

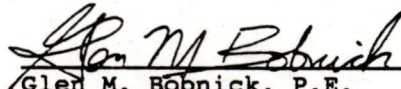
A Report Prepared For

Ms. Margaret Russell
Post Office Box 25
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WORK PLAN
REMEDIAL ACTION
RUSSELL'S AT ORCAS ISLAND
ORCAS, WASHINGTON

AGI Project No. 15,676.001

by:


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March 31, 1994

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INTRODUCTION

GENERAL

This Work Plan (WP) has been developed by Applied Geotechnology Inc. (AGI) for hydrocarbon remediation actions at Russell's at Orcas (the site) on Orcas Island, Washington. The WP describes the objective and the general scope, field activities, and reporting procedures AGI will follow for the site work. A site-specific Health and Safety Plan has been prepared and is attached.

The site is an active bulk fuel facility located on the waterfront, immediately west of the Washington State ferry dock in Orcas, Washington. The site vicinity is shown on Figure 1. The site is rectangular-shaped, with the longer side extending approximately 220 feet parallel to the shoreline. The site width varies between 85 and 100 feet. Six aboveground fuel storage tanks are located on the west end of the site. Fuel pumps and a truck loading rack are located at the site center. A small office building and store are located on the east end of the site. A wood dock extends out over the water from the middle of the site. Site features are shown on Figure 2.

AGI's remedial actions are directed at excavating selected soils from the fuel dispenser area (pump area) and truck loading rack; the excavated materials will be moved to an off-site area for treatment. Pacific Environmental Services Company (PESCO) will provide the contractor services for this project.

GeoEngineers Inc. (GeoEngineers) has completed two investigations at the site. The results are summarized in January 31 and July 19, 1990 reports to Unocal, a former owner of a portion of the facility and supplier of fuel to the bulk plant (*Report of Geotechnical Services, Subsurface Contamination Study and Report of Remedial Action*, respectively). These reports indicate that hydrocarbon concentrations exceeding Washington Department of Ecology's (Ecology) Model Toxics Control Act (MTCA) Method A cleanup levels exist beneath the pump area. In the July 19th report, GeoEngineers speculates that the hydrocarbons may extend into the slope west of the pump area, under adjacent concrete slabs, and potentially beneath the loading rack. Soil encountered in an excavation in the pump area consisted of approximately 1-1/2 feet of crushed rock fill underlain by silt to the explored depth of 3 feet below ground surface (bgs). Groundwater seepage was encountered in the excavation at 1 to 2 feet bgs. Basalt underlies the site at shallow depths (likely between 2 and 4 feet bgs).

OBJECTIVE AND SCOPE OF WORK

The objective of this WP is to define the activities needed to: 1) establish the nature and extent of soils containing hydrocarbon concentrations exceeding state cleanup levels beneath and in the vicinity of the pump area, loading rack, and product piping; and 2) complete the excavation and remediation of this soil. The scope of work to achieve these objectives includes:

- ▶ Remove the oil/water separator and investigate the area beneath the loading rack (by PESCO).

Applied Geotechnology Inc.

- ▶ Excavate soil exceeding state cleanup levels below the pump area and loading rack (by PESCO).
- ▶ Investigate soil conditions beneath the product piping extending to the aboveground bulk storage tanks and beneath the paving in the vicinity of the pump area (by AGI).
- ▶ Install a drainage system on the upslope side of the retaining wall, if needed (by PESCO).
- ▶ Collect and chemically analyze soil samples from the excavation limits (by AGI).
- ▶ Collect and chemically analyze samples from the excavated soil stockpile (by AGI).
- ▶ Transport stockpiled soil to a suitable location for Solid Phase treatment (by PESCO).
- ▶ Oversee Solid Phase treatment and proper disposal of the excavated soils (by PESCO and AGI).
- ▶ Collect and chemically analyze samples from the treated soil and treatment site (by AGI).
- ▶ Prepare a summary report of our field activities, findings, conclusions and any recommendations. The report will be consistent with requirements of Ecology's Independent Remedial Action Program to obtain a "No Further Action" designation, if cleanup can be completed to Ecology's satisfaction (by AGI).

Our work will be in general accordance with MTCA and WAC requirements and Ecology's July 1991 *Guidance for Remediation of Releases from Underground Storage Tanks*.

Other services include sediment sampling in the tide-flats area, which is not associated with remedial action but required by Ecology as part of property ownership transfer. Sediment sampling is not described in this WP.

FIELD ACTIVITIES

EXCAVATION ACTIVITIES

Excavation will occur beneath the loading rack slab, pump area, and along product piping, all shown on Figure 2. A discussion of excavation at each of the areas and handling of excavated soils is presented here.

Loading Rack

PESCO will decommission the loading rack area, remove the concrete over the oil/water separator tank servicing the loading rack, remove the noted tank, and excavate hydrocarbon-contaminated soil. An AGI field representative will monitor these activities and make recommendations for soil excavation based on visual observations and field screening of the soils encountered during excavation. Soil field screening procedures are described below.

Excavation will proceed until field screening of soils indicates that residual hydrocarbons in the soil are below state cleanup levels or the practical limits of the excavation are met. The practical limits are when the excavation nears a 2:1 (horizontal:vertical) slope from the foundation bottom of any building or structure. The retaining wall between Waterfront Street and the loading dock will not be removed to avoid potential slope failure. Should contaminated soils need to remain in place due to slope stability concerns, controls may be implemented as described below to mitigate contamination migration.

Pump Area

Soils beneath the pump area and adjacent drive will be excavated to remove the hydrocarbon-contaminated soil identified by GeoEngineers. Excavation will proceed until field screening of soils indicates that residual hydrocarbons in soil are below state cleanup levels or the practical limits of the excavation are met. The practical limits are when the excavation nears a 2:1 (horizontal:vertical) slope from the foundation bottom of any building or structure.

Product Piping

AGI will investigate soil conditions beneath the piping and direct any required excavation of soil impacted by hydrocarbons.

Stockpiled Soil

Excavated soil will be temporarily stockpiled on paving or plastic sheeting and covered with plastic sheeting until it can be transported to an appropriate treatment area. Based on AGI's current understanding of conditions, less than 200 cubic yards of soil is expected to be excavated for treatment.

MIGRATION CONTROL

If the field investigations indicate that soil contamination exists upslope of the retaining wall, then migration control, involving a subsurface drainage system, would be installed by PESCO on the upslope side of the wall. The drainage system would consist of a hand-excavated trench containing a 4-inch-diameter pipe surrounded by gravel backfill. The pipe would be sloped and plumbed to discharge to the on-site oil/water separator. Contaminated soils excavated from the trench will be added to the soil stockpile. Figure 3 shows a typical design for the proposed drainage system.

Water from the drainage system would need to be tested for at least TPH and BETX concentrations before full-time discharges to the oil/water separator system start. The analytical chemistry results may indicate the added discharge would require pretreatment.

SOIL SAMPLING AND ANALYSIS

Once the limits of the excavations are reached, either on the basis of visual observations, field screening results, or by practical limitation, soil samples will be collected from the excavation walls and floors to confirm that cleanup goals have been met. AGI expects 10 composite or discrete samples will be collected from the overall excavation, assuming sampling may not be practical or required where contaminated soil has been removed to a physical barrier such as bedrock or a concrete bulkhead. The actual number of samples will depend on the site conditions encountered.

Soil samples collected from the limits of excavation will be submitted to Analytical Technologies, Inc. (ATI) in Renton, Washington for chemical analysis. The analyses will consist of fuel fingerprinting total petroleum hydrocarbon (TPH) by U.S. Environmental Protection Agency (EPA) Method 8015 Modified and HCID and quantifying the concentrations of benzene, ethylbenzene, toluene, and total xylenes (BETX) by EPA Method 8020. Analysis for lead would be performed by EPA Method 6010 if gasoline hydrocarbons are detected. AGI will receive analytical results from ATI about 1 week after the samples reach the laboratory. Expedited analyses (i.e., 24- or 48-hour turnaround) can be requested at further cost.

SOIL STOCKPILE SAMPLING AND ANALYSIS

A single composite sample will be collected from approximately every 100 yards of excavated soil, with a minimum of one sample being collected. Procedures for collecting samples from the soil stockpile are discussed below. Samples will be submitted to the laboratory for TPH fuel fingerprinting and BETX analyses using EPA Methods 8015 and 8020, respectively. Analysis for lead would be performed by EPA Method 6010 if gasoline hydrocarbons are detected. Sample results will provide baseline concentrations and will be used to direct soil treatment, if needed.

SOIL TREATMENT

Excavated Soil

Excavated soil will be treated to meet cleanup levels by Solid Phase treatment. Based on AGI's current understanding of the site, soil treatment using Solid Phase treatment technology is appropriate for the types of contaminants expected. AGI understands there is not sufficient room to treat soil on the site and that soil will need to be transported to another property owned by Russell. AGI expects that PESCO will transport this soil to the other property and place it on a soil treatment pad as needed while the excavation is progressing. PESCO will coordinate and manage Solid Phase treatment. A typical soil remediation pad construction diagram is shown on Figure 4. AGI will sample subgrade soil for HCID, TPH, and BETX analyses before treatment begins.

In order to encourage degradation of the hydrocarbons, optimal moisture, temperature, available oxygen, and supplemental nutrient levels will be maintained in the top 8 to 12 inches of the treatment pad soils. Aerating the soils regularly should expedite the cleanup, as the lack of oxygen will be the most likely factor limiting treatment. Treated soils will be sampled and tested by AGI for HCID, TPH, BETX, and lead before removing; then the soils will be removed in 8- to 12-inch lifts. The end use or disposal of the treated soil will be in accordance with MTCA and Ecology's July 1991 *Guidance for Remediation of Releases from Underground Storage Tanks*.

Remaining Contaminated Soil

Remediation goals are essentially to excavate all available soil impacted by hydrocarbons above state cleanup levels and treat the excavated soil off site. Residual contaminated soil may persist in areas where its removal would threaten existing structures.

If contaminated soil is left in place, Ecology may require monitoring until the residual hydrocarbons degrade naturally to a concentration no longer considered a threat to human health or the environment or until the soil becomes available for removal. Monitoring would likely require testing shallow groundwater, if present, that may come in contact with the contaminated soil. (Practicality of monitoring is subject to depth of bedrock and other subsurface conditions.) AGI will submit monitoring recommendations based on field observations and analytical results from samples collected at the limits of the excavations.

FIELD SCREENING AND SAMPLING PROCEDURES

FIELD SCREENING PROCEDURES

During excavation, field screening will help identify hydrocarbon-impacted soil. Screening will consist of noting any visual signs of hydrocarbons, sheen, or staining and analyzing soil headspace. Headspace analysis will consist of placing soil into a resealable plastic bag, sealing the bag, thoroughly agitating the soil, and then measuring the headspace within the bag for volatile organic compounds with an organic vapor meter equipped with a photoionization detector (OVM-PID). Headspace readings are influenced by soil type, moisture content, and type of petroleum fuel present. The readings indicate only the presence of volatile hydrocarbons and may or may not represent relative concentrations in the soil. Actual concentrations of hydrocarbons in the soil can only be verified through proper laboratory analytical methods.

EXCAVATION SAMPLING PROCEDURES

Samples will be collected at positions corresponding to a given depth, a particular soil horizon, or a geologic contact along the excavations. AGI's field representative will direct appropriate sampling locations based on physical properties of exposed soils and other pertinent field conditions as indicated by visual observations and field screening.

AGI expects to collect two soil samples beneath the product piping area and at least six discrete sidewall and two discrete bottom confirmatory soil samples from the excavation in the loading rack and pump area, for a total of 10 confirmatory samples. If contaminated soil is removed to a physical barrier, such as a concrete bulkhead, no sidewall sample will be recovered. The bottom of the excavation will be visually divided into two approximately equal areas and a single discrete sample will be collected from each area.

Samples will be collected using a stainless steel sampling utensil. The sample will be immediately placed into an 8-ounce sampling jar, sealed with the lid, and labeled for analysis.

SOIL STOCKPILE SAMPLING PROCEDURES

A single composite soil sample will be collected for approximately every 100 cubic yards of excavated soil, with a minimum one sample being collected. The composite soil sample will consist of several grab samples taken from various depths within the soil stockpile. Samples will be field composited in a stainless steel bowl. The composite sample will be of sufficient volume to completely fill an 8-ounce sample jar.

SAMPLE CONTROL AND SHIPMENT

Each sample container will be labeled with the project name and number, a sample identification number, the date and time of sample collection, and the initials of the person collecting the sample. Each sample will be shipped with AGI chain-of-custody tape across both sides of the lid. All samples will be shipped for overnight delivery to ATI in compliance with U.S. Department of Transportation procedures for handling environmental samples.

DECONTAMINATION PROCEDURES

All sampling equipment and materials that could contact the soil will be decontaminated between each sampling by following the procedure outlined below.

- Step 1: Rinse and pre-clean using potable water.
- Step 2: Wash in solution of laboratory-grade nonphosphate-based detergent and potable water.
- Step 3: Dip rinse in potable water.
- Step 4: Rinse with laboratory-grade N-Isopropanol.
- Step 5: Rinse with distilled deionized water.

All solutions will be renewed frequently. Nylon bristle brushes and nylon scrub pads will be used in Steps 1 through 3. All equipment will be held in clean plastic bags between uses.

QUALITY ASSURANCE

All analytical results will receive a quality assurance check according to established AGI procedures. The results of this check will be presented in the form of a quality assurance summary report attached to a copy of the appropriate laboratory report.

DOCUMENTATION AND REPORTING

All pertinent field activities associated with the remedial action will be properly documented using appropriate AGI forms and records. Records and record keeping will be checked by the project manager during the course of field activities to assure accuracy, precision, and completeness.

AGI Field Investigation Daily Reports will be used on a daily basis to record and summarize all activities. This includes a discussion of any problems encountered during excavation activities and any deviations from this Work Plan. These reports will also summarize all soil sampling activities on a daily basis and will be supplemented with a photographic record of the work.

Soil Sampling Records will be used to document collection of soil samples at the limits of excavation, verification samples, and soil stockpile samples. Examples of the AGI forms and records to be used in documenting the remedial action are included as Appendix A.

After receiving the final laboratory reports, AGI will prepare a report summarizing field activities, the analytical data, conclusions, and recommendations for any further site remediation work.

HEALTH AND SAFETY PLAN

A Project Health and Safety Plan, included as Appendix B, has been prepared by AGI to provide guidance and procedures for AGI personnel involved in field activities associated with this project.

SCHEDULE

AGI's schedule will depend on PESCO's schedule. AGI expects our on-site field activities can be completed within 5 days of the beginning of PESCO's work; PESCO is tentatively scheduled to begin work on April 4, 1994. AGI's summary report will be submitted within 5 weeks of finishing the field work.

DISTRIBUTION

1 Copy

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Post Office Box 25
Orcas, Washington 98280

3 Copies

Skellenger Bender Mathias and Bender
1301 Fifth Avenue, Suite 3401
Seattle, Washington 98101-2605

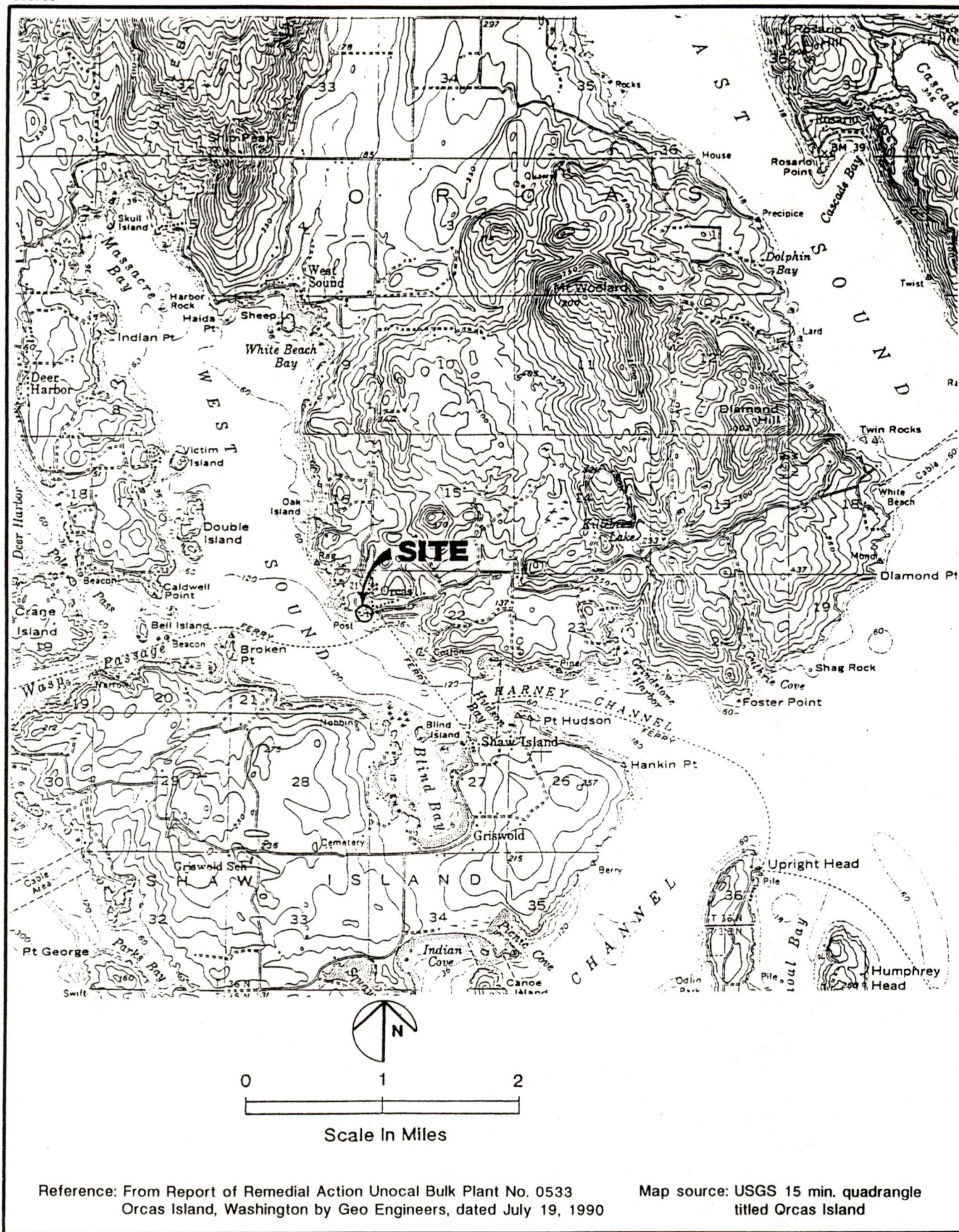
Attention: Ms. Christine Lamson

Quality Assurance/Technical Review by:



Gary Laakso
Remediation Services Manager

GMB/GLL/jlh



Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Vicinity Map

Russel's at Orcas
Orcas, Washington

FIGURE

1

JOB NUMBER
15,676.001

DRAWN
KM

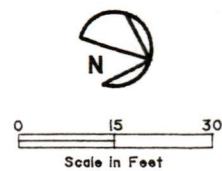
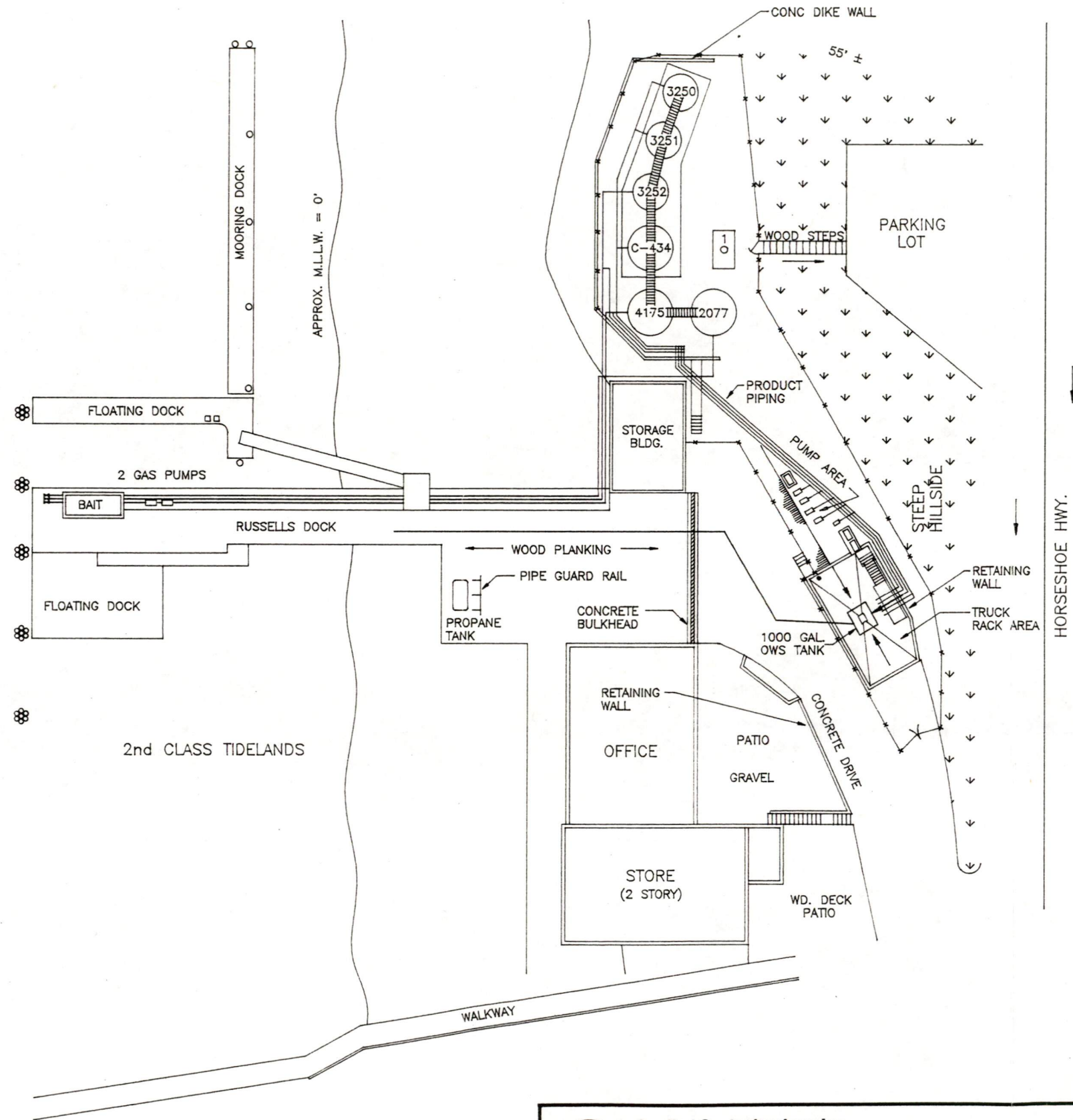
APPROVED
SMB

DATE 12/2/94

REVISÉ

DATE _____

HARNEY CHANNEL



Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Site Plan
Russel's at Orcas
Orcas, Washington

FIGURE

2

JOB NUMBER
15,676.001

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JFL

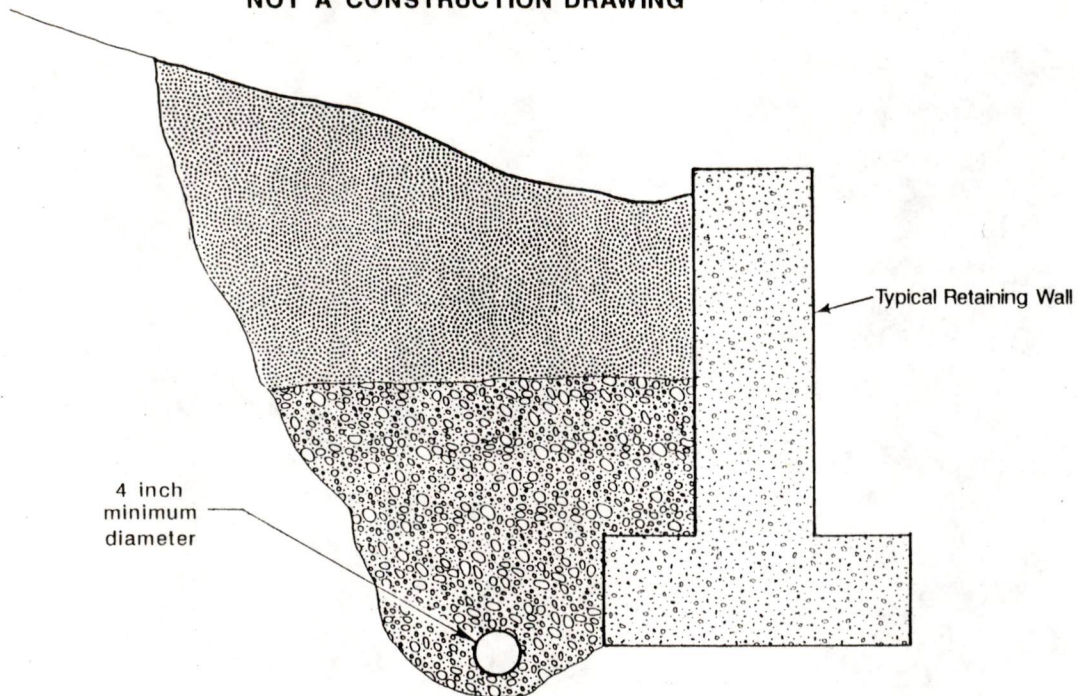
APPROVED
GMB

DATE
3/28/94

REVISED

DATE

SCHEMATIC ONLY—NOT TO SCALE
NOT A CONSTRUCTION DRAWING



LEGEND



Surface Seal; native soil or other low permeability material



Gravel Backfill



Drain Pipe; perforated or slotted PVC pipe surrounded by filter fabric
tight jointed; with a positive gradient, pipe to
drain to oil/water separator



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Geotechnical Engineering
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Typical Retaining Wall Subdrain

Russel's at Orcas
Orcas, Washington

FIGURE

3

JOB NUMBER
15,676.001

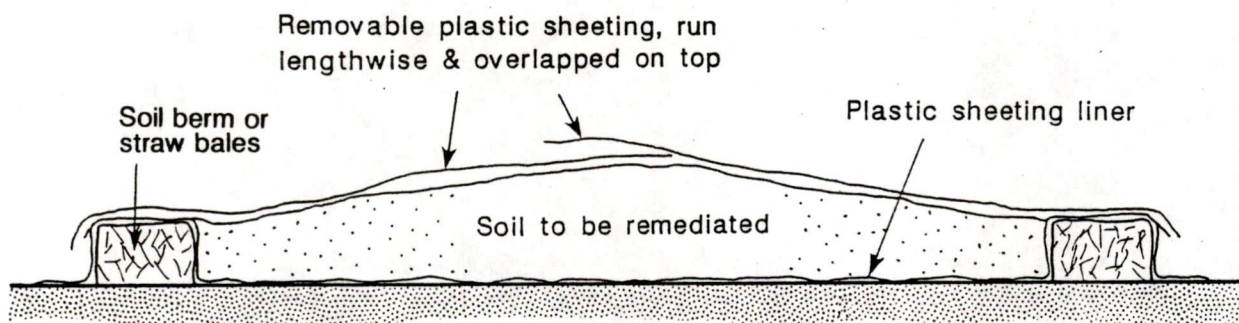
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KM

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3/28/94

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DATE



**Cross Section Showing Proposed
Remediation Pad Construction**



Applied Geotechnology Inc.
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Soil Treatment Area Detail

Russel's at Orcas
Orcas, Washington

FIGURE

4

JOB NUMBER
15,676.001

DRAWN
KM

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SMR

DATE
3/28/94

REVISED

, DATE

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FIELD INVESTIGATION DAILY REPORT

Sheet _____ of _____

Project: _____ Job No.: _____
Location: _____ Date: _____
Equipment Rental: _____ Company: _____ To: _____
Equipment Hours: _____ F.E. Time from: _____ to: _____ By: _____

Visitors:

Attachments:

☐ Continued:

Distribution:

Initial:

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SOIL SAMPLING RECORD

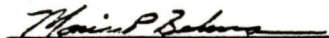
Sheet _____ of _____

Project: _____		Date: _____	
Project No.: _____		Sampled by: _____	
Location: _____		Reviewed by: _____	
NO.	Sample No.:		
	Time collected:		
LOCATION	Location:		
	Depth:		
	Surface Elev.:(feet)		
SAMPLING	Sampling method:		
	Container :		
	Composited: (Yes/No)		
	Cooled by ?		
SAMPLE DESCRIPTION	Soil Description/ Classification :		
	Odor:		
	Head Space Analysis:	Instrument	
		Background	
	Reading		
DISPOSITION	Split	Name:	
		Organization:	
	Duplicate No.:		
	Archive: (Yes/No)		
	AGI Lab: (Yes/No)		
	Other: (Describe)		
	Name of analytic lab:		
	Date sent:		
	Delivery method:		
Chain of Custody No.:			
COMMENTS:			

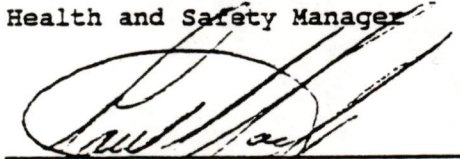
PROJECT-SPECIFIC HEALTH AND SAFETY PLAN
HYDROCARBON REMEDIAL ACTION
RUSSEL'S AT ORCAS ISLAND
ORCAS, WASHINGTON

AGI Project No. 15,676.001

by



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Health and Safety Manager



Gary L. Laakso
Remediation Services Manager

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June 16, 1992

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1.0 GENERAL INFORMATION

1.1 INTRODUCTION

The purpose of this project-specific Health and Safety Plan (HASP) is to provide guidance and procedures to Applied Geotechnology Inc. (AGI) personnel conducting field activities in support of the hydrocarbon remedial action at the Russel's at Orcas Island site. This project-specific HASP has been written to meet Washington Department of Labor and Industries, Division of Industrial Safety and Health regulations.

Soil and water containing petroleum hydrocarbons may be present at the site. This HASP includes hazards and corrective procedures common to sites containing petroleum hydrocarbons. Information concerning the site location, description, and previous investigations is included in Section 1.3. If special or unusual hazards (e.g., confined space entries) are believed present at the site, the AGI Health and Safety Manager (HSM, Monica Beckman) or Project Manager (PM, Jan Deick) should prepare and implement an addendum to this project-specific HASP.

Prior to working at the site, a copy of this HASP shall be provided to AGI employees by the HSM or PM. AGI employees are expected to conduct site work in a safe manner and comply with the project-specific HASP and applicable federal, state, and local regulations. When no policies or regulations apply, AGI employees should act in a manner to reduce potential risk of injury or health effects.

This project-specific HASP is not intended to apply to other contractors or subcontractors working at the site. Contractors and subcontractors are responsible for providing and implementing their own HASP.

1.2 RESPONSIBILITIES

Remediation Services Manager	Gary Laakso	(206)453-8383
Project Manager/Site Safety Officer	Jan Deick	(206)453-8383
Health and Safety Manager	Monica Beckman	(206)453-8383
Occupational Physician	Dr. Susan Berg	(206)822-3651
(Virginia Mason Occupational Medicine Clinic)		

The PM will act as the Site Safety Officer (SSO) and is responsible for implementing the project-specific HASP for AGI employees. The PM should notify the HSM of additional hazards or deviations from the HASP.

1.3 SITE-SPECIFIC INFORMATION

1.3.1 Site Location And Surrounding Area

The Russel's at Orcas Island site is located along the southwest shore of Orcas Island, Washington. The site is bordered on the north by Waterfront Street, on the east by the Orcas Island Ferry Dock, and on the south by a body of water named West Sound.

1.3.2 Site Description

Site structures extending over West Sound include a wooden wharf and moorage float; a dock house is located on the end of the wharf. Structures along the shore include a store, office, warehouse, and aboveground tank farm. A kerosene storage rack, truck loading rack, five pumps, and two oil/water separators are located in the middle portion of the site. A parking lot covered with crushed rock is located in the northwest portion of the site.

1.3.3 Previous Investigations

Previous investigations summarized in the AGI Work Plan (June, 1992) indicate hydrocarbons may exist beneath areas of the site, specifically the pump and loading rack areas.

1.4 WORK ACTIVITIES

The objective of the hydrocarbon remedial action is to establish the nature and extent of soils containing petroleum hydrocarbons at concentrations above cleanup levels and to remediate this soil. Soils containing petroleum hydrocarbons are believed located beneath and in the vicinity of the pump area, loading rack, and product piping extending to the bulk storage tanks. Field tasks to be conducted to achieve this scope of work include the following:

- ▶ Decommission the loading rack area and remove the American Petroleum Institute (API) separator.
- ▶ Excavate soil containing petroleum hydrocarbons from beneath the loading rack area, pump area, and product piping extending to the aboveground bulk storage tanks.
- ▶ Collect soil samples from the excavation limits and excavated soil stockpile.
- ▶ Transport stockpiled soil to a suitable treatment location.

Pacific Environmental Services, Inc. (PESCO) will be providing contractor services at the site and will be responsible for excavation activities. An AGI field representative will monitor excavation activities; make recommendations concerning soil excavation based on visual observations, field screening of the soils as described in the work plan, and health and safety regulations; and collect environmental samples.

2.0 HAZARD ASSESSMENT

2.1 CHEMICAL HAZARDS

AGI employees may be exposed to petroleum hydrocarbons while conducting field work at the site. Exposure could be the result of contact with contaminated soil or water. The following substances are suspected at the site:

- ▶ Diesel fuel
- ▶ Gasoline (regular and unleaded)

2.1.1 Diesel Fuel

Constituents of diesel fuels usually include kerosene and light- to middle-weight distillates, some also contain naphthalene. The most common routes of exposure for diesel fuels include inhalation and skin contact or absorption. Prolonged inhalation of these compounds may cause central nervous system effects including headache, dizziness, loss of appetite, weakness, and loss of coordination. Prolonged skin contact may result in pain or a feeling of heat, discoloration, swelling, and blistering. Overexposure to naphthalene may result in fever, sweating, nausea, abdominal pain, diarrhea, lethargy, tremors, and convulsions. Toxicology tests reportedly indicate middle-weight distillates can cause skin cancer and mutagenic effects.

2.1.2 Gasoline

Gasoline products usually include benzene, ethylbenzene, toluene, and total xylenes (BETX). Gasoline products may also contain cyclohexane, methyl tert butyl ether, and tetraethyl lead (leaded gasoline only.) The most common routes of exposure for these compounds include inhalation and skin contact or absorption. Acute short-term inhalation of petroleum hydrocarbon concentrations up to 1,000 parts per million (ppm) may result in headache, dizziness, loss of appetite, weakness, loss of coordination, and upper respiratory tract irritation. Inhalation of vapor concentrations in excess of 5,000 ppm may result in loss of consciousness, coma, and death. Dermal contact may result in eye and skin irritation. Benzene is considered carcinogenic; therefore, exposure should be minimized.

2.2 FIRE AND EXPLOSION HAZARDS

The risk of fire or explosion exists during activities at the site. Diesel fuel and gasoline are considered combustible and extremely flammable liquids, respectively.

A combustible gas meter should be utilized during excavation activities in areas where highly flammable or combustible products are suspected (i.e., near the loading rack, pump, and product piping areas). If combustible gas meter readings indicate vapor levels in the general area have reached 20 percent of the Lower Explosive Level (LEL), AGI personnel should inform the contractor and leave the site.

As a precautionary measure, field personnel should not smoke or light open flames at the site. Electrical equipment should be of explosion-proof design. In addition, containers should be grounded and bonded if flammable liquids are transferred. If AGI personnel note these precautions are not being followed, they should notify the contractor and leave the site.

2.3 OXYGEN DEFICIENCY HAZARDS

It is not expected that AGI employees will be exposed to oxygen deficient atmospheres during site activities at the Russel's at Orcas Island site. Entry into a confined space is considered a last resort, requiring an addendum to this project-specific HASP. Confined spaces are considered to be any space having a limited means of exit, which is subject to the accumulation of toxic or flammable vapors, or has an oxygen deficient atmosphere. This definition includes trenches over 4 feet deep. Sampling methods that do not require an individual to enter an excavation or trench should be selected and utilized.

2.4 ELECTRICAL HAZARDS

AGI personnel should be aware of overhead powerlines located in the work area. If such lines are present, the contractor should be responsible for ensuring they are guarded, insulated, or turned off prior to the start of excavation activities. In addition, a locate service should be utilized to determine whether underground utilities are located in the area prior to beginning excavation activities. Utilities should be notified a minimum of 48-hours prior to the start of underground work. AGI personnel should be satisfied this notice has been given and utilities have been located. As a precautionary measure, AGI personnel should not contact heavy equipment while it is in operation.

AGI personnel are responsible for ensuring AGI equipment and activities are adequately clear of utilities. Other site contractors are responsible for their own equipment and activities. AGI personnel should take particular care to never direct a contractor to act in an unsafe manner.

2.5 PHYSICAL HAZARDS

Physical hazards during fieldwork can result from temperature extremes and range from hypothermia to heat stress. Appropriate clothing and a heated rest area should be available if outside temperatures fall below 40°F for

more than 2 hours. If symptoms of hypothermia (e.g., uncontrolled shivering, feeling disoriented, etc.) are noted, AGI personnel should stop working and seek warm shelter. Personnel performing physical labor while wearing protective clothing at temperatures above 70°F are subject to developing heat-related disorders. In this case, employee oral temperatures and radial pulse rates should be monitored hourly to ensure an adequate work-rest regimen is followed. If an employee's oral temperature exceeds 99.6°F or pulse rate exceeds 110 beats per minute, the next work cycle should be reduced by one third.

2.6 EXCAVATING AND TRENCHING HAZARDS

Additional site hazards associated with excavating and trenching activities. Hazards include cave-ins, undermining adjacent structures and underground installations, working around heavy equipment, and dangerous atmospheres in the excavation. Most trenches and excavations greater than 4 feet deep are considered confined spaces and should only be entered as a last resort and only after the required precautions have been taken.

Cave-ins should be prevented by maintaining a minimum of two feet from the edge of an excavation and stockpiled material, heavy equipment, and personnel. In addition, the sides of excavations should be sloped appropriately for the type of soil present in accordance with Washington Administrative Code (WAC) 296-155, Part N. The maximum allowable slope for Type C soils is 1-1/2:1 (horizontal:vertical); Type C soils include submerged soils or soils from which water is freely seeping.

Precautions that should be taken to prevent undermining of adjacent structures include maintaining a conservative slope of 2:1 along the sides of the excavations and limiting the excavation length adjacent to the structure. If adjacent structures are still at risk, support systems designed by a registered professional engineer should be provided. In addition, if underground installations are unburied, such installations should be supported, protected, or removed.

The principal hazard associated with heavy equipment is being crushed or pinned. Heavy equipment should be equipped with backup alarms. AGI personnel should be aware of moving equipment at the site and stay out of the way; particular attention should be paid when a backup alarm is sounding because operator visibility in the direction of travel may be decreased. AGI personnel should remain outside the swing radius and should not ride on the outside of heavy equipment. When required to approach heavy equipment, AGI personnel should first make eye contact with the operator. In addition, when equipment is being loaded and unloaded, AGI personnel should stand clear to prevent injuries in case the load falls.

3.0 SITE CONTROL

3.1 WORK ZONES

The contractor should establish exclusion zones at the site, therefore AGI personnel should check with the contractor's site representative concerning the location of the exclusion zone before entering the area. If the contractor has not established work zones at the site, the AGI field representative should designate such zones for use by AGI employees. Only AGI personnel meeting training and medical surveillance requirements described in Sections 7.0 and 8.0, respectively, should be allowed to enter exclusion zones.

Generally, an exclusion zone should be established around potentially hazardous areas including excavations and soil treatment areas. The size of the exclusion zone depends on weather conditions and site operations.

A contamination reduction zone should be established outside and adjacent to each exclusion zone. This zone should be used as a transition area and for decontamination activities. Decontamination should take place upwind from the exclusion zone.

The remaining areas of a site should be referred to as the support zone. This zone should be "clean" and should be used for support facilities including office areas, vehicle parking, employee rest areas, etc.

3.2 DECONTAMINATION PROCEDURES

The contractor should have established decontamination procedures to prevent contaminated materials from migrating from exclusion zones. If the contractor has not established decontamination procedures, the AGI field representative should implement such procedures for AGI employees. Generally, decontamination procedures should consist of the following:

- ▶ Personnel: At the end of each work day (or before lunch breaks), AGI personnel should wash, rinse, and dispose of non-reusable equipment. Reusable equipment should be thoroughly cleaned and properly stored for the next use. Personnel should wash their hands and face before eating, and should shower as soon after leaving the site as possible. In addition, coveralls should be placed in the laundry bag at AGI for pickup by the drycleaning service.
- ▶ Sampling Equipment: Sampling equipment should be decontaminated after use, before returning it to the AGI equipment storage room. Samples and sample coolers should be wiped down to prevent laboratory personnel from contacting contaminated soil or groundwater.

3.3 MINIMIZATION OF CONTACT

AGI personnel should minimize contact with contaminated soil and groundwater. This may be accomplished by remaining upwind as much as possible, walking around stockpiled soil, using plastic as a barrier on sampling and air monitoring equipment, etc.

3.4 GENERAL SAFE WORK PRACTICES

- ▶ A 10-unit first aid kit, eyewash kit, and at least one fire extinguisher rated for Class ABC fires should be available to AGI personnel.
- ▶ Work should take place during daylight hours unless adequate lighting is provided in the work area.
- ▶ Eating, drinking, smoking, and chewing gum or tobacco should only be allowed in support areas.
- ▶ AGI personnel should not ignite flammable liquids or start open flames at the site.
- ▶ Contact lenses should not be worn while working in an exclusion zone. If glasses cannot be worn, vapor-proof goggles should be worn over contact lenses.

4.0 PERSONNEL PROTECTION

This section describes the personal protective equipment (PPE) that should be worn by AGI personnel performing field work at the site. Appropriate PPE was determined based on information in Section 2.0. The following PPE should be worn by AGI personnel working near excavations and collecting environmental samples:

- ▶ Hard hats.
- ▶ Safety glasses. Face shields should also be worn if there is a high splash potential.
- ▶ Steel toe and shank work boots.
- ▶ Cotton coveralls.
- ▶ Chemically protective gloves.

AGI personnel should stay upwind during site operations as much as possible to limit the potential for overexposure situations. If air monitoring conducted in the breathing zone indicates organic vapor concentrations are reaching the site action level (see Section 5.0), additional engineering controls should be implemented to minimize exposure.

If vapor levels cannot be controlled and AGI personnel must stay in the area, they should wear National Institute of Occupational Safety and Health (NIOSH)-approved, properly fitted air-purifying respirators. Respirators should be equipped with organic vapor cartridges.

5.0 AIR MONITORING AND SAMPLING

Air monitoring should be conducted during excavation and sample collection activities to document exposure levels and indicate whether additional precautions are necessary to protect AGI personnel. The organic vapor action level was established with particular attention given to benzene; the 15-minute short-term exposure limit (STEL) for benzene is 5 ppm. Based on this information, the organic vapor action level should be a sustained (5 minutes) reading of 5 ppm greater than background, measured with a photoionization detector (PID) or flame ionization detector (FID).

Personnel air monitoring should be conducted in the breathing zone. The breathing zone is considered to encompass a circle of 1-foot radius around an employee's nose. If the organic vapor action level is reached, AGI personnel should implement engineering controls or don respiratory protection. Half-face respirators may be worn in concentrations up to 10 ppm. At concentrations greater than 10 ppm, full-face respirators should be worn. At sustained breathing zone concentrations greater than 100 ppm, AGI personnel should leave the site.

Air monitoring using a PID or FID should also be conducted around the site perimeter. If downwind concentrations exceed 5 ppm above background, work should cease and site operations should be reevaluated.

Combustible gas monitoring should be conducted if organic vapor concentrations exceed 2,000 ppm to prevent field personnel from working in explosive atmospheres. The combustible gas action level considered the industry standard is 20 percent of the LEL. If 20 percent of the LEL is measured near a work operation, AGI personnel should leave the area. AGI personnel may reenter the area when explosive levels fall below 10 percent of the LEL.

Air sampling may be conducted using 3M-brand Organic Vapor Diffusion Badges (OVD Badges). Air sampling should be performed to document personnel exposures to and offsite emissions of petroleum hydrocarbons. For personnel sampling, the sample media should be placed within 1 foot of the individual's nose and exposed 8 to 10 hours. Sample media may be exposed shorter durations if personnel leave the exclusion zone. Upon sampling completion, the sample media should be collected and sealed, exposure times recorded, and the sample media sent to an independent laboratory accredited to perform industrial hygiene analysis.

Personnel air samples have previously been collected at sites similar to the Russel's at Orcas Island site. The samples were analyzed for benzene by NIOSH Reference Method 1501 and TPH by NIOSH Reference Method 1500. Analytical results received from these samples indicate no exposures to benzene above the permissible exposure limit (PEL) of 1 part per million (ppm) measured as an 8-hour Time Weighted Average (TWA) at any site.

Air monitoring and sampling equipment should be calibrated daily in accordance with the manufacturer's requirements. Calibration data, wind direction, background readings, air monitoring readings, and air sampling information should be recorded as part of the daily field logs.

6.0 EMERGENCY PROCEDURES

Emergency response procedures have been developed for events that could occur during operations at the site. These events include accidents, chemical exposures, fires, and spills.

In general, the following actions should be implemented in the event of an emergency:

- ▶ First aid or other appropriate initial action should be administered by those closest to the accident or event. This assistance should be conducted so those giving aid are not placed in a situation of unacceptable risk.
- ▶ The AGI PM and HSM should be contacted.
- ▶ If an AGI employee is injured, an AGI Supplementary Record of Occupational Injuries and Illnesses Form should be completed and forwarded to the PM and HSM. Any necessary changes to the operation should be made to prevent the same accident or event from occurring in the future.

6.1 ACCIDENTS AND INJURIES

The following procedures should not be considered inflexible. Every accident presents a unique event that should be dealt with by trained personnel working in a calm, controlled manner. In the event of an accident or unusual event, the prime consideration is to provide the appropriate initial response to assist those in jeopardy without placing additional personnel at unnecessary risk.

6.1.1 Accident or Injury in an Exclusion Zone

If a person working in an exclusion zone is physically injured, American Red Cross first aid procedures should be followed. Depending on the severity of the injury, emergency medical response may be sought. If the person can be moved, they should be taken to the edge of the work area where PPE may be decontaminated and removed (if necessary), emergency first aid administered, and transportation to an emergency medical facility awaited.

6.1.2 Accident or Injury Outside an Exclusion Zone

The procedures above should be followed with the exception that the injured individual should not be moved.

6.2 CHEMICAL EXPOSURES

If the injury is chemical in nature, the following first aid procedures should be followed:

6.2.1 Eye Exposure

If solid or liquid enters the eyes, they should be flushed with large amounts of clean water while lifting the upper and lower eye lids occasionally. Medical attention should be obtained.

6.2.2 Skin Exposure

If contaminated material contacts the skin, the affected area should be washed with soap and water. If the materials penetrate clothing or protective equipment, the items should be removed and the affected skin areas washed. Medical attention should be obtained if symptoms warrant.

6.2.3 Inhalation

If a person breathes a large volume of potentially toxic vapors, they should be moved to fresh air. If breathing has stopped, artificial respiration should be performed. Medical attention should be obtained.

6.2.4 Ingestion

If contaminated material is swallowed, medical attention should be obtained and a poison control center contacted for further instructions.

6.3 FIRES

Fire extinguishers should be available on site and in vehicle cabs. In the case of a fire at a site, the following actions should be taken:

- ▶ Evacuate personnel from the area, preferably to an upwind location.
- ▶ Notify the local fire department and emergency response agencies.
- ▶ Attempt to extinguish the fire using portable fire extinguishers or by smothering (ONLY IF SMALL).
- ▶ Notify the AGI PM and HSM.

6.4 SPILLS

The primary considerations during a hazardous materials spill are to keep personnel out of the area, contain existing spillage, and prevent further spillage. In the event of a spill of stored material (except potable water) the following actions should be taken:

- ▶ Evacuate personnel from the area.
- ▶ Summon local emergency medical or fire services if the spill involves extremely toxic or flammable materials.

- ▶ Contain the spill with absorbent booms and block drains and sewers.
- ▶ Attempt to stop the flow of material from the container.
- ▶ Notify the AGI PM and HSM.

6.5 EMERGENCY SERVICES

Figure 1 shows the location of Orcas Island Medical Center with respect to the Russel's at Orcas Island site. Driving directions are as follows:

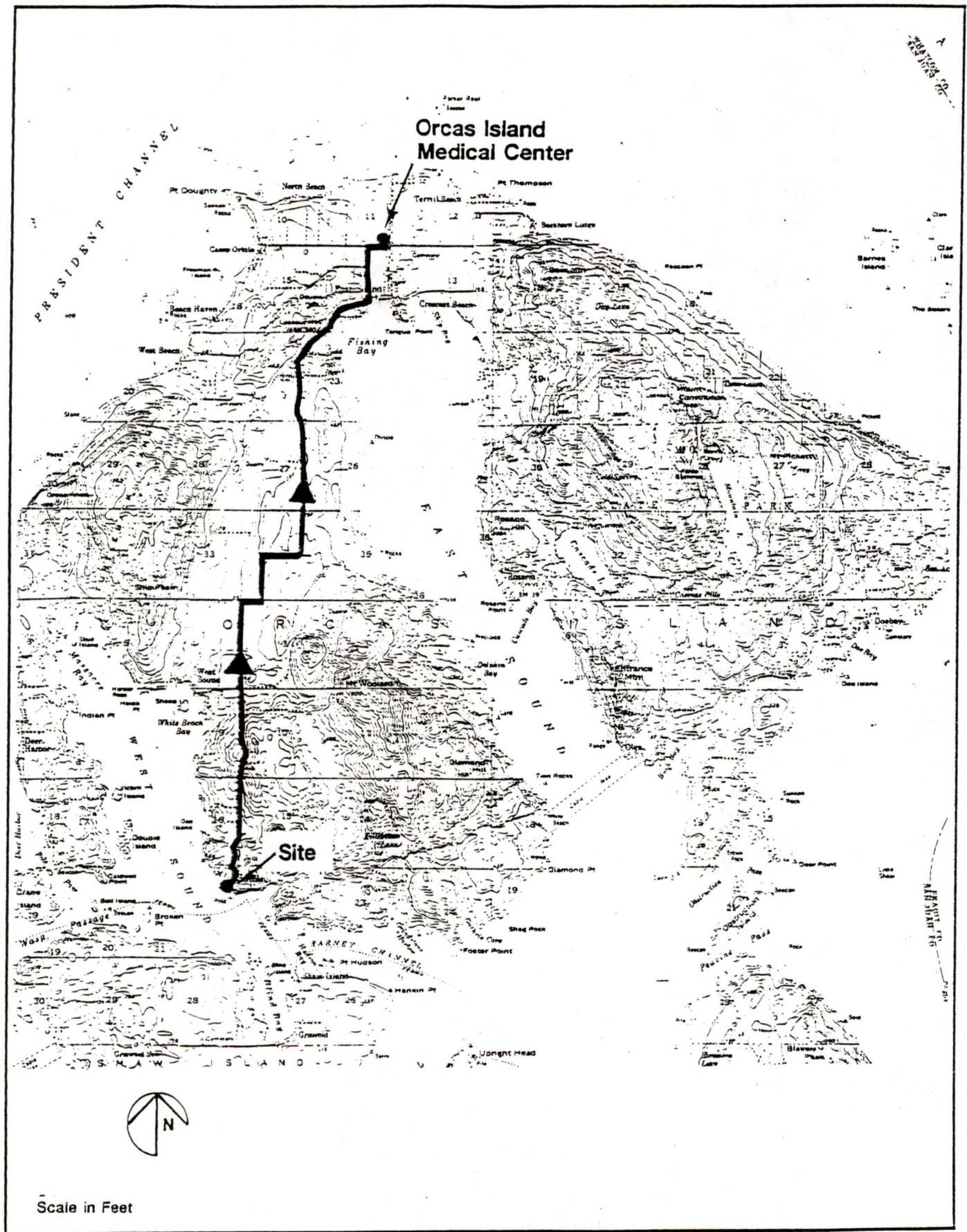
From the site, follow the signs to Eastsound and the Eastsound Airport. Orcas Island Medical Center is located on Mt. Baker Road, just east of the Eastsound Airport.

In cases involving severe emergencies, personnel should await emergency medical transport.

6.6 EMERGENCY TELEPHONE NUMBERS

Emergency telephone numbers should be available and include the following:

Orcas Island Medical Center.	(206)376-2561
Fire	911
Ambulance	911
Police	911
Poison Control Center	911



Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Hospital Route Map

Russel/Orcas UST
Orcas, Washington

JOB NUMBER
15,676.001

DRAWN
KM

APPROVED

[Signature]

DATE
22 Jun 92

REVISED

DATE

7.0 TRAINING REQUIREMENTS

AGI employees observing working at the site should have received training in accordance with state and federal regulations. The training should have included the following topics:

- ▶ Names of personnel and alternates responsible for the safety and health of AGI employees.
- ▶ Accident reporting procedures.
- ▶ Safety, health, and potential hazards at the site including chemical hazards and benzene exposure.
- ▶ Use of PPE, including the use of respirators and a fit test.
- ▶ Additional work practices and engineering controls that should be followed to minimize the potential risks present at the site, including excavation and confined space hazards.
- ▶ Medical surveillance requirements.
- ▶ Recognition of symptoms and signs which may indicate overexposure to hazardous chemicals.
- ▶ Site control measures including work zones, decontamination procedures, emergency response procedures, and spill containment procedures.

AGI personnel should review this project-specific HASP and sign the Field Team Review Form included in Attachment 1 prior to commencing fieldwork at the site.

8.0 MEDICAL SURVEILLANCE REQUIREMENTS

AGI employees working at the site should participate in the AGI Medical Surveillance Program. Medical surveillance examinations are required for employees potentially exposed to chemicals at concentrations greater than the respective PEL more than 30 times per year, employees who wear respirators more than 30 times per year, and employees who are injured, become ill, or develop signs or symptoms due to potential overexposure.

Direct hire and new employees should be given a baseline physical and current employees should be up-to-date with respect to their annual exam. The examining physician should verify individuals are fit to work at hazardous waste sites and utilize protective equipment, including respirators.

Additional medical exams should be given if an overexposure to petroleum hydrocarbons is suspected or an injury occurs. In addition, exit physicals should be required upon an employee's termination. Exit exams should be performed at the discretion of the examining physician if the previous exam was conducted less than six months prior.

The AGI Medical Surveillance Program is administered by a physician board certified in Occupational Medicine. The occupational physician determines the content of medical examinations, but the physicals include, at a minimum, a detailed work history, head to toe examination, pulmonary function test, audiogram, vision acuity test, urinalysis, and blood work. Documentation of the Medical Surveillance Program is maintained by the AGI HSM.

9.0 HASP MODIFICATIONS

This project-specific HASP should be reviewed and amended, if necessary, whenever:

- ▶ Applicable regulations are revised.
- ▶ Additional information concerning site hazards, operations, personnel, emergency services, etc. is obtained.
- ▶ Site operations are revised.

When this project-specific HASP is revised, personnel should review the changes and file a new Field Team Review Form with the AGI HSM.

ATTACHMENT 1

Field Team Review Form

I have read and reviewed the most recent revision, dated June 10, 1992, of the project-specific Health and Safety Plan (HASP) for work at the Russel's at Orcas Island site located in Orcas, Washington. I have been given a chance to ask questions regarding the project-specific HASP and understand the information contained therein. I agree to comply with all aspects of the project-specific HASP.

Name: _____

Signature: _____

Date: _____

Completed copies of this form should be forwarded to the AGI Health and Safety Manager.