total metals
3. Purgeable organic carbon (POC)
4. Purgeable organic halogens (POX)
5. Extractable organics
6. Dissolved metals
7. Total organic carbon (TOC)
8. Total organic halogens (TOX)
9. Phenols
10. Cyanide
11. Sulfate and chloride
12. Nitrate and ammonia
13. Radionuclides used for field analyses should be discarded in an approved and safe manner when the analyses are complete

4.0 CHAIN-OF-CUSTODY PROCEDURES

4.1 Purpose

This document describes standard operating procedures used to ensure complete chain-of-custody recording for all samples.

4.2 Scope

On most projects formal chain-of-custody procedures are required to document sample possession from time of collection to time of analysis.

The procedures described in this document are designed to meet all legal accountability requirements, including those used for sample documentation under RCRA.

4.3 Procedures

4.3.1 Chain-of-custody program

The chain-of-custody program tracks possession and handling of individual samples from the time of field collection through the time of laboratory analysis. Elements of the chain-of-custody program include:

- Sample labels, which prevent mididentification of samples;
- Sample seals to preserve the integrity of the sample from the time it is collected until it is opened in the laboratory;
- Field logbook to record information about each sample collected during the monitoring program;
- Chain-of-custody record, to establish the documentation necessary to trace sample possession from the time of collection to the time of analysis:
- Sample analysis request sheets, which tell the laboratory the particular analysis(es) to be performed on each sample and which provide further evidence that the chain-of-custody is complete; and
- Laboratory logbook and analysis notebooks, which are maintained at the laboratory and contain all pertinent information about the sample.

4.3.2 Chain-of-Custody Label

Immediately after sample collection, label each sample container with an adhesive label containing the information needed to positively identify the sample and to specify the treatment appropriate for it. Labels are usually supplied by the laboratory that will perform the analyses and in some cases may already be affixed to the sample containers. Mark the labels with a waterproof ink.

Include on the label:

- Project and site identification
- Sample number
- Sample preservation (e.g., H_2SO_4, $Na_2S_2O_3$)
- Date and time of sampling
- Any other information needed for sample analysis.

Standard practice is to assign a sample number of 10 digits, indicating the date and time of sampling, as follows:

- Year (2 digits)
- Month (2 digits)
- Day (2 digits)
- Time (24-hour clock; 4 digits)

Thus, a sample collected at 2:45 p.m. (14:45 on the 24-hour clock) on May 15, 1987, would be assigned the sample number 8705151445. Other systems of identifying samples may be used for certain projects if desired by the client.

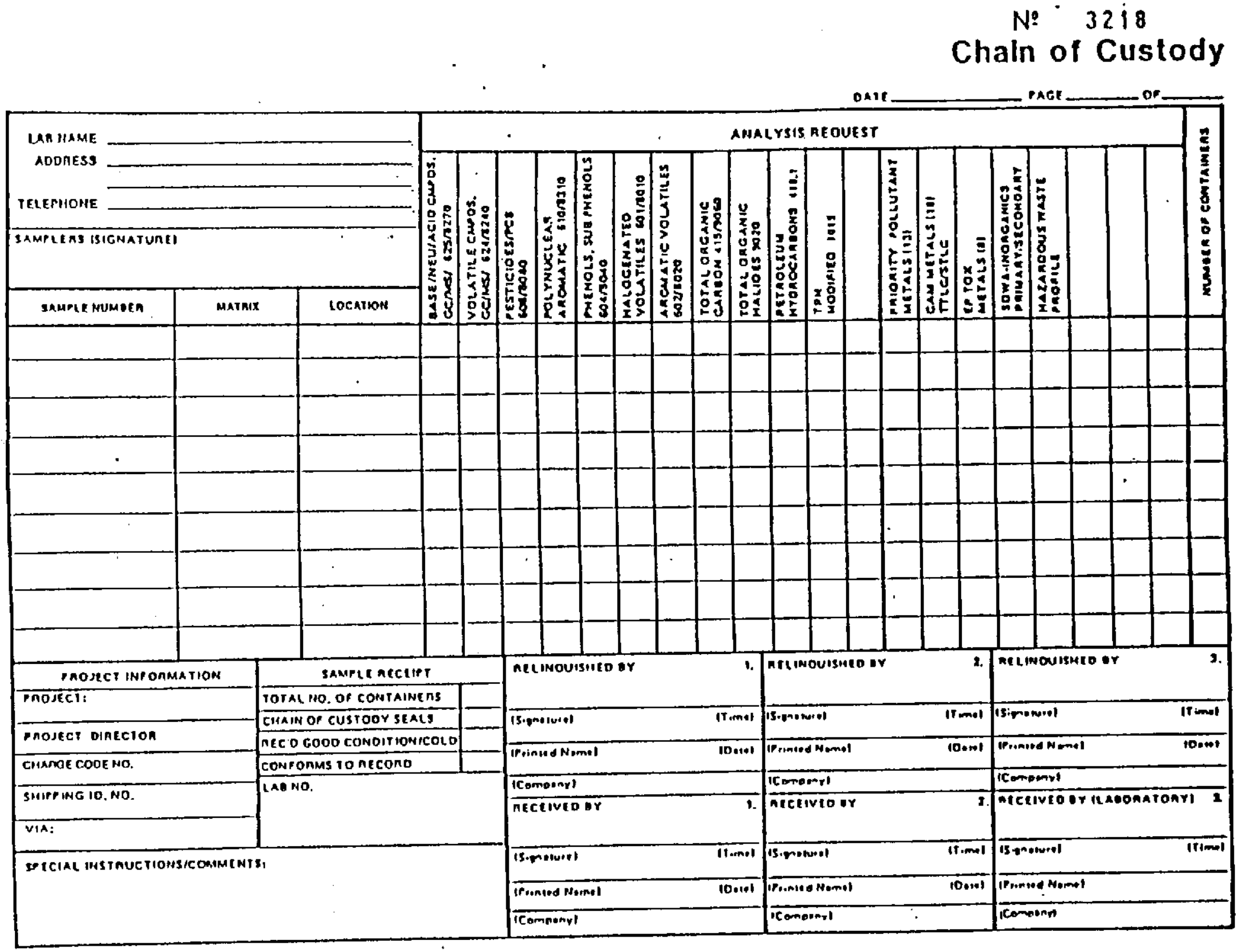
Sample splits, spikes, and blanks required for QA/QC analysis will be labeled and given sample numbers according to the same scheme. Record all sample numbers and the source of the associated samples in the Field Logbook.

4.3.3 Chain-of-Custody Seal

Seal each sample container with a chain-of-custody seal. The chain-of-custody seal is an adhesive seal with space for recording the following information:

- Sample number
- Project and site identification
- Date
- Signature and printed name of individual responsible for sampling.

Record this information on the seal using a waterproof ink, and affix the seal over the lid of the sampling container so that the container cannot be opened until the seal is broken. The seal is not to be broken except by laboratory personnel at the time the sample container is opened for analysis.



№ 3218

Chain of Custody

DATE ______ PAGE ______ OF ______

LAB NAME ______
ADDRESS ______
TELEPHONE ______
SAMPLERS (SIGNATURE)

ANALYSIS REQUEST

SAMPLE NUMBER	MATRIX	LOCATION	BASE/NEU/ACID CMPDS. GC/MS/ 625/8270	VOLATILE CMPDS. GC/MS/ 624/8240	PESTICIDES/PCB 608/8080	POLYNUCLEAR AROMATIC 610/8310	PHENOLS, SUB PHENOLS 604/8040	HALOGENATED VOLATILES 601/8010	AROMATIC VOLATILES 602/8020	TOTAL ORGANIC CARBON 415/9060	TOTAL ORGANIC HALIDES 9020	PETROLEUM HYDROCARBONS 418.1	TPH MODIFIED 8015		PRIORITY POLLUTANT METALS (13)	CAM METALS (18) TTLC/STLC	EP TOX METALS (8)	SDWA-INORGANICS PRIMARY/SECONDARY	HAZARDOUS WASTE PROFILE				NUMBER OF CONTAINERS

PROJECT INFORMATION
PROJECT:
PROJECT DIRECTOR
CHARGE CODE NO.
SHIPPING ID. NO.
VIA:

SAMPLE RECEIPT	
TOTAL NO. OF CONTAINERS	
CHAIN OF CUSTODY SEALS	
REC'D GOOD CONDITION/COLD	
CONFORMS TO RECORD	
LAB NO.	

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY 1.	RELINQUISHED BY 2.	RELINQUISHED BY 3.
(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name) (Date)
(Company)	(Company)	(Company)
RECEIVED BY 1.	**RECEIVED BY 2.**	**RECEIVED BY (LABORATORY) 3.**
(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name)
(Company)	(Company)	(Company)

Figure 4-1

Chain-of-Custody Form

4.3.4 Recording Sample Number

Record the sample number, date and time of sampling, and any other pertinent information in the Field Logbook.

4.3.5 Chain-of-Custody Record

Before delivering samples to the analytical laboratory or relinquishing possession to another person for delivery, fill out a chain-of-custody record. The chain-of-custody record must accompany the sample to the laboratory and each change in sample custody, from the person collecting the sample to the receiving party at the analytical laboratory, must be recorded. It must be signed by every person who has custody of the sample.

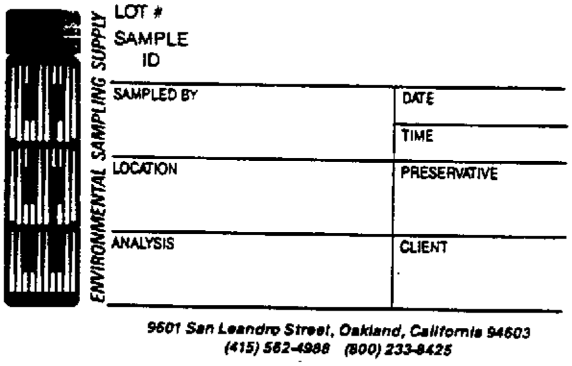
The chain-of-custody record should contain:

- Sample number(s)
- Signature of collector
- Date and time of collection
- Sample type (e.g., ground water, immiscible layer)
- Identification of sample site (well, spring, soil boring, etc.)
- Number of containers
- Signature of person(s) involved in the chain of possession
- Inclusive date of possession
- Date sample was received by the laboratory

4.3.6 Sample Analysis Request Form

Before delivering samples to the analytical laboratory, fill out a Sample Analysis Request Form. A typical chain-of-custody record and Sample Analysis Form is shown in Figure 4-2. The Sample Analysis Request Form provides the analytical laboratory with information and instructions as to the types of samples received, preservation techniques used, and types of analyses to be performed.

Figure 4-2



ENVIRONMENTAL SAMPLING SUPPLY

LOT #

SAMPLE ID

SAMPLED BY	DATE TIME
LOCATION	PRESERVATIVE
ANALYSIS	CLIENT

9601 San Leandro Street, Oakland, California 94603
(415) 562-4988 (800) 233-8425

The Sample Analysis Request Form should contain the following information:

- Company and person requesting analyses
- Sample number
- Date of sampling
- Project and job number or billing code
- Type of sample
- Number and type of sample containers
- Preservation methods
- Number and type of analyses requested

4.3.7 Chain-of-Custody Form Copy

When delivering the samples to the analytical laboratory, obtain a signed copy of the Chain-of-Custody Record/Sample Analysis Request Form for client files and in case subsequent information is requested regarding the types of analyses performed.

4.3.8 Shipment of Samples

If it is necessary to ship the samples to the analytical laboratory via commercial or common carrier (including truck, bus, plane, train, or other parcel delivery service), the following procedures will be followed.

Retain one copy of the chain-of-custody form and seal the other copy or copies in a watertight pouch. Place the pouch inside the container containing the samples and seal the entire container with a completed chain-of-custody seal and strapping tape so that it cannot be opened without breaking the seal. Record the name of the shipping company and the date, time, and place of delivery to the shipping company on the retained copy of the chain-of-custody form signed by the person relinquishing the package to the shipping company. Instruct the receiving laboratory to verify the integrity of the package on arrival. The laboratory must also certify the date, time, and place of delivery and the company making the delivery to the laboratory or to the location where the package is picked up by laboratory personnel. A copy of the chain-of-custody form certifying delivery of the samples to the laboratory will be returned to GCL and retained, along with the copy certifying GCL relinquishment of the package to the shipping company.

4.0 References

U.S. Code of Federal Regulations, 1983, 40 CFR 264.97.

U.S. Environmental Protection Agency, 1986a, RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, pp. 114-117.

5.0 PROCEDURES FOR DECONTAMINATION OF SAMPLING EQUIPMENT

5.1 Purpose

The purpose of this document is to describe the standard operating procedures used for decontaminating of sampling equipment prior to field use.

5.2 Scope

To prevent contamination of ground water samples, monitoring wells,or soil samples, all sampling equipment must be thoroughly cleaned prior to each use. This document describes the recommended procedures for cleaning equipment and tools before sampling.

Sampling equipment dedicated to a particular well will be cleaned before installation and after any maintenance requiring removal of that equipment from the well. Other equipment will be cleaned prior to each use.

Equipment used in each of several wells will be cleaned prior to use at each individual well.

These procedures are designed to fully comply with the requirements of RCRA ground water monitoring requirements.

5.3 Procedures

5.3.1 Equipment Preparation

Any equipment, either new or used, should be assumed to be contaminated and should undergo the level of decontamination appropriate to its intended use and construction. The following sections detail these procedures.

5.3.2 General Levels of Decontamination

Level 1 procedures apply to all glassware and stainless steel equipment whose construction will tolerate high temperatures of the muffle furnace and that will be used in collection and containerization of organic samples.

1. Thoroughly wash in hot water with nonphosphate detergent.
2. Rinse several times with tap water.
3. Rinse several times with deionized water.
4. Rinse once with methanol.
5. Rinse once with pesticide grade hexane.
6. Place in muffle furnace at 450°C for 15 to 30 minutes.
7. Allow to cool and protect from dust and other contaminants by sealing or covering with aluminum foil.

Level 2 procedures apply to all Teflon equipment and stainless equipment with components that would be damaged by high temperatures of the muffle furnace. This procedure is also applicable where a muffle furnace is not available.

1. Thoroughly wash with nonphosphate detergent in hot water.
2. Rinse several times with tap water.
3. Rinse several times with deionized water.
4. Rinse once with methanol.
5. Rinse once with pesticide grade hexane.
6. Air dry in a dust free environment.
7. Cap or cover after drying; Teflon bailers and other applicable equipment should be sealed in plastic bags.

Level 3 procedures apply to sample containers used for metal samples.

1. Wash thoroughly with nonphosphate detergent in hot water.
2. Rinse once with 1:1 nitric acid.
3. Rinse several times with tap water.
4. Rinse once with 1:1 hydrochloric acid.
5. Rinse several times with tap water.
6. Rinse several times with deionized water.
7. Invert and air dry in dust free environment.

Level 4 procedures apply to safety equipment such as respirators, boots, gloves, and equipment susceptible to degradation by solvent rinsing.

1. Brush off loose dirt with soft bristle brush or cloth.
2. Rinse thoroughly with tap water.
3. Wash in nonphosphate detergent in warm water.
4. Rinse thoroughly with tap water.
5. Rinse thoroughly with deionized water.
6. Air dry in dust free environment; keep articles out of the sun.
7. Store in plastic bags.

Level 5 procedures apply to ancillary equipment such as ropes, extension cords, generators, and hand carts.

1. Brush off loose dirt with stiff bristle brush.
2. Rinse off with high pressure water.
3. Air dry.

Once equipment has been allowed to dry, package the equipment to protect it from dust. Plastic bags are appropriate for larger items such as bailers and purging pumps; aluminum foil is preferred for glassware. After packaging the equipment, mark the packaging material with the date and level of decontamination and the initials of the individual certifying the decontamination procedures.

5.3.3 Procedures for Field Decontamination of Sampling Equipment

5.3.3.1 General Considerations

Field decontamination of equipment used for well purging, sample collection, and sample compositing is not to be considered a procedure of preference; rather it should be viewed as a last resort where logistical considerations and practical concerns outweigh the preferred use of dedicated equipment.

When field decontamination cannot be avoided, the following general rules should adhered to:

1. Unless it is absolutely necessary, no equipment should be decontaminated in the field more than once before it is sent back to the laboratory for decontamination.
2. Equipment used to collect hazardous waste samples prior to decontamination should not subsequently be used for collecting environmental samples. In general, any equipment that has been decontaminated should then be reused to collect samples of "lower quality" than the first sample collected.
3. All decontamination and subsequent use of decontaminated equipment should be documented in a field logbook. Record item decontaminated, method used, level of decontamination, and time.
4. Never reuse equipment if visual signs such as discoloration indicate that decontamination was insufficient.

5.3.3.2 Decontamination of Pumps

1. Submerge pumps in a nonphosphate soap solution (e.g., Alconox).
2. Operate pump for a minimum of 10 minutes; recycle the soap solution to a wash basin through the entire length of hose.
3. Clean all exterior surfaces of both the tubing and the pump with a bristle brush and clean cloth.
4. Submerge pump in tap water.

5. Operate pump for a minimum of 10 minutes; recycle the water to rinse basin through the entire length of hose.
6. Submerge pump in deionized water.
7. Pump volume of rinse basin for disposal (e.g., do not recycle deionized water).
8. Repeat steps Number 6 and 7 two additional times.
9. Place pump and hose on rack to air dry.
10. Place pump and hose in a plastic bag or cover them with plastic sheeting to prevent contamination during transport.

5.3.3.3 Decontamination of Bailers

1. Disassemble both top and bottom check valve assemblies.
2. Clean all components in a nonphosphate soap solution using a bristle brush and a bottle brush on the inside surfaces.
3. Rinse all surfaces five times with tap water.
4. Rinse all surfaces twice with methanol.
5. Rinse all surfaces five times with deionized water.
6. Place all components on a rack and allow them to air dry.
7. Put on clean cotton gloves (powderless) and reassemble bailer.
8. Place bailer in plastic bag, seal the bag, and label the bag indicating date of decontamination.

5.3.3.4 Decontamination of Composting Containers

1. Scrub both inside and outside surfaces of container, lid, and Teflon liner with nonphosphate soap solution using a bristle brush.
2. Rinse five times with tap water.
3. Rinse once with methanol.
4. rinse five times with deionized water.
5. Place containers on drying rack and allow them to air dry.
6. Replace Teflon liner and lid.
7. Place label on lid indicating date of decontamination. When used equipment is to be returned H$^+$GCL for thorough decontamination, Level 5 decontamination should first be performed in the field. The equipment should then be sealed in a plastic bag and segregated from unused equipment.

5.4 References

U.S. Environmental Protection Agency, 1986, RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, pp. 106-107.

6.0 Procedures for Steam Cleaning of Sampling Equipment

6.1 Purpose

The purpose of this document is to describe the standard operating procedures used in steam cleaning of sampling equipment.

6.2 Scope

To prevent contamination of samples or monitor wells, all sampling equipment must be thoroughly cleaned prior to each use. Steam cleaning is commonly the most efficient method of decontaminating equipment in the field.

This document describes the procedures to be used in steam cleaning sampling equipment. Sampling equipment dedicated to a particular well will be cleaned prior to installation and after any maintenance requiring its removal from the well. Other equipment will be cleaned prior to each use. Equipment used in each of several wells will be cleaned prior to use at each individual well.

The procedures described in this SOP are intended to be used only when the more rigorous decontamination methods described in the SOP "Procedures for Decontamination of Sampling Equipment" are impracticable for technical or logistical reasons.

6.3 Procedures

1. Always wear gloves and safety glasses when operating the steam cleaner.
2. Disconnect any equipment, such as pumps, which cannot be thoroughly cleaned if it remains attached to the unit.
3. Remove any obvious dirt or other foreign substances from all tools and equipment to be cleaned using tap water, a brush, and soap if necessary. Spread the tools and equipment on a clean hard surface.

4. Read the operating instructions for operating the steam cleaner and be certain that you understand them before you proceed. Inspect the steam cleaner to ensure that it is properly fueled and in good working order and to be sure that there are no solvents, detergents, or other foreign substances in the machine. Clean the steam cleaner, if necessary.

5. Thoroughly steam clean all equipment and tools and then rinse them with distilled water. Be certain to measure and record the temperature of the steam cleaner discharge.

6. Use the appropriate equipment (e.g., a bailer or a glass sample container) to take an "equipment blank". Sample by flushing the equipment with distilled, deionized water and collecting the effluent in 2 40-ml septum vials. Close the vials securely, ensuring that no air or headspace remain in the vials. Label, store, transport, and analyze the equipment blanks in the same manner as other samples collected in the program.

7. Wearing clean disposable rubber gloves, reassemble any equipment that was disassembled for cleaning. Transfer all of the cleaned tools and equipment to clean plastic bags and fasten tightly.

8. After cleaning, handle equipment no more than is essential for conducting the sampling procedure. Always wear clean, disposable rubber or cotton gloves when handling the clean equipment.

6.4 References

U.S. Environmental Protection Agency, 1986, RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, pp. 106-107.

QUALITY ASSURANCE/QUALITY CONTROL
PROJECT PLAN FOR
THE LIVERMORE ARCADE SHOPPING CENTER
LIVERMORE, CALIFORNIA

Prepared for:

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and
California Regional Water Quality Control Board

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Project No. 48016-08
LivermoreArcade/QAQC Plan

H+GCL
Environmental Scientists and Engineers

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1.0 QUALITY ASSURANCE/QUALITY CONTROL PROJECT PLAN

The City of Livermore, California is located approximately 25 miles east of San Francisco Bay along Highway 580. The Livermore Arcade Shopping Center is located at the northwest corner of First Street and South P Street in downtown Livermore. Railroad Avenue borders the Arcade site to the north. South S Street borders the site to the west. The Livermore Arcade Shopping Center was constructed in 1972. The property covers approximately 11.75 acres, including large asphalt parking areas. The topography is relatively flat with runoff moving to the north and west. Twelve retail stores and two restaurants occupy the tenant spaces. Ornamental vegetation on the property consists of grass, bushes, and small trees.

Mike's One-Hour Cleaners at the Livermore Arcade Shopping Center has been identified as the source of tetrachloroethylene (also referred to as perchloroethylene or PCE) contamination which has moved through the soil and into the ground water. A soil and ground-water investigation found dissolved phase PCE contamination in the shallow ground water (40 - 65 feet). In quarterly monitoring throughout 1991, H^+GCL detected very little change in the contaminant levels but discovered a significant decrease in the ground-water table.

A work plan for an RI/FS that addresses the new ground-water conditions at the Arcade site has been requested by the California Regional Water Quality Board (CRWQCB). This Quality Assurance/Quality Control Project Plan (QAPP) is provided as a supplement to the Work Plan for RI/FS at the Livermore Arcade Shopping Center. Procedures requiring specific protocols for execution are noted and carried out as specified herein. This specific protocol of execution will also serve the purpose of creating legally defensible data.

The staffing requirements for this work plan shall be as follows:

> The Principal in Charge will be Mr. Randy Hicks, R.G.. Mr. Hicks is a Principal Hydrogeologist with extensive experience in ground water investigations and remediation. He will provide quality control and review of all plans and reports.
>
> The Project Manager is Karl Novak, P.E., R.E.A.. Mr. Novak will direct daily operations, coordinate activities and prepare investigation findings and feasibility study results.
>
> The Project Geologist is Mike Wright, R.E.A.. Mr. Wright will perform field sampling, log borings, and monitoring well installation. He will assist with preparation of the report and coordination of field activities.

2.0 QUALITY ASSURANCE OBJECTIVES

Procedures described in this QAPP are provided so that precise and accurate data for the purposes of regulatory, legal and remedial requirements will be collected. These procedures are also provided so that quality assurance for the design and implementation of an efficient and effective treatment system will be attained.

2.1 Quality Assurance Measures for Valid Data

Specific quality assurance measurements will be addressed so that valid data will be provided according to the following quality assurance objectives, as set forth by EPA (1987):

- Precision - a measure of mutual agreement among individual measurements of the same parameter, usually under prescribed similar conditions.
- Accuracy - the degree of agreement of a measurement (or an average of measurements of the same parameter) with an accepted reference or true value.
- Representativeness - the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.
- Comparability - the confidence with which one data set can be compared to another. Comparability is assessed by comparing sampling methodology, analytical methodology, and units or reported data.
- Completeness - a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions.

As outlined in various EPA guidelines, the following factors will be considered in evaluating precision, accuracy, representativeness, comparability, and completeness (PARCC parameters) of data and the date collection process:

- Sample identification documentation. This requirement consists of keeping detailed records of samples in logbooks, on chain-of-custody forms, and in data management systems.
- Sample preservation and holding times. Various types of samples must be preserved, stored and analyzed within time frames such that data generated will be representative of the true value analyzed for in a sample.
- Field sampling methodology. Correct methods of sample collection will create comparability of data and representativeness of results. Evaluation of sample collection techniques in the field and of data generated from the analysis of field replicates provides indications of sampling methodologies.
- Analytical laboratory methodology. Quality of the analytical technique affects data precision and accuracy. Laboratory technique is determined by evaluating the results of data generated from the analysis of sample duplicates, laboratory spikes, and performance evaluation samples.
- Validation of data. A combination of the above factors determines whether the data collected is complete and is evaluated by data validation methodology.

The creation of quality PARCC parameters and legally defensible data will be ensured by following the procedures set forth in EPA guidelines for field activities and sampling procedures. QAPP guidelines for the collection and transfer of samples according to EPA chain-of-custody procedures (EPA 1981, 1985) will also ensure the creation of valid data. These procedures are reviewed in Sections 3.0 and 4.0.

The creation of valid data will also be ensured by following EPA-approved methodology. The EPA-approved protocols to be followed are designed to provide analytical data of consistent, known and documented quality. Section 7.0 reviews these general laboratory practices.

Data validation will be performed as described.

The ultimate goal of this QAPP is

1) to produce valid ground-water samples that will, inter alia, be analyzed to detect tetrachloroethylene (PCE) at levels below the maximum contaminant level (MCL) for PCE, which is 5 mg/l (micrograms/liter)

2) to produce valid soil samples that will, inter alia, be analyzed to detect tetrachloroethylene (PCE) at levels below the maximum contaminant level established by the lead regulatory agency

3) to produce valid subsurface data that will allow the development of a defendable RI/FS.

2.2 Quality Assurance Measures for Design Criteria

Aquifer testing and ground water modeling may be required for testing of design criteria. Quality assurance guidelines for these two processes are reviewed in Sections 3.4 and 3.5.

3.0 FIELD ACTIVITIES AND SAMPLING PROCEDURES

3.1 Soil Borings

Soil boring samples will be collected to characterize the vertical and horizontal extent of contamination identified on the site. Samples will be field screened using a photoionization detector prior to submitting samples for laboratory analysis. Soil boring data will provide vertical profiles and concentration magnitudes to be used for remedial soil vapor extraction.

Soil borings will be drilled with a hollow-stem auger drill equipped with 5 ft. sections of a continuous coring device. Samples will be collected from the base of each 5 ft. interval until the water table or the clay aquitard, whichever is encountered first, is reached.

Standard operating procedures for soil boring emplacement and collection of samples from each interval are provided in Section 1 of the SOP Guidelines.

3.2 Monitoring Well Installation

The installation of ground-water monitoring wells may be required should significant levels of contamination be identified on the site. Ground-water sampling of monitor wells would be used to characterize the extent of the contamination plume in the shallow water bearing zone on the site.

The proper emplacement of monitor wells is critical to collection of valid representative ground-water samples. Drilling equipment must be chosen and decontaminated properly, screens must be set at the appropriate depth, and wells must be properly developed.

Installation of monitor wells in the shallow zone is initiated by using a hollow-stem auger drilling technique. Procedures for such installations are provided in Section 2 of the SOP Guidelines.

3.3 Ground-Water Sampling

Monitoring wells installed to determine the extent of contamination in the shallow zone would need to be sampled to determine accurate background levels of metals, and other potential contaminants.

Standard operating procedures and QA guidelines for the purging and sampling of monitor wells are provided in Section 3 of the SOP Guidelines. All samples collected will be analyzed according to EPA methods.

3.4 Aquifer Tests

A ground-water pump and treat system is one of the remedial action alternatives anticipated to be addressed in the RI/FS.

Aquifer testing of the shallow zone may be performed to collect data for the modeling and design of an efficient pump and treat system for remediation of ground water.

Appendix 1-Fl provides a form for the recording of essential data to be collected and analyzed as a result of aquifer testing.

3.5 Ground-Water Modeling

Design of an efficient, effective ground water extraction system will require ground water modeling.

Quality assurance for such design will be maintained by refining and calibrating models as aquifer test and water level data is collected. Reiteration of numeric models will be performed as each treatment well is drilled and tested. Such a system for refinement of modeling will be effective for locating wells and determining optimum pump rates for the treatment strategy.

3.6 Soil-Vapor Extraction Monitoring

It is anticipated that soil-vapor extraction will be a principal remedial action alternative evaluated in the RI/FS

The effectiveness of a soil-vapor extraction system would be monitored by daily observations of blower operation and by weekly measurements of system characteristics.

Measurements would be made of the exhaust air velocity at the blower using a hot wire anemometer. The concentration of organic vapors in the exhaust air will be measured by a photoionization detector. Also, the pressure drop through the vapor phase activated carbon units would be measured along with organic vapor concentrations of the air as it leaves the carbon units. These measurements would be compared with the design values and, if they should be outside the prescribed limits, established procedures would be followed to bring them back into compliance.

Detailed instructions will be prepared for the operation and maintenance of the vapor extraction system and a log book will be kept of all observations and measurements.

4.0 SAMPLE CONTROL, CUSTODY AND MANAGEMENT PROCEDURES

Each sample received by the analytical laboratory for processing must be properly documented to ensure complete and accurate analysis for all parameters requested and, most importantly, to support use of sample data in potential legal actions concerning the site.

The system of documentation provided in the following text is designed according to EPA Contract Laboratory Program (CLP) requirements. This system provides a highly efficient means of tracking each sample from the time of collection through final data reporting.

4.1 Field Logbook Entry Procedures

The field logbook is a controlled evidentiary document and will be maintained accordingly.

Field logbooks provide a means for recording all data collecting activities performed at a site. Entries will be as descriptive and detailed as possible so that a particular situation can be reconstructed without reliance on the collector's memory. Where feasible, the logbook will consist of printed, formatted pages to facilitate data entry and standardization. The field logbook will be kept on-site, and will be maintained by the contractors task leader or his assigned representative.

All measurements made and samples collected are recorded. During sampling events, sample number, date, and time of sampling, and any other pertinent information are included in the log book. No erasures are permitted. If any incorrect entry is made, the data will be crossed out with a single strike mark, initialed, and dated. Entries will be organized into easily understandable tables if possible.

All logbook entries will be made with indelible ink and legibly written. The language will be factual and objective.

The following guidelines will be implemented for all logbooks.

- Each page signed, dated, numbered
- Blank pages marked as such
- Each entry identified with time (24 hr. clock)
- Weather conditions

- Logbook extensions (field sheets, purge records, etc.) will be recorded in the logbook.
- Logbooks will be returned to proper files upon completion of the logbook, during absence, or at the end of investigation.

4.2 Sample Container Labeling

Immediately after sample collection, all sample containers will be labeled with an adhesive label containing the information needed to positively identify the sample and the treatment appropriate for it. Labels are usually supply by the laboratory performing the analyses and, in most cases, they are already affixed to the sample containers. The labels will be marked with waterproof ink.

Include on the label:

- Project and site identification
- Sample number
- Sample preservation
- Date and time of sampling
- Any other information needed for sample analyses

Appendix 1-F2 provides an example of an appropriate sample container label.

4..3 Sample Identification

A convenient and standard practice is to assign a sample number of 10 digits, indicating the date and time of sampling as follows:

- Year (2 digits)
- Month (2 digits)
- Day (2 digits)
- Time (24-hour clock; 4 digits)

For example, a sample collected at 2:45 p.m. (14:45 on the 24-hour clock) on May 15, 1989, would be assigned the sample number: 8905151445.

Sample duplicates, spikes, and blanks required for QA/QC analysis will be labeled and given sample numbers according to the same scheme. Record all sample numbers and the source of the associated samples in the field logbook.

4.4 Chain-of-Custody Procedures

After collection, identification, and preservation, the sample is maintained under chain-of-custody procedures (EPA 1981, 1985) until it is in the custody of the analytical laboratory and has been stored.

Field chain-of-custody procedures include sealing each sample container with a chain-of-custody seal. The chain-of-custody seal is an adhesive seal with spaces for recording the following instructions.

- Sample number
- Project and site identification
- Date
- Signature and printed name of individual responsible for sampling

This information is recorded on the seal, using a waterproof ink, and the seal is affixed over the lid of the sampling container so that the container cannot be opened until the seal is broken. The seal is not to be broken except by laboratory personnel at the time the sample container is opened for analysis. A typical chain-of-custody seal is shown in Appendix 1-F3.

Transfer of custody and shipment procedures include filling out a chain-of-custody record form to accompany samples to the laboratory.

The chain-of-custody record should contain:

- Sample number
- Signature of collectors
- Date and time of collection
- Sample type (e.g., ground water, grab)
- Identification of sample site (well, soil boring, etc.)
- Number of containers
- Signatures of persons involved in chain of possession
- Inclusive dates of possession
- Airbill number if applicable
- Date of sample receipt by the laboratory

The chain-of-custody form may also serve as a sample analysis request form. Both forms are required to accompany the samples to the lab. Appendix 1-F4 provides an example of a combination form serving this dual purpose.

The sample analysis request form provides the analytical laboratory with information and instructions as to the types of samples shipped, preservation techniques used, and types of analyses to be performed.

The sample analysis request form should contain the following information:

- Party and person requesting analyses
- Sample number
- Date of sampling
- Project and job number or other identification code

4.5 Sample Handling, Shipping, and Analysis

Samples will be handled, shipped, and analyzed in accordance to EPA CLP chain-of-custody procedures (EPA 1981, 1985) and CLP processes since these guidelines are designed for the creation of valid and legally defensible data.

All analytical samples will be placed in the appropriate sample containers and preserved as specified in Appendix 1-F5 and 1-F6, respectively. Appendix 1-F6 provides a list of the analyses to be performed on soil and ground water samples collected. Direction for individual bulk packaging is provided in Appendix 1-F7.

5.0 DECONTAMINATION PROCEDURES

Any equipment to be used for sampling is decontaminated according to the following general guidelines:

- Equipment is scrubbed with alconox and water
- Equipment is then rinsed with distilled water
- Equipment is thoroughly rinsed with methanol
- Equipment is again rinsed with distilled water and is allowed to thoroughly dry

A more detailed outline of procedures to be followed for the decontamination of equipment to be used for sampling monitor wells is provided in Section 5 of the SOP Guidelines.

6.0 CALIBRATION PROCEDURES AND FREQUENCY

Calibration procedures and frequency are the responsibility of the designated field investigation team leader (contractor) for field equipment and of the chosen laboratory for lab equipment.

6.1 Field Equipment

All equipment used in field analyses or sampling must have a documented maintenance and/or calibration procedure. These procedures will be made available to all the relevant personnel and include:

- Equipment identification
- Calibration and/or maintenance schedule
- Equipment necessary to accomplish calibration
- Procedure for calibration and/or maintenance

If an instrument has been in the field for longer than two weeks, it shall be returned to an equipment maintenance station to undergo calibration and maintenance checking.

Calibration procedures and the required frequency of calibration are integral components of the manufacturer's specifications for each piece of field equipment. These calibration procedures are available with the manufacturer's operating instructions and should be followed accordingly.

The following types of equipment will be required at the site:

- HNu Photoionization Detector
- Electronic Water Level Indicator
- Temperature, pH and Conductivity Meter
- Combustible Gas Indicator

6.2 Laboratory Equipment

A laboratory which follows EPA CLP protocol will be used for all sample laboratory analyses. The laboratory's responsibility is to perform calibration procedures for all analytical equipment using procedures at the frequencies routinely required by EPA.

7.0 ANALYTICAL QA/QC

Since data generated from site sampling must be legally defensible, EPA approved laboratory services must be rendered for sample analyses.

The laboratory that is chosen should be able to provide a recent Statement of Work (SOW) showing EPA approved methodology for organic and inorganic analyses. Choosing such a laboratory insures that their procedures and calibrations will provide the most accurate and valid data available.

The general practices the lab is required to observe are elaborated below.

7.1 Purity of Standards, Solvents, and Reagents

All reagents will be of the highest standard laboratory quality obtainable. Where applicable, reference standard solutions will be traceable to National Bureau of Standards (NBS). Each new lot or reagent grade chemicals shall be tested for quality of performance.

7.2 Analytical QC Samples

- Laboratory pure water is prepared by a special distilled and/or deionized water system augmented by individual filter cartridges and polishers located at each outlet point. The polishers include special particulate filters, organic resins, and inorganic resins.

- Method Blank/Reagent Blank

    1. A laboratory pure water blank is analyzed along with all samples submitted for analyses. The method blank is processed through all procedures, materials, reagents, and labware used for sample preparation, and analysis.

    2. In case of non-aqueous samples, reagent blanks serve as method blanks.

- Calibration Standards

    A calibration standard is prepared in the laboratory by dissolving a known amount of a pure compound/element in an appropriate matrix. The final concentration calculated from the known quantities is the true value of the standards. The results obtained from these standards are used to generate a standard curve and thereby quantify the compound/element in the environmental sample.

Typically, a minimum of three calibration standards will be used in generating a standard curve for all analyses, unless otherwise specified. Specific requirements are outlined in the EPA Contract Laboratory Program SOW.

- Check Standards

A check standard is prepared in the same manner as a calibration standard. The final concentration calculated from the known quantities is the true value of the standard. The important difference in a check standard is that it is from an alternate, EPA-approved source or provided by EPA. It is not carried through the same process used for the environmental samples and does not undergo the sample preparation procedure. A check standard result is used to validate an existing concentration calibration standard file or calibration curve. Check standards are run every 20 samples (or every time instrument turned on) and the value obtained must fall within ± 10% for inorganics and ±10-30% for organics.

- Control

A control is a sample of known value used to validate the analytical procedure. Control samples are obtained from EPA or from an EPA-approved or recognized source and are prepared by carrying them through the same process used for the environmental samples. The control does undergo the sample preparation procedure. One control is used for every twenty samples and the value obtained must fall within ± 20% of the true value for validation.

- Spikes

A sample spike is prepared by adding a known amount of a pure compound to the environmental sample (before extraction for extractables), and the compound is the same as that being analyzed in the environmental sample. A matrix spike is prepared by adding a known amount of the analyte(s) of interest to a sample aliquot known mass prior to sample digestion. An analytical spike is prepared by adding a known amount of sample digestate. These spikes simulate the background and interferences found in the actual sample. The calculated percent recovery of the matrix spike is considered to be a measure of the accuracy of the total analytical method, e.i., sample preparation and analysis. The calculated percent recovery of the analytical spike is considered to be a measure of the accuracy of the sample analysis procedure only and is calculated as follows:

$$\%R = \frac{100\,(O-X)}{T}$$

%R = Percent Recovery
O = Measured value of analyte after spike added
X = Measured value of analyte concentration in the sample before the spike added
T = True value of spike

Tolerance limits for acceptable percent recovery are established by EPA protocol.

Matrix spikes will be analyzed at a minimum frequency of 1 per 20 samples of similar matrix. In addition, surrogate compound spikes are added to every sample for organics analysis. Recovery requirements are specified by EPA protocol.

- Laboratory Duplicate Sample

Aliquots are made in the laboratory of the same sample and each aliquot is treated exactly the same throughout the analytical method. The relative percent difference between the values of the duplicates, as calculated below, is taken as a measure of the precision of the analytical method.

$$RPD = \frac{D1 - D2}{(D1 + D2)/2} \quad X\ 100$$

RPD = Relative Percent Difference
D_1 = First Sample Value
D_2 = Duplicate Sample Value

For inorganics analysis, the tolerance limit for percent differences between laboratory duplicates should not exceed either concentration value for the duplicates by $\pm$ 35 RPD for validation of soil and sediment samples or $\pm$ 20 RPD for water samples. Tolerance limits for organics analysis are specified by EPA CLP protocol. Laboratory duplicates will be analyzed at a minimum frequency of 1 for every 20 samples.

- Data Requirements

- Analyses performed by the chosen lab will be by their Routine Analytical Services (RAS). The EPA methods to be used for the analyses of samples are provided in Appendix F-6.

8.0 DATA REDUCTION, VALIDATION AND REPORTING

Samples received and data generated by the chosen lab will be controlled by the guidelines presented below.

8.1 Sample Login

Upon receipt of samples for analysis, a representative of the chosen lab will perform the following:

- Verify that all chain-of-custody and analysis request forms are filled out properly and are in order, and verify that custody seals are properly signed and unbroken
- Login samples, assign unique log numbers, and attach the numbers to the sample containers
- Open a project file and enter login data on computer
- Check turn around times and begin analyses if necessary
- Store samples, if required, in proper sample bank

8.2 Analyzing the Sample and Procedural Detail

The samples will be analyzed by chemists and/or technicians using the procedures listed in Appendix 1-F6.

The appropriate laboratory personnel will record the results of analyses and detail all procedural modifications, deviations, or problems associated with analyses in a parameter workbook.

8.3 Validation of Data

Upon completion of an analytical procedure, data undergoes QA/QC review before reporting for screening purposes. This task may be subcontracted to a qualified data validation entity.

The data validation process is a review of analytical laboratory data according to procedures and requirements established and adopted by the EPA in the Functional Guidelines for Data Validation (EPA, 1988). The data reviewing entity will evaluate whether the parameters of precision, accuracy, representativeness, completeness, and correctness have been met.

Precision is measured during the data validation process as the relative percent difference (RPD) between analytical results for laboratory duplicates.

Relative accuracy is measured as a percent recovery for a spiked sample from the specified analysis. Matrix spikes and analytical spikes are used to evaluate the inorganic data for accuracy; matrix spikes and surrogate spikes are used to evaluate organic data for accuracy.

Completeness and correctness are determined by checking documentation and calculations for instrument calibration or tuning and correction factors, internal standards, and laboratory blanks.

When QC criteria are not completely met, the data review entity attaches qualifiers, or designated code letters, indicating a deviation from normal or acceptable data quality.

Data validation requires submission from the laboratory of all chain-of-custody information, all quality control data, sample data, calibration, methodology and procedural information, proper report forms, and all raw (and/or instrument) data.

8.4 Final Reporting and Data Archival

Upon completion of data validation, data is generally submitted to an interpreting entity in report form. Validated results are submitted on the data validation entities report forms. These forms have the pertinent sample and project information.

Copies of all analytical data and/or final reports are retained in the laboratory files and will be stored on computer disk at the laboratory for a minimum of one year.

A method of permanent data archival is generally decided at the end of one year.

9.0 QUALITY CONTROL CHECKS

The quality of the field sampling process and the evaluation of the comparability of data for samples collected from various locations on site is performed by the collection and analyses of samples referred to as quality control checks.

Four types of quality control checks can be collected and analyzed. They are discussed in the sections below:

9.1 Field Duplicate Samples

Duplicate samples will be collected in the field and analyzed to check for sampling reproducibility. For each sample medium (ground water or soil), one duplicate will be collected every ten samples. If less than 10 samples are collected for a particular medium, one duplicate will still be collected. Duplicates for the various parameters to be analyzed will be collected separately.

9.2 Trip Blanks

One trip blank per aqueous volatile organic sample shipment can be analyzed to check for ambient conditions at the site that may cause sample contamination. A trip blank consists of laboratory-cleaned sample containers filled at the laboratory with laboratory demonstrated, analyte-free water at the location of the lab. These samples are kept with investigative samples as they are collected and processed. Trip blanks are packaged for shipment with the other samples and sent for analysis. At no time after their preparation are the trip blanks opened prior to reaching the laboratory. One trip blank can be used per day per aqueous medium sampled for volatile organics, and will be analyzed for volatile organics only.

9.3 Decontamination/Rinsate Blanks

Decontamination/rinsate blanks consist of a group of laboratory-cleaned sample containers which are transported empty into the field. They are used to check the thoroughness of decontamination procedures. Decontamination blanks are prepared by pouring laboratory-demonstrated analyte-free water over decontaminated sample collection equipment and into the appropriate sample container. These samples are analyzed for the same parameters as the investigative samples.

9.4 Field Blanks

Field blanks consist of a group of laboratory cleaned sample containers which are transported empty into the field and are used to check ambient air conditions. Field blanks are prepared by filling laboratory-cleaned sample containers with laboratory-demonstrated analyte-free water at the sampling site during sample activities. These samples are analyzed using the same parameters as the investigative samples. One set of field blanks can be collected each week per medium sampled.

10.0 PREVENTIVE MAINTENANCE PROCEDURES

An inventory control system for equipment and instrumentation will create the basis for maintenance and calibration control.

Inventory control documentation should include:

- Description of item
- Manufacturer, model number, internal identification number
- Timing and frequency of routine maintenance, servicing and calibration

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EPA, 1987. Data Quality Objectives, OSWER Directive 9355-7A.

EPA, 1987. Compendium of Superfund Field Operation Methods.

EPA, 1988b. Functional Guidelines for Evaluating Organics Analyses; Draft Document, Prepared by EPA Data Review Group for Hazardous Site Evaluation Division.

APPENDIX 1

QUALITY ASSURANCE/QUALITY CONTROL FORMS AND TABLES

Page ______ of ______

APPENDIX F-1

AQUIFER TEST DATA

Owner ______________________ Address ______________________ County ______________ State ________

Date ______________ Company performing test ______________________ Measured by ______________

Well No. ______________ Distance from pumping well __________ Type of test ______________________ Test No. ________

Measuring equipment ____

Time Data

Pump on: Date ______ Time ______ (t_0)

Pump off: Date ______ Time ______ (t'_0)

Duration of aquifer test:

Pumping ________ Recovery ________

Water Level Data

Static water level ______________

Measuring point ______________

Elevation of measuring point ______________

Discharge Data

How Q measured ______________

Depth of pump/air line ______________

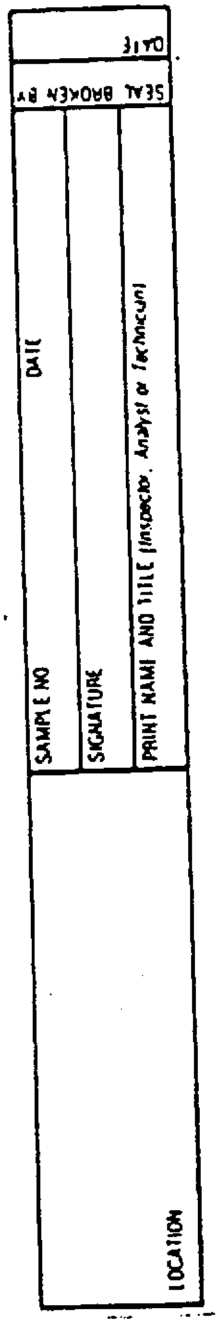
Previous pumping? Yes ______ No ______

Duration ______________ End ______________

Comments on factors affecting test data

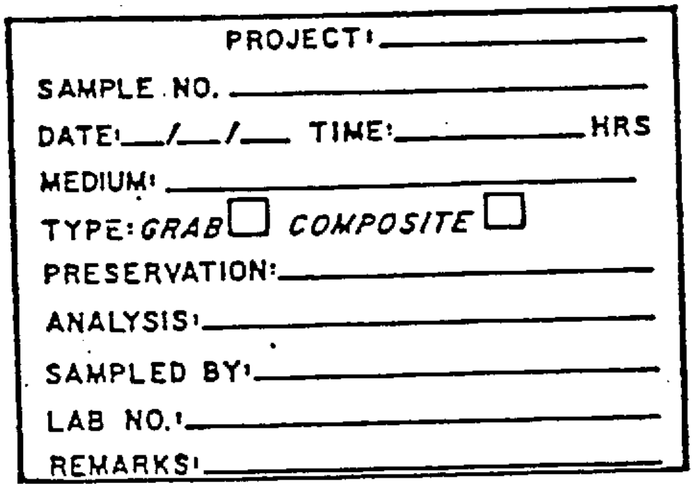
Date	Clock time	Time since pump started	Time since pump stopped			Water level measurement	Correction or Conversion	Water level	Water level change		Discharge measurement	Rate		
		t	t'	t/t'					s or s'					

Appendix F-3



Example Chain-of-custody Seal

Appendix F-2



PROJECT: ____________

SAMPLE NO. ____________

DATE: __/__/__ TIME: ________ HRS

MEDIUM: ____________

TYPE: *GRAB* ☐ *COMPOSITE* ☐

PRESERVATION: ____________

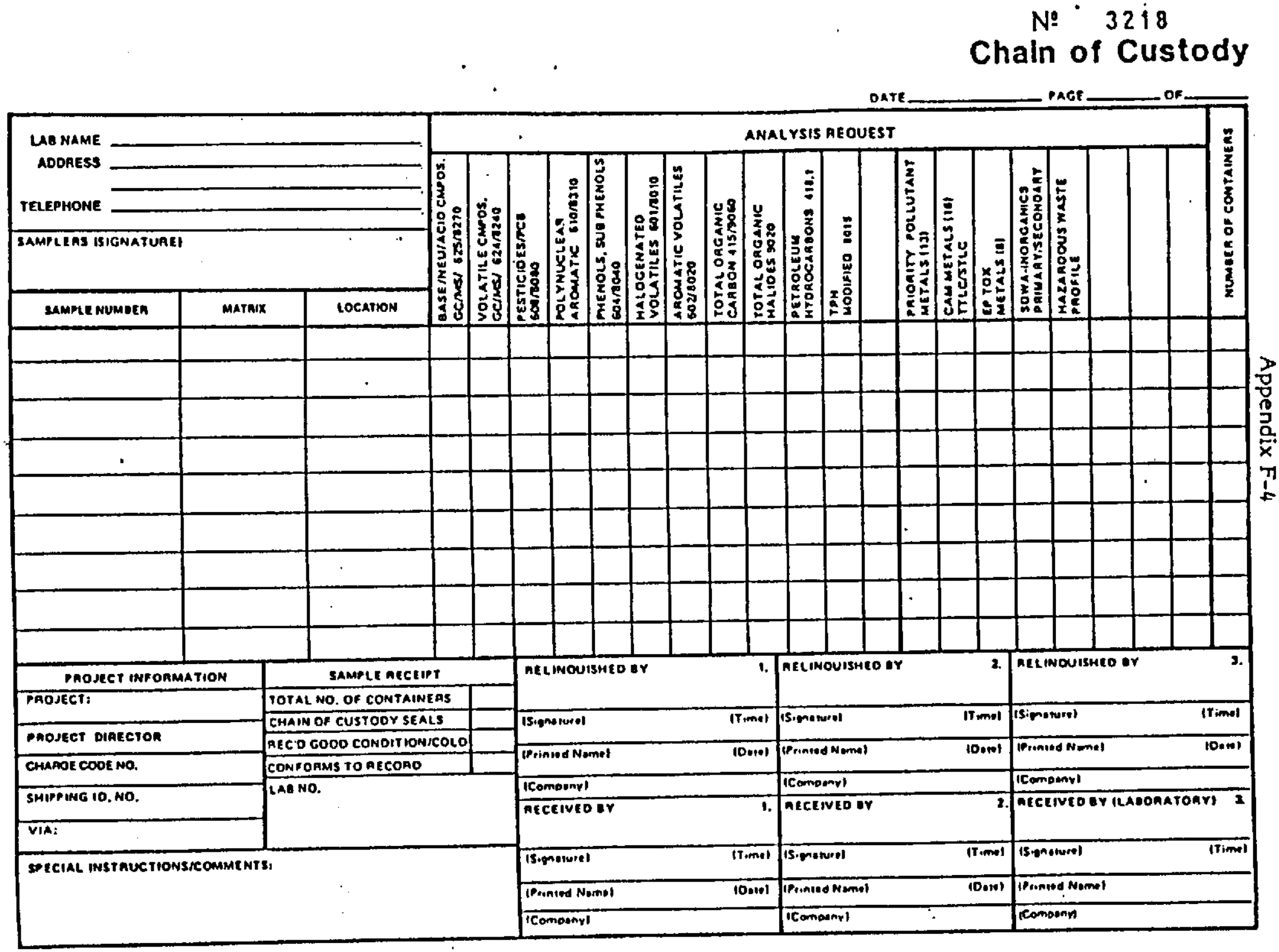
ANALYSIS: ____________

SAMPLED BY: ____________

LAB NO.: ____________

REMARKS: ____________

Example Label for Sample Containers



Nº 3218

Chain of Custody

DATE ______ PAGE ______ OF ______

LAB NAME ______

ADDRESS ______

______

TELEPHONE ______

SAMPLERS (SIGNATURE)

			ANALYSIS REQUEST																				
SAMPLE NUMBER	MATRIX	LOCATION	BASE/NEU/ACID CMPDS. GC/MS/ 625/8270	VOLATILE CMPDS. GC/MS/ 624/8240	PESTICIDES/PCB 608/8080	POLYNUCLEAR AROMATIC 610/8310	PHENOLS, SUB PHENOLS 604/8040	HALOGENATED VOLATILES 601/8010	AROMATIC VOLATILES 602/8020	TOTAL ORGANIC CARBON 415/9060	TOTAL ORGANIC HALIDES 9020	PETROLEUM HYDROCARBONS 418.1	TPH MODIFIED 8015		PRIORITY POLLUTANT METALS (13)	CAM METALS (18) TTLC/STLC	EP TOX METALS (8)	SDWA-INORGANICS PRIMARY/SECONDARY	HAZARDOUS WASTE PROFILE				NUMBER OF CONTAINERS

PROJECT INFORMATION
PROJECT:
PROJECT DIRECTOR
CHARGE CODE NO.
SHIPPING ID. NO.
VIA:

SAMPLE RECEIPT	
TOTAL NO. OF CONTAINERS	
CHAIN OF CUSTODY SEALS	
REC'D GOOD CONDITION/COLD	
CONFORMS TO RECORD	
LAB NO.	

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY 1.	RELINQUISHED BY 2.	RELINQUISHED BY 3.
(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name) (Date)
(Company)	(Company)	(Company)
RECEIVED BY 1.	RECEIVED BY 2.	RECEIVED BY (LABORATORY) 3.
(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name)
(Company)	(Company)	(Company)

Example Chain-of-custody and Sample Analysis Request Form, Combined

Appendix F-4

APPENDIX F-5

SAMPLE CONTAINER REQUIREMENTS

Matrix	Analysis	Volume	Container Type
		Inorganic Analysis	
Water polyethylene	Metals	1 liter	1 liter
		Organic Analysis	
Water vial	Volatiles	80 ml.	2x40 ml. glass
Water	Extractables	1 gal.	2x80 oz. amber glass bottle
Soil	Volatile	120 ml.	1x120 ml. wide-mouth glass jar
Soil	Extractables	6 oz.	2x4 oz. wide-mouth glass jar

APPENDIX F-6

SAMPLE PRESERVATION AND ANALYTICAL METHOD

Parameters	Sample Media	Analytical Methods	Preservative
Metals (As,Cd,Se)	Water	6000 - 8000 *	Nitric Acid
Volatiles	Water	EPA 624	Cool to 4°C
Semi-Volatiles Organics	Water	EPA 625	Cool to 4°C
Volatiles Organics	Soil	EPA 8240	Cool to 4°C
Semi-Volatiles Organics	Soil	EPA 8270	Cool to 4°C

---

* Methods 6000-8000 for ICP or AA (Furnace Technique), depending upon metal, in SW-846, EPA, 1986.

APPENDIX F-7

PROCEDURES FOR INDIVIDUAL AND BULK SAMPLE PACKAGING

Prior to packaging any samples for shipment, the sample container will be checked for proper identification and compared to the field logbook for accuracy. The following steps for packaging are then observed:

- Place sample container, properly identified and with a sealed lid in a polyethylene bag, and seal the bag.
- Place sample in a picnic cooler which has been lined with a large polyethylene bag.
- Pack with enough non-combustible absorbent, cushioning materials to minimize the possibility of the container breaking. Vermiculite is a commonly preferred material.
- Seal large bag.
- Place necessary documentation (sample analysis request for and chain-of-custody form) required to accompany the samples during shipment in a sealed plastic bag and tape to underside of cooler.
- The cooler will then be sealed with fiber tape, and the custody seals will be placed so any opening of the cooler prior to arrival at the laboratory can be detected.

APPENDIX 3

SAMPLING AND ANALYSIS PLAN

SAMPLING AND ANALYSIS PLAN
FOR
LIVERMORE ARCADE SHOPPING CENTER
SOIL AND GROUND-WATER INVESTIGATION

Prepared for:

Grubb & Ellis Realty Income Trust
and
California Regional Water Quality Control Board

Prepared by:

H+GCL, Inc.
2200 Powell Street, Suite 880
Emeryville, California 94608

January 1992

Project No. 48016.08
MW1/Grubb & Ellis/Arcade RI/FS

H+GCL
Environmental Scientists and Engineers

TABLE OF CONTENTS

1.0 SITE BACKGROUND

H+GCL (formerly known as Hygienetics, Inc.) has been retained by Grubb and Ellis Realty Income Trust (Grubb and Ellis) to perform a Remedial Investigation/Feasibility Study (RI/FS) at the Livermore Arcade Shopping Center (the Arcade) in Livermore, California.

A work plan for an RI/FS that addresses the new ground-water conditions at the Arcade site was requested by the CRWQCB at a December 6, 1991, meeting with representatives of Grubb & Ellis. This Sampling and Analysis Plan (SAP) is an attachment to the work plan that responds to that request.

The City of Livermore, California is located approximately 25 miles east of San Francisco Bay along Highway 580. The Livermore Arcade Shopping Center is located at the northwest corner of First Street and South P Street in downtown Livermore. Railroad Avenue borders the Arcade site to the north. South S Street borders the site to the west.

Mike's One-Hour Cleaners at the Livermore Arcade Shopping Center has been identified as the source of tetrachloroethylene (also referred to as perchloroethylene or PCE) contamination which has moved through the soil and into the ground water. The former operator routinely discharged PCE waste into the floor drain. The floor drain leads to a broken four-inch diameter sewer line which released the PCE into the soil. A constant flow of water through the line washed the PCE through the soil and dissolved it. The dissolved phase PCE entered the ground water and spread north in the direction of ground-water movement.

The soil and ground-water investigation found dissolved phase PCE contamination in the shallow ground water (40 - 65 feet). No detectable levels of PCE or other organic contaminants were found in the California Water Service (CWS) wells screened in the deeper aquifers (120 - 400 feet) and located adjacent to the PCE plume originating at Mike's Cleaners. In historical CWS well boring logs, several clay aquitards were found to exist between the depths of 75 and 110 feet in the site vicinity. All fifteen ground-water monitoring wells installed at the Arcade site by H+GCL were completed above the clay aquitard, in order to avoid the risk of damaging this natural protective layer.

Tetrachloroethylene (PCE), cis-1,2-dichloroethene, and trichloroethene were detected in the ground water, with the highest concentrations found in monitoring well MW-7 at Mike's One Hour Cleaners. The volume of PCE that has leaked into the soil and reached the ground water is unknown. However, the concentration and distribution of contaminants in the ground water was defined to the satisfaction of the CRWQCB and Alameda County. The PCE plume in 1990 was defined to be approximately 900 feet in length, and extend north of Mike's One Hour Cleaners.

The ground water along the eastern edge of the Arcade site has been impacted with gasoline. Components of gasoline (i.e. benzene, toluene, ethylbenzene and total xylene isomers) were detected in the ground water in monitoring well MW-1, located on the southeast corner of the Arcade property. There is significant evidence that the gasoline leaked from underground storage tanks at a Beacon Oil Service Station located just southeast and up-gradient of the site. Activities related to verifying the source of the gasoline release and determining the extent of contamination have not been addressed in this investigation

Chloroform, bromodichloromethane and bromoform were detected in the ground water, with the highest concentrations found in monitoring well MW-9. These chemicals are common products of chlorine degradation in drinking water disinfection processes and have also been detected as remnants of analytical processes.

In quarterly monitoring throughout 1991, H+GCL detected very little change in the contaminant levels but discovered a significant decrease in the ground-water table in recent months. The November 1991 quarterly monitoring of the ground-water elevation at the Arcade site showed that the ground water had fallen below the depth of the deepest ground-water monitoring well, MW-7, which is screened to 65 feet. The ground water had previously been measured at depths of between 40 and 44 feet.

H+GCL informed Alameda County and the CRWQCB of the changes in the ground-water level and explained that previously planned approaches for ground-water remediation are probably no longer be applicable. In a meeting with the CRWQCB and representatives of Grubb & Ellis on December 6, 1991, the changing ground-water conditions were discussed as well as several new remedial action alternatives. The CRWQCB requested that Grubb & Ellis submit a work plan to characterize the new ground-water conditions at the Arcade site.

2.0 INITIAL OBJECTIVES

Additional subsurface information must be collected to characterize the distribution of contaminants due to the changing ground-water conditions at the Arcade site. A soil boring will be placed near the source of the PCE release. Soil samples collected at 5-foot intervals from a depth of 40-feet to the bottom of the aquifer will be analyzed for solvent and gasoline compounds. The analytical results will verify the distribution of the PCE concentrations, and any other related compounds, in the soil and in the ground water, allowing the development of remedial alternatives.

Soil sampling and analysis will verify the distribution of PCE (and other previously identified compounds) in the unsaturated soil zone and in the saturated zone. The bottom of the aquifer can be defined by identifying a prominent clay unit located in a depth interval of 70 to 90-feet. The borings will be completed as monitoring wells, screened to the deepest portion of the shallow aquifer to allow for future ground-water monitoring under the changing ground-water conditions. These wells may also be utilized as vapor extraction wells if it is found that a significant amount of PCE contamination has been retained in the unsaturated zone. Ground-water sampling and analysis will verify the thickness of the saturated zone and will document the change of PCE concentrations in the ground water as it exists in the lower portion of the aquifer.

The work plan tasks will resolve the contaminant distribution due to ground-water migration. The data acquired will also provide supplemental information needed to conduct a Baseline Public Health Evaluation (BPHE) and to evaluate the remedial action alternatives in the feasibility study. Additional work may be required upon completion of the work plan tasks and the analysis of the acquired data.

3.0 SAMPLE LOCATION AND FREQUENCY

The following subsurface investigation tasks will be performed:

1) Drill one soil boring at the source and one in the downgradient portion of the previously documented PCE plume area.

Advance the boring through the extended unsaturated zone and through the saturated zone to the bottom of the aquifer.

Utilize a core soil sampler to document the depth of lithologic contacts and to identify the depth of the clay aquitard. Take precautions to prevent penetrating the clay aquitards.

Collect soil samples every five feet for laboratory analyses in the interval between a depth of 40 feet and the clay aquitard to establish a PCE distribution profile in the unsaturated zone.

Deliver soil samples to an EPA and California certified environmental laboratory under strict chain-of-custody protocols .

Analyze the soil for halogenated volatile organics by EPA Method 8010 and aromatic volatile organics by EPA Method 8020.

Analyze one soil sample from each boring location for Title 26 Metals

Analyze one soil sample from each boring location for for semi-volatiles (including PCBs and pesticides) by EPA Method 8270. If other contaminants not previously identified are discovered the SAP may be expanded

2) Stop each boring upon entry into the clay aquitard, complete the hole as a screened well

Survey the new wells to determine the relative ground-water elevations.

Develop each well by the surge/bail method or by the bail/pump method.

Sample ground water from each well.

Deliver ground-water samples to a California certified environmental laboratory under strict chain-of-custody protocols.

Analyze the ground water for halogenated volatile organics by EPA Method 8010 and aromatic volatile organics by EPA Method 8020.

Analyze one ground-water sample from each of the new wells for Title 26 Metals.

Analyze one ground-water sample from each of the new wells for semi-volatiles (including PCBs and pesticides) by EPA Method 8270. If other contaminants not previously identified are discovered the SAP may be expanded

3) Perform monthly sampling of California Water Service wells CWS-3 and CWS-8 for six months and monitor quarterly for one year thereafter.

Deliver ground-water samples to a California certified environmental laboratory under strict chain-of-custody protocols.

Analyze the ground water for purgeable organics by EPA Method 524.2.

Prior to the completion of the RI/FS report further sampling may be required to evaluate the potential remedial action alternatives in the FS.

4.0 SAMPLE DESIGNATION

Immediately after sample collection, label each sample container with an adhesive label containing the information needed to positively identify the sample and to specify the treatment appropriate for it. Labels are usually supplied by the laboratory that will perform the analyses and in some cases may already be affixed to the sample containers. Mark the labels with a waterproof ink.

Include on the label:

- Project and site identification
- Sample number
- Sample preservation (e.g., H_2SO_4, $Na_2S_2O_3$)
- Date and time of sampling
- Any other information needed for sample analysis.

Standard practice is to assign a sample number of 10 digits, indicating the date and time of sampling, as follows:

- Year (2 digits)
- Month (2 digits)
- Day (2 digits)
- Time (24-hour clock; 4 digits)

Thus, a sample collected at 2:45 p.m. (14:45 on the 24-hour clock) on May 15, 1987, would be assigned the sample number 8705151445. Other systems of identifying samples may be used for certain projects if desired by the client.

Sample splits, spikes, and blanks required for QA/QC analysis will be labeled and given sample numbers according to the same scheme.

5.0 SAMPLING EQUIPMENT AND PROCEDURES

Soil samples will be analyzed utilizing a HNu photoionization detector, and selected samples will be sent to the laboratory for analysis. Ground-water samples will be collected after development of the wells and sent to the laboratory for analysis. All work performed under this SAP will be conducted according to the H+GCL Standard Operating Procedures and the Quality Assurance/Quality Control document that has been developed for work at the Arcade site. Sampling equipment and procedures are developed for work plan tasks at the Arcade site, and have been adopted from the SOP and QA/QC documents which are incorporated by reference in appendices 1 and 2.

6.0 SAMPLE HANDLING AND ANALYSIS

All work performed at the Arcade site under this SAP will be conducted according to the H+GCL Standard Operating Procedures and the Quality Assurance/Quality Control document that has been developed for work at the Arcade site. Sample handling and analysis procedures developed for the work plan tasks at the Arcade site are described in the SOP and QA/QC documents which are incorporated by reference in appendices 1 and 2.

All field personnel involved with the subsurface investigation tasks will be familiar with the contents of the H+GCL Health and Safety Plan (HSP) specifically designed for the Arcade site which is incorporated by reference in appendix 4 . One copy of the HSP will be kept on-site at all times for the duration of the field investigation. All on-site personnel will read, sign and agree to adhere to the plan.

An HNu photoionization detector with a 10.2 electron-volt ionization source lamp will be used to field screen soil samples at the down-gradient boring location and to help select the samples to be sent to the laboratory for analysis. The HNu will also be used to monitor the breathing zone during all drilling activities.

Soil and ground-water samples will be analyzed for aromatic and halogenated hydrocarbons using approved EPA Methods 8020 and 8010 as referenced in EPA Publication SW-846. One soil sample from each boring location will be analyzed for Title 26 Metals and for semi volatiles (including PCBs and pesticides) by EPA Method 8270.

The deeper aquifer zones will be monitored through periodic sampling of the CWS water supply wells. The analysis will be by EPA Method 524.2 for purgeable organics.

APPENDIX 4

HEALTH AND SAFETY PLAN

SITE HEALTH AND SAFETY PLAN FORM

Project Name: Livermore Arcade Shopping Center

Site Name: Mike's Cleaners   **Date:** 1/1/92

Site Address: 1st and P Streets   **Site No:** 1

Prepared By: KN   **Work Assignment No.:** 1

Client Name: Grubb & Ellis

[X] Original HSP
[ ] Amendment to Existing HSP, Date Approved

Objectives: Summarize below. Attach sheet if necessary.

Health and Safety Plan for field operations.

Site Type: Check as many as applicable.

[X] Active
[ ] Inactive
[ ] Secure
[X] Unsecured
[ ] Enclosed Space

[ ] Service Station
[ ] Refinery
[ ] Landfill
[ ] Industrial
[ ] Well Field

[ ] Unknown
[X] Other: (Specify) Shopping center

Surrounding Population:

[X] Residential
[ ] Rural

[ ] Industrial
[ ] Urban

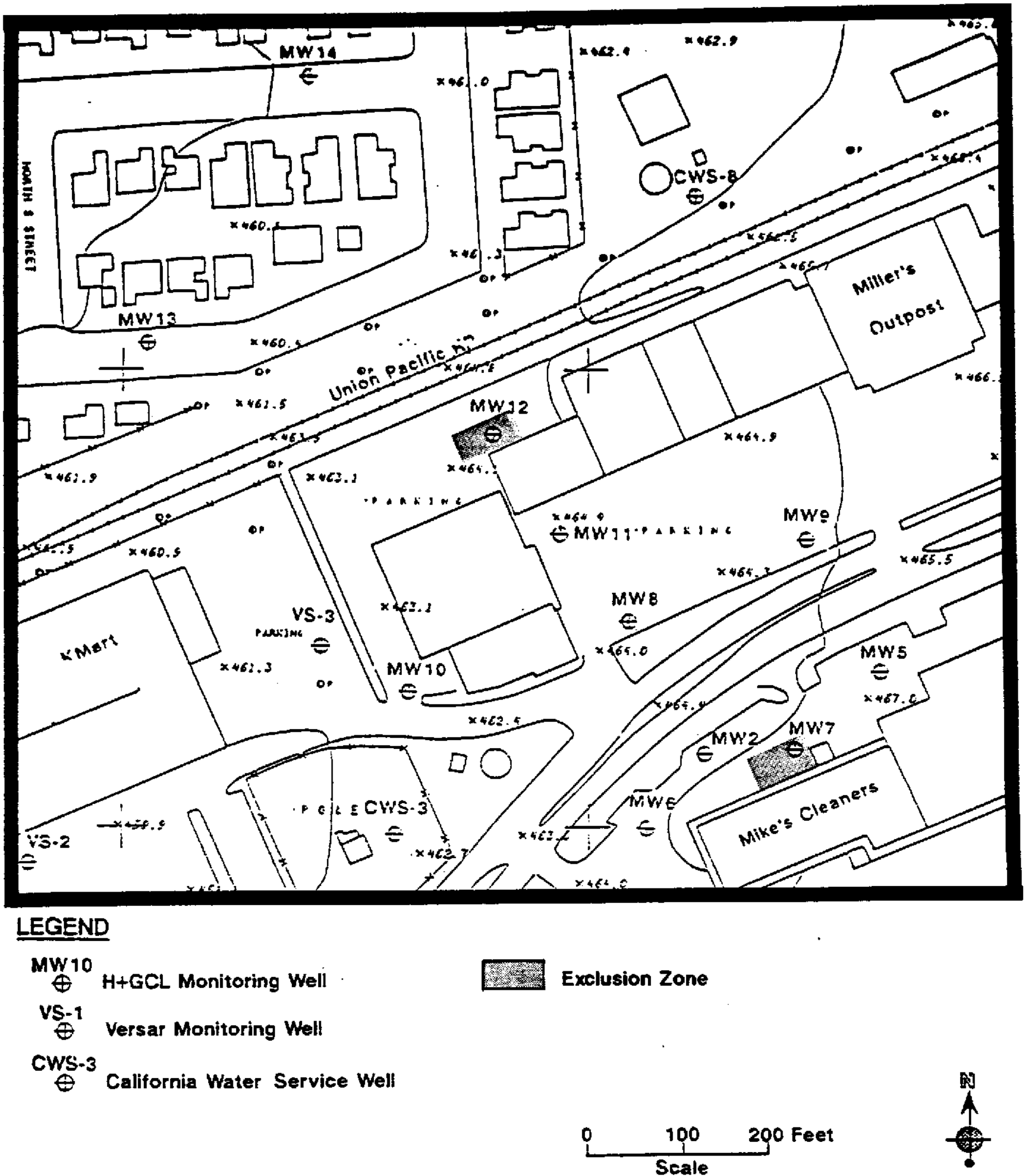
Other:

Site Description and Features: Summarize below. Include principal operations and unusual features (containers, dikes, power lines, terrain, etc.). Attach sheet if necessary.

11.75 acre shopping center with large parking areas; sewer, power, and other utilities are buried. Terrain is flat with limited vegetation.

SITE HEALTH AND SAFETY PLAN FORM

This page reserved for site map. Attach sheet if necessary.
Exclusion zone(s), decontamination zone(s), and support zone(s) must be delineated on the site map.



SITE HEALTH AND SAFETY PLAN FORM

History: Summarize below. In addition to history, include complaints from public, previous agency actions, known exposures or injuries, etc.

Mike's One Hour Cleaners has been identified as the source of PCE contamination that has moved through the soil and into the ground water. The pathway for the release is a broken 4" sewer line. PCE is believed to have entered the ground water in the dissolved phase and spread north with the flow of the ground water.

Waste Types:

[X] Liquid
[ ] Solid
[ ] Gasoline
[ ] Sludge
[ ] Gas
[ ] Unknown
[ ] Other: (Specify)

Waste Characteristics: Check as many as applicable.

[ ] Corrosive
[X] Toxic
[ ] Flammable
[ ] Inert
[ ] Volatile
[ ] Unknown
[ ] Reactive
[ ] Radioactive
[ ] Other: (Specify)

Hazards of Concern:

[X] Heat Stress - Attach Guidelines (heatstrs.gid)
[ ] Cold Stress - Attach Guidelines (cold.gid)
[ ] Explosion/Flammable
[ ] Oxygen Deficient
[ ] Biological
[ ] Inorganic Chemicals
[X] Organic Chemicals
[X] Noise
[ ] Radiological
[ ] Other: (Specify)

Principal Disposal Methods and Practices: Summarize below. Also define if underground tanks, transmission lines, pumps have been removed.

Drill cuttings are contained in 55-gallon drums until soil is determined to be non-hazardous. Well development water is discharged to sanitary sewer under permit conditions. Soil and water samples are collected and transported to an analytical laboratory.

SITE HEALTH AND SAFETY PLAN FORM

Known Site Contaminant:	Tetrachloroethylene (PCE)
Highest Concentration Observed: (specify units and media)	900 ug/l

Contaminant Data:

TETRACHLOROETHYLENE

Fire and Explosion Hazard:
Not flammable. Poisonous gases are produced when heated. Toxic, irritating gases may be generated in fires. (USCG, 1985)

Protective Clothing:
Keep upwind. Wear boots, protective gloves, and goggles. Wash away any material which may have contacted the body with copious amounts of water or soap and water. Do not handle broken packages without protective equipment. ((C)AAR, 1986)

Health Hazards:
VAPOR: Irritating to eyes, nose and throat. If inhaled, will cause difficult breathing, or loss of consciousness. LIQUID: Irritating to skin and eyes. Harmful if swallowed. (USCG, 1985)

General Description:
Tetrachloroethylene, also called perchloroethylene, is a clear colorless volatile liquid having an ether-like odor. It is used as dry cleaning solvent, a vapor degreasing solvent, drying agent for metals, and for the manufacture of other chemicals. It is non-combustible, insoluble in water and its vapors are heavier than air. ((C)AAR, 1986)

Fire Fighting Procedures:
Extinguish fire using agent suitable for type of surrounding fire (material itself does not burn or burns with difficulty). ((C)AAR, 1986)

Spill Cleanup:
Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without hazard. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. Water spill: If dissolved, apply activated carbon at ten times the spilled amount in region of 10 ppm or greater concentration. Remove trapped material with suction hoses. Air spill: Apply water spray or mist to knock down vapors. Vapor knockdown water is corrosive or toxic and should be diked for containment. ((C)AAR, 1986)

First Aid:
If this chemical comes in contact with the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. If this chemical comes in contact with the skin, promptly wash the contaminated skin with soap and water. If this chemical penetrates through the clothing, promptly remove the clothing and wash the skin with soap and water. Get medical attention promptly. If a person breathes in large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible. If this chemical has been swallowed, get medical attention immediately. (NIOSH, 1987)

Warning Concentration (ppm or mg/m^3): 5 ppm

Exposure Limits/Guidelines:

OSHA PEL:	25 ppm
NIOSH REL:	CA
ACGIH TLV-TWA:	50 ppm
IDLH:	500 ppm
Photoionization Potential:	9.32 eV

SITE HEALTH AND SAFETY PLAN FORM

Known Site Contaminant:	cis 1,2-dichloroethene
Highest Concentration Observed: (specify units and media)	140 ug/l

Contaminant Data:

1,2-DICHLOROETHYLENE

Fire and Explosion Hazard:
FLAMMABLE. POISONOUS GASES MAY BE PRODUCED IN FIRE. Containers may explode in fire. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Phosgene and hydrogen chloride fumes may form in fires. Vapor is heavier than air and may travel a considerable distance to a source of ignition and flash back. (USCG, 1985)

Protective Clothing:
Wear goggles and self-contained breathing apparatus. (USCG, 1985)

Health Hazards:
VAPOR: If inhaled will cause dizziness, nausea, vomiting, or difficult breathing. LIQUID: Harmful if swallowed. (USCG, 1985)

General Description:
Liquid; colorless; sweet pleasant odor. Sinks in water. Flammable, irritating vapor is produced. (USCG, 1985)

Fire Fighting Procedures:
Extinguish with dry chemicals, foam or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water. (USCG, 1985)

Spill Cleanup:
Wear goggles and self-contained breathing apparatus. Shut off ignition sources. Stop discharge if possible. Keep people away. Isolate and remove discharged material. Notify local health and pollution control agencies. (USCG, 1985)

First Aid:
If this chemical comes in contact with the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. If this chemical comes in contact with the skin, promptly wash the contaminated skin with soap and water. If this chemical penetrates through the clothing, promptly remove the clothing and wash the skin with soap and water. Get medical attention promptly. If a person breathes in large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible. If this chemical has been swallowed, get medical attention immediately. (NIOSH, 1987)

Warning Concentration (ppm or mg/m^3): Data not available

Exposure Limits/Guidelines:

OSHA PEL:	200 ppm (790 mg/m$^{3)}$
NIOSH REL:	
ACGIH TLV-TWA:	200 ppm
IDLH:	4,000 ppm

Photoionization Potential:	9.65 eV

SITE HEALTH AND SAFETY PLAN FORM

Known Site Contaminant: Trichloroethene

Highest Concentration Observed: 26 ug/l
(specify units and media)

Contaminant Data:

TRICHLOROETHYLENE

Fire and Explosion Hazard:
Combustible. POISONOUS GASES ARE PRODUCED IN FIRE. Toxic and irritating gases are produced in fire situations. (USCG, 1985)

Protective Clothing:
Keep upwind. Wear boots, protective gloves, and goggles. Avoid breathing vapors or dusts. Wash away any material which may have contacted the body with copious amounts of water or soap and water. ((C)AAR, 1986)

Health Hazards:
VAPOR: Irritating to eyes, nose and throat. If inhaled, will cause nausea, vomiting, difficult breathing, or loss of consciousness. LIQUID: Irritating to skin and eyes. If swallowed, will cause nausea, vomiting, difficult breathing, or loss of consciousness. (USCG, 1985)

General Description:
Trichloroethylene is a clear colorless volatile liquid having a chloroform-like odor. It is used as a solvent, fumigant, in the manufacture of other chemicals, and for many other uses. It is heavier than water and is slightly soluble in water. It is non-combustible. ((C)AAR, 1986)

Fire Fighting Procedures:
Extinguish fire using agent suitable for type of surrounding fire (material itself does not burn or burns with difficulty). ((C)AAR, 1986)

Spill Cleanup:
Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. Water spill: If dissolved, apply activated carbon at ten times the spilled amount in region of 10 ppm or greater concentration. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. Air spill: Apply water spray or mist to knock down vapors. Combustion products include corrosive or toxic vapors. ((C)AAR, 1986)

First Aid:
If this chemical comes in contact with the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. If this chemical comes in contact with the skin, promptly wash the contaminated skin with soap and water. If this chemical penetrates through the clothing, promptly remove the clothing and wash the skin with soap and water. Get medical attention promptly. If a person breathes in large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible. If this chemical has been swallowed, get medical attention immediately. (NIOSH, 1987)

Warning Concentration (ppm or mg/m^3): 50 ppm

Exposure Limits/Guidelines:

OSHA PEL:	50 ppm
NIOSH REL:	CA
ACGIH TLV-TWA:	50 ppm
IDLH:	1000 ppm
Photoionization Potential:	9.45 eV

SITE HEALTH AND SAFETY PLAN FORM

Known Site Contaminant:	Benzene
Highest Concentration Observed: (specify units and media)	11,000 ug/l

Contaminant Data:

BENZENE

Fire and Explosion Hazard:
FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back. (USCG, 1985)

Protective Clothing:
Avoid breathing vapors. Keep upwind. Wear boots, protective gloves, and goggles. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water. ((C)AAR, 1986)

Health Hazards:
VAPOR: Irritating to eyes, nose and throat. If inhaled, will cause headache, difficult breathing, or loss of consciousness. LIQUID: Irritating to skin and eyes. Harmful if swallowed. (USCG, 1985)

General Description:
Benzene is a clear colorless liquid with a characteristic aromatic odor. It is used to make other chemicals, as a solvent, and as a gasoline additive. It has a flash point of 12 deg F., and solidifies at 42 deg F. It is lighter than water and insoluble in water. Its vapors are heavier than air. ((C)AAR, 1986)

Fire Fighting Procedures:
Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may spread fire. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, carbon dioxide or dry chemical. ((C)AAR, 1986)

Spill Cleanup:
Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without hazard. Use water spray to knock-down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, sawdust, or commercial sorbents. Apply fluorocarbon-water foam to diminish vapor and fire hazard. Water spill: Use natural barriers or oil spill control booms to limit spill motion. Use surface active agent (e.g. detergent, soaps, alcohols) to compress and thicken spilled material. Inject "universal" gelling agent to solidify encircled spill and increase effectiveness of booms. If dissolved, apply activated carbon at ten times the spilled amount in region of 10 ppm or greater concentration. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. Air spill: Apply water spray or mist to knock down vapors. ((C)AAR, 1986)

First Aid:
If this chemical comes in contact with the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. If this chemical comes in contact with the skin, promptly wash the contaminated skin with soap and water. If this chemical penetrates through the clothing, promptly remove the clothing and wash the skin with soap and water. Get medical attention promptly. If a person breathes in large amounts of this chemical, move the exposed person to fresh air at once. If breathing has

stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible. If this chemical has been swallowed, get medical attention immediately. (NIOSH, 1987)

Warning Concentration (ppm or mg/m^3): 4.68 ppm

Exposure Limits/Guidelines:

OSHA PEL:	1 ppm (mg/m^3)
NIOSH REL:	Carcinogenic 0.1 ppm (mg/m^3)
ACGIH TLV-TWA:	10 ppm
IDLH:	2,000 ppm

Photoionization Potential: 9.24 eV

SITE HEALTH AND SAFETY PLAN FORM

Known Site Contaminant:	Ethyl benzene
Highest Concentration Observed: (specify units and media)	3,400 ug/l

Contaminant Data:

ETHYL BENZENE

Fire and Explosion Hazard:
FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Irritating vapors are generated when heated. Vapor is heavier than air and may travel considerable distance to the source of ignition and flash back. (USCG, 1985)

Protective Clothing:
Avoid breathing vapors. Keep upwind. Wear boots, protective gloves, and goggles. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water. ((C)AAR, 1986)

Health Hazards:
VAPOR: Irritating to eyes, nose and throat. If inhaled, will cause dizziness or difficult breathing. LIQUID: Will burn skin and eyes. Harmful if swallowed. (USCG, 1985)

General Description:
Ethyl benzene is a clear colorless liquid with an aromatic odor. It is used as a solvent and to make other chemicals. It has a flash point of 59 °F. It is lighter than water and insoluble in water. Its vapors are heavier than air. ((C)AAR, 1986)

Fire Fighting Procedures:
Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may spread fire. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, carbon dioxide or dry chemical. ((C)AAR, 1986)

Spill Cleanup:
Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without hazard. Use water spray to knock-down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, sawdust, or commercial sorbents. Apply "universal" gelling agent to immobilize spill. Apply fluorocarbon-water foam to diminish vapor and fire hazard. Water spill: Use natural barriers or oil spill control booms to limit spill motion. Use surface active agent (e.g. detergent, soaps, alcohols) to compress and thicken spilled material. Inject "universal" gelling agent to solidify encircled spill and increase effectiveness of booms. If dissolved, apply activated carbon at ten times the spilled amount in region of 10 ppm or greater concentration. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. Air spill: Apply water spray or mist to knock down vapors. ((C)AAR, 1986)

First Aid:
If this chemical comes in contact with the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. If this chemical comes in contact with the skin, flush the contaminated skin with water promptly. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water promptly. If irritation persists after washing, get medical attention. If a person breathes in large amounts of this chemical, move the exposed person to fresh air at once. If

breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible. If this chemical has been swallowed, get medical attention immediately. (NIOSH, 1987)

Warning Concentration (ppm or mg/m^3):	N/A

Exposure Limits/Guidelines:

OSHA PEL:	100 ppm
NIOSH REL:	100 ppm
ACGIH TLV-TWA:	N/A
IDLH:	2000 ppm

Photoionization Potential:	8.76 eV

SITE HEALTH AND SAFETY PLAN FORM

Known Site Contaminant: Toluene

Highest Concentration Observed: 22,000 ug/l
(specify units and media)

Contaminant Data:

TOLUENE

Fire and Explosion Hazard:
FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Vapor is heavier than air and may travel a considerable distance to a source of ignition and flash back. (USCG, 1985)

Protective Clothing:
Avoid breathing vapors. Keep upwind. Wear boots, protective gloves, and goggles. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water. ((C)AAR, 1986)

Health Hazards:
VAPOR: Irritating to eyes, nose and throat. If inhaled, will cause nausea, vomiting, headache, dizziness, difficult breathing, or loss of consciousness. LIQUID: Irritating to skin and eyes. If swallowed, will cause nausea, vomiting or loss of consciousness. (USCG, 1985)

General Description:
Toluene is a clear colorless liquid with a characteristic aromatic odor. It is used in aviation and automotive fuels, as a solvent for many materials, and to make other chemicals. It has a flash point of 40 °F. It is lighter than water and insoluble in water. Its vapors are heavier than air. ((C)AAR, 1986)

Fire Fighting Procedures:
Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may spread fire. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, carbon dioxide or dry chemical. ((C)AAR, 1986)

Spill Cleanup:
Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without hazard. Use water spray to knock-down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, sawdust, or commercial sorbents. Apply "universal" gelling agent to immobilize spill. Apply fluorocarbon-water foam to diminish vapor and fire hazard. Water spill: Use natural barriers or oil spill control booms to limit spill motion. Use surface active agent (e.g. detergent, soaps, alcohols) to compress and thicken spilled material. Inject "universal" gelling agent to solidify encircled spill and increase effectiveness of booms. If dissolved, apply activated carbon at ten times the spilled amount in region of 10 ppm or greater concentration. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. Air spill: Apply water spray or mist to knock down vapors. ((C)AAR, 1986)

First Aid:
If this chemical comes in contact with the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. If this chemical comes in contact with the skin, promptly wash the contaminated skin with soap and water. If this chemical penetrates through the clothing, promptly remove the clothing and wash the skin with soap and water. Get medical attention promptly. If a person

breathes in large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible. If this chemical has been swallowed, get medical attention immediately. (NIOSH, 1987)

Warning Concentration (ppm or mg/m^3): 0.17 ppm

Exposure Limits/Guidelines:

OSHA PEL:	100 ppm
NIOSH REL:	100 ppm
ACGIH TLV-TWA:	100 ppm
IDLH:	2000 ppm

Photoionization Potential: 8.82 eV

SITE HEALTH AND SAFETY PLAN FORM

Known Site Contaminant:	Total xylenes
Highest Concentration Observed: (specify units and media)	20,000 ug/l

Contaminant Data:

M-XYLENE

Fire and Explosion Hazard:
FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back. (USCG, 1985)

Protective Clothing:
Wear self-contained breathing apparatus. (USCG, 1985)

Health Hazards:
VAPOR: Irritating to eyes, nose, and throat. If inhaled, will cause headache, difficult breathing, or loss of consciousness. LIQUID: Irritating to skin and eyes. If swallowed, will cause nausea, vomiting, or loss of consciousness. (USCG, 1985)

General Description:
Watery liquid; colorless; sweet odor. Floats on water. Flammable, irritating vapor is produced. (USCG, 1985)

Fire Fighting Procedures:
Extinguish with foam, dry chemical, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water. (USCG, 1985)

Spill Cleanup:
Stop discharge if possible. Keep people away. Avoid contact with liquid and vapor. Isolate and remove discharged material. Notify local health and pollution control agencies. (USCG, 1985)

First Aid:
If this chemical comes in contact with the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. If this chemical comes in contact with the skin, promptly wash the contaminated skin with soap and water. If this chemical penetrates through the clothing, promptly remove the clothing and wash the skin with soap and water. Get medical attention promptly. If a person breathes in large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible. If this chemical has been swallowed, get medical attention immediately. (NIOSH, 1987)

Warning Concentration (ppm or mg/m^3): 0.05 ppm

Exposure Limits/Guidelines:

OSHA PEL:	100 ppm
NIOSH REL:	100 ppm
ACGIH TLV-TWA:	100 ppm
IDLH:	1000 ppm

Photoionization Potential: 8.56 eV

SITE HEALTH AND SAFETY PLAN FORM

Known Site Contaminant: Gasoline

Highest Concentration Observed: 84,000 ug/l
(specify units and media)

Contaminant Data:

SITE HEALTH AND SAFETY PLAN FORM

Known Site Contaminant: Chloroform

Highest Concentration Observed: 20 ug/l
(specify units and media)

Contaminant Data:

CHLOROFORM

Fire and Explosion Hazard:
Container may explode in the heat of fire. When heated it liberates phosgene; hydrogen chloride, chlorine and toxic and corrosive oxides of carbon and chlorine. It develops acidity from prolonged exposure to air and light. Chloroform explodes when in contact with aluminum powder or magnesium powder or with alkali metals and dinitrogen tetroxide. It reacts vigorously with acetone in the presence of potassium hydroxide or calcium hydroxide. It is oxidized by strong oxidizers such as chromic acid forming phosgene and chlorine. It reacts vigorously with triisopropylphosphine. (EPA, 1986)

Protective Clothing:
Wear self-contained breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. (EPA, 1986)

Health Hazards:
It is classified as moderately toxic. Probable oral lethal dose for humans is 0.5 to 5 g/kg for a 150 lb. person. The mean lethal dose is probably near 1 fluid ounce. It is a human suspected carcinogen. Also, it is a central nervous system depressant and a gastrointestinal irritant. It has caused rapid death attributable to cardiac arrest and delayed death from liver and kidney damage. Signs and Symptoms of Exposure: Symptoms of acute exposure include fainting sensation, vomiting, dizziness, salivation, nausea, fatigue, and headache. Other symptoms are respiratory depression, coma, kidney damage, and liver damage. Liquid in the eye causes tearing and conjunctivitis. Symptoms of chronic exposure include loss of appetite, hallucinations, moodiness and physical and mental sluggishness. (EPA, 1986)

General Description:
Chloroform is a clear colorless heavy liquid with a characteristic odor. It is used as a solvent, to make other chemicals, as fumigant, and for other uses. It is heavier than water and slightly soluble in water. It is nonflammable under most conditions, but it will burn under extreme fire conditions. It can cause illness by inhalation, skin absorption and/or ingestion. ((C)AAR, 1986)

Fire Fighting Procedures:
Extinguish with dry chemical, carbon dioxide, water spray, fog or foam. Move container from fire area. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. (EPA, 1986)

Spill Cleanup:
Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. Apply "universal" gelling agent to immobilize spill. Water spill: Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. Remove trapped material with suction hoses. If dissolved, apply activated carbon at ten times the spilled amount in region of 10 ppm or greater concentration. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. Air spill: Combustion products include corrosive or toxic vapors. Thermal decomposition to phosgene can occur. ((C)AAR, 1986)

First Aid:

Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Speed in removing material from skin is of extreme importance. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation. (EPA, 1986)

Warning Concentration (ppm or mg/m^3): 205-307 ppm

Exposure Limits/Guidelines:

OSHA PEL:	2.0 ppm
NIOSH REL:	CA
ACGIH TLV-TWA:	10 ppm
IDLH:	1000 ppm

Photoionization Potential: 11.42 eV

SITE HEALTH AND SAFETY PLAN FORM

Known Site Contaminant:	Bromodichloromethane
Highest Concentration Observed: (specify units and media)	10 ug/l

Contaminant Data:

SITE HEALTH AND SAFETY PLAN FORM

Known Site Contaminant: Bromoform

Highest Concentration Observed: 2 ug/l
(specify units and media)

Contaminant Data:

SITE HEALTH AND SAFETY PLAN FORM

Site Personnel and Responsibilities (Include Subcontractors)

Name	Firm	Health Clearance	Responsibilities	Task
Michael Wright	H+GCL	HAZWOPER	Work Assignment Manager	
Karl Novak	H+GCL	HAZWOPER	Health and Safety Officer	
Stuart Sleeman	H+GCL	HAZWOPER	Corporate Health and Safety Officer	
Mike Luksic	H+GCL	HAZWOPER	Geologist	
Sean McFadden	H+GCL	HAZWOPER	Field Technician	
Subcontractors	Westex, Layne Western, Weeks	HAZWOPER	Drillers	

SITE HEALTH AND SAFETY PLAN FORM

Task **Drilling and sampling** **Level:** **D** **Modified** **Yes [X]** **No [ ]**

Task Description Specific Technique/Site Location

Specialized Medical Surveillance Required	[ ] Yes [X] No
Specialized Training Required	[X] Yes [ ] No
Type	[X] Intrusive [ ] Non-Int.
Level of Protection (Primary)	D
Contingency	C
Schedule	

Respiratory: [ ] **Not Needed**

[ ] SCBA, Airline:
[ ] APR:
[X] Cartridge: Volatile organic
[ ] Escape Mask:
[ ] Other:

Head and Eye: [ ] **Not Needed**

[ ] Safety Glasses:
[ ] Face Shield:
[ ] Goggles:
[X] Hard Hat:
[ ] Other:

Gloves: [ ] **Not Needed**

[ ] Undergloves:
[X] Gloves:
[ ] Overgloves:

Prot. Clothing: [X] **Not Needed**

[ ] Encapsulating Suit:
[ ] Splash Suit:
[ ] Apron:
[ ] Tyvek Coverall
[ ] Saranex Coverall
[ ] Coverall:
[ ] Other:

Boots: [ ] **Not Needed**

[X] Boots: Steel-toed
[ ] Overboots:

Other: Specify below.

Ear protection as required

SITE HEALTH AND SAFETY PLAN FORM

Monitoring Equipment: Specify by task. Indicate type as necessary.

Instrument	Task	Action Guidelines	
Combustible Gas Indicator		0-10%LEL	No explosion hazard.
		10-25% LEL	Potential explosion hazard; notify SHSC.
		>25%LEL	Explosion hazard; interrupt task/evacuate.
		21.0%O_2	Oxygen normal.
		<21.0%O_2	Oxygen Deficient; notify SHSC.
		<19.5%O_2	Interrupt task/evacuate.

Comments (Includes schedules of use)

[X] Not Needed

Instrument	Task	Action Guidelines
Photoionization Detector		Specify:

[ ] 11.7 ev
[X] 10.2 ev
[ ] 9.8 ev
[ ] ev

Type:

Comments (Includes schedules of use)

To be used during drilling operations and for field screening of soil samples

[ ] Not Needed

Instrument	Task	Action Guidelines	
Radiation Survey Meter		3 x Background:	Notify HSM.
		>2mR/hr:	Establish REZ.

Comments (Includes schedules of use)

[X] Not Needed

SITE HEALTH AND SAFETY PLAN FORM

Monitoring Equipment: Specify by task. Indicate type as necessary.
(Continued)

Instrument	**Task**	**Action Guidelines**
Flame Ionization Detector		Specify:

Type:

Comments (Includes schedules of use)

[X] Not Needed

Instrument	**Task**	**Action Guidelines**
Detector Tubes/ Monitor		Specify:

Type:
Type:

Comments (Includes schedules of use)

[X] Not Needed

Instrument	**Task**	**Action Guidelines**
Other		Specify:

Specify:

Comments (Includes schedules of use)

[X] Not Needed

SITE HEALTH AND SAFETY PLAN FORM

Decontamination Procedures

Personal Decontamination

Summarize below and/or attach diagram.

[ ] Not Needed

Containment and Disposal Method:

Sampling Equipment Decontamination

Summarize below and/or attach diagram.

To prevent contamination of ground water samples, monitoring wells, or soil samples, all sampling equipment must be thoroughly cleaned prior to each use. The details of all sampling equipment decontamination procedures are presented in H+GCL's Standard Operating Procedures.

[ ] Not Needed

Containment and Disposal Method:

Rinsate shall be contained and stored in 55 gallon drums or discharged into the sanitary sewer under an appropriate municipal discharge permit.

Heavy Equipment Decontamination

Summarize below and/or attach diagram.

All heavy equipment entering the site as part of the soil and ground water sampling program will be steam cleaned prior to mobilization.

[ ] Not Needed

Containment and Disposal Method:

Rinsate shall be contained and stored in 55 gallon drums or discharged to the sanitary sewer under an appropriate municipal discharge permit.

SITE HEALTH AND SAFETY PLAN FORM

Emergency Contacts

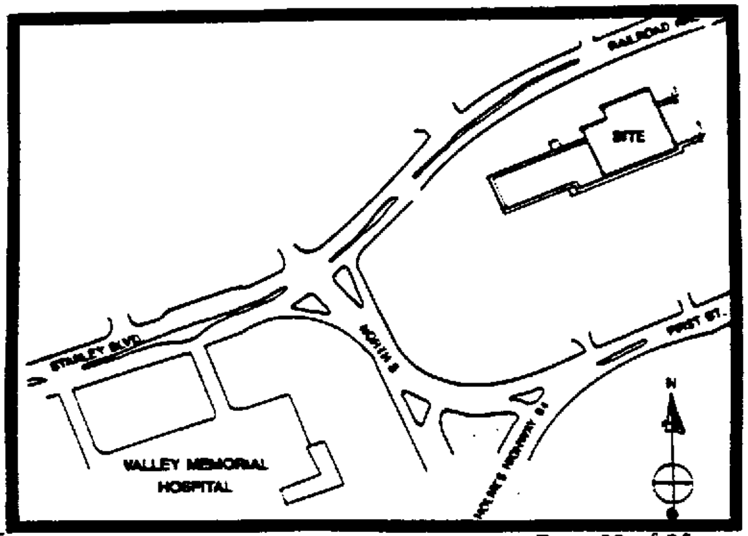
Site Water Supply	Jack Cockran (510) 447-4869
Site Telephone	Dee Pfeifer (510) 792-1720 (Property Manager)
Site Radio	
Site Other (Specify)	
USEPA Environmental Response Team	(800) 424-8802

Emergency Contacts

Regional Health and Safety Supervisor	(617) 723-4664
Project/Site Manager	(510) 547-3886
Site Health and Safety Coordinator	(510) 547-3886
RWQCB Contact	Rico Duarzo (510) 464-0837
H+GCL Home Office	(510) 547-3886
H+GCL Health and Safety Manager	(617) 589-0660
Other (Specify)	
State Environmental Agency	(510) 540-2356
State Spill Contractor	
Fire Department	911
Police Department	911
State Police	911
Health Department	(510) 271-4320
Poison Control Center	(800) 523-2222

Medical Emergency

Hospital Name:	Valley Memorial Hospital	**Phone:**	(510) 447-7000
Hospital Address:	1111 E. Stanley, Livermore		
24-Hour Ambulance:	Regional Medical Systems	**Phone:**	(510) 373-4130
Route to Hospital:	West on Railroad Avenue past North S Street. Turn left at sign for Valley Memorial Hospital.		
Distance: (Attach Map)	1/2 Mi.		



ROUTE TO HOSPITAL

SITE HEALTH AND SAFETY PLAN FORM

Contingency Plans: Summarize below.

Workers will work in Level D protective gear. Ambient air conditions will be monitored continuously when work is being performed at the site. If the vapor levels exceed five times the background level or exceed the Threshhold Limit Values, workers will go to Level C protective gear and don full-face passive respirators with organic vapor cartridges.

Site Health and Safety Plan Approvals

Prepared By: Karl Novak **Date:** ______________

Signature: ________________________________ **Date:** ______________

SHSC Signature: ________________________________ **Date:** ______________

HSM Signature: ________________________________ **Date:** ______________

SITE HEALTH AND SAFETY PLAN FORM

Signature Page

This Health and Safety Plan is to be read by all site workers, including subcontractors and visiting regulatory personnel.

I have read, understand, and agree to comply with the provisions of the attached Health and Safety Plan and agree to comply with the provisions the Health and Safety Plan for work activities on this project.

PRINTED NAME **SIGNATURE** **DATE**

During hazardous waste site investigations, good work habits are important to the prevention of undue exposure to contaminants and to maintain a safe working environment. One of the simplest methods of preventing undue exposures is the development of good personal hygiene habits. These should include the though washing of hands and face upon leaving the contamination reduction zone and before eating, drinking, or smoking, all of which should take place only in the support zone. Personnel should change clothes and shower immediately following each work shift.

In addition, the following general safety rules will be obeyed during GCL field activities,

- In the event of intrusive activities, utility companies shall be informed of proposed work prior to the initiation of the actual operation. Determinations shall be made of the existence of underground installations, and if these are near the area to be drilled, the concerned utility shall clearly delineate their locations.
- Plan site activities thoroughly ahead of time: Enter the site only to get to a designated point by a designated route for a specific purpose.
- No contact lenses are to be worn. Contact lenses can absorb chemicals and can become coated with low concentrations d dust which may irritate the eye.
- Always observe the buddy system: Never enter or exit a site alone, and never work alone in an isolated area.
- All individuals must go through specified decontamination procedures.
- Always maintain contact with site health and safety personnel.
- Decontaminate clothing (such as gloves and boots) which has contacted known sources of contamination at the site.
- Keep track of weather conditions and wind direction.
- Never climb over or under refuse or obstacles.
- Never assume that a situation is as safe as it appears to be.
- Be alert to any unusual behavior on the part of other team members which might indicate distress, disorientation, or other ill effects.
- Any open wounds must be covered with an air-tight bandage; ideally, someone with an open wound should not enter the site.
- If possible, excessively dusty conditions will be kept to a minimum by the use of a waster spray. However, the use of a full face air purifying respirator with particulate cartridge for both dust and organic vapors during soil intrusive activities may be necessary. See Site Health and SAfety Plan for details on protective equipment.
- No one shall be permitted to eat, drink, or smoke on the site and all personnel shall thoroughly wash hands with soap and water before doing any of these activities off site.

- Wet weather operations will require that disposable rainsuits be worn by all personnel.
- At the end of each day, disposable clothing shall be removed and disposed of in a doubled heavy duty plastic bags. These will be placed in a secure contaminated waste storage area.
- All work operations on site shall cease at sunset unless proper auxiliary light has been provided and approved.
- All personnel shall attend a safety meeting prior to beginning work on site. They will sigh a form stating their understanding of site hazards and agreement to abide by provisions of the Site Health and Safety Plan.

Employee Injury/Exposure Incident Report

Name: ______________________ SSN: ______________________
Site Name/Client: ______________________________________
Date of Report: _______________ Task/Phase: ______________________
Incident Type: [ ] Possible Excessive Exposure [ ] Excessive Exposure [ ] Injury
Date of Incident: ____________________ Time of Incident: ______________

Site Conditions at the Time of the Incident

Temperature: ________ Relative Humidity: ________ Precipitation: ________
Cloud Cover %: __________ Wind Speed & Direction: ____________________
Other Factors That May Have Impacted the Site: ______________________

Nature of Exposure/Injury

Material Exposed To: ______________________ Concentration: ______
Matrix: ____________________ Physical State: ________________
Part(s) of Body Exposed or Injured: ______________________________
Type or Extent of Injury or Exposure: ______________________________

Medical Care Received

When: __________ Where: ______________________________
Name of Physician: ______________________________________

Result of Exposure/Injury

[ ] Death [ ] Permanent Disability [ ] Temporary Disability [ ] Loss of Work Time
[ ] Other Explain: ______________________________________
Was Operation Conducted According to an Approved Health and Safety Plan
[ ] yes [ ] no Explain: ______________________________________
Who Witnessed the Injury/Incident: ______________________________
Was the Injury/Incident due to the Failure of Protective Equipment [ ] yes [ ] no
Possible Cause of Injury/Incident: ______________________________
____

Possible Prevention of the Injury/Incident: ______________________________
____

Signature of Person Completing Report: ______________________________
Name of Person Completing Report: ______________________________

Employee Injury/Exposure Incident Report

In the event of an injury or incident:

- decontaminate the individual as much as possible without inflicting further injury
- if decontamination is not possible, wrap the individual in a tarp to prevent the contamination of the vehicle and medical treatment facility
- transport the victim to a medical treatment facility

The decision to use an ambulance or to use a vehicle from the site will depend upon the nature and severity of the injury. Minor injuries can usually be treated faster at a free- standing medical emergency center (Lovelace Urgent Care Center, Family Medical Center, etc.) than at a hospital emergency room. A more serious injury will often be referred to a hospital emergency room from a free-standing emergency center, this will of course result in additional delay, discomfort for the victim, and cost.

APPENDIX 5

COMMUNITY RELATIONS PLAN

COMMUNITY RELATIONS PLAN
LIVERMORE ARCADE SHOPPING CENTER SITE
SOIL AND GROUNDWATER PCE CLEANUP

Prepared for:

Griubb & Ellis Realty Income Trust
One Montgomery Street
Sanfrancisco, California 94103

Prepared by:

H$^+$GCL, INC.
2200 Powell Street, Suite 880
Emeryville, CA 94608

JANUARY 1991

Project No. 48016-08
MW1/Commun Rela Plan

H$^+$GCL
Environmental Scientists and Engineers

This Community Relations Plan sets out the procedures by which Grubb & Ellis Realty Income Trust ("Grubb & Ellis"), which is taking the lead on a private party cleanup of the Livermore Arcade Shopping Center Site, will inform and encourage public participation in the remedy development and implementation process and respond to any community concerns.

As described more fully in the attached work plan for Remedial Investigation/Feasibility Study prepared by Grubb & Ellis' consultant H^+GCL, tetrachloroethylene ("PCE") contamination in soils and shallow groundwater was discovered in 1990 at the Livermore Arcade Site. Presently, no public exposure is occurring either through direct contact or through use of contaminated groundwater, since the shallow aquifer is not presently used for consumptive purposes. Information regarding the site indicates that the contaminated shallow aquifer and the deep aquifer are separated by one or more clay layers. Site characterization is continuing and a cleanup is being evaluated due to the potential need to avoid contamination of the deeper aquifer, which is used for consumptive purposes.

Given the lack of present public exposure to the contamination, and the active involvement and commitment to any necessary remediation by the current landowner, it is anticipated that general public concern may be minimal or nonexistent. It is expected that the only significant participation will be by those potentially responsible parties ("PRPs") that may ultimately bear cleanup costs. For that reason, this Community Relations Plan ("CRP") principally seeks to involve the known PRPs, and identify those members of the public that might have a concern with the decisions made regarding the site.

This CRP consists of four elements. First is the designation of a site manager as the principal contact for any members of the general public that may be concerned with the site. Second is the issuance of a notice and demand letter to the PRPs. Third is the publication of two public notices in a newspaper of general circulation in the area regarding the availability of the notice and demand letter and the draft Remedial Investigation/Feasibility Study ("RI/FS") when it becomes available. Fourth will be an opportunity for a 30 day public comment period on the draft RI/FS. Each of these elements is discussed below.

The site manager for this site is:

John Hyjer
Grubb & Ellis Realty Income Trust
One Montgomery Street
San Francisco, California 94103
Telephone: (415) 956-1990

The site manager is responsible for responding to any public requests for information, and will maintain a list of members of the public that have expressed an interest in the site. The site manager will not be responsible for discussions or negotiations with the PRPs, which will be coordinated by Grubb & Ellis' attorney, Alan Waltner, 1736 Franklin Street, Eighth Floor, Oakland, CA 94612, phone (510) 465-4494.

A notice and demand letter is being issued to the PRPs concurrently with this CRP, which discusses the history of the site, the investigations that have occurred to date, the liability of the various PRPs, and transmits the RI/FS Work Plan. The notice and demand letter invites the PRPs to meet and discuss development of the RI/FS, and to pay for the costs of cleanup and/or accept responsibility for cleanup.

The first public notice, which will be published in the Valley Times and the Tri-Valley Heard will contain substantially the following language:

> PUBLIC NOTICE OF AVAILABILITY OF WORK PLAN AND ADDITIONAL INFORMATION, LIVERMORE ARCADE SHOPPING CENTER SHALLOW GROUNDWATER CLEANUP. The Livermore Arcade Shopping Center, located at First and South P Street in downtown Livermore, is currently undertaking an investigation of tetrachloroethylene contamination of soils and shallow groundwater caused by unauthorized activities of a former tenant between 1982 and 1987. Although no drinking water sources are presently affected, remedial action is being considered to address potential future threats to water supplies. A work plan describing the planning activities at the site has been issued. For further information, please contact the site manager, John Hyjer.

The second public notice, which will be published at the time of issuance of the draft RI/FS, will contain substantially the following language:

> PUBLIC NOTICE OF AVAILABILITY OF DRAFT REMEDIAL INVESTIGATION/FEASIBILITY STUDY, LIVERMORE ARCADE SHOPPING CENTER SHALLOW GROUNDWATER CLEANUP. The Livermore Arcade Shopping Center, located at First and South P Street in downtown Livermore, is currently undertaking cleanup of tetrachloroethylene contamination of soils and shallow groundwater caused by unauthorized activities of a former tenant between 1982 and 1987. Although no drinking water sources are presently affected, remedial action is being undertaken to address potential future threats to water supplies. The proposed remedial action will involve (DISCUSS REMEDY PROPOSED IN RI/FS). A draft Remedial Investigation/Feasibility Study ("RI/FS") describing the results of the investigation of the site and the proposed selection of remedy is now available for public review and comment. If you would like to receive a copy of the draft RI/FS, please contact the site manager, John Hyjer. A public meeting is also scheduled for (DATE) at (LOCATION). Written comments are to be submitted to the site manager no later than (30 DAYS AFTER PUBLICATION).

All individuals responding to the first public notice will be mailed a copy of the second public notice, together with the draft RI/FS and any additional information specifically requested.

Finally, a 30 day public comment period will be provided to receive public input on the RI/FS, and a public meeting will be held at or near the site. All significant public comments will be responded to in a responsiveness summary accompanying a record of decision memorializing the selection of remedy.

If significant public interest is expressed regarding the RI/FS, this CRP will be amended to provide for appropriate community involvement in the remedial design and remedial action phases.