Applied Geotechnology Inc.

AGI

September 21, 1993

93-4033

Mr. David Delamontte
Durham Transportation, Inc.
9171 Capital of Texas Highway North
Travis Building, Suite 200
Austin, Texas 78759

Dear Mr. Delamontte:

Proposal
Groundwater and Soil Remediation
19984 Meekland Avenue
Hayward, California

Applied Geotechnology Inc. (AGI) is pleased to submit this proposal and our qualifications to provide professional services regarding remediation of soil and groundwater at the referenced site. We are very interested and well qualified to perform this work. AGI has substantial practical experience in soil and groundwater remediation as the Statement of Qualifications attached to this proposal demonstrates. AGI is familiar with regulations governing this project and have established working relationships with state and local regulators.

This proposal is in response to your Request For Proposal dated August 20, 1993. Our proposed scope of services and associated cost estimate are based upon:

- The Request For Proposal (RFP) from Durham Transportation, Inc. (Durham) dated August 20, 1993.
- Our understanding of site conditions gained from the Work Plan for the Delineation, Containment, and Remediation of Soil and Groundwater Contamination, by CTTS, Inc., dated November 1, 1992.
- Letters from the Alameda County Health Care Services Agency, dated November 19, 1992 and June 11, 1993.
- Our previous experience with similar projects, and understanding of pertinent State of California and Alameda County regulations.

BACKGROUND

The subject site is owned by Durham and is currently a vacant lot. The site is located at the northeast corner of the intersection of Meekland Avenue and Blossom Way in an unincorporated area of Alameda County, near the city of Hayward. The site is in a mixed use commercial and residential area. It is surrounded by single-family homes and multi-family complexes. Located at the four corners of Meekland/Blossom intersection are the subject site; a liquor store; an auto repair shop; and a strip center with grocery store, hair salon, and comics/trading card shop. Both the liquor store and auto repair shop had operated at one time as gas stations. We understand that fuel tanks have been removed from both locations.

During the 1940's and 1950's, the subject site operated as a family owned service station. Later, Harbert Transportation purchased the site and operated it as a vehicle fueling and maintenance yard. In 1986, Durham purchased the site and operated it as a fuel and maintenance facility until

1989. In August 1989, 1-4,000 gallon, 1-5,000 gallon, and 1-6,000 gallon gasoline underground storage tanks (UST's), and 1-500 gallon waste oil UST were removed from the site.

The site is underlain by fine grained alluvial fan and flood plain deposits derived from the hills located approximately 2 miles east of the site. Three to four feet of fill overlies the site. The fill consists of clayey to sandy gravel. The native deposits underlying the fill consist of silty clay to clayey silt with minor and varying amounts of sand and gravel. Lenses of silty sand and gravel approximately 3 to 4 inches thick were encountered during installation of the wells that currently exist on-site. No other significant bedding or stratification of the units were reported to a depth of approximately 40 feet below ground surface (bgs), and the deposits were reported to be homogeneous for hydrologic consideration. There are currently 8 groundwater monitor wells on-site, and 2 groundwater monitor wells off-site that were installed during previous investigations. Ground water flow is to the west and was reported at 28 feet bgs.

Previous assessment results of previous site assessments indicate that petroleum hydrocarbons including gasoline, and benzene, ethylbenzene, toluene and xylenes (BETX) have been detected in soil samples from 12 to 28 feet bgs in the area of the 3 former gasoline UST's. A soil gas survey of the site indicated petroleum hydrocarbons as gasoline and BETX from 20 to 28 feet bgs throughout most of the site. Groundwater samples from the on- and off-site wells indicate dissolved petroleum hydrocarbons as gasoline, BETX , and low levels of halogenated volatile organic compounds (VOCs). We understand the lateral extent of impacted groundwater has not been delineated during the previous assessments.

PROJECT OBJECTIVE

Our objective will be to assist Durham in effectively remediating the site in compliance with all local, state, and federal rules and regulations. All remediation activities as well as proposed alternatives are designed to meet regulatory action levels set for the site. AGI will provide all labor, materials, equipment, and outside services to design, execute and document soil and groundwater remediation.

SCOPE OF WORK

Task 1: <u>Project Initiation</u>

Within 5 days of executing an agreement, AGI will issue a project schedule for Durham's approval. The project schedule will indicate when each project task will be started and completed.

A Corrective Action Plan (CAP), will be prepared describing in detail the technical approach and methods to be employed during soil and groundwater remediation. The CAP will be submitted to Durham in draft form and then submitted to the Lead Regulatory Agency (LRA) for approval. Included in the CAP, will be a project specific site health and safety plan (SHSP). The SHSP will identify each project task and specified personal protection, monitoring and operations requirements to assure the work is accomplished in a safe manner and according to requirements of 29 Code of Federal Regulations 1910 and 1926, and AGI's health and safety procedures.

Task 2: Permits

Upon approval of the CAP, AGI will apply for the appropriate permits for installation of the soil and groundwater remediation systems. Based on the treatment systems outlined in the RFP, the anticipated permits include: Bay Area Air Quality Management District (BAAQMD) Authority to Construct Permit and Excavation Permit; BAAQMD permit to operate, which will be secured prior to installation and operation of the thermal unit; and a permit to release treated groundwater to the Oro Loma Sanitary District sewer lines, which will be obtained prior to initiating groundwater extraction.

Task 3: Groundwater Remediation

The following paragraphs describe groundwater remediation using a carbon adsorption system as request by the RFP and two reasonable alternatives treatment methods (air stripping/catalytic oxidation, and bioremediation). We have included advantages and disadvantages for each of the methods. Costs associated with each method are provided as part of the fee estimate included with this proposal.

Carbon Adsorption: Contaminated groundwater will be extracted from the existing on-site monitor wells and directed through granulated activated carbon (GAC) units. The treated water will then be discharge to the sanitary sewer system. The system will be designed such that each extraction well will contain a dedicated pump and the output from each will be manifolded into a single pipe. Pumping rates will be determined by conducting a pump test. Extracted water will be directed through 3 GAC canisters. Treated water will then be pumped into a holding tank. After water in the holding tank has been verified clean through chemical analysis, it will be discharged into the Oro Loma Sanitary District sewer system.

Advantages:

- The system is simple to install and operate.
- Carbon adsorption is familiar to and well accepted by the regulatory agencies.

Disadvantages:

- Frequent changing of the GAC canisters. Used carbon will require disposal or regeneration.
- Relatively high treatment costs over the course of the project.

Air Stripping/Catalytic Oxidation: Contaminated groundwater will be extracted from the existing on-site monitor wells and directed through an air stripping unit equipped with a catalytic oxidizer. The air stripping unit will remove the volatile hydrocarbons contaminates within the groundwater. Hydrocarbon laden air from the stripper will then pass through the catalytic oxidizer unit. The stripper would remove the majority of the volatile fuel constituents (gasoline and BETX) and VOCs from the groundwater. From the stripper, treated groundwater would pass through two GAC canisters as a polishing step to remove any contaminant not removed during air stripping.

Advantages:

- The capability of treating a wide range of compounds.
- Relatively low treatment costs over the course of the project.
- Possible to combine treatment process with soil treatment (soil vapor extraction, bioremediation).

Disadvantages:

- Permit requirements, would require longer start-up period.
- Plugging and fouling potential

Bioremediation: Contaminated groundwater would be extracted from the existing on-site monitor wells and directed through an on-site bioreactor. Naturally occurring microorganisms within the groundwater would be enhanced by the introduction of oxygen and nutrients (if necessary), to degrade contaminants within the groundwater. Following the bioreactor two GAC canisters would used as a polishing step to remove any remaining contaminants.

Advantages:

- The capability of treating a wide-range of compounds.
- Possible to combine treatment process with soil treatment (soil vapor extraction, bioremediation).
- Possible to combine treatment with In-situ soil remediation.

Disadvantages:

- Permit requirements, would require longer start-up period.
- Relatively low treatment rates.

Task 4: Soil Excavation

Depending upon the soil remediation method chosen, excavation of contaminated soil may be necessary. Soil excavation will be performed using conventional earth moving equipment and methods. It is anticipated that shoring will be required to excavate contaminated soil to approximately 28 feet bgs. During excavation, soil not containing petroleum hydrocarbons will be segregated from contaminated soil. The contaminated soil will be identified using head space screening. Head space analysis will be performed by collecting a soil sample and placing it in a resealable plastic bag. The bag will be sealed, the sample disaggregated and allowed to equilibrate in the air space (head space) for approximately 5 minutes. The corner of the bag will be opened, and an organic vapor meter equipped with a photo-ionization detector (OVM-PID) probe will be inserted in the bag using care to minimize the potential for loss of volatiles. The OVM-PID display, in parts per million, relative to the calibration standard, will be observed until a peak reading is

obtained. These results will be used to qualitatively assess soil contamination levels and aid in the segregation of the excavated soil. Excavated soil will be placed on plastic sheeting and stockpiled in separated piles.

Task 5: Soil Remediation

Remediation of contaminated soil at the site can be attained via several different methods. The following paragraphs describe soil remediation using a thermal desorption system as outlined in the RFP and two alternative treatment methods (Vapor extraction, and In-situ bioremediation). Included advantages and disadvantages for each of the methods. Costs associated with each method are provided as part of the fee estimate included with this proposal.

Thermal Desorption: The soil in the area of the former fuel tanks would be excavated and stockpiled onsite. The soil would then be treated using a portable thermal desorption system to remove contaminant from the soil. Treated soil would then be re-used as backfill for the soil excavation. Soil samples would be analyzed prior to and after treatment to check system performance and to confirm treatment to LRA requirements.

Advantages:

- High remediation rate.
- Relatively low treatment costs.
- The capability of treating a wide range of compounds.

Disadvantages:

- Pre-treatment of soil will likely be required, which would increase overall soil treatment costs.
- High costs of shoring and excavation.
- Difficult to attain adequate compaction during backfilling.

Vapor Extraction: would be used to remove the volatile fuel constituents (gasoline and BETX, and the VOCs). This method consists of placing extraction well(s) in the vadose zone, applying a vacuum to the wells. Vapors would be treated by GAC canisters to collect contaminants or treated by combining treatment with a groundwater treatment unit on-site (i.e.air stripping/catalytic oxidation or bioremediation). Vapor discharge would be monitored during remediation to verify the effectiveness of treatment. When contaminants are no longer present in the extracted vapors, the system would be shut down for a period of one to two months, restarted, and the vapors would be immediately monitored to detect contaminant vapors which would not be detectable during normal system operation. If no contaminants are detected, the system would be shut down. Soil samples from test boring drilled at the completion of treatment would be analyzed to confirm that LRA clean-up levels are achieved.

Advantages:

- Little or no excavation costs.

- Possible combination with groundwater treatment system.
- High remediation rate.
- Relatively low treatment costs.

Disadvantages:

- Inability to remove low volatility fuels (i.e. diesel, waste oils)
- Additional verification soil sampling following completion of treatment.
- Capability of treating only a narrow range of compounds.

In-Situ Bioremediation: In conjunction with a groundwater treatment system, groundwater would be reintroduced into the soil within the vadose zone in the area of soil contamination to enhance natural biodegradation of the contaminates. Following completion of groundwater treatment, the treated water would be discharged into reintroduction galleries constructed on-site to allow infiltration of the treated water through the contaminated soil. Naturally occurring microorganisms within the groundwater would be enhanced by the introduction of oxygen and nutrients (if necessary), to degrade contaminants within the groundwater. Soil samples from test borings drilled at the completion of treatment would be analyzed to confirm that LRA clean-up levels are achieved.

Advantages:

- Little or no excavation costs.
- Possible combination with groundwater treatment system.
- Relatively low treatment costs.
- Possible to treat a wide-range of compounds.

Disadvantages:

- Permitting requirements would require a longer start-up period.
- Relatively long remediation time.
- Additional verification soil sampling following completion of treatment.

Task 6: Chemical Analyses

During soil and groundwater remediation, and post closure activities, selected soil and/or water samples will be submitted to a California Department of Health Services certified analytical laboratory for testing. Sample handling will be recorded using Chain-of-Custody records. The analytical tests performed on each sample will include one or more of the following:

- TPH as gasoline, and benzene, ethylbenzene, toluene, and xylenes (BETX), sample preparation and analysis using EPA Methods 5030, 8015 (modified), and 8020.

- TPH as diesel and oil, sample preparation and analysis using EPA Methods 3550 and 8015 modified.

- Purgeable halocarbons, sample preparation and analysis using EPA Methods 5030 and 8010.

AGI will review the quality control sample results and prepare a Quality Assurance Report of the final analytical laboratory results.

Task 7: Groundwater Monitoring

Groundwater monitoring of the 10 on- and off-site wells will be performed as follows:

- Prior to soil and groundwater remediation, we will monitor all ten wells during one event to determine pre-remediation contaminant levels.

- During groundwater treatment, three of the wells will be used for groundwater extraction. We will monitor contaminant levels within these three wells as part of the groundwater treatment system monitoring described under Task 3. We will monitor the other seven wells quarterly during groundwater treatment to check the progress of remediation. This proposal is based upon the assumption that groundwater treatment will occur over a period of one year during which 4 monitoring events will be performed. Additional monitoring events may be required if groundwater treatment is not completed in one year.

- After groundwater contaminant levels have reached clean-up levels, the treatment system has been shut down, and when the groundwater levees have stabilized, we will monitor all 10 wells during one event to confirm completion of groundwater remediation.

- After site closure, we will monitor all 10 wells on a quarterly basis for one year (four events).

During each monitoring event, we will measure the depth to groundwater beneath the top of casing of each well using an electric well sounding device. Each well will then be purged until the pH, temperature and specific conductance of the purged water have stabilized. At least 4 well casing volumes of water will be removed. After purging, groundwater samples will be obtained using a clean Teflon sampler. The water will be placed in the appropriate containers, put in an ice chest, and refrigerated until delivery to the analytical laboratory.

All of the samples will be analyzed as described in Task 6.

Task 8: Report Preparation

We will submit monthly progress reports during remediation, reports at the completion of soil and groundwater remediation, and quarterly reports during post-closure monitoring.

The monthly progress reports will include:

- Descriptions of activities performed since the last reporting event.
- Treatment system operation data including treatment rate, and adjustments to improve efficiency.
- Results of monthly groundwater elevation readings, including a site plan showing groundwater elevation contours.
- Results of quarterly groundwater monitoring, including analytical testing.

The report at the completion of soil remediation will include:

- Descriptions of soil excavation; treatment system installation, monitoring, maintenance and removal; and/or disposal (depending on which treatment method is used).
- Results of analytical testing to confirm the soil has been remediated to the required clean-up levels.

The report at the completion of groundwater remediation will include:

- Descriptions of treatment system installation, monitoring, maintenance and removal.
- Results of treatment system monitoring and maintenance, including volume of water treated, and analytical testing to confirm the water has been remediated to the required clean-up levels.

The post-closure monitoring reports will include:

- Results of quarterly groundwater elevation readings, including a site plan showing groundwater elevation contours.
- Results of quarterly groundwater monitoring, including analytical testing.

Depending upon the activities performed, each report will also include logs of test borings, and copies of analytical test data, quality assurance summaries of the chemical analyses, permits, manifests, and chain-of-custody records.

FEE

We propose our services be performed on a time-and-materials fee basis in accordance with our General Conditions and Schedule of Charges, copies of which are attached and form a part of this proposal. Our fee estimate includes the following:

- Preparing a Corrective Action Plan (CAP) to be submitted and approved by Durham, and then the LRA.
- Obtaining necessary permits and performing necessary pilot studies.
- Purchasing (or leasing) all equipment, structures, and materials required to complete the CAP.

- Maintaining and operating all equipment.
- Preparing all monitoring reports.
- Post-closure monitoring and site closure.

Our fee estimate for the soil and groundwater remediation, and monitoring is presented below. For bidding purposes AGI has assumed the following:

- Groundwater remediation (Task 3) will take approximately two years.
- Groundwater Monitoring (Task 7) will take approximately one year.

Soil and Groundwater Remediation as Outlined in the RFP

	TASK	ESTIMATED FEE
Task 1	Project Initiation	$ 2,929.
Task 2	Permits	$ 2,630.
Task 3	Groundwater Remediation by GAC	$ 26,918.
Task 4	Soil Excavation (includes shoring)	$173,639.
Task 5	Soil Remediation by Thermal Desorption	$ 51,974.
Task 6	Chemical Analyses	$ 57,400.
Task 7	Groundwater Monitoring	$ 3,710.
Task 8	Report Preparation	$ 4,151.
Estimated Cost		$323,351.

ALTERNATIVES

Presented below are cost estimates we believe are reasonable remediation alternatives.

Alternative 1: Remediation using; groundwater remediation by air stripper/catalytic oxidation; soil remediation by vapor extraction.

	TASK	ESTIMATED FEE
Task 1	Project Initiation	$ 2,929.
Task 2	Permits	$ 2,630.
Task 3	Groundwater Remediation	$ 46,918.
Task 4	Soil Remediation	$ 51,974.
Task 5	Chemical Analyses	$ 57,400.

Task 6	Groundwater Monitoring	$ 3,710.
Task 7	Report Preparation	$ 4,151.

Estimated Cost $169,274.
(Note: Task 4 Excavation not required)

Alternative 2:

Remediation using; groundwater remediation by bioreactor; soil remediation by In-situ bioremediation.

	TASK	ESTIMATED FEE
Task 1	Project Initiation	$ 2,929.
Task 2	Permits	$ 2,630.
Task 3	Groundwater Remediation	$ 42,918.
Task 4	Soil Remediation	$ 49,974.
Task 5	Chemical Analyses	$ 57,400.
Task 6	Groundwater Monitoring	$ 3,710.
Task 7	Report Preparation	$ 4,151.

Estimated Cost $163,407.

(Note: Task 4 Excavation not required)

RECOMMENDATION

Based upon our understanding of site conditions, we recommend employing alternatives using Alternative 2 to remediate the site. This recommendation is based upon its technical applicability, significant cost reductions over excavation and above ground treatment methods, and the simplicity of operating one remediation system to clean up both the groundwater and soil. However, should there be time or site use constraints of which we are not currently aware, we will reevaluate our recommendation upon your request.

If you have any questions regarding this proposal, please do not hesitate to call me at (510) 238-4590. We are pleased to have the opportunity to submit this proposal and look forward to your favorable consideration.

Sincerely,

APPLIED GEOTECHNOLOGY INC.

Daniel T. Henninger
Senior Construction Manager

DTH/JBA/wkw

STATEMENT OF QUALIFICATIONS

ENGINEERING AND ENVIRONMENTAL SERVICES

For:

DURHAM TRANSPORTATION, INC.

Prepared by:

APPLIED GEOTECHNOLOGY INC.

827 Broadway, Suite 210
Oakland, California 94607
(510) 238-4590
FAX: (510) 238-4599

300 120th Avenue N.E.
Building 4
Bellevue, Washington 98005
(206) 453-8383
FAX: (206) 646-9523

541 N.E. 20th, Suite 103
Portland, Oregon 97201
(503) 232-1800
FAX: (503) 232-9272

2501 East D. Street, Suite 215
Tacoma, Washington 98421
(206) 383-4380
FAX: (206) 627-7261

2930 Wetmore, Suite 510
Everett, Washington 98201
(206) 339-8845
FAX: (206) 258-4510

September 1993

APPLIED GEOTECHNOLOGY INC.

Providing services in engineering, earth sciences, and environmental restoration and management.

AGI is a recognized leader in the environmental and engineering consulting field specializing in the following areas:

- Solid and Hazardous Waste Site Evaluation and Remediation
- Environmental Site Assessments, Compliance Audits, and Permitting
- Process Development and Treatability Studies
- Geotechnical Engineering
- Groundwater Development, Management, and Protection
- Petroleum Hydrocarbon and UST Evaluation and Remediation

Our staff of well over 100 employees includes geotechnical, environmental, and civil engineers; geologists; hydrogeologists; chemists; microbiologists; toxicologists; and industrial hygienists. Our expertise enables us to manage projects from initial planning through analyses and site characterization; conceptual and final design; construction management; and testing, performance monitoring, and closure.

AGI was established in Bellevue, Washington in 1983. We have grown steadily in size and capabilities, opening a Tacoma field office in 1984 and a Portland, Oregon branch office in 1988. Offices were established in Oakland, California and Everett, Washington in 1990. Because our structure allows a free flow of concepts and technical personnel between offices and projects, our clients benefit from our firmwide expertise and experience.

CAPABILITIES AND SERVICES

SOLID AND HAZARDOUS WASTE SITE EVALUATION AND REMEDIATION

AGI has conducted regional and site-specific hazardous waste studies throughout the United States. These studies frequently include comprehensive subsurface investigations to define geologic conditions and predict groundwater occurrence and movement and associated contaminant fate and transport. Hazardous waste site evaluations and remediations are usually carried out in response to RCRA, CERCLA, or specific state laws and regulations. Existing site conditions are frequently evaluated to determine the impacts to soil chemistry and water quality resulting from historical or current land use and waste disposal practices. AGI services specifically suited to solid and hazardous waste site evaluation and remediation include:

- Site history evaluation
- Site geology and groundwater characterization
- Nature and extent of contamination characterization
- Drilling program management
- Soil and groundwater monitoring/sampling program development and implementation
- Groundwater and contaminant transport computer modeling
- Solid waste landfill minimum functional standards compliance
- Solid waste landfill closure
- Regulatory agency liaison
- RCRA permitting and compliance
- Expedited response actions
- Multi-task Remedial Investigations/Feasibility Studies under CERCLA/SERA
- Human health and ecological risk assessment
- Remedial alternative identification and evaluation
- Remedial design and construction management

ENVIRONMENTAL SITE ASSESSMENTS, COMPLIANCE AUDITS, AND PERMITTING

Environmental site assessments evaluate potential liabilities to a property owner or buyer resulting from contamination caused by on-site activities or left by previous owners/operators. The overall assessment goal is to determine if hazardous substances are present and if the presence of these substances presents a potential liability. AGI has conducted over 500 environmental site assessments on undeveloped, vacant, or agricultural land; industrial and commercial properties; waterfront facilities (including dredge material quality); and UST sites. AGI services routinely provided for environmental site assessments include:

- Historical map and aerial photograph interpretation
- State and federal database search
- Site historical land use evaluation
- Historical waste management and disposal evaluation
- Site reconnaissance and inspection
- Asbestos assessment

GEOTECHNICAL ENGINEERING

AGI's professional staff has substantial experience in all phases of geotechnical engineering, including site selection, site investigation and evaluation, and construction monitoring on projects involving excavation dewatering, site development earthwork, deep foundations, braced and tied back excavation shoring systems, port and waterfront structures, and borrow source evaluation. AGI's geotechnical engineering services include:

- Subsurface exploration and characterization
- Laboratory evaluation of physical soil properties
- Foundation alternative analysis
- Bulkhead and retaining wall stability evaluation
- Slope stability analysis
- Earthwork recommendations
- Dredge and fill studies for waterfront projects
- Design of dams, dikes, and other earth structures
- Construction and permanent excavation dewatering systems design
- Excavation shoring system evaluation and design
- Seismicity and dynamic response analysis
- Asphalt and concrete pavement analysis and design

GROUNDWATER DEVELOPMENT, MANAGEMENT, AND PROTECTION

AGI's professional staff has considerable hands-on experience in providing groundwater resource evaluation, development, and management services, including design, installation, and testing of high yield production water supply wells. We are thoroughly familiar with available drilling and downhole construction technologies and frequently use sophisticated well completion designs to ensure maximum well efficiency and highest possible sustained yield. AGI services specifically suited to groundwater development and management include:

- Regional and site-specific hydrogeologic studies
- Groundwater availability evaluation
- Aquifer safe yield determination
- Well site selection and well field design
- Computer simulation of aquifer systems
- Evaluation of land use impacts on water quality
- Drilling program planning and management
- Test and production well design and installation
- Production well inspection and rehabilitation
- Well and aquifer testing and hydraulic analysis
- Groundwater monitoring system design and installation

PETROLEUM HYDROCARBON AND UST EVALUATION AND REMEDIATION

Many AGI investigations include assessing site conditions to predict potential impacts from spills or releases of petroleum hydrocarbons to the environment. Studies have also been conducted to determine impacts from past spills or waste disposal practices and to recommend appropriate cleanup technologies as needed. AGI has provided services on numerous petroleum hydrocarbon releases throughout the United States, including 325 assessments, 180 removals, 90 cleanups, and 90 installations. We have provided these services to service stations, bulk fuel storage facilities, railroad fueling facilities, airports and marine fueling facilities, and industrial manufacturing facilities. AGI services specifically suited to underground storage tank (UST) evaluation, removal, and site remediation include:

- Site history evaluation
- Site geology and groundwater characterization
- Drilling program planning and management
- Soil and groundwater monitoring/sampling program development and implementation
- Contamination source and extent characterization
- Groundwater contaminant transport computer modeling
- Risk assessment
- Hydrocarbon product recovery system design, installation, and operation
- Remediation system plans and specifications preparation
- Contractor selection assistance
- Remediation system operations
- Regulatory agency liaison

EXPERIENCE

Our clients include commercial, industrial, and professional service businesses; architects, engineers, developers, and contractors; and federal, state, and local government agencies. We have served more than 2,400 clients and have completed over 7,000 projects.

The following project descriptions provide an overview of our experience.

SOLID AND HAZARDOUS WASTE SITE EVALUATION AND REMEDIATION

Remedial Alternatives Evaluation
Santa Fe Springs, California

AGI developed technical and cost evaluations for UST soil contamination remediation and removal at this former adhesives manufacturing facility. The facility included two farms totalling 20 USTs filled with various volatile organic compounds used in manufacturing sealants and adhesives. Chemical testing indicated soil was contaminated with volatile organic compounds, including chlorinated ethanes, ethenes, and benzenes. Based on site geologic conditions and the nature and extent of soil contamination, AGI evaluated remedial action alternatives and identified soil vapor extraction as the technology best suited for site remediation.

Client: Confidential

Remediation Design and Construction Management
Manufacturing Plant
San Jose, California

AGI provided design and construction management services for rehabilitation of an aging underground storage tank farm at this adhesives, sealants, and wood preservative manufacturing plant. The work included removal of seven badly corroded and leaking USTs (each 10,000-gallon capacity), cleaning up soil and groundwater contaminated with aromatic volatile organic compounds, and installation of new state-of-the-art USTs, and product distribution and leak detection systems. Soil was treated on site using solid phase methods in a lined treatment cell. Based on the results of post-treatment chemical analyses, AGI petitioned the regional water quality control board to allow on-site disposal of the soil, which was granted. Construction management services included full time on-site observation and documentation of the work, sampling and testing, air quality monitoring, and regulatory agency liaison.

Client: Confidential

Solid Waste Assessment and Testing
Plaster City, California

AGI prepared the Solid Waste Assessment and Testing program for this industrial landfill. We conducted the site investigation, including thorough characterization of the site hydrology through groundwater monitoring well installation and sampling and extensive unsaturated zone monitoring. This project included substantial sampling and chemical testing of the landfill itself. In addition, we evaluated waste generation, management, and disposal practices at the plant and provided recommendations for waste minimization and process water treatment and disposal.

Client: Confidential

Remedial Investigation/Risk Assessment/Feasibility Study/Remedial Design/Remedial Action
Pocatello Sludge Pit NPL Site
Pocatello, Idaho

AGI recently completed the RI/RA/FS for this industrial wastewater treatment plant sludge disposal site. The RI included designing, installing, and sampling a groundwater monitoring system comprised of more than 40 new monitor and existing private water supply wells. Water level data were used to characterize the aquifer potentiometric surface and resulting hydraulic relationship with a high yield City of Pocatello water supply well. Groundwater samples were tested for full EPA Target Compound List substances. Monitoring stations in nearby ponds and the Portneuf River were used to determine the hydraulic relationship between shallow groundwater and surface water. The RI also involved extensive characterization of sludge chemical composition and physical properties to aid in treatment system design and evaluation of contaminant transport through the air, groundwater, and direct exposure routes.

Human Health and Ecological Risk Assessments were developed for the site using all exposure routes (ingestion, inhalation, and direct contact) under various exposure scenarios. Detailed comparison of local and regional background metals concentrations in soil and groundwater was also necessary because many of the metals of concern at the site were common constituents of soil and groundwater.

The RI and risk assessments were used in the FS to identify, evaluate, and rank appropriate remedial alternatives. USEPA Region 10 used the alternative selected in the FS, which offers significant waste treatment, to develop a Record of Decision for the site. The project is now in the design phase, which will include extensive aquifer testing, computer modeling, and groundwater treatability studies.

Client: Union Pacific Railroad

SPCC Plan Preparation
Western United States

AGI prepared Spill Prevention Contingency and Countermeasure (SPCC) plans for 55 railroad classification yards and fueling facilities throughout the western United States, including California and Nevada, as part of a national program of SPCC plan preparation and upgrade. Our work included preparing a computerized database, with detailed maps of each facility. The database lists potentially hazardous substances, shows their location at each facility, and presents the locations and types of materials to be used in a spill response. Developing spill response procedures, including appropriate reporting, was also part of this project. AGI is currently assisting the railroad in the design and implementation of improvements to the facilities' spill containment structures identified and required by the plans.

Client: Confidential

Soil and Groundwater Contamination Assessment and Remediation Pilot-Scale Testing
La Mirada, California

AGI assessed soil and groundwater contamination at this adhesives and sealant manufacturing facility. The facility included 20 USTs containing a variety of volatile organic compounds used in the manufacturing process. We negotiated with the local regulatory agencies and prepared appropriate project plans. Our drilling, soil and groundwater sampling, and chemical testing results were used to identify, evaluate, and select an appropriate remedial action.

Client: Confidential

Remedial Investigation/Feasibility Study
Landfill 4/ Solvent Refined Coal Pilot Plant NPL Site
Fort Lewis, Washington

The Seattle District Corps of Engineers (the Corps) is assisting the Department of the Army in technical investigation at two Fort Lewis sites. AGI has been retained by the Corps to conduct the investigations, which comprise a full Remedial Investigation/Risk Assessment/Feasibility Study under CERCLA. One site includes Landfill 4 and the other an historic coal fuel refining and research facility (SRCPP). Both sites are a potential source of contaminants to Sequalitchew Springs, the major drinking water source for Fort Lewis. Landfill 4 has been shown in previous studies to be a source of halogenated volatile organic compound contamination (primarily TCE) to groundwater. SRCPP contaminants include a wide range of fuel hydrocarbons, metals, and polycyclic aromatic hydrocarbons.

To date, the Landfill 4 investigation includes an extensive PETREX soil gas survey, installation of a comprehensive groundwater and soil gas monitoring network consisting of 38 wells totalling more than 3,500 feet of drilling, extensive hydrologic and soil gas monitoring, and surface water and groundwater sampling and chemical analysis. The SRCPP investigation includes, to date, the installation of 14 groundwater monitoring wells, 33 soil borings, 20 test pits, and 9 hand auger borings. Over 150 soil samples have been collected for chemical analysis, and all monitoring wells have been sampled on two occasions. Groundwater modeling is planned for Landfill 4.

Client: U.S. Army Corps of Engineers

Drum Characterization and Disposal
City of Industry, California

Subsequent to assessing and removing three USTs, AGI was retained to inventory a number of stored drums and arrange for their proper disposal in accordance with applicable state and federal regulations. Our services included preparing a Work Plan and a Health and Safety Plan; visually inspecting the drums; sampling and analyzing the contents for total petroleum hydrocarbons, volatile organic compounds, flashpoint corrosivity, and reactivity; preparing a disposal plan; locating a Treatment, Storage, and Disposal facility; managing disposal; verifying final treatment processing as required by RCRA standards; and documenting disposal.

Client: Confidential

Remedial Investigation
Tacoma Tar Pits NPL Site
Tacoma, Washington

AGI completed the first privately funded RI in the State of Washington at the Tacoma Tar Pits, a former manufactured gas site. The study included detailed surface water and groundwater investigations to determine the nature and extent of contamination from a wide variety of organic compounds and metals. An extensive groundwater monitoring network, including 40 monitor wells, was designed and installed to characterize the hydrogeologic system and to calculate contaminant flux off site. A surface water monitoring system, including 14 individual sampling and gaging stations, was operated in conjunction with the shallow groundwater monitoring system to evaluate the hydraulic relationships between shallow groundwater and site surface water features, including 3 fresh water ponds, 2 large perennial ditches, 1 ephemeral ditch, the Puyallup River, and Puget Sound. This project also included drilling 25 individual borings for subsurface soil sampling, excavating 13 backhoe test pits, and collecting approximately 35 surficial soil samples. Approximately 150 surface water and groundwater samples were collected for analyses of a wide variety of EPA Target Compound List analytes. Data developed during the RI was used to support the Risk Assessment and Feasibility Study. The remedial action for this site has been selected and is part of the site Record of Decision.

Client: Douglas B.M. Ehlke

Surface Impoundment Closure
Plaster City, California

AGI assisted in the closure of two former surface impoundments used to evaporate process water. Closure was successfully accomplished according to California Code of Regulations, Title 23, Chapter 15, Article 56. AGI's scope of work included preparing a sampling and analysis plan, liaison with the plant engineer, construction management to assist an excavation contractor in selecting and stockpiling clean and potentially contaminated soil, collecting and chemically analyzing soil samples from the sides and bases of the former impoundments, waste designation testing of stockpiled soil, preparating a summary report for submission to the local Regional Water Quality Control Board, and recommending disposal alternatives. Followup work included preparation of a waste designation report discussing the nature of contaminated soil as compared to RCRA hazardous waste, non-RCRA hazardous waste, or RCRA solid waste.

Client: Confidential

ENVIRONMENTAL SITE ASSESSMENTS, COMPLIANCE AUDITS, AND PERMITTING

Environmental Site Assessment
Stockton, California

AGI conducted an environmental site assessment at this industrial site in preparation for sale of the property. Fuel hydrocarbon contamination was encountered during the assessment. We drilled soil borings, installed monitoring wells, and collected soil and groundwater samples for chemical testing. We determined groundwater quality was not impacted by the soil contamination. The site was remediated through excavation and off-site treatment of contaminated soil. We supervised site excavation and collected soil samples for chemical analysis to verify remediation.

Client: Confidential

Environmental Site Assessment
PG&E Gas Line Relocation
Santa Clara County, California

PG&E relocated a high pressure natural gas line east of San Thomas Aquino Creek. AGI was retained to conduct a site assessment and chemically characterize the area where field crews were expected to excavate soils for the gas line relocation. We explored subsurface conditions by advancing two soil borings. Soil samples were collected continuously from ground surface to depth during drilling. Selected soil samples were submitted for chemical analysis of California List priority pollutant metals, asbestos fibers, volatile organic compounds, semivolatile organic compounds, organochlorine pesticides, and PCBs. We also performed air quality monitoring of the borehole headspace at 3-foot intervals to determine if methane, volatile organic compounds, hydrogen sulfide, and/or hydrogen cyanide were present.

Client: PG&E

Phase I Environmental Site Assessment
Oakland, California

AGI conducted a Phase I environmental site assessment of a 1-city-block urban site (57,000 square feet) containing 7 properties which have been developed since about 1870. AGI investigated past use of the site by reviewing historical aerial photographs, chain-of-title reports, Sanborn Fire Insurance maps, and 10 separate databases of hazardous materials leaks/uses in the area compiled by local, state, and federal agencies. City records and geologic maps and reports were also examined. In addition, AGI reviewed environmental assessment reports maintained in regulatory agency files, conducted site reconnaissances, and interviewed people with knowledge of the site's history. AGI identified 5 minor on-site potential contaminant sources, 3 potential sources across the street, and 45 other potential sources within 2,000 feet of the site. AGI recommended sampling and analyzing soil from beneath the potential on-site source locations, and installing wells to check for groundwater contamination from off-site sources.

Client: Confidential

Environmental Site Assessment
Port of Tacoma
Tacoma, Washington

Northwest Building Corporation developed a 135-acre Port of Tacoma site as an industrial park. AGI investigated the site history as a basis for assessing potential for soil and groundwater contamination. Two potentially serious land uses were identified: a chlorinated solvent sludge dump and an abandoned historic municipal landfill. Potential contamination from these sources was evaluated by drilling soil borings, collecting subsurface soil samples for chemical testing, and installing and sampling groundwater monitoring wells. Soil and groundwater monitoring well borings were also used to generate geotechnical data for foundation and pavement design. Using the same borings for the contamination assessment and geotechnical study resulted in a substantial cost saving.

Client: Northwest Building Corporation

Environmental Site Assessment
Pier 27, Port of Seattle
Seattle, Washington

AGI conducted a fast-track environmental site assessment for the Port of Seattle. Pier 27 has been used as a marine rail terminal since the early 1900s; it is currently unused. The Port was acquiring the site and requested the assessment based on indications of petroleum hydrocarbon, PCBs, and metals contamination. AGI mobilized within days of notice to proceed and completed all site investigations within the one-week period in which the Port had legal access to the property. Investigations included installating and sampling 4 groundwater monitoring wells, collecting 24 surface and subsurface soil samples for chemical analysis, and tidal response monitoring in all monitoring wells and the Waterway with a transducer network. Site data were analyzed and remedial alternatives selected and evaluated in terms of Washington Model Toxic Control Act (MTCA) requirements. Site-specific cleanup levels were also developed under MTCA.

Client: Port of Seattle

Environmental Site Assessment
Livermore, California

AGI conducted an environmental assessment at this commercial site for acquisition of the property for future development. During the assessment AGI identified historical and current uses of the property and of nearby properties by reviewing historical aerial photographs, chain-of-title reports, Sanborn Fire Insurance maps, and databases of hazardous materials leaks/uses in the area compiled by local, state, and federal agencies. AGI also reviewed environmental assessment reports supplied by the client and conducted site reconnaissances.

Client: Golden West Development

Environmental Site Assessment
Rubber Products Manufacturing Plant
Seattle, Washington

AGI conducted a Phase I Environmental Assessment (EA) at a rubber products manufacturing plant. The process and associated equipment use several hazardous substances, including methyl ethyl ketone (MEK), trichloroethylene (TCE), toluene, xylene, paint thinner, various solvents and lubricating oils, and carbon black. MEK, toluene, xylene, and paint thinner were stored in underground storage tanks which had been removed prior to the EA. While the majority of the material used at the site is completely contained in the final product, a certain percentage of the spent solvent waste is stored on site in DOT-approved 55-gallon drums for subsequent off-site disposal by a licensed hazardous disposal firm. The EA was conducted to establish historical and current uses of the subject property and nearby properties as a basis for assessing potential for environmental contamination. The results of the EA indicated a potential for soil and groundwater contamination beneath the site from several on-site and off-site sources. We recommended conducting a Phase II Environmental Assessment to confirm or deny the presence of suspected surface and subsurface contamination.

Client: Scougal Rubber Company

Stormwater Pollution Control Plan
Boeing of Portland
Portland, Oregon

AGI was commissioned by Boeing to develop a stormwater pollution control plan (SWPCP) for their rapidly growing Portland facility. The 80-acre industrial site drains to the Columbia Slough, a water quality limited stream. Work included compiling available civil drawings and developing a master Autocad storm drain plan. A sampling and anlysis program addressing metals and volatile organic compounds was developed in accordance with Oregon requirements. In addition, a review of the facility and its existing National Pollutant Discharge Elimination System (NPDES) permits was completed. Appropriate sampling locations were determined based on the facility drainage and material storage. Stormwater sampling was initiated in the fall of 1992.

Client: The Boeing Company

GEOTECHNICAL ENGINEERING

Geotechnical Investigation
Parcels 1A and 2
PASSCO Site
Union City, California

AGI conducted a geotechnical investigation of a 20.6-acre former steel plant site to be developed with single-family residences and appurtenant access roads. AGI investigated the site with 4 borings 30 feet deep, supplementing existing data from a previous environmental study. Soil samples were tested for shear strength, Atterberg Limits, moisture/density, and settlement characteristics. Major considerations were existing slag containing heavy metals, expansive soils, and the 100-year flood elevation. Solutions included removing the slag to an adjacent area and placing at least 3 feet of select fill to bring site grade to above the 100-year flood elevation and provide a moisture barrier to prevent expansive soil volume changes. The residential structures are to be supported on conventional shallow spread footings.

Client: Chemical Waste Management, Inc.

Preliminary Geotechnical Investigation and Limited Phase II Environmental Site Assessment
Oakland, California

AGI conducted a preliminary geotechnical investigation and limited Phase II environmental site assessment of a 1-city-block urban site to be developed with a 12-story building with 2 below-grade parking levels. Environmental concerns included documented and undocumented on- and off-site contaminant sources identified in a previous Phase I environmental site assessment performed by AGI. AGI investigated the site with 3 borings, each 100- to 120-feet-deep. The borings were drilled using hollow-stem augers until groundwater was encountered approximately 30 feet below ground surface. Fluid rotary techniques were then used below groundwater to limit heaving of sands and to obtain samples for geotechnical testing. All soil cuttings from the drilling operations were collected, analyzed for contaminants, and disposed of at a Class III landfill. Standard Penetration Tests were performed to check for liquefaction potential. Soil samples were tested for geotechnical properties, including shear strength (triaxial and direct shear), Atterberg Limits, settlement characteristics, grain-size distribution, and moisture/density. Soil samples from the borings and drill cuttings were analyzed for gasoline and diesel, volatile hydrocarbons, and total lead; all concentrations were below detection limits or within typical background levels. Major considerations were heavy building loads, settlement, seismic forces, construction below the groundwater level, and temporary excavation retention. Solutions included supporting the structure on a deep foundation (driven piles or drilled piers) or mat foundation, and limiting the excavation depth to above the groundwater level.

Client: Confidential

Geotechnical Investigation
1280 63rd Street
Emeryville, California

AGI conducted a geotechnical investigation of an urban city lot to be developed with 6 residential units. AGI investigated the site with 3 borings, each 20 feet deep. Soil samples were tested for shear strength, Atterberg Limits, and moisture/density. Major considerations were loose near-surface soils and expansive soil. Solutions included compacting the near-surface soils and supporting the structure on a deepened continuous perimeter spread footing foundation bearing below the depth of seasonal moisture changes.

Client: Emeryville Redevelopment Agency

Excavation Support System
San Jose, California

AGI provided recommendations for design of an excavation support system for a hazardous waste site remediation. The project involved removing seven 10,000-gallon underground chemical storage tanks and contaminated soil and groundwater. The 20-foot-deep excavation was located within an operating chemical plant and directly adjacent to several operating above-ground storage tanks and a tanker truck loading/unloading ramp. A cantilevered steel soldier pile and lagging system was used to support the excavation for over 4 months. AGI monitored the system installation and its successful performance over the duration of the project.

Client: Confidential

Geotechnical Engineering Services
City of Seattle
Seattle, Washington

AGI has provided geotechnical engineering services to the City of Seattle since 1986 under a Biannual Consultant Agreement. Project assignments have included review and comment on design and construction aspects of the Westlake Mall Project (including the Westlake Station of the Metro Downtown Tunnel Project) for the Department of Construction and Land Use, assisting the Parks Department with emergency evaluation and repair of a landslide at the West Seattle Golf Course, and review of conventional soldier pile/tieback and soil nail excavation retention system designs for mid- and high-rise projects in Seattle.

Client: Seattle Engineering Department

Geotechnical Investigation
Sea-Tac Airport
SeaTac, Washington

HNTB was selected to provide all required professional design services necessary for reconstructing Taxiway B North and the overlay of Runway 16L/34R. AGI was the geotechnical consultant for the project. Our project role included:

- Comprehensive subsurface exploration in conjunction with nondestructive deflection testing as a basis for delineating areas below which unsuitable soils may be present
- Soil stratigraphy evaluation and identification of pertinent engineering characteristics of soil units encountered throughout the project area
- Evaluation of pavement section strengthening requirements in conjunction with replacement of the main runway (16L/34R) porous friction course
- Recommendations for design and construction of PCC pavements, including construction methods to mitigate unsuitable subgrade support conditions
- Slope stability evaluation
- Preparation of a final written report detailing findings, conclusions, and recommendations

AGI also provided geotechnical design drawings and specifications for reconstruction of Taxiway A South and the South Holding Apron, and a new hardstand in the Northeast Cargo Area. AGI's project involvement included:

- Identifying soil stratigraphy and pertinent engineering characteristics of the soil units encountered
- Correlating soil characteristics with nondestructive deflection test data as a basis for evaluating possible variations in subsurface conditions
- Providing recommendations that focus on construction operations for inclusion in project specifications

A written report detailing findings, conclusions, and recommendations was submitted. The project involved close liaison with Port of Seattle and FAA personnel to avoid interference with airport operations.

Client: Howard Needles Tammen & Bergendoff

Landslide Consultation
Tiburon Division II
Redmond, Washington

AGI conducted a landslide consultation for the City of Redmond. The scope of work included visiting the site, located in a residential subdivision of Redmond, and reviewing existing documents. Based on the review and observations, AGI provided opinions regarding possible future landslide activity and potential threat to residential owners and their property. AGI presented results in a report and attended a meeting with the city to discuss report conclusions.

Client: City of Redmond

GROUNDWATER DEVELOPMENT, MANAGEMENT, AND PROTECTION

Groundwater Resource Evaluation and Well Design, Installation, and Testing
Mono Lake, California

AGI evaluated groundwater conditions, including water supply availability to augment streamflows at a destination fly fishing resort. In addition to reviewing existing water rights and groundwater use, we identified test drilling locations and target aquifers. Our field investigations included detailed geologic mapping and thorough analysis of the complex surface water system. We also designed, installed, and tested a production well to supply the growing recreational community.

Client: Triad Engineering

Water Supply Well Design and Installation
Hawthorne, Nevada

AGI staff assisted in the design of a 200-gallon-per-minute water supply well for the Hawthorne Army Ammunition plant in Hawthorne, Nevada. The project included installing one 400-foot-deep fluid rotary test boring and preparing well design criteria based on the hydrogeologic conditions encountered. We inspected the drilling and collected numerous samples for grain size distribution analysis. The final well design was based on the aquifer particle size analysis and the conditions observed during drilling.

Client: U.S. Army

Consulting Services
Washington Groundwater Planning Handbook
Washington State

AGI, in association with Hall & Associates, prepared a groundwater planning handbook for the Washington Department of Ecology. The handbook (Ground Water Resource Protection: A Handbook for Local Planners and Decision Makers in Washington State) describes groundwater occurrence and movement in Washington State and illustrates common groundwater contamination sources. The handbook also outlines groundwater management and protection strategies for implementation throughout the state.

Client: King County Planning Department

Hydrogeologic Assessment and Groundwater Use
Muckleshoot Indian Reservation
Auburn, Washington

AGI's hydrogeologic assessment was the first phase of a multi-phase effort designed to identify and protect groundwater resources at the Muckleshoot Indian Reservation near Auburn, Washington. Evaluation of Tribal groundwater resources required that a 30-square-mile study area be characterized. The effort included comprehensive compilation and review of existing data, geologic mapping and well inventory, and initiation of groundwater monitoring. Major aquifers and aquitards were identified, as well as current and potential threats to groundwater quality and quantity.

Client: Muckleshoot Indian Tribe

Supplemental Hydrologic Evaluation and Groundwater Management Plan Concepts
Muckleshoot Indian Reservation
Auburn, Washington

This was the second phase of AGI's multi-phase effort to characterize the groundwater resources of Tribal lands. The study had four goals: an enhanced understanding of the hydrogeologic system, identification of existing and future threats to MIR groundwater, finalization of aquifer protection zones, and establishment of aquifer protection priorities and initial management plan concepts. The achievement of these goals required further characterization of the MIR hydrogeologic system through a reconnaissance study of springs and their discharge, development of a water budget, assessment of potential contamination loading through a mapping of sources, development of a vulnerability map, and definition of aquifer protection zones.

Client: Muckleshoot Indian Tribe

Groundwater Availability Study
Hidden Acres Water Supply
Kitsap County, Washington

AGI evaluated groundwater availability for this 40-acre development in southern Kitsap County. Our evaluation identified a well site location and determined preliminary well design, anticipated drilling depth, and potential yield. We prepared drilling specifications, assisted in drilling contractor selection, supervised drilling, designed the well, supervised construction and development, and conducted an aquifer test. The well is currently on line supplying the developing community.

Client: Penwest Real Estate

Groundwater Resource Evaluation
Cle Elum River Project
Kittitas County, Washington

AGI evaluated groundwater availability for this 7,000-acre site in western Kittitas County for potentially developing surface water and/or groundwater as a water supply resource. AGI analyzed existing geological and hydrogeological data and performed a site reconnaissance to map geology. Our evaluation included recommendations for test drilling, including well locations and design criteria. The project included base map preparation; existing data analysis, including geology, hydrogeology, and mining information; aerial photograph interpretation; site reconnaissance and geological mapping; hydrogeological characterization and evaluation; and report preparation.

Our evaluation identified a potentially large (yielding thousands of gallons per minute) water resource and we subsequently implemented a drilling and testing program to evaluate the resource. A three-well drilling program identified two undeveloped aquifers; testing of the potentially prolific upper aquifer indicates a well field could potentially yield more than two million gallons per day from wells producing over 1,000 gallons per minute each. Implementation of the drilling and testing program required attainment of a preliminary water right permit from the Washington State Department of Ecology. Evaluation of the resource is being conducted as part of a comprehensive planning process to classify the site under Washington State's Growth Management Act. AGI also conducted geological, geotechnical, and mine hazard surveys of the entire 7,000-acre site as part of the planning process.

Client: Plum Creek Timber Company

PETROLEUM HYDROCARBON AND UST EVALUATION AND REMEDIATION

UST Assessment and Removal
City of Industry, California

In 1988, AGI observed and documented removal of three USTs from a facility leased to a transportation and warehousing company. Our services included obtaining appropriate permits and acquiring a tank removal contractor. We directed the tank removal and sampled soils surrounding the tanks to verify that no releases of petroleum hydrocarbons had occurred. Soil chemical analysis was accomplished using an on-site mobile laboratory to expedite the removal process.

Client: Confidential

Environmental Remediation - Design and Construction
City of Santa Rosa - Old Corporation Yard
Santa Rosa, California

AGI, in conjunction with Envirodyne Corporation, provided full-service design and construction to remediate approximately 22,000 cubic yards of petroleum contaminated soil and associated groundwater at a former city corporation yard. The site is underlain by fill and alluvial sediments. The depth to groundwater is typically less than 10 feet. Contaminants included petroleum hydrocarbons, semivolatiles, and metals. AGI's responsibilities for the project included:

- Preparing a Phase II environmental site assessment to evaluate the limits of known contamination.
- Preparing construction documents including a state-of-the-art solid phase treatment facility incorporating a double 40-mil, high-density polyethylene liner, leachate collection and detection systems, a leachate treatment system, and an irrigation system.
- Providing bench-scale treatability studies to refine treatment efficiencies and operational parameters.
- Providing on-site construction management personnel to oversee project implementation and provide technical oversight.
- Conducting sampling and chemical testing to verify treatment adequacy and assisting Envirodyne with identifying and selecting disposal sites for the treated soil.

AGI's services also included evaluating groundwater at the site and identifying potential upgradient off-site contaminant sources that may affect the site in the future. AGI provided regulatory liaison and successfully negotiated with the Regional Water Quality Control Board and Sonoma County to develop a cleanup level that allowed the treated soil to be disposed of locally, saving the City of Santa Rosa approximately $500,000.

Client: Envirodyne Corporation

UST Assessment and Remediation
Concord, California

AGI performed a soil and groundwater contamination assessment at a site in Concord following removal of a 1,000-gallon gasoline storage tank. This project included on-site solid phase treatment of contaminated soils and groundwater extraction and treatment. Contaminated soils were excavated, aerated on site, sampled, chemically tested, and disposed of at a Class III landfill. During soil remediation, a sump was installed in the excavation to recover contaminated groundwater. Three groundwater monitoring wells were installed, developed, sampled, and analyzed. The groundwater treatment system uses granular activated carbon and discharges into the sanitary sewer. Groundwater is sampled and tested quarterly.

Client: Envirodyne Corporation

UST Assessment and Remediation
Newark, California

AGI provided observation and hydrocarbon contamination assessment services associated with removal of four USTs and associated underground piping. During removal, the contaminated soil was excavated, stockpiled on site, and covered to prevent uncontrolled contaminant migration. Our assessment included reviewing published information concerning subsurface geological and hydrogeological conditions, drilling and logging soil borings and completing several borings as groundwater monitoring wells, collecting soil samples during drilling and performing on-site analysis, developing and sampling groundwater monitoring wells, and submitting selected soil and groundwater samples for analysis to quantify subsurface contamination. Based on the findings, AGI developed a Work Plan providing recommendations for remediation.

Client: Envirodyne Corporation

Hydrocarbon Contamination Remediation
Newark, California

AGI developed a Work Plan to remediate hydrocarbon contaminated soil and groundwater at this former UST site. The Work Plan follows the LUFT manual remedial guidelines set forth in regional guidance documents. Remediation activities being performed on site include treating contaminated soil using solid phase bioremediation techniques and groundwater extraction and treatment. Soil and groundwater samples are collected for laboratory analysis and to document remediation progress.

Client: Silvey Transportation, Inc.

Hydrocarbon Excavation and Treatment
Santa Rosa, California

AGI is providing technical assistance and field oversight during excavation of petroleum hydrocarbon contaminated soils encountered during excavation of an underground utility line. AGI provided regulatory liaison to obtain permits necessary to transport contaminated soils to an off-site treatment facility. Treatment of soils is being accomplished under supervision and technical direction of AGI field representatives.

Client: Envirodyne Corporation

UST Assessment and Removal
Midland, California

AGI provided observation and hydrocarbon contamination assessment services associated with the removal of USTs and hydraulic hoists. Our services included obtaining permits, acquiring a tank removal contractor, directing the tank and hydraulic hoist removal and disposal, collecting selected soil samples, and providing regulatory liaison. Our assessment of the site included reviewing available information concerning previous activities at the site, excavating tests pits, and collecting soil samples for chemical analysis to quantify subsurface conditions.

Client: Confidential

UST Replacement/Upgrade Program
California, Washington, Oregon, Idaho, and Montana

AGI is providing full UST removal and upgrade engineering services to GTE Northwest for over 250 sites with standby generator or vehicle fuel requirements in 5 states. These services include:

- Developing a complete Construction Specifications Institute (CSI) format specification for tank removal, tank disposal, and soil cleanup
- Preparing a new generic design for GTE Northwest's USTs to meet current regulations, including selection of the optimum system, full design drawings, and construction specifications
- Preparing and administering the bid documents and contractor selection
- Observing and testing UST removal and installation as GTE Northwest's on-site representative

Client: GTE Northwest

REFERENCES

Mr. Randy Gibson
Unocal Corporation
Real Estate Division
1201 W. Fifth Street
Los Angeles, California 90017
(213) 977-5845

Mr. Bob Markworth, P.E.
Union Pacific Railroad
1416 Dodge Street
Omaha, Nebraska 68179
(402) 271-4054

Ms. Julie Carver
City of Oakland
1330 Broadway, Suite 800
Oakland, California 94612
(510)238-6361

Mr. John Clark
Envirodyne Corporation
2840A Howe Road
Martinez, California 94553
(510)370-7800

Ms. Maria Bigornia
Emeryville Redevelopment Agency
2200 Powell Street, 12th Floor
Emeryville, California 94606
(510)596-4350

Mr. Arnold Silvey
Silvey Transportation, Inc.
8175 Wells Avenue
Newark, California 94560
(510)447-0179

PERSONNEL

Our professional staff has considerable hands-on experience providing geotechnical and environmental engineering services. These services are directed by registered professionals. Qualifications for several of our senior professional staff members are presented below.

Mr. John Newby, P.E., AGI President, is a registered professional engineer with more than 19 years of experience in the geotechnical aspects of civil design and construction. His experience includes participation in groundwater studies and contamination evaluations. He has successfully scheduled, budgeted, and managed numerous hazardous waste projects. Mr. Newby has overall responsibility for AGI's quality assurance/quality control program (QA/QC) and has served as QA manager for contamination investigations in Washington, Oregon, California, Montana, Idaho, and Texas.

Mr. Patrick Kelly, P.E., Vice President, has been project leader of over 700 geotechnical studies during his 26 years of experience. He has been involved with a wide range of projects from planning through construction, including exploration, testing, engineering analysis, and quality control. Mr. Kelly has also been QA manager for soil and groundwater contamination projects.

Mr. Mackey Smith, C.E.G., Vice President and Principal Hydrogeologist, manages AGI's groundwater and geological services. He is a certified engineering geologist with over 20 years of experience in geology, hydrogeology, soil and groundwater contamination evaluation, water supply development, and aquifer testing and evaluation. In recent years, he has concentrated on identifying impacts of municipal, mining, industrial, and landfill projects on surface and groundwater systems and the practical mitigation or correction of soil and groundwater contamination.

Mr. Robert Strazer, P.E., Vice President, has over 27 years of geotechnical engineering experience. He has managed numerous projects, including foundation investigations for industrial, commercial, municipal, and professional clients. He has a broad range of experience in the evaluation and design of shoring systems, port and waterfront structures, and special foundations for large buildings.

Mr. Donald Bruggers, P.E., Principal Engineer, has more than 16 years of practical experience as a civil and geotechnical engineer. His responsibilities as manager of AGI's geotechnical engineering services include overall project planning, engineering management, technical direction, quality assurance, and quality control. His areas of expertise include geotechnical field and laboratory investigations, foundation engineering analysis and design, geotechnical consultation for complex construction, and construction management.

Mr. Vincent Lascko, P.E., Principal Engineer, has 13 years of professional experience. As principal investigator or manager for major hazardous waste projects, he has had significant involvement in investigation planning, engineering analyses, design, and construction control. Mr. Lascko has been responsible for personnel allocation, budget, and timeliness. He has been project manager for remedial investigations conducted under CERCLA at Superfund sites in Idaho and Montana and managed major site evaluations and cleanups in Washington, Texas, California, Ohio, Maryland, and New York.

Mr. William Wikander, P.E., Associate Engineer, is a registered civil and geotechnical engineer with more than 13 years of practical experience participating in and managing geotechnical and environmental projects. His geotechnical experience includes investigations and services during construction for industrial facilities, high-rise structures, sanitary landfills, roadways, and large commercial and residential developments. Mr. Wikander's environmental experience includes preparing Phase I assessments, investigating the presence and extent of soil and groundwater contamination, negotiating cleanup levels with regulatory agencies, determining remediation methods, managing site remediation, and monitoring groundwater wells and treatment systems.

Mr. Mark Adams, P.G., Associate Geologist, has more than 14 years of experience in geology, hydrogeology, and hazardous waste evaluation and remediation. He has managed or been principal investigator for numerous groundwater contamination investigations and environmental assessments. He has also managed large multidisciplinary Remedial Investigation/Feasibility Study projects under CERCLA at municipal landfills and industrial facilities.

Mr. Richard Fejta, P.E., Associate Engineer, has 10 years of experience in geotechnical engineering, including investigation and design for driven piling, slope stability, pavements, containment ponds, preloading, and instrumentation. Mr. Fejta is responsible for project management, report preparation, and quality assurance.

Ms. Teri Floyd, Ph.D., Associate Environmental Chemist, has over 15 years of experience in project management, environmental and aqueous chemistry, and chemical statistics. Her chemical experience includes organic and inorganic contaminant chemistry, quantitative analysis and quality control, and the application of numerical methods to chemical analyses. She has managed RCRA and CERCLA projects dealing with the fate and transport of hazardous organic chemicals and metals in the environment. Dr. Floyd has developed a contaminant fate and transport in groundwater model based on chemical partitioning.

Mr. Daniel Henninger, Remedial Construction Manager, has over 9 years of experience in project and construction management, including remedial design, engineering and system operations, subcontractor oversight, regulatory compliance, and construction inspection. Mr. Henninger has managed soil bioremediation and groundwater extraction and treatment projects in California, Texas, North Dakota, Washington, and Oregon. Several of these remediations were on federal Superfund sites.

Mr. Gary Laakso, Remediation Services Manager, has over 13 years of experience in project management, including hazardous waste site assessments, Remedial Investigations/Feasibility Studies, and site remediations. He is responsible for technical and contractual direction of projects and has conducted contamination assessments and remediation programs at UST sites and chemical manufacturing and storage facilities.

Mr. David Rankin, P.G., Associate Geologist, with more than 10 years of professional experience, has conducted numerous soil and groundwater investigations. Mr. Rankin has been project engineering geologist and assisted in geotechnical analyses relating to foundation design, subdrainage, settlement analysis, force main/gravity sewer design, site grading, slope stability, sump/dry well feasibility, and pavement design. He has conducted environmental assessments and UST site evaluations and cleanups throughout Oregon and Washington.

Mr. Geoffrey Compeau, Ph.D., Senior Scientist, is a microbiologist with more than 12 years of field and laboratory experience developing and implementing remediations at industrial facilities throughout the United States. His efforts in developing microorganisms to remediate waste are recognized nationally. Dr. Compeau leads AGI bioremediation projects and oversees the AGI bench-scale treatability studies laboratory.

Mr. Robert C. Palmquist, Ph.D., Senior Geologist, has over 25 years of research and consulting experience in groundwater and surficial geology in the western United States. He is responsible for landfill siting, groundwater contamination studies, and aquifer evaluation, including characterization of contaminant plumes and aquifer vulnerability analysis. His surficial geology experience includes research on glacial and alluvial deposits, karst development, landslides, and application of geological and soils data to site evaluation and land use planning.

Other professionals on AGI's staff include geotechnical, civil, and environmental engineers; engineering geologists; geologists; and hydrogeologists. Members of the professional staff are listed in the following Personnel Table.

AGI's support staff includes administration, accounting, clerical, graphics, marketing, word processing, and laboratory personnel.

PERSONNEL TABLE

AGI PROFESSIONAL STAFF

Name	Degree	Registrations
Scott Adamek	MA, Geology	
John Adams	BA, Environmental Studies	
Mark Adams	MS, Geology	P.G. (OR)
Peter Barry	MS, Geology	
Monica Beckman	BS, Industrial and Operations Engineering	
Glen Bobnick	MS, Civil Engineering	P.E. (MI,WA)
Kathy Bourbonais	BS, Clinical Chemistry	
Bart Bretherton	MS, Hydrology	
Steven Bruce	BS, Geology	P.G. (VA, WY, ID)
Donald Bruggers	MS, Civil Engineering	P.E. (AK,CA,OR,WA) Geotech. Engr. (CA)
Alan Carey	BS, Geology	
Martin Carlson	MS, Geotechnical/ Environmental Engineering	P.E. (WA)
Lief Christenson	MS, Geology	P.G. (ID)
Rebecca Clodfelter	MS, Hydrogeology	
Geoffrey Compeau	Ph.D., Environmental Microbiology	
Jessie Compeau	BS, Biology/Chemistry	
Laurene Compton	BA, Geology	
Glenn Cotter	BS, Civil Engineering	
Edward Crow	MS, Hydrogeology/Geology	
David Dawson	BS, Environmental Geology	
Jan Deick	MS, Hydrogeology	
Wesley DeKlotz	MS, Geotechnical Engineering	
Richard Fejta	BS, Civil Engineering	P.E. (WA,OR,TX)
Teri Floyd	Ph.D., Environmental Engineering/Chemistry	
David Gabler	BS, Soil Science	
Andrew Harvey	MS,Geology	P.E. (AZ, OR)
Dan Henninger	BS, Zoology	
Doug Hutchinson	BS, Geological Sciences	
Jim Imbrie	BS, Geological Engineering	P.E. (OR,CA)
Annette Jakubiak	MS, Geochemistry	
Don Kaizen	BS, Environmental Science Engineering	
Patrick Kelly	MS, Soil Mechanics and Foundation Engineering	P.E. (OR)
Nancy Kraushaar	BS, Civil Engineering	P.E. (OR,CO)
Gary Laakso	BA, Zoology	
Don Lance	MS, Geology	P.G. (CA,ID,OR)
Vince Lascko	MS, Civil Engineering	P.E. (WA,OH,ID)

PERSONNEL TABLE (cont.)

AGI PROFESSIONAL STAFF

Name	Degree	Registrations
Lee MacClellan	BA, Geology	
Howard Marks	Ph.D., Env. Toxicology	
Lauren McCann	BS, Geology	P.G. (OR,CA) C.E.G. (OR)
Thomas McFarlane	MS, Geotechnical Engineering	P.E. (WA)
Thomas Mercer	BS, Geology	
Thomas Meyer	MS, Hydrology	
Allen Moore	MS, Geology	
Roy Moore	MS, Soil Mechanics	P.E. (OR,CA) Geotech. Engr. (CA)
Pamila Morrill	BS, Soils	
John Newby (WA,CA,MT,ID,OK,KS,TX)	MS, Civil Engineering	P.E. Geotech. Engr. (CA)
Robert Palmquist	Ph.D., Geology	P.G. (WY)
Susan Penoyar	MS, Civil Engineering	P.E. (WA)
Lance Peterson	MS, Hydrogeology	
Christopher Pressey	BS, Civil Engineering	P.E. (WA)
Barbara Portwood	BS, Geology	P.G. (OR)
David Rankin	MS, Geology	P.G. (OR)
Stephen Reimers	MS, Civil Engineering	P.E. (CA,MS)
Ray Sadowski	MS, Geochemistry	
Peter Sajer	MS, Geotechnical Engineering	
Jim Schmidt	MS, Civil Engineering	P.E. (WA,CA)
John Schwartz	BA, Geography/Geology	
Jim Seaberg	MS, Hydrogeology	
Tom Short	BS, Education	
Russ Simonson	BS, Chemistry	
Mackey Smith	MS, Geology	C.E.G. (OR)
Chuck Soule	MS, Hydrogeology	P.G. (CA)
Garry Squires	MS, Civil Engineering	P.E. (WA)
Ross Stainsby	BS, Geology & Earth Science	
Robert Strazer	MS, Civil Engineering	P.E. (WA,OR)
Jeff Thompson	MS, Engineering Geology	

PERSONNEL TABLE (cont.)

AGI PROFESSIONAL STAFF

Name	Degree	Registrations
Jeffrey Uding	AAS, Hazardous Materials Management	
P.J. Vanasten	MS, Environmental Engineering	P.E. (WA,WI)
Scott Ward	MS, Civil Engineering	P.E. (OR)
William Wikander	MS, Civil Engineering	P.E. (CA)
Cara Wright	MS, Geology	Geotech. Engr. (CA)

HEALTH AND SAFETY

AGI believes health and safety is the first and foremost consideration in successful operations. Operations typically involve some degree of risk; AGI is concerned about job-related hazards and makes concerted efforts to reduce risks. Consequently, a corporate Health and Safety Program meeting the requirements of 29 Code of Federal Regulations (CFR) 1910, 29 CFR 1926, and state-specific requirements for those states in which we conduct work has been prepared and implemented to provide AGI employees with information to perform their jobs in a safe manner.

AGI has approximately 10 years of experience providing health and safety-related services at both noncontaminated and contaminated sites, including hazardous waste investigation and remediation projects. We have written and implemented Health and Safety Plans for more than 300 projects, including several USEPA Superfund projects. Health and safety services include:

- Writing and implementing site-specific Health and Safety Plans
- Performing construction observation services in compliance with OSHA regulations
- Managing construction and hazardous waste sites to ensure compliance with applicable health and safety rules and regulations
- Performing field investigation and remediation services at sites requiring Levels A through D personal protective equipment
- Performing air monitoring utilizing flame ionization detectors, photoionization detectors, and combustible gas meters to ensure the safety of site employees and the general public
- Collecting air samples utilizing organic vapor diffusion badges, colorimetric tubes, and personal air sampling pumps equipped with the appropriate sampling media to document employee exposures and off-site emissions of hazardous chemicals
- Providing training for employees working at hazardous waste sites, including 40- and 24-hour basic training, 8-hour supervisor training, and 8-hour annual refresher training
- Conducting specialized training for specific sites and operations, including confined space entries
- Conducting compliance audits to ensure facilities meet applicable state and federal regulations
- Conducting health-based risk assessments
- Ensuring compliance with state and federal Clean Air Act laws and regulations

AGI's health and safety services are supported by personnel specifically trained in the areas of industrial hygiene, toxicology, and engineering. Our areas of safety expertise include general construction, underground storage tank, and landfill sites; our chemical safety expertise includes petroleum hydrocarbons, metals, polycyclic aromatic hydrocarbons, volatile organic compounds pesticides and PCBs, and dioxins. Health and safety activities are fully documented. Upon project completion, information is summarized and forwarded to the client.

PROJECT SUPPORT

SOILS LABORATORY

AGI maintains well-equipped physical soil properties testing laboratories at our offices in Bellevue, Washington and Portland, Oregon. Our laboratories support in-house projects and provide routine on-call testing services for several Pacific Northwest engineering companies. The labs include state-of-the-art equipment for testing both clean and contaminated samples. Soil pore water pressure and volume change can be measured during triaxial or consolidation testing. Various permeants can be used, including landfill leachates and groundwater contaminated with inorganic and organic compounds. All testing is performed in accordance with current ASTM standards. The equipment is automated for electronic data acquisition; this allows rapid and accurate data collection and analysis. Where applicable, final reports include computer generated graphics and statistics. More commonly performed testing procedures include:

- Index and Classification Tests
  - Visual classification of soil samples
  - Moisture and density determinations
  - Particle size (both sieve and hydrometer)
  - Atterberg Limits
  - Specific gravity
  - Electrical properties
  - Compaction
- Strength Tests
  - Strain controlled direct shear on partly or fully saturated and consolidated specimens
  - Stress or strain controlled triaxial
  - Vane shear testing
- Consolidation Tests
- Permeability Tests
  - Constant or falling head
- Falling Wright Deflectometer Testing
- Specialized Tests
  - Triaxial cell and permeameter permeability using leachate or simulated leachate for hazardous waste and groundwater studies
  - To model the behavior of dredged soils and underwater slopes, two 8-inch-diameter water sedimentation columns are used to estimate rates of sedimentation and densities for dredged fill and suspended solids concentrations in the discharge water
- Data Acquisition and Reduction

Digital or analog electronic devices are used whenever possible to enhance test accuracy and efficiency. LVDTs, load cells, and pressure transducers are used to measure displacements, loads, and pore pressures in consolidation, permeability, and strength tests. These devices are connected to an automatic, 10-channel data logger which monitors all or any combination of channels at specified time intervals and provides a printout of the data. Where applicable, computer programs are used to reduce test data.

ENVIRONMENTAL TECHNOLOGY LABORATORY

AGI's Environmental Technology Laboratory contains instrumentation to conduct organic, inorganic, and microbiological analyses necessary to address remediation issues. These same techniques are used in monitoring support for site investigations and full-scale remediation projects, including field hydrocarbon analysis during soil excavation. The 900-square-foot laboratory is equipped with refrigerated storage space, ventilation systems, and fume hoods required to maintain and evaluate contaminated samples safely. The laboratory is also equipped with Ph meters, dissolved oxygen apparatus, specific conductance meters, reciprocating shakers, an autoclave, and other general laboratory equipment. Specific analyses and testing include:

- Infrared analysis of petroleum hydrocarbons
- Microbiological analysis of hydrocarbon-degrading organisms
- Nutrient analyses and other wet chemistry analyses
- Soil leaching and flushing apparatus
- Bench-scale vapor phase bioreactors
- Bench-scale liquids/solids contact reactors

LIBRARY AND FILES

AGI maintains technical libraries in our corporate office and all branch offices. All offices have access to the resources in these libraries. Resources include:

- Local, state, and federal codes and regulations
- U.S. Government daily Federal Registers
- U.S. Code of Federal Regulations
- Technical reference books, papers, maps, and reports
- Technical periodicals
- U.S. Geological Survey geologic and hydrologic maps
- Topographic maps
- Aerial photos
- Project files dating back to 1974 (includes projects conducted by AGI predecessor firms)

AGI's libraries are recognized as technical libraries and therefore maintain borrowing privileges with university, public, and technical libraries throughout the United States. AGI also has access to numerous online databases.

INFORMATION MANAGEMENT AND REPORTING SYSTEM

AGI's facilities include more than 50 microcomputers linked via a multi-branch Local Area Network (LAN) in each office. The office LANS are linked through high speed modems. Departmental Servers and system resources are shared through a peer-to-peer network operating system which combines 10-Net and Windows for Workgroups. Computer work centers are maintained in the following departments:

- Graphics: Utilizes AutoCad, desktop publishing, and other graphics software to prepare logs, tables, and illustrations for reports and to prepare project-specific specifications and drawings
- Word and Data Processing: Responsible for report preparation, data management, and archiving
- Accounting: Utilizes an in-house jobcost accounting system that manages and tracks payroll, project charges, billing, and invoices
- Marketing: The Marketing Department utilizes the network to prepare proposals, track project histories, and maintain marketing-related records.

Individual work stations located throughout AGI's offices are linked to this network and have access to all data.

AGI's computer hardware and software allows us to:

- Prepare, manage, track, and archive all technical reports efficiently
- Produce CAD drawings, tables, charts, and figures utilizing digitizing, scanning, color pen plotting (A to E size), and laser printing
- Collect, reduce, plot, and evaluate laboratory test data
- Collect soil and water test data and perform routine to complex geotechnical, hydrogeological, and geochemical analysis and modeling
- Manage and track project charges, billing, and invoicing efficiently
- Transfer reports and data between clients and our other offices quickly

Our documented software library includes many applications for project management, engineering, hydrology, statistical analysis, graphics, word processing, and data management. In addition, we have in-house programming capability which allows us to enhance off-the-shelf software, develop our own applications, and create data management systems. Internal programming capability includes C, C++, Fortran, Basic, and Pascal. Database capabilities include Dbase III and IV+, Btrieve, C-tree, Raima, db_Vista, and SQL. AGI is a Beta site for Windows for Workgroups and Windows NT.