ARCADIS

Infrastructure, buildings, environment, communications

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ENVIRONMENT

Donald P. Gallo, Esq.
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Subject:
Addendum to Alternative Proposal for Site Remediation Services, N. Getz Property, 6854 West Beloit Road, West Allis, Wisconsin

Date:
15 January 2003

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Dear Mr. Gallo:

In a letter dated December 10, 2002, ARCADIS provided a proposal for remediation services at the subject property. The remedy consisted of chemical oxidation, which was the technology recommended by a previous consultant. In a letter dated December 19, 2002, ARCADIS provided an alternate proposal for remediation services. The alternate approach recommended the use of enhanced biodegradation. This alternate approach was developed because chemical oxidation may be difficult to implement at this property, due to the high organic carbon content of the soil. Chemical oxidation removes carbon and changes the groundwater geochemical conditions, and could interfere with other remedies such as natural attenuation.

It was noted that a significant amount of contaminant mass is located in the vadose zone beneath the building. The proposed alternate approach included the installation of an infiltration gallery to provide some in-situ treatment of the soil. An ex-situ remedy such as excavation would likely be more effective; however, in situ treatment was proposed to provide maximum flexibility in the use of the building, if plans exist to find a tenant in the short-term. You have indicated that the building is currently unoccupied and that there are no plans to seek a tenant.

On January 3, 2003, ARCADIS conducted a drive-by survey of the property. Based on the configuration of the building and the absence of a tenant, ARCADIS has modified its alternate approach. Based on the current accessibility of the building interior, ARCADIS recommends the following remedy:

- Targeted excavation of impacted soil, with off-site disposal.
- Enhanced biodegradation treatment of the impacted groundwater.

This approach will provide expedient removal of a large percentage of the contaminant mass in the subsurface, coupled with active treatment of the groundwater. This letter presents a brief description of the amended approach,

including an estimate of project costs. The cost estimate provided herein supercedes our December 19, 2002 cost estimate. However, the previous documents present background information on the project which is not reiterated in this submittal.

Scope of Work

The remedy will include targeted excavation and enhanced biodegradation of impacted groundwater. As noted by the site investigation report, limited concentrations of biodegradation products were detected during the investigation. The absence of biodegradation products may be related to the concentrations of parent products, a shortage of nutrients, or the age of the release. Consequently, ARCADIS recommends the use of a field-scale pilot test to evaluate the feasibility of enhanced biodegradation. The pilot test would also provide design parameters for full-scale implementation. The scope of work for the design and implementation of the remedy will consist of the following tasks:

- Notification to the Wisconsin Department of Natural Resources (WDNR) of the alternate remedy and consultant selection for implementation of the remedy.
- Preparation and submittal of a field-scale pilot test work plan to the WDNR.
- Solicitation of competitive bids for subcontractor services.
- Preparation of a site-specific Health and Safety Plan (HASP) to safely accomplish planned on-site activities.
- Obtain a Wisconsin Pollutant Discharge Elimination System (WPDES) permit for the enhanced biodegradation process.
- Completion of a field-scale pilot test.
- Collection of soil samples from the building interior to conduct a hazardous waste determination and to identify a disposal facility.
- Preparation of a pilot test report and work plan for full-scale implementation.
- Excavation and off-site disposal of impacted soil.
- Installation of an infiltration gallery within the excavation, followed by placement and compaction of backfill material and concrete restoration.

- Installation of an injection gallery around the north and west interior walls of the building.
- Completion of up to 12 injection events using a carbon amendment solution.
- Collection of groundwater samples from the monitoring well network for 1 year.
- Data evaluation and preparation of a site status report.
- Characterization of investigation-derived waste (IDW) generated during the previous site investigation activities.

ARCADIS will also prepare a reimbursement claim under the Drycleaning Environmental Response Program (DERP). The following sections present further details of the proposed remediation activities.

WDNR Notification and Work Plan

It is understood that the WDNR has provided approval of chemical oxidation as the remedial alternative for the property. ARCADIS will notify the WDNR of the proposed change in the remedy and the selection of our firm to implement the remedy.

To verify the effectiveness of enhanced biodegradation as a remedial alternative and obtain design parameters for full-scale implementation, ARCADIS will conduct a field-scale pilot test. The notification letter will also include a work plan for the pilot test. A draft work plan will be completed and forwarded to you for review. Comments received will be incorporated into the final copy of the work plan and forwarded to the WDNR. In accordance with DERP requirements, field activities will not be initiated until the WDNR has issued written approval to proceed.

Subcontractor Procurement

All subcontractors will be selected based on a competitive (i.e., low cost) basis in accordance with NR 169. ARCADIS will solicit three proposals for each contractor service, such as drillers or laboratories.

Health and Safety Plan

A site-specific HASP will be prepared for use in conjunction with the proposed field activities at the Site. The HASP will be designed to comply with the applicable requirements of the Occupational Safety and Health Administration (OSHA) and

other applicable regulations. The elements of the HASP will be based upon requirements described in the:

- *"Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities"* (October 1985).
- The final (March 1989) OSHA rules (29 Code of Federal Regulations [CFR] 1910).

All reasonable precautions will be taken by ARCADIS and its subcontractors to ensure the safety and health of workers and the general public.

Injection Permitting

During the pilot test, the carbon amendment solution will be pumped into the impacted aquifer via a series of injection wells. Because the process involved the injection of a reagent into groundwater, a WPDES permit is required. In addition, a variance request must be submitted and approved by the WDNR in accordance with Chapter NR 140.28(5). Under this task, a WPDES permit and variance request will be prepared and submitted to the WDNR for review.

Enhanced Biodegradation Pilot Test

To evaluate the feasibility of enhanced biodegradation, a field scale pilot test will be completed. The pilot test will consist of three elements: installation of injection wells, application of a carbon amendment solution, and concurrent groundwater monitoring. A pilot test report and remediation work plan will be prepared following the pilot test. The following sections present a summary of each element of the pilot test.

Well Installation: To conduct the pilot test, three injection wells will be installed in the vicinity of Monitoring Well MW-3. These wells will be used to introduce the carbon amendment solution to the aquifer in the area with the highest dissolved phase VOC concentrations. The wells will be installed using hollow-stem auger drilling techniques. Borings for the injection wells will be advanced to a depth of approximately 15 feet. Prior to well installation, soil samples will be collected from the borings at 2-1/2 foot vertical intervals to provide a relatively continuous profile of the subsurface materials at each boring location. Logs will be prepared for each test boring in accordance with WDNR requirements and will present both the classification and engineering properties of the materials encountered. The soil samples will be screened with a flame ionization detector. However, soil samples will not be collected for laboratory analysis.

Each of the soil borings will be converted to an injection well. Following completion of each borehole, a well will be constructed inside of the hollow-stem augers. Once the well is constructed, the augers will be removed to complete the well. Each injection well will consist of a 2-inch diameter Schedule 40 polyvinyl chloride (PVC) riser and a 10-foot length of 2-inch diameter Schedule 40 PVC well screen. Upon positioning the well screen and riser within the bolehole, the annular space between the well screen and borehole will be filled with a silica sand filter pack and filter pack seal. The remainder of the annular space will be sealed with bentonite, and a flush-mount well vault will be installed at the ground surface. After construction, the new wells will be developed in accordance with Chapter NR 141 of the Wisconsin Administrative Code.

Injection Activities: During this phase, a carbon amendment solution will be pumped into each of the three injection wells. Approximately 20 to 50 gallons of solution will be introduced to each well. Water levels will be periodically measured at the nearby Monitoring Wells MW-3, MW-4, and PZ-1 during each injection to evaluate the hydraulic zone of influence (if any) created by the injections.

Approximately four injection events will be completed during the pilot test. The injections will be conducted on a monthly basis. Additional injection events may be necessary to maintain a sufficient level of dissolved organic carbon, based on the concentrations of hydrocarbons present at MW-3. Adjustment to the injection schedule will be made based on the results of groundwater monitoring (discussed below).

Groundwater Monitoring: Five rounds of groundwater samples will be collected from MW-3, MW-7, and MW-9 during the pilot test. Prior to the start of injections, a baseline round of groundwater samples will be collected. A second round of samples will be collected 2 weeks after the first injection event. The third and four sampling events will be completed at one month intervals. The fifth and final event will be completed 1 month after the last injection. This program will provide data of baseline conditions and subsequent changes following introduction of the carbon amendment.

Groundwater samples will be collected using low-flow sampling techniques and analyzed for VOCs, total organic carbon (TOC), and organic gases (ethene, ethane, and methane). The results will be used to evaluate the residence time of the carbon solution in the test area, changes in geochemical parameters, and changes in VOC concentrations.

Reporting: The results of the pilot test will be compiled in a summary report. The report will provide recommendations for full-scale implementation, and will include a work plan for the implementation phase.

The subsequent sections of this proposal present a description of the tasks to be completed during implementation of the remedy. The scope may be adjusted based on the results of the pilot test and the hazardous waste determination (discussed below).

Hazardous Waste Determination

Targeted excavation of impacted soils will be completed in the northwestern corner of the building interior. ARCADIS will complete a hazardous waste determination to evaluate whether the soils can be managed as a solid waste. The determination will be completed in accordance with a recently published draft guidance, prepared by the WDNR.

The evaluation will consist of two components. First, ARCADIS will calculate direct contact soil screening levels (SSLs) for each constituent identified in the soil during the investigation. If the constituent concentrations detected in the soil are less than the SSLs, the impacted soil would not meet the definition of a listed hazardous waste under the draft WDNR guidance (i.e., the 'contained-out' rule). ARCADIS will then collect a sample from the soil beneath the building for analysis of volatile organic compounds (VOCs) using the Toxicity Characteristic Leaching Procedure (TCLP) and other parameters required by the disposal facility. If the TCLP results are less than the NR 600 TCLP limits, the soil would not meet the definition of a characteristic hazardous waste.

ARCADIS will submit the SSL calculations and the analytical data to a licensed disposal facility to obtain approval to dispose of the soils targeted for excavation. Concurrently, ARCADIS will conduct waste stream profiling for the drums of investigative-derived waste presently stored on-site from the investigation.

Excavation of Targeted Impacted Soil

Based on the investigation data, the volume of VOC-impacted soil beneath the building is approximately 900 cubic yards. Because of the large volume of soil and its presence beneath the building, it would not be feasible or cost-effective to excavate all of this soil. ARCADIS proposes to excavate a limited volume of soil from the most highly impacted area, located in the northwestern corner of the building. The volume of soil targeted for excavation would be approximately 440

cubic yards (800 tons). This volume estimate assumes that the soil could be managed as a solid waste.

ARCADIS will obtain contractor bids for the excavation activities. Prior to excavation, a private utility locator service will be contacted to mark utilities within the building. Diggers Hotline will also be contacted for utility location services. The subcontracted excavator will devise an access route for the building interior and saw-cut the concrete above the area to be excavated. A small backhoe will be used to excavate the soil. Because of space limitations, the maximum depth of the excavation will likely be approximately 5 to 6 feet. The soil will then be transferred to the building exterior by small skid loaders or comparable equipment. The soil will be loaded into dump trucks for transport and disposal off-site.

Once the excavation is completed, soil samples will be collected from the base and sidewalls of the excavation. Approximately six sidewall samples and two base samples will be collected. In addition, one soil sample will be collected from every 300 cubic yards of soil excavated (approximately 2 samples). The samples will be placed in laboratory-supplied containers and shipped on ice to a laboratory for analysis of VOCs. The analytical results will be used to evaluate the mass of VOC removed during the excavation activities and the conditions of the soil left in place. As noted earlier, the intent of the excavation is not to remove all of the impacted soil, but to remove accessible highly impacted soil.

Infiltration Gallery Installation, Backfilling, and Surface Restoration

Following the completion of soil removal and sampling activities, an infiltration gallery will be installed within the excavation. The infiltration gallery will be used in conjunction with a set of injection wells (discussed below) to implement the enhanced biodegradation portion of the remedy. The gallery will consist of a network of 2-inch diameter Schedule 40 PVC well screen, oriented horizontally within the excavation. The gallery will be connected to two vertical sump installed within the excavation. These sumps will be used to introduce the carbon amendment solution to the gallery.

The gallery will be placed on a 6-inch thick layer of gravel, and then backfilled with a 6-inch thick layer of gravel. The remainder of the excavation will be backfilled with engineered backfill material in 12-inch nominal lifts, and compacted to 90 percent of the standard proctor. The surface of the excavation will be completed with concrete to match the surrounding grade and flooring. An independent testing firm will be retained to conduct moisture-density testing of the backfill material, and to conduct density measurements of the compacted backfill using nuclear density testing methods.

Injection Gallery Installation

To provide additional treatment of the impacted groundwater, a series of vertical infiltration wells will be installed inside the building once the excavation is completed. Approximately 11 injection wells will be installed within the building using a low-clearance drilling rig. The wells will be installed on 20-foot centers along the west and north interior walls of the building. The well depths will be based on the capacity of the drilling unit and the clearance within the building, but will likely be 8 to 15 feet deep. These wells will be used to create a treatment zone in the groundwater, near the downgradient edge of the plume, while the infiltration gallery will create a treatment zone within the source area. Each well will be completed with a steel flush mount well cover. To reduce excavation costs, the wells will not be connected to a central amendment distribution system. The wells will be accessed individually to inject the amendment solution. Rather than installing aboveground tanks or equipment, ARCADIS will use a mobile pumping system to conduct the applications of the carbon amendment on an as-needed basis.

The actual injection well locations and well construction details will be determined during the design phase.

Injection Activities

Up to twelve injection events will be completed at the property under this scope of work. During each event, a mobile pumping unit will be used to inject a carbon amendment solution into the subsurface. The dosage will be determined by the pilot test. The injections will be conducted on a monthly basis. The volume of amendment will be determined by the final size of the injection wells and the configuration of the infiltration gallery. Based on similar systems employed by ARCADIS, approximately 20 to 50 gallons of amendment solution will be applied to each injection well per event, and approximately 500 gallons of solution will be applied to the infiltration gallery per event.

Groundwater Monitoring Program

Concurrent with the injection activities, a groundwater monitoring program will be implemented. Water levels will be measured using a decontaminated electronic water level probe prior to each sampling event to evaluate groundwater flow. Groundwater samples will then be collected from each of the wells. Conventional bailer sampling methods can alter sensitive biological parameters such as dissolved oxygen. To obtain more representative groundwater samples, low-flow sampling techniques will be utilized. A downhole probe will be lowered down each well to

measure aquifer parameters such as temperature, pH, dissolved oxygen, specific conductance and oxidation-reduction potential (ORP). Water will be pumped from the aquifer at a low flow rate (less than 150 milliliters per minute [ml/min]) until the probe readings stabilize. Samples will then be collected in clean, laboratory-supplied sample containers, and placed in a cooler filled with ice.

Groundwater samples will be collected from Monitoring Wells MW-2, MW-3, MW-7, MW-9, and MW-10 on a monthly basis during the first 3 months of remediation. These samples will be analyzed for VOCs, dissolved gases, and total organic carbon. All of the site monitoring wells will be sampled on a quarterly basis thereafter. Samples from five wells (MW-2, MW-3, MW-7, MW-9, and MW-10) will be analyzed for VOCs, organic gases, and TOC. The remaining six wells (MW-1, MW-4, MW-5, MW-6, MW-8, and PZ-1) will be analyzed for VOCs.

The samples will be collected using low-flow sampling techniques. The groundwater samples will be submitted to a WDNR-certified laboratory for analysis using appropriate chain-of-custody procedures.

Site Status Report

Upon completion of the injection activities and groundwater monitoring, ARCADIS will prepare a remediation status report. The report will present the results of the excavation activities, injection well installation, injection events, and groundwater monitoring. The results will be used to evaluate the effectiveness of the remedy and develop options for pursuing site closure.

In addition to the status report, ARCADIS will periodically schedule project meetings with you. The purpose of the meetings will be to discuss the progress of remediation and determine if any modifications are necessary.

Disposal of Investigative-Derived Waste

Soil cuttings and purge water were generated during prior well installation activities. Fifteen drums of soil cuttings and six drums of water are present at the property. During the characterization of the soils slated for excavation, ARCADIS will also complete a characterization of the drummed materials. The purge water will likely be disposed of through the sanitary sewer system. The soil cuttings will be disposed of during the soil excavation activities. Costs for disposal of IDW are included with this proposal, and are based on the assumption that the material can be disposed as a solid waste.

Reimbursement Claim

As indicated earlier, costs associated with the remediation may be eligible for reimbursement through the DERP. ARCADIS will prepare a reimbursement claim of eligible project costs for submittal to the WDNR. Currently, up to two claims per year can be submitted during the remediation phase.

Project Schedule

ARCADIS will begin work immediately following receipt of authorization to proceed. The DERP work plan and notification will be submitted to you for review within two weeks of authorization. The pilot test will commence within two weeks after approval from the WDNR.

Estimated Costs

ARCADIS will conduct the scope of work for implementing the excavation and enhanced biodegradation remedy as described above for an estimated cost of $194,472. These costs could vary depending upon the results of the pilot test, conditions encountered in the field, or access inside the building. Table 1 includes a breakdown of the project costs. These costs include all labor and subcontractor services. The proposed scope of work will be invoiced on a time and materials basis in accordance with the Fee Schedule presented in Appendix A.

The disposal cost presented in Table 1 ($22/ton) assumes that the soils can be managed as a solid waste. A hazardous waste determination was not completed during the investigation, and IDW from the investigation remains on site. Based on the concentrations of VOCs detected in the soil, it is possible that a portion of the soils targeted for excavation would require management as a hazardous waste. The cost for transportation and disposal of soil as a hazardous waste would be approximately $345/ton. Because the purpose of the excavation activities is to remove a portion of the mass in soil , the targeted volume could be change to partially offset any potential cost increases due to hazardous waste disposal requirements. Alternatively, the soil could be excavated and segregated on-site into stockpiles of hazardous or solid wastes. At a recent project completed by ARCADIS, this approach decreased the volume of soil requiring management as a hazardous waste by approximately 75 percent. Following completion of the hazardous waste determination, ARCADIS will contact you to discuss potential changes in the soil handling strategy if some of the soils require management as a hazardous waste.

Project Team

The project team members assigned to implement the outlined scope of work were selected because of their experience in the following areas:

- Demonstrated successful experience in projects reimbursed by various funding programs in Wisconsin.
- Knowledge of the DERP and the evolving administrative rules.
- Experience in conducting site remediation activities at existing and former dry cleaning facilities.
- Technical expertise and experience with chlorinated hydrocarbons in soil and groundwater.
- Experience with in-situ remediation and ex-situ remediation of chlorinated solvents.

The project team was selected to satisfy the requirements of s. NR 169.21(2)(c). The project team members will work under the direction of Mr. James Drought, PH, project advisor, and Mr. James Bannantine, PG, hydrogeologist, both of whom are thoroughly familiar with technical and administrative issues associated with investigation and remediation aspects of dry cleaning projects, as well as the DERP. Supporting Mr. Drought and Mr. Bannantine in the coordination and implementation of design and field activities will be Mr. Wes May, staff engineer. Resumes for all key personnel involved in the project are presented in Appendix B.

Certification

This proposal has been prepared in accordance with the requirements of s. NR 169.21. In accordance with s. NR 169.21(6), ARCADIS certifies the following:

- If selected to complete the scope of work described herein, ARCADIS will comply with the applicable requirements of Chapters NR 169 and NR 700 through NR 728.
- ARCADIS will make available to the WDNR upon request, for inspection and copying, all of the documents and records related to the contract services.

Also in accordance with s. NR 169.21(6), ARCADIS' Certificate of Insurance is presented in Appendix C.

Qualifications

ARCADIS is a full-service environmental consulting company with over 40 years of experience in assessing soil and groundwater quality and developing remedial solutions. An intraoffice electronic mail system provides ready access to corporate resources and technical experts in ARCADIS offices worldwide. A company-wide project management system has been implemented to provide project managers and team members with tools to manage client communications, track budgets and select personnel for executing project work. The Milwaukee office employs a staff of over 35 geologists, engineers and scientists. We are thoroughly experienced in assessing and remediating chlorinated compounds and implementing cost effective remedial solutions, including natural attenuation.

Case study information for investigation and remediation activities on dry cleaning projects completed or currently in-progress by ARCADIS is included in Appendix D. A case study for chemical oxidation pilot testing is also included in Appendix D. Among the remedial techniques utilized by ARCADIS to address dry cleaner releases is a patented process that enhances the biological degradation of chlorinated hydrocarbons. ARCADIS has also employed natural attenuation as a remedy for chlorinated hydrocarbons. The dissolved gases concentrations and other groundwater quality data collected during the investigation can be used to assess whether natural attenuation or enhanced biodegradation are feasible remedial methods.

The experience and administrative systems described above will enable the ARCADIS project team to meet and exceed the following criteria established in s. NR 169.21(2)(c)1-4, Wis. Admin. Code:

- Be fully informed about this project's scope and services, and have the experience and ability to analyze alternatives and design the most suitable response action consistent with technical and economic feasibility, environmental statutes and rules, restoration timeframes, and the latest technical advances.

- Provide necessary staff and facilities for all phases of planning, investigation, design, construction and operation.

- Retain and confer with specialists on unusual matters; provide qualified technical reviewers, who will keep the owners advised on technical and regulatory matters and work toward planned remediation goals.

- Perform all services in an ethical, professional and timely manner.

References

A list of client references is included in Appendix E.

Closing

ARCADIS appreciates the opportunity to submit this proposal to you and looks forward to working with you on this project. Should you have any questions relating to the information presented herein, please feel free to call us at your convenience.

Sincerely,
ARCADIS G&M, Inc.

Edmund A. Buc, PE
Senior Engineer

James F. Drought, PH
Principal Hydrogeologist

Attachments

Table 1. Cost Estimate for Implementation of Targeted Soil Excavation and Enhanced Biodegradation Remediation, N. Getz Property, 6854 West Beloit Road, West Allis, Wisconsin.

ARCADIS Services

WDNR Notification			
Senior Engineer	2 hours @ $125/hr		$250
Engineer II	6 hours @ $78/hr		$468
Administrative Support	1 hours @ $62/hr		$62
		Subtotal	$780
Pilot Test Work Plan			
Senior Engineer	1 hours @ $125/hr		$125
Staff Engineer I	16 hours @ $92/hr		$1,472
Drafting	1 hour @ $78/hr		$78
Administrative Support	2 hours @ $62/hr		$124
		Subtotal	$1,799
Subcontractor Procurement			
Senior Engineer	1 hours @ $125/hr		$125
Staff Engineer I	6 hours @ $92/hr		$552
Engineer II	15 hours @ $78/hr		$1,170
Drafting	3 hour @ $78/hr		$234
Administrative Support	3 hours @ $62/hr		$186
		Subtotal	$2,267
Health and Safety Plan			
Staff Engineer I	1 hour @ $78/hr		$78
Administrative Support	1 hour @ $62/hr		$62
		Subtotal	$140
Injection Permitting			
Senior Engineer	1 hour @ $125/hr		$125
Staff Engineer I	10 hours @ $92/hr		$920
Drafting	1 hour @ $78/hr		$78
Administrative Support	2 hours @ $62/hr		$124
		Subtotal	$1,247
Pilot Test Well Installation Oversight			
Staff Engineer I	4 hours @ $92/hr		$368
Scientist II	12 hours @ $78/hr		$936
Equipment and Expenses			$500
		Subtotal	$1,804
Pilot Test Injections (Four Events)			
Senior Engineer	2 hours @ $125/hr		$250
Project Engineer	8 hours @ $110/hr		$880
Engineer I	24 hours @ $78/hr		$1,872
Equipment and Expenses			$1,200
		Subtotal	$4,202
Pilot Test Groundwater Monitoring (Five Events, Three Wells per Event)			
Project Engineer	8 hours @ $110/hr		$880
Scientist I	40 hours @ $78/hr		$3,120
Equipment and Expenses			$1,500
		Subtotal	$5,500

Table 1. Cost Estimate for Implementation of Targeted Soil Excavation and Enhanced Biodegradation Remediation, N. Getz Property, 6854 West Beloit Road, West Allis, Wisconsin.

Waste Determination for Soils to be Excavated			
Senior Engineer	2 hours @ $125/hr		$250
Project Engineer	10 hours @ $110/hr		$1,100
Engineer II	6 hours @ $78/hr		$468
Equipment and Expenses			$750
		Subtotal	$2,568
Pilot Test Report/Remediation Work Plan			
Senior Engineer	4 hours @ $125/hr		$500
Project Engineer	10 hours @ $110/hr		$1,100
Staff Engineer I	35 hours @ $78/hr		$2,730
Administrative Support	6 hours @ $62/hr		$372
Drafting	8 hours @ $78/hr		$624
Expenses			$200
		Subtotal	$5,526
Oversight of Excavation, Infiltration Gallery Installation, and Backfilling			
Senior Engineer	4 hours @ $125/hr		$500
Project Engineer	16 hours @ $110/hr		$1,760
Engineer II	100 hours @ $78/hr		$7,800
Equipment and Expenses			$4,000
		Subtotal	$14,060
Oversight of Injection Well Installation			
Senior Engineer	4 hours @ $125/hr		$500
Project Engineer	7 hours @ $110/hr		$770
Engineer II	35 hours @ $78/hr		$2,730
Equipment and Expenses			$3,000
		Subtotal	$7,000
Injection Event (One Event)			
Senior Engineer	1 hours @ $125/hr		$125
Project Engineer	2 hours @ $110/hr		$220
Scientist II	12 hours @ $78/hr		$936
Equipment and Expenses			$1,000
		Subtotal	$2,281
Remediation Groundwater Sampling (One Event, Five Wells per Event)			
Project Engineer	2 hours @ $110/hr		$220
Scientist II	16 hours @ $78/hr		$1,248
Equipment and Expenses			$700
		Subtotal	$2,168
Sitewide Groundwater Sampling (One Quarter, Ten Well per Quarter)			
Project Engineer	2 hours @ $110/hr		$220
Scientist II	35 hours @ $78/hr		$2,730
Equipment and Expenses			$1,500
		Subtotal	$4,450
Remediation Status Report			
Senior Engineer	4 hours @ $125/hr		$500
Project Engineer	15 hours @ $110/hr		$1,650
Staff Engineer I	35 hours @ $78/hr		$2,730
Administrative Support	6 hours @ $62/hr		$372
Drafting	8 hours @ $78/hr		$624
Expenses			$200
		Subtotal	$6,076

Table 1. Cost Estimate for Implementation of Targeted Soil Excavation and Enhanced Biodegradation Remediation, N. Getz Property, 6854 West Beloit Road, West Allis, Wisconsin.

Characterization of Investigative Derived Waste			
Project Engineer	3 hours @ $110/hr		$330
Scientist II	6 hours @ $78/hr		$468
Administrative Support	2 hours @ $62/hr		$124
		Subtotal	$922
		Subtotal, ARCADIS Services	$101,117
		Including Twelve Injection Events, Three Sampling Events of Five Wells, and Three Quarters of Sitewide Groundwater Sampling	
Subcontractor Services			
Subcontracted Drilling Services - Pilot Test Well Installation (Three Wells)			
Mobilization	Lump Sum		$250
Drilling	45 LF @ $20/LF		$900
Well Installation	45 LF @ $3.50/LF		$158
Flush-Mount Cover	3 units @ $70/ea		$210
Decontamination	Lump Sum		$750
		Subtotal	$2,268
Subcontracted Soil Excavation Services			
Mobilization	Lump Sum		$2,500
Saw Cutting	210 LF @ $2/LF		$420
Concrete Removal/Disposal	2600 SF @ $5/SF		$13,000
Excavation/Loading of Soil	800 tons @ $12/ton		$9,600
Transportation of Soil	800 tons @ $7/ton		$5,600
Infiltration Gallery	300 LF @ $4/LF		$1,200
Sumps	2 @ $150/ea		$300
Backfill Material	800 tons @ $4/ton		$3,200
Placement and Compaction	800 tons @ $7/ton		$5,600
Compaction Testing	Lump Sum		$800
Concrete Replacement	2600 SF @ $5/SF		$13,000
Site Restoration	Lump Sum		$1,500
		Subtotal	$56,720
Subcontracted Drilling Services - Remediation Injection Well Installation (11 Wells)			
Mobilization	Lump Sum		$250
Drilling	165 LF @ $20/LF		$3,300
Well Installation	165 LF @ $3.50/LF		$578
Decontamination	Lump Sum		$750
		Subtotal	$4,878

Table 1. Cost Estimate for Implementation of Targeted Soil Excavation and Enhanced Biodegradation Remediation, N. Getz Property, 6854 West Beloit Road, West Allis, Wisconsin.

Subcontracted Analytical Testing Services			
Pilot Test Groundwater Samples (Five Rounds from Three Wells)			
VOCs	15 samples @ $70/each		$1,050
Total Organic Carbon	15 samples @ $30/each		$450
Ethene, Ethane, Methane	15 samples @ $80/each		$1,200
Hazardous Waste Characterization Analysis			
TCLP Testing	1 samples @ $200/each		$200
Profile Analyses	1 samples @ $200/each		$200
Excavation Soil Sampling			
VOCs	10 samples @ $70/each		$700
Startup Remediation Sampling (Three Rounds from Five Wells)			
VOCs	15 samples @ $70/each		$1,050
Total Organic Carbon	15 samples @ $30/each		$450
Ethene, Ethane, Methane	15 samples @ $80/each		$1,200
Sitewide Groundwater Sampling - (Three Quarters of 11 Wells)			
VOCs	33 samples @ $70/each		$2,310
Total Organic Carbon	15 samples @ $30/each		$450
Ethene, Ethane, Methane	15 samples @ $80/each		$1,200
		Subtotal	$10,460
Subcontracted Disposal of Soil			
Excavated Soil and Cuttings	850 tons @ $22/ton		$19,030
		Subtotal, Subcontractor Services	$93,355
		Total Cost for Implementation of Remedy	**$194,472**

ARCADIS
FEE SCHEDULE FOR PROFESSIONAL SERVICES

Invoices for services provided by ARCADIS consist of: (1) hourly rate professional services fees; (2) material and equipment expenditures and usage; (3) subcontractor costs; (4) travel, shipping, and communications charges; and (5) sales or gross receipt taxes, as applicable.

Subject to periodic revisions, hourly rate fees for ARCADIS professional services are indicated below:

STAFF CATEGORIES	HOURLY RATES
ENGINEERS & SCIENTISTS	
Scientist II	$78
Staff Scientist I	$85
Senior Engineer	$125
OFFICE SUPPORT STAFF	
Administrative Support	$62
Draftsperson	$78

INVOICING & PAYMENT: Progress invoices will be issued monthly and payment is due within thirty (30) days of invoice date. Invoices for subcontractor charges are payable upon presentation. Non-standard, client-requested invoice formats and supporting documentation will be invoiced at $49.00 per hour plus expenses. A finance charge of 1.5% per month will be payable on past-due account balances.

ARCADIS
FEE SCHEDULE FOR PROFESSIONAL SERVICES

ADDITIONAL TERMS

PROJECT MATERIALS AND EQUIPMENT: All project-related expenses, materials, field supplies, equipment charges; premiums for insurance, bonds, and letters of credit required by the client in addition to normal coverage; project-required permits and licenses; et. will be invoiced at cost plus 15%.

PROJECT COMMUNICATION AND SHIPPING EXPENSES: Charges for long-distance telephone, photocopying, blueprints, express and regular shipping, and postage will be invoiced at cost plus 15%.

TRAVEL AND RELATED EXPENSES: Charges for rental vehicles, meals, travel, and lodging will be invoiced at actual cost plus 15%. Personal vehicles will be charged at $0.40/mile.

SUBCONTRACTS: Subcontractor (drillers, analytical laboratories, etc.) charges will be invoiced at cost plus 15%.

LEGAL PROCEEDINGS: A surcharge of 50% will be added to the professional services rates for actual sequestered preparation time and for actual time spent in depositions, public testimony, court, and/or hearings.

PROJECT ADVISORS AND SENIOR EXPERTS: Rates for Project Advisors are $230/hour. Rates for Senior Experts are a function of the individual and are quoted upon request.

ARCADIS EQUIPMENT AND MATERIALS: ARCADIS-owned equipment, vehicles, and materials will be invoiced at fixed unit rates. A summary of these rates will be provided upon request.

ARCADIS TREATABILITY LAB ANALYSES: Routine Treatability Laboratory analyses will be invoiced at a fixed price per test. Rates will be available upon request.

ARCADIS

James F. Drought, PH

Vice President
Principal Hydrogeologist

Mr. Drought has been employed with ARCADIS since 1995. As Vice President and Principal Hydrogeologist, Mr. Drought is responsible for the development, management and completion of brownfield remediation and redevelopment, real property due diligence, Guaranteed Property Remediation™, peer review, and litigation support services. Mr. Drought and his staff provide these services to clients throughout the United States and the world. Mr. Drought's Project Director responsibilities include staff development and monitoring, client and regulatory agency coordination, project scope and budget development and control, development and execution of investigation and remediation work plans, analytical and feasibility data review, and report technical review.

As coordinator of the business development activities within the Great Lakes Region of ARCADIS, Mr. Drought is responsible for organizing an annual business development retreat and the development of sales plans for each of the eight regional offices. In addition, Mr. Drought's responsibilities include professional seminar presentations to attorneys, financial institutions, realtors, and contractors, and proposal preparation and execution. Mr. Drought serves as a regulatory compliance specialist by tracking and commenting on proposed regulations at the state and federal level. Mr. Drought also serves as the account manager for several national and regional clients.

Prior to joining ARCADIS, Mr. Drought was the Assistant Environmental Manager at a national environmental and geotechnical consulting firm from 1989 through 1994 and was responsible for the development, management and completion of soil and groundwater remedial investigations, feasibility studies and remedial design. Mr. Drought was also responsible for the supervision of professional and technical staff and the coordination of an analytical laboratory certified under Chapter NR 149 of the Wisconsin Administrative Code.

Mr. Drought also served as an Assistant Environmental Planner at the Bay-Lake Regional Planning Commission (BLRPC) and the Southeastern Wisconsin Regional Planning Commission (SEWRPC) from 1985 through 1988. Mr. Drought's responsibilities included the preparation of resource management and environmental planning reports, and serving as a regulatory agency liaison between USEPA, WDNR, WDOA, and local and county units and agencies of government.

Education

MS, Contaminant Hydrogeology and Geosciences, University of Wisconsin-Milwaukee, June 1999

Graduate Coursework in Biological and Chemical Sciences, University of Wisconsin-Milwaukee, 1983-1985

BS, Physical Geography and Biology, Carroll College, May 1982

Professional Registrations

Wisconsin Professional Hydrogeologist (No. 45-111)

NR 712 Hydrogeologist

WDHFS Asbestos Inspector (Certification No. AII-4259)

COMM UST Site Assessor

COMM PECFA Consultant

Professional Associations

National Ground Water Association

Wisconsin Fabricare Institute

Wisconsin Ground Water Association

Professional Training

- ARCADIS Advanced Management Programme Training, October 2000 (The Netherlands); January 2001 (Los Angeles, CA); April 2001 (The Netherlands)
- Wisconsin Department of Commerce Brownfield Seminar, 2000
- 8-Hour Health and Safety Refresher Training Completed in 1991-2001
- In-Situ and On-Site Bioremediation: The Fifth International Symposium, Sponsored by Batelle, San Diego, California, 1999
- Wisconsin Ground Water Association Fall Conference, 1998 and 1999
- National Ground Water Association Soil and Groundwater Modeling for Soil Clean-up Level Evaluation and Risk Assessment Seminar, 1996
- Symposium of Natural Attenuation of Chlorinated Organics in Groundwater, Sponsored by USEPA, Dallas, Texas, 1996
- UWEX and WDNR Environmental Clean-Ups Under NR 700 Seminar, 1994
- Nuclear Density Gauge Operation and Radiation Safety Training, 1993
- UWEX and WDNR Remediation Technologies for Environmental Contamination Clean-Ups Seminar, 1993
- 40-Hour Health and Safety Training for CERCLA and RCRA Remediation, 1990
- USEPA AHERA Asbestos Building Inspection Course, 1989. AHERA update courses completed in 1990-2000
- Microscopic Identification of Asbestos, McCrone Research Institute, 1989
- Federation of Environmental Technologist (FET) Programs:

  FET Annual Conference and Exhibition, 1990-2002

  RCRA Update, 2000

  Environmental Update, 1998

  Solid and Hazardous Waste Committee, 1996-Present

  Legal Committee, 1995-Present

  NR 700 Update Seminar, 1994

  Soil Remediation Issues in Wisconsin, 1992

  Current and Future Wastewater Concerns, 1992

  Criminal Enforcement of Environmental Law, 1992

James F. Drought, PH

Vice President
Principal Hydrogeologist

Fields of Specialization

- Brownfield remediation, redevelopment, and financing
- Real property due diligence and Guaranteed Property Remediation™ services
- Petroleum and chlorinated hydrocarbon (NR 700), hazardous waste (NR 600), and PCB remedial investigations, feasibility studies, and remedial design
- Underground storage tank (UST) closure assessments, and leaking underground storage tank (LUST) remedial investigations
- Commingled petroleum aromatic and chlorinated aliphatic hydrocarbon remedial investigations and remedial design
- Ex-situ remedial design and monitoring utilizing thermal desorption, passive aeration, and bioremediation technologies
- Petroleum Environmental Clean-up Fund Act (PECFA) reimbursement guidance
- Dry cleaning solvent (PCE and stoddard solvent) investigation, remedial design, and remediation cost recovery under the Drycleaner Environmental Response Program (DERP)
- Computer fate and transport modeling utilizing the USEPA SESOIL model
- Abiotic and biotic degradation of chlorinated and petroleum hydrocarbons
- Subsurface explorations utilizing Geoprobe, truck and track-mounted, portable and low clearance, and all-terrain drilling equipment
- Feasibility evaluations including vapor extraction and air sparging, aquifer studies, and in-situ hydraulic conductivity determinations
- State and Federal regulatory compliance

Committee Representation

- WDNR NR 169 Committee (DERP)
- WDNR Consultant Focus Group
- WDNR Brownfields Committee
- COMM 47 Advisory Committee
- River Revitalization Committee (Board Member)

Key Projects

- Project advisor for the investigation, remediation, and redevelopment of the former Pabst Brewery Complex in Milwaukee, Wisconsin. The 150-year-old, 1,400,000 square foot Pabst Brewer Complex had been vacant

since 1997 and was selected for commercial and residential redevelopment in 2002. ARCADIS was selected to assess and inventory the environmental impairment, developed restoration plans and cost projections, and coordinated the restoration with the redevelopment activities.

- Project advisor for PCE-impacted soil and groundwater investigation and remediation activities at the former Crestwood Shopping Center brownfield site located in Glendale, Wisconsin. A dry cleaning facility had operated within the mall, two different locations, from the early 1960s to 2000. A plume of PCE-impacted soils and groundwater existed on and off the seven-acre shopping center.

- A combination of aggressive in-situ soil and groundwater treatment and institutional controls were selected, approved by the Wisconsin Department of Natural Resources (WDNR), and completed within six months of contract execution. Demolition of the existing mall and construction of new retail and commercial buildings were completed concurrently with treatment activities. Investigation and remediation activities were completed under a guaranteed maximum price contract.

- Project advisor for the completion of a remedial investigation and an in-situ remedial pilot test at a existing industrial facility located in Oconomowoc, Wisconsin. A spill of TCE occurred at this site in 1994 within a former vapor degreasing system. The spill resulted in the release of TCE to soils and groundwater. The TCE migrated in saturated coarse alluvial deposits in a long and narrow groundwater plume ("core") off-site in the direction of the Oconomowoc River.

- The remedial investigation consisted of the advancement and sampling of 52 Geoprobe borings, eight groundwater monitoring wells, and four piezometers on and off the property. In addition, five seepage meters were installed in the Oconomowoc River to determine rates of contaminant and water fluxes. The in-situ pilot test included injection and recirculation of a natural carbon supplement to enhance anaerobic conditions and promote reductive dechlorination of TCE as an electron donor. The in-situ pilot test was completed over the course of six months and demonstrated to the WDNR that the injection of natural carbon represented a feasible and cost effective remedial alternative.

- A risk assessment was also completed as part of the pilot test activities to determine "threshold" levels for the chlorinated hydrocarbons venting to the Oconomowoc River. The "threshold" levels determined by the risk assessment demonstrated that active remediation was not warranted

adjacent to the Oconomowoc River. The project was managed under Chapter NR 700 of the Wisconsin Administrative Code.

- Project advisor for a PCE impacted soil and groundwater investigation and remediation project at the Washington Square Mall brownfield site located in Germantown, Wisconsin. A dry cleaning facility operated within the retail mall over the period from 1980 to 1997. The remedial investigation consisted of the advancement and sampling of Geoprobe borings, monitoring wells, and piezometers within and adjacent to the retail mall. Soil remediation consisted of the excavation and off-site disposal (at a RCRA subtitle C landfill in Michigan) of approximately 3,500 tons of PCE impacted soils. Groundwater remediation consisted of the extraction and treatment of approximately 80,000 gallons of PCE-impacted groundwater from the resulting excavation, and the injection of a natural carbon solution as an electron donor to promote the reductive dechlorination of PCE.

- This project was completed under the Wisconsin Brownfields Program (Wisconsin Act 453) and Chapters NR 700 and 600 of the Wisconsin Administrative Code. In addition, all investigation and remediation activities were completed under a guaranteed maximum price contract. The Washington Square Mall project was closed by the WDNR in January 2001, approximately 2-1/2 years after the initiation of remediation activities.

- Project advisor for a commingled polychlorinated biphenyl (PCB) and tetrachloroethylene (PCE) impacted soil and groundwater project at an existing die casting facility located in Milwaukee, Wisconsin. Prior to 1981, some of the die casting machines within the facility used phosphate ester oil (PEO) hydraulic oils that contained PCBs. PCE was utilized during the die casting process as a vapor degreaser.

- Investigation activities included an evaluation of the extent of PCB and PCE impacted soils and groundwater by advancing and sampling Geoprobe borings and monitoring wells. Groundwater samples were collected using low-flow sampling methods. Soil and groundwater remedial alternatives were evaluated in accordance with Chapter NR722 of the Wisconsin Administrative Code. A performance standard consisting of a engineered cap and long-term monitoring was selected as the final remedial alternative.

- Project manager for the assessment and remedial design of commingled petroleum aromatic and chlorinated aliphatic hydrocarbon impacted soil and groundwater at two existing dry cleaning/former gasoline service station facilities located in Milwaukee, Wisconsin. Projects were initiated by completing closure assessments on the

former USTs that remained from the former gasoline service station operations. Investigation activities identified the presence of petroleum (BTEX) and chlorinated (PCE, TCE) hydrocarbons within the groundwater in exceedance of Chapter NR 140 regulatory levels. The assessment and remedial design activities were completed in accordance with Chapters NR 600 and 700 of the Wisconsin Administrative Code. Feasibility studies completed at these sites included soil vapor extraction, air sparging and aquifer testing. A dual phase vapor and groundwater extraction system was designed and installed for treatment of the commingled plumes at one site; a program to monitor the degradation of PCE was approved by the WDNR for the other site. The cost for the assessment and remediation of the petroleum and chlorinated hydrocarbons were eligible for reimbursement under the PECFA and DERF programs, respectively.

- Project manager for site investigation, remediation, and risk assessment activities completed at a former retail gasoline service station located in northern Illinois. The site operated as a retail gasoline service station over the period from about 1935 to 1985. ARCADIS was retained in March 1996 to review ten years of groundwater gauging, analytical testing, and remedial system performance data, and to implement a strategy for site closure. A risk assessment was completed in accordance with the Illinois Environmental Protection Agency (IEPA) Tiered Approach for Clean-up Objectives (TACO) for the dissolved phase hydrocarbons. An evaluation of the historical groundwater gauging data indicated that the mass of the separate phase product, both on and off the site, had been reduced by approximately ninety percent from the mass that was present in the mid-1980s.

- ARCADIS met with representatives from the IEPA in Springfield, Illinois in June 1996. The meeting was held to discuss the site investigation and remediation activities that were previously completed on the site, the TACO risk assessment, and a request for no further action. The representatives from the IEPA indicated at the meeting that the groundwater SSLs developed for the risk assessment were generated correctly and, since the maximum analyte levels were below the site-specific levels, further remediation of dissolved phase hydrocarbons was not necessary. The risk assessment developed for this project was the first TACO Tier III risk assessment approved by the IEPA.

- Project manager for a reactive cyanide impacted soil (F listed hazardous waste) assessment and remediation project at a construction project adjacent to the Fox River in Waukesha, Wisconsin. Project was

completed in accordance with Chapter NR 600 of the Wisconsin Administrative Code. As the Project Manager, Mr. Drought designed and supervised the installation of a containment system to protect worker and public welfare during construction activities, and to prevent the migration of exposed cyanide wastes from entering the Fox River. Following completion of the investigation activities, remedial alternatives were evaluated including excavation and off-site stabilization and treatment, which was implemented and completed at the CWM facility in Lake Charles, Louisiana.

- Project manager for the investigation and remediation of petroleum and chlorinated hydrocarbon-impacted soil and groundwater on active and former gasoline service stations, dry cleaning facilities, and commercial and industrial sites. Most projects were completed under the PECFA or DERP reimbursement programs to maximize claimant eligibility for recovery of eligible costs. Soil remediation technologies included development of direct contact and groundwater pathway residual contaminant levels (RCLs), and performance standards, low temperature thermal desorbtion, passive aeration, landfill disposal, and vapor extraction. Groundwater remediation technologies included natural attenuation, air sparging, and groundwater extraction and treatment.

- Project manager for Phase I and Phase II Environmental Site Assessments completed in South America, Western Europe, and The United Kingdom. All Phase I environmental site assessments were completed in accordance with ASTM 1527. All Phase II environmental site assessments were completed in accordance with national or international regulatory guidelines.

Selected Presentations

Regulatory Update: Principles and Applications, Milwaukee Bar Association, July 24, 2002.

Crestwood Shopping Center Brownfield Case Study, Wisconsin Department of Natural Resources, Bureau for Remediation and Redevelopment In-House Conference, Wisconsin Dells, Wisconsin, November 9, 2000.

Natural Attenuation of a Mixed Hydrocarbon Plume, Summer Intern Program, University of Wisconsin-Milwaukee Great Lakes Water Institute, July 19, 1999.

Development and Implementation of a Better Mouse Trap! Technical Update - Trends and Developments in Site Investigation, Remediation, and Institutional Controls, 1999 Environmental Law Update,

Sheraton Hotel, Brookfield, Wisconsin; May 4, 1999.

Fate of Tetrachloroethene and Benzene at a Dry Cleaning Facility, In-Situ and On-Site Bioremediation - The Fifth International Symposium, Sheraton San Diego Hotel and Marina, San Diego, California; April 22, 1999.

A Case Study of Natural Attenuation at a Dry Cleaning Facility, American Water Resources Association Annual Meeting, Radisson Hotel, La Crosse, Wisconsin; March 25, 1999.

Controlling and Managing Investigation and Remediation Activities and Costs, Wisconsin Fabricare Institute Fall Convention, Devil's Head Resort, Merrimac, Wisconsin; September 20, 1998.

Natural Attenuation of Petroleum and Chlorinated Hydrocarbons, Graduate Student Groundwater Seminar, University of Wisconsin-Milwaukee, Milwaukee, Wisconsin; March 31, 1997.

Natural Attenuation and the Wisconsin Groundwater Reform Policy, Wisconsin Fabricare Institute Winter Convention, Radisson Hotel, Green Bay, Wisconsin; February 8, 1997.

Fate, Transport, and In-Situ Remediation of Hazardous Wastes, Registered Environmental Manager Training, University of Wisconsin - Extension, Madison, Wisconsin; April 22, 1996.

Public Comments, Proposed Wisconsin Department of Natural Resources Groundwater Reform Policy, Havenswood State Forest Auditorium, Milwaukee, Wisconsin, March 21, 1996.

The Petroleum Environmental Clean-up Fund Act: Proposed Changes and a Consultants Perspective on the Future of the Program, The Milwaukee Bar Association, Milwaukee, Wisconsin; December 14, 1995.

Fate and Transport of Tetrachloroethylene, Wisconsin Fabricare Institute Fall Convention, Pioneer Inn, Oshkosh, Wisconsin; September 17, 1995.

Overview: Environmental Site Assessments, Registered Environmental Manager Training Seminar, University of Wisconsin - Extension, Madison, Wisconsin; August 28, 1995.

The Petroleum Environmental Clean-Up Fund Act (PECFA) and Recent Updates, Milwaukee Bar Association, Milwaukee, WI; October 24, 1994.

Environmental Consultant's Perspective - Practice Under the New NR 700

Rule Series, State Bar of Wisconsin 1994 Annual Convention, Milwaukee, WI; June 23, 1994.

Wetlands: Features, Functions, and Regulations, Commercial Real Estate Issues Seminar sponsored by Hiller and Frank S.C., Marriott Hotel, Brookfield, WI; March 17, 1994.

USTs and Petroleum-Impacted Soil: Concerns and Solutions, Wisconsin Mortgage Banker's Association meeting, Midway Hotel, Brookfield, WI; January 18, 1994.

Environmental Assessments and Remediation Alternatives, Upper Midwest Fabricare Exposition sponsored by the Wisconsin Fabricare Institute, Waukesha Exposition Center, Waukesha, WI; October 17, 1992.

Multi-Phased Approach to Environmental Assessments, Hazardous Contamination and Environmental Protection Seminar sponsored by the Metropolitan Builders Association of Greater Milwaukee, Milwaukee Athletic Club, Milwaukee, WI; November 13, 1990.

Environmental Liabilities in Real Property Transactions, CECO Exchange Club meeting, Sheraton Inn-Mayfair, Wauwatosa, WI; March 13, 1990.

Featured on PBS "Outdoor Wisconsin" (1987, 1989, & 1990).

Organizer of ARCADIS In-House Training Seminars

Dry Cleaning Initiatives Training Seminar for the Great Lakes Region, April 17-18, 1998.

Great Lakes Region Real Estate Training Seminar, July 14-15, 2000.

Business Development Retreats for the Great Lakes Region, 1997-2002.

Peer Review and Litigation Support Services

Cook & Franke – Milwaukee, WI

Davis & Kuelthau – Milwaukee, WI

Foley & Lardner – Milwaukee, WI

Fox, O'Neill & Shannon – Milwaukee, WI

Leonard, Street & Deinard – Minneapolis, MN

McCarter & English – Newark, NJ

Michael Best & Friedrich – Milwaukee, WI

Reinhart Boerner & Van Deuren – Milwaukee, WI

Whyte Hirschboeck Dudek – Milwaukee, WI

ARCADIS

James E. Bannantine, PG, CPG

Senior Hydrogeologist

Mr. Bannantine is a Senior Hydrogeologist in the Milwaukee office of ARCADIS, with 12 years of experience managing construction projects, site investigations and environmental audits, feasibility studies, and site remediation design on numerous commercial, industrial, and residential projects. Mr. Bannantine is familiar with obtaining and recovering costs for environmental projects from multiple funding sources. His experience includes the project management, field supervision, and analysis for projects relating to environmental and engineering problems with up to $5 million budgets. He provides internal consultation to company personnel regarding project funding and budgets, hydrogeologic and geologic evaluations, and assists in performing groundwater and soil treatment feasibility studies and design of treatment systems. Mr. Bannantine has given seminars and presentations to groups of professionals inside and outside of the technical arena, regarding site characterization and feasibility study techniques and has performed soil and groundwater computer modeling to assist with remediation cost reduction.

Environmental Assessments/Audits

Conducted over 50 Phase I and Phase II Environmental Site Assessments (ESA) on properties throughout the United States for refinancing and property transfers.

Reviewed over 100 Phase I and Phase II ESAs for property transfers and refinancing throughout the United States.

Site Investigation and Remediation

Project Manager for over 300 site investigations characterizing the magnitude and extent of environmental problems.

Project involvement in over 200 petroleum release investigations including monitoring well design, installation and development; soil, groundwater and air sampling; mapping; permitting; and report preparation.

Project Manager for site characterization and remediation of perchloroethane (PCE) releases at several dry cleaning facilities. Remediation systems utilized included air stripping and on-site groundwater treatment facilities.

Project Manager for site characterization and remediation of an acetone solvent spill at a printing facility using ex-situ thermal desorption.

Project Manager for site characterization and remediation of a multiple solvent UST release at a manufacturing facility.

Project Manager for site characterization of a 17-acre solid waste landfill. Contaminants at issue included methane, benzene and heavy metals.

Education

M.S., Geology, Northern Illinois University, 1990

B.S., Geology, University of Wisconsin-Oshkosh, 1987

Professional Registrations

Wisconsin Registered Professional Geologist

Wisconsin DILHR-Certified for UST Closure Assessments

American Institute of Professional Geologists, Certified Professional Geologist

OSHA 40-Hour Hazardous Waste Operations Certificate

Professional Associations

American Institute of Professional Geologists

Wisconsin Ground Water Association

Underground Storage Tank Management, Tank Removal and Site Remediation/ Corrective Action

Project Manager, including on-site supervision, subsurface investigation of soil and groundwater and oversight management for the removal of petroleum underground storage tanks (USTs) and the subsequent remediation of petroleum impacted soils and groundwater, using a variety of strategies.

Assisted clients with the completion of cost recovery applications from a variety of agencies, resulting in the maximization of reimbursement.

Project Management

Project Manager for investigation and remediation of a 60-acre railroad yard facility in north-central Wisconsin and 52-acre railroad yard in northwest Minnesota. Contaminants include gasoline, diesel, hydraulic oil, heavy metals, Stoddard solvents, TCE and vinyl chloride.

Lead Project Manager for negotiations with regulatory agency regarding solid waste landfill closure. Successfully negotiated to reduce cap and operation and maintenance requirements, resulting in project savings of $1 to $3 million.

Project Manager for numerous remediation feasibility studies including bail down tests, aquifer pump tests, vapor extraction and air sparging pilot studies, initial bioremediation and bioventing assessments, and enhanced bioremediation studies.

Project Manager for groundwater remediation projects using water/LNAPL separation techniques, oxygen injection, air stripping, activated carbon absorption, in-situ air sparging, and several "pump and treat" methodologies, natural attenuation and bioremediation.

Lead Project Manager for Phase I ESA, Phase II ESA, and site remediation for an industrial property that a lending institution foreclosed on.

Project Manager for several soil remediation projects. Techniques included on-site bioremediation, excavation and landfilling, asphalt incorporation, on-site thermal desorption, thinspreading, soil vapor extraction and biopiles.

Responsible for budget control and state reimbursement applications for several projects up to $5 million in cost.

Experience working with several state reimbursement programs for USTs, including Wisconsin, Illinois, Indiana, Michigan, Tennessee, Florida, and Missouri.

Site Closure

Obtained regulatory closure for approximately 100 residential, commercial and industrial facilities.

Project Manager for closure activities including well abandonment, treatment system dismantlement and site restoration.

Construction Oversight

Oversaw construction of a 32-foot diameter interceptor tunnel for the Milwaukee Metropolitan Sewerage District Deep Tunnel Project. The project covered over four miles and included blasting, drilling and various activities to provide structural support for the tunnel.

Legal/Litigation Support

Provided assistance to attorney working for the owner of a landfill in southeastern Wisconsin. The Wisconsin Department of Natural Resources attempted to place this landfill into the Superfund program. Working with the client's attorney, we successfully prevented this site from being entered into the Superfund program, thereby protecting our client's assets.

Provided expert witness testimony for a village in southeastern Wisconsin. The village was attempting to gain access to a property to conduct an environmental investigation prior to acquiring the property through condemnation proceedings.

ARCADIS

David M. Buser

Scientist/Hydrogeologist

Mr. Buser is a Hydrogeologist in the Milwaukee office of ARCADIS. His experience covers a wide range of environmental applications, including coordination of field activities and implementation of complex investigation and remediation projects. Mr. Buser's primary responsibilities include the oversight of drilling operations, collection of soil and groundwater samples, subcontractor coordination, data analysis and interpretation, task management and report preparation. His experience also includes computer-aided drafting, remedial system maintenance and contributions to system design.

Fields of Specialization

Task management

Coordination of field activities at numerous sites within the Great Lakes region

Implementation of field investigations and remedial technologies

Innovative drilling and soil sampling technologies

Conventional and low-flow groundwater sampling

Soil vapor monitoring

Geological mapping and stratigraphic interpretation, with an emphasis on glacial stratigraphy

Drafting using AutoCAD

Key Projects

Investigation

Served as task manager and field team leader for investigation of site in Wisconsin with low levels of chlorinated hydrocarbons in groundwater. Responsibilities included collection and analysis of investigative data, report preparation, coordination of various subcontractors, communications with state environmental regulators and budget management. Site activities included installation of off-site groundwater monitoring wells in addition to well and system abandonment. Accomplished successful case closure when chlorinated hydrocarbons were found to be emanating from an off-site source.

Served as field geologist for investigation of metals-impacted soil and groundwater on a large Superfund site in Michigan. Responsibilities included collection and analysis of investigative data, report preparation and coordination of various subcontractors. Site activities were completed in accordance with EPA and state environmental regulators.

Served as field team leader for investigation of a dry cleaner site in Wisconsin with chlorinated hydrocarbons in groundwater. Responsibilities included collection and analysis of investigative data, coordination of various subcontractors

Education

Bachelor of Geology, University of Wisconsin-Madison, 1997

Professional Training

OSHA 1910.120 Certification, 40-Hour Health and Safety Training

Site Assessor Certification

First Aid Certification

CPR Certification

and interactive communication with merchants occupying the site.

Served as field geologist for investigation of groundwater contamination and elevated methane levels in subsurface at a large site in Michigan. Responsibilities included collection and analysis of investigative data, and communications with various subcontractors. Investigation involved the installations of monitoring wells to depths exceeding 300 feet using Rotosonic drilling techniques. Participated in a door-to-door public safety program in which methane detectors were tested and installed. Site activities included cooperating with city officials and working closely with state environmental regulators.

Remediation

Served as field team leader for in-situ remediation and disposal of metals-impacted soil at a brownfield site in Wisconsin. Responsibilities included implementation of cost-effective remedial technologies, soil sampling and coordination of various subcontractors.

Served as field geologist or a federally funded remedial alternatives study at a confined disposal facility in Wisconsin. Dredged sediment within the facility contained soils impacted with polyaromatic hydrocarbons (PAHs) and metals, including polychlorinated biphenols (PCBs). Responsibilities included soil sampling and surveying with the use of global positioning satellite (GPS) system. Site activities were completed under the direction of EPA and U.S. Army Corp of Engineers.

Served as field team leader for remediation at an abandoned rail yard in Wisconsin with lead, PAHs, and both petroleum and chlorinated hydrocarbons in soil. Responsibilities included soil sampling, oversight of soil excavation, coordination of various subcontractors and report preparation.

MARSH

CERTIFICATE OF INSURANCE

CERTIFICATE NUMBER: SEA-000634401-01

PRODUCER

MARSH USA, INC.
1225 17TH STREET, SUITE 2100
DENVER, CO 80202-5534
Attn: STEVE WILSON 303-308-4569

33320 -12345-5/10-00-01

INSURED

ARCADIS
ATTN: CHANDRA DOWNEY
630 PLAZA DRIVE, SUITE 200
HIGHLANDS RANCH, CO 80129-2377

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER OTHER THAN THOSE PROVIDED IN THE POLICY. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES DESCRIBED HEREIN.

COMPANIES AFFORDING COVERAGE

COMPANY A: GREENWICH INSURANCE COMPANY
COMPANY B: XL SPECIALTY INSURANCE COMPANY
COMPANY C: INDIAN HARBOR INSURANCE COMPANY
COMPANY D:

COVERAGES This certificate supersedes and replaces any previously issued certificate for the policy period noted below. 1

THIS IS TO CERTIFY THAT POLICIES OF INSURANCE DESCRIBED HEREIN HAVE BEEN ISSUED TO THE INSURED NAMED HEREIN FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THE CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, CONDITIONS AND EXCLUSIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
	GENERAL LIABILITY					
A	[X] COMMERCIAL GENERAL LIABILITY	GEC001076101	01/01/03	01/01/04	GENERAL AGGREGATE	$ 2,000,000
	[ ] CLAIMS MADE [X] OCCUR				PRODUCTS - COMP/OP AGG	$ 2,000,000
	OWNER'S & CONTRACTOR'S PROT				PERSONAL & ADV INJURY	$ 1,000,000
					EACH OCCURRENCE	$ 1,000,000
					FIRE DAMAGE (Any one fire)	$ 1,000,000
					MED EXP (Any one person)	$ 10,000
	AUTOMOBILE LIABILITY					
A	[X] ANY AUTO	AEC001075801	01/01/03	01/01/04	COMBINED SINGLE LIMIT	$ 1,000,000
A	ALL OWNED AUTOS	AEC001104701 (TX)	01/01/03	01/01/04	BODILY INJURY (Per person)	$
	SCHEDULED AUTOS					
	HIRED AUTOS				BODILY INJURY (Per accident)	$
	NON-OWNED AUTOS					
					PROPERTY DAMAGE	$
	GARAGE LIABILITY				AUTO ONLY - EA ACCIDENT	$
	ANY AUTO				OTHER THAN AUTO ONLY:	
					EACH ACCIDENT	$
					AGGREGATE	$
	EXCESS LIABILITY				EACH OCCURRENCE	$ 5,000,000
A	[X] UMBRELLA FORM	UEC001075901	01/01/03	01/01/04	AGGREGATE	$ 5,000,000
	OTHER THAN UMBRELLA FORM					$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY				[X] WC STATUTORY LIMITS [ ] OTHER	
B	THE PROPRIETOR/ PARTNERS/EXECUTIVE OFFICERS ARE: [X] INCL [ ] EXCL	WEC001076001	01/01/03	01/01/04	EL EACH ACCIDENT	$ 1,000,000
					EL DISEASE-POLICY LIMIT	$ 1,000,000
					EL DISEASE-EACH EMPLOYEE	$ 1,000,000
C	**OTHER** CLAIMS- MADE PROFESSIONAL AND CONTRACTORS POLLUTION LIABILITY	PEC0008763-01	03/16/02	03/16/03		10,000,000

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS

CERTIFICATE HOLDER

SPECIMEN CERTIFICATE

CANCELLATION

SHOULD ANY OF THE POLICIES DESCRIBED HEREIN BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE INSURER AFFORDING COVERAGE WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED HEREIN, BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER AFFORDING COVERAGE, ITS AGENTS OR REPRESENTATIVES, OR THE ISSUER OF THIS CERTIFICATE.

MARSH USA INC.

BY: Dorothy A. Stevens

ARCADIS

Guaranteed Remediation, Crestwood Shopping Center

Glendale, Wisconsin

Client
Financial Institution

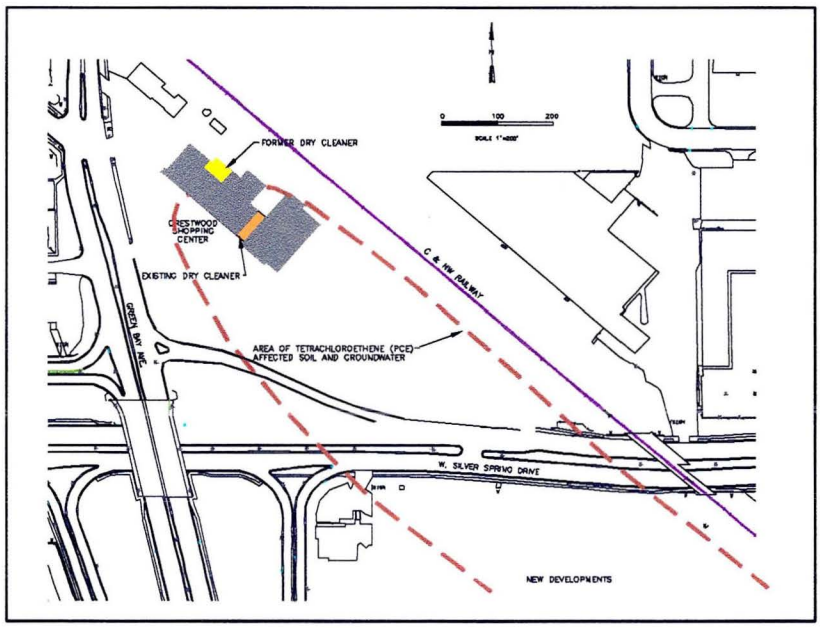
Scope of Services
Soil Remediation Using Enhanced Soil Vapor Extraction
Groundwater Remediation Using Carbon-Enhanced Reductive Dechlorination
Natural Attenuation
Risk Assessment Monitoring
Guaranteed Remediation Program™

Background

Prior to 2000, the Crestwood Shopping Center was an underused and dilapidated 27,000 square foot strip mall. Chlorinated hydrocarbons, including tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE) and vinyl chloride (VC) were present in soils and groundwater on and off the seven acre Crestwood site. A groundwater plume of dissolved chlorinated solvents had migrated off-site approximately 5,000 feet in the direction of a residential subdivision and the Milwaukee River. The chlorinated hydrocarbons were released during dry cleaning operations, which had been ongoing at the shopping center at one of two locations since the early 1960s. Initial redevelopment efforts for the site were unsuccessful due to regulatory and financial uncertainties associated with the contamination at, and emanating from, the site.

Guaranteed Remediation Program™ (GRiP™)

To address these uncertainties, ARCADIS was able to work with the land owners, local municipality, Wisconsin Department of Natural Resources (WDNR), and the site developer to formulate a guaranteed, fixed-price remediation agreement. Under this agreement, ARCADIS is responsible for all remediation work necessary to obtain regulatory closure and for coordinating remediation work with site redevelopment activities. The ARCADIS guaranteed, fixed-price remediation agreement was instrumental in getting all parties to agree to the terms for this successful property redevelopment project. To minimize the liability of the various parties involved with this redevelopment project, remediation stop-loss and pollution legal liability insurance policies were obtained



in conjunction with the ARCADIS guaranteed, fixed-price remediation agreement.

Remedial Program

The remedial program developed by ARCADIS consists of comprehensive in-situ treatment of impacted soil and groundwater to reduce contaminant mass within the source areas. Enhanced soil vapor extraction (SVE) using an injection and extraction system with horizontal and vertical wells is being used to treat the soils. The SVE system installation began in December 2000 and the system startup began in August 2001. The groundwater remediation program, which was initiated in June 2000, involves the periodic injection of an organic carbon solution to promote the biological degradation of the groundwater contaminants (i.e., an in-situ bioremediation process).

Once the source area treatment has been accomplished, groundwater monitoring will be completed to confirm that natural attenuation will reduce contaminant mass over time within the downgradient plume.

Engineered barriers will be used to prevent infiltration into the vadose zone and prevent exposure to any residual soil contamination remaining across the site. A risk assessment has also been conducted to assess whether current and future constituent concentrations, on-site and downgradient of the site, pose any unacceptable risks to human health or

the environment. Supplemental remedial actions may be necessary if constituent concentrations are found to exceed the threshold levels established in the risk assessment.

Proposed Redevelopment

Concurrent with the installation of the soil vapor extraction system and groundwater treatment activities, the former shopping center was demolished in June/July 2000. Construction of the proposed redevelopment at the site will likely be initiated in Fall 2001. The proposed development was used to create a Tax Incremental Financing (TIF) district to finance a portion of the property redevelopment.

ARCADIS

Guaranteed Remediation Program, Washington Square Mall Proiect

Germantown, Wisconsin

Client
General Capital

Scope of Services
Excavation/Off-Site Disposal of RCRA F-Listed Soils
Enhanced Biodegration of Impacted Groundwater
Guaranteed Property Remediation and Insurance Program

Background

Prior to 1998, the Washington Square Mall in Germantown, Wisconsin was a dilapidated retail center that was over 80 percent vacant. Initial attempts to redevelop the property were unsuccessful due to uncertainties associated with contamination at the site. This contamination resulted from the release of tetrachloroethylene (PCE), a common dry cleaning solvent, from a dry cleaning facility that operated within the former shopping mall.

On behalf of General Capital the site developer, ARCADIS was able to formulate a cost-effective remedial strategy with a ***fixed-price remediation guarantee*** for site closure. In addition, ARCADIS was able to obtain several supplemental insurance policies for minimizing the developer's long-term liability associated with this project. The ***fixed-price remediation guarantee*** and associated insurance policies effectively minimized the risks associated with developing the contaminated property and were instrumental in obtaining the financing necessary for this successful property redevelopment.

Remedial Program

The soil remediation program, which was conducted over the period of August through September 1998, consisted of excavation and off-site disposal of unsaturated soils (RCRA F-listed soils) that contained PCE at levels above the soil cleanup objective approved by the Wisconsin Department of Natural Resources (WDNR). The groundwater remediation program, involved the periodic injection of an organic carbon solution to promote the biological degradation of the groundwater contaminants (i.e., an in-situ bioremediation process).

Photo Above: Vacant shopping mall prior to initiating site remediation and redevelopment activities

Photo Below:
Initial carbon injection within partially backfilled excavation

ARCADIS

Guaranteed Remediation Program, Washington Square Mall Proiect

Germantown, Wisconsin

Financial/Liability Protection Highlights

- ***Guaranteed Fixed-Price Remediation Contract*** (for a guaranteed fixed-price, ARCADIS is responsible for all remediation work necessary to obtain regulatory closure)
- Tax Incremental Financing (TIF) district established to pay for remediation and site development costs
- Cleanup activities conducted under WDNR's purchaser liability exemption program
- Remediation stop-loss insurance policy
- Pollution legal liability insurance policy

Project Accomplishments

- Design and implementation of the site remedy within a 10 week time frame
- Excavation and off-site disposal of approximately 3,125 tons of contaminated soil
- Completion of an initial carbon injection event using 182 temporary injection wells
- Installation of permanent carbon injection system
- Average PCE concentration within the groundwater plume decreased from 1,600 ppb to 23 ppb within a 9 month time frame
- Site closure letter received from the WDNR in January 2001, less than 30 months following initiation of site remediation

Photos:
Completed site development

ARCADIS GERAGHTY & MILLER

Potassium Permanganate Oxidation Treatability Soil – Soil and Groudwater Treatment Effectiveness and the Effect of Soil Organic Matter

RTP, NC

Client
Confidential Industrial Client, CT

Scope of Services
Soil Treatability

Contact
Chris Lutes
919-544-4535

DESCRIPTION

In 2000, column testing conducted at ARCADIS G&M's (ARCADIS) Treatability Laboratory was used to provide engineering guidance to the implementation of *In Situ* Chemical Oxidation (ISCO) at a confidential CT manufacturing site. Two phases of column testing were conducted.

In Phase I unsaturated soil samples were collected in four stainless steel sleeves from identical intervals in closely adjacent locations at the site. The cores were quickly homogenized to minimize volatilization. The homogenized soil was then repacked into glass columns with a target in place density approximating the density of the cores as received. A sample of the homogenized pretreated soil was taken for volatile organic compounds (VOC), metals and hexavalent chromium analyses. Six gallons of site city water was collected, which was used to saturate the soil in the columns while also ensuring proper column operation and was also used to make up the permanganate solution.

Tests were conducted using a 3% permanganate solution prepared from industrial grade $KMnO_4$ and site city water. The column length was 1 foot with a 2.17 inch O.D. and column volume of 570 mL. A peristaltic pump was used to pump influent into the column from the influent reservoir. The liquid pressure was measured through an attached pressure gauge before the influent entered the column. The effluents were collected by displacement in HPLC type bottles. The displaced and any evolved gases were collected on one $KMnO_4$ treated column in an initially flat Tedlar bag.

Treatment consisted of pumping approximately seven pore volumes of permanganate solution (or site water in the case of the control) through the columns at room temperature. This was followed by one pore volume of deionized (DI) water as a flush in an attempt to quench the reaction.

After pumping a total of four pore volumes, and again after seven pore volumes, effluent samples were collected from the collection bottle for analyses of metals, VOC, hexavalent chromium, chloride and permanganate. Permanganate analyses were performed frequently throughout the study at the treatability lab using chemetrics kits.

Following a DI water purge, an influent and effluent end soil sample was collected from each column for analysis of metals, VOCs, and total organic carbon (TOC).

In Phase II another column study was conducted using the same soil homogenate and apparatus. The primary difference between the initial study and this Phase II study was the use of a recirculating permanganate feed system. In addition, the Phase II test was continued until measurable permanganate consumption ceased.

Figure 1 shows the experimental apparatus for Phase I. Figures 2 and 3 show the experimental apparatus for Phase II.

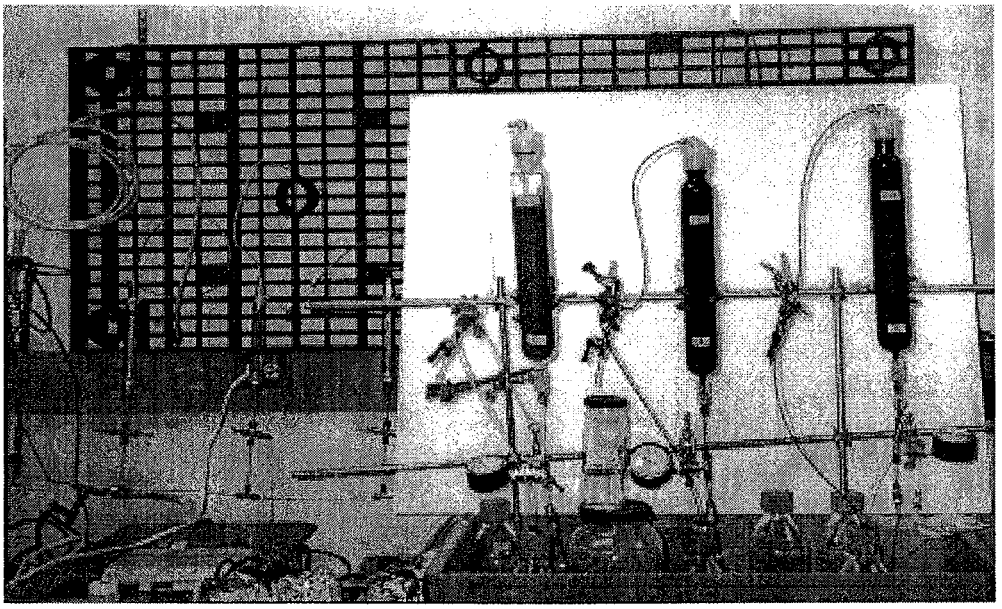


Figure 1. Wide View of Phase I Set-Up.
Bottles with red tops were effluent collection vessels. Pumps were located in the red bin to the left. The control column is on the left; treated columns are in the center and on the right.

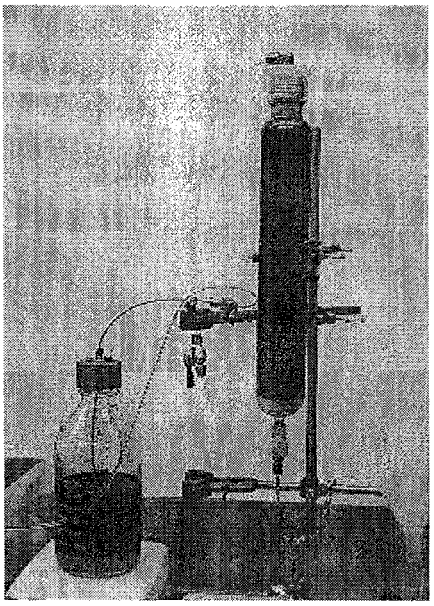


Figure 2. Phase II Test Apparatus before Permanganate Flow

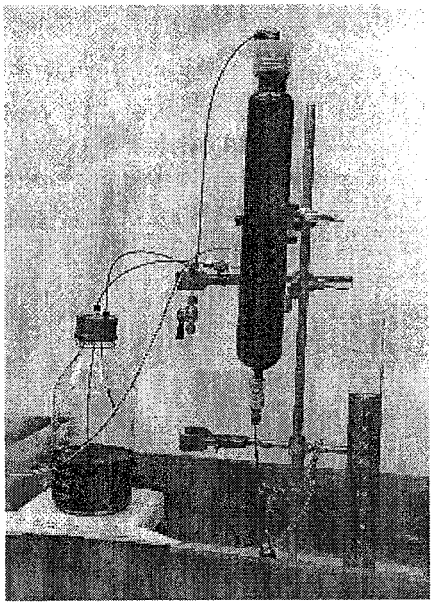


Figure 3. Phase II Test Apparatus after Permanganate Flow

This study demonstrated:

- A significant percentage of the soil PCE was not oxidized (50%) even after the study was allowed to proceed until permanganate consumption ceased and even though PCE was very effectively treated in the water phase
- A significant proportion of the soil TOC was consumed (50%)
- The decrease in aqueous phase PCE concentration even after a brief rebound period was much greater than the soil PCE concentration decrease – suggesting that the technology would be effective in treating groundwater *because it preferentially attacked the portion of the contaminant that was available to the groundwater and thus available to receptors. Stated another way* even the partial treatment could meet groundwater remedial objectives in the field application. Those results combined to make it clear that soil organic matter was a significant factor in the behavior and effectiveness of in situ oxidation methods.
- Acetone and 2-butanone were formed as oxidation byproducts
- Hexavalent chromium was released into the water phase
- Problems with heat release and gas generation that are commonly observed in chemical oxidation processes may be less significant at this site
- Oxidation efficiency at this site will be primarily limited by the thoroughness of contact between the PCE contaminated soil and permanganate that can be achieved both at a macro and micro scale.

ARCADIS

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