



Infrastructure, buildings, environment, communications

Jill Fitzgerald
c/o Donald P. Gallo, Esq.
Reinhart Boerner Van Deuren S.C.
W233 N2080 Ridgeview Parkway
Waukesha, WI 53188

Subject:

Scope of Work and Cost Estimate for Investigation Activities, Jill's Cleaners, S74
W16834 Janesville Road, Muskego, Wisconsin.

Dear Ms. Fitzgerald:

Thank you for your consideration of ARCADIS for the completion of site investigation services at the Jill's Cleaners property in Muskego, Wisconsin. In accordance with the April 22, 2005 Request for Proposal (RFP) from Don Gallo of Reinhart, Boerner, Van Deuren, we have prepared a scope of work and cost estimate for completion of investigation services at this Site. A description of our qualifications to complete the work is also included. This scope of work was prepared in accordance with NR 169 (Dry Cleaner Environmental Response Program [DERP]), Wis. Admin. Code.

Project Background

ARCADIS reviewed the information in the RFP, and conducted a site visit on May 12, 2005 to gain a better understanding of the property layout. The property is developed with a commercial building occupied by several tenants. One of the occupants is the Jill's Cleaners store. The property and business are owned by Jill Fitzgerald. Dry cleaning is currently conducted at the store, with tetrachloroethene (PCE) used as the cleaning solvent.

The building is a one-story commercial structure constructed at grade (i.e., no basement). The building is located at the northeast corner of Parkland Drive and Janesville Road. The dry cleaning store is located in the northern portion of the property, and the dry cleaning machine is located near the north exterior wall of the building. A double door is located near the dry cleaning machine, providing access to this area of the store. Asphalt parking areas are located along the south and west sides of the building, and an asphalt walkway extends along the north side of the building. This walkway is approximately 4 feet higher than the surrounding grade to the north and east. The north adjacent property is occupied by a tennis and basketball court owned by the city of Muskego. The east adjacent property is occupied by Olson Outdoor Power Equipment, which sells and repairs lawnmowers,

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ENVIRONMENT

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17 May 2005

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snowblowers and other small engine equipment. A narrow (approximately 20 feet) strip of grass is located between the Fitzgerald's building and the Olson property. A pond is located to the northeast, approximately 300 feet from the dry cleaner.

As part of a property transaction, Olson Outdoor Power Equipment retained an environmental consultant to conduct a Phase I Environmental Site Assessment (ESA) at a property located at S73 W16790 Janesville Road. This property is adjacent to the property occupied by Jill's Cleaners. The Phase I ESA identified the dry cleaners as a potential recognized environmental condition, and a Phase II ESA was completed in March 2005.

Three borings (B-1, B-2, B-3) were advanced along the east boundary of the Jill's Cleaners property during the Phase II ESA. The boring locations are depicted on Figure 1. Two soil samples, collected from B-1 and B-2, were submitted to a laboratory for analytical testing. Both soil samples contained PCE. The soil sample from B-1 contained PCE at 180 micrograms per kilogram ($\mu\text{g}/\text{kg}$), and the soil sample from B-2 contained PCE at 1,050 $\mu\text{g}/\text{kg}$. The soil sample from B-2 also contained trichloroethene at a concentration of 111 $\mu\text{g}/\text{kg}$, and cis-1,2-dichloroethene at a concentration of 52 $\mu\text{g}/\text{kg}$. These compounds are produced during the anaerobic biodegradation of PCE.

Limited information about the site hydrogeology was presented in the Phase II ESA report. Soils consist of silty clay to clay. No information was provided regarding depth to groundwater or the direction of groundwater flow. However, based on observations made during the May 12, 2005 ARCADIS site visit, groundwater likely flows to the northeast towards the pond. The surface of the pond is approximately 4 to 6 feet lower than the floor of the dry cleaner. It is expected that the groundwater table is located near this elevation.

The results from the Phase II ESA suggest that a release has occurred from the dry cleaners. It is understood that the WDNR was notified of the potential release in a letter dated April 14, 2005. It is also understood that the property has been entered into the DERP. Costs associated with the investigation and remediation of a release from the dry cleaners should be eligible for reimbursement under the DERP.

Scope of Work

Based on the RFP, the intent of the next phase of work at the Site is to define the extent of soil and groundwater impacts, and to obtain information for identifying a feasible and cost-effective remedy. ARCADIS has developed a scope of work for completing the site investigation in accordance with Chapters NR 700 through 726

and Chapter NR 169, Wis. Admin. Code. The scope of work consists of the following elements:

- Prepare a work plan for the investigation in accordance with NR 716, Wis. Admin. Code.
- Complete pre-investigation activities, including the solicitation of competitive bids for subcontracted services, preparation of a Health and Safety Plan for the field activities, and assisting with obtaining access agreements with the city of Muskego and Olson Outdoor Power Equipment.
- Complete three soil borings within the building.
- Complete six Geoprobe borings around the perimeter of the building and east of Borings B-1 and B-2.
- Complete four groundwater monitoring wells and one piezometer on the Site.
- Survey the location and top-of-casing elevations of the monitoring wells and piezometer.
- Collect one round of groundwater samples from the monitoring wells and piezometer using low-flow sampling techniques for laboratory analysis of volatile organic compounds (VOCs), total organic carbon (TOC), and dissolved gases (ethane, ethene, and methane).
- Collect one sample from the on-site water supply well for analysis of VOCs, and evaluate the construction of the well.
- Dispose of investigation-derived waste from the facility.
- Perform an assessment of the potential for vapor migration and intrusion associated with the identified release.
- Prepare a site investigation report in accordance with NR 716 and DERP requirements, and a reimbursement claim.

It is understood that Reinhart, Boerner, Van Deuren is soliciting proposals on your behalf from at least three consultants in accordance with NR 169. Following review of the proposals, it is assumed that you will submit the selected proposal to the WDNR for approval. If selected, it is understood that ARCADIS will not commence work until written approval to proceed has been received from WDNR.

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The following sections present a brief summary of the proposed investigation activities.

Work Plan

In accordance with NR 716, a site investigation work plan will be prepared and submitted to the WDNR. The work plan will present an overview of current site conditions and a description of the means and methods to be used in executing the investigation. The work plan will be prepared in draft format for review by you and Mr. Gallo. Comments regarding the draft will be incorporated into the final work plan for submittal to the WDNR.

Pre-Investigation Activities

In accordance with NR 169, three written contractor bids will be obtained by ARCADIS for all subcontracted services (drillers, laboratories, surveyors). Service providers will be selected on a competitive (i.e., low-cost) basis.

ARCADIS is committed to "Zero Accident" performance in all phases of work. Through an integrated safety management approach to work, hazards are mitigated and "Zero Accident" performance is strived for at every level of company operations. ARCADIS will develop a Health and Safety Plan tailored specifically for the project.

Because of the proximity of Boring B-1 to the north and east property boundaries and the apparent direction of groundwater flow, it is recommended that some of the investigation activities be implemented on the city of Muskego property to the north and the Olson Outdoor Power Equipment to the east. ARCADIS will assist Reinhart, Boerner, Van Deuren in obtaining access agreements to conduct investigation activities on this property. Work will include the preparation of figures illustrating boring locations, contacting the city of Muskego regarding access requirements, and supporting Reinhart, Boerner, Van Deuren in preparing the agreements.

Installation and Sampling of Interior Borings

The source of the identified soil impacts is likely associated with historical releases from the dry cleaning equipment inside the building. The soil beneath the building could represent a potential source and should be evaluated to address the potential for vapor migration. A driller will be contracted to advance three borings through the floor slab to evaluate the degree and extent of soil impacts beneath the building. The boring locations are illustrated on Figure 1. Prior to advancing the borings, a private utility locator service will be utilized to scan the boring locations for potential

subsurface utilities. Diggers Hotline will also be contacted to mark utilities along the exterior of the building.

To facilitate the advancement of the soil borings, a core of the concrete floor will be removed from each location to a depth of the granular base. Portable drilling equipment will be used to advance a boring 4 to 8 feet below the top of the floor slab. Soil samples will be collected at 2-foot intervals and field screened with a Flame Ionization Detector. One soil sample from each soil boring will be submitted for laboratory VOC analysis. After the sampling is completed, the boreholes will be abandoned in accordance with Chapter NR 141, and the floor repaired with concrete.

Installation and Sampling of Geoprobe Borings

During this phase of the investigation, ARCADIS will advance Geoprobe borings to further evaluate the lateral extent of soil impacts outside the building, and to evaluate groundwater conditions. The Geoprobe borings will be advanced concurrently with the interior borings to reduce mobilization costs.

A total of six soil borings are proposed for this phase of investigation. The boring locations are depicted on Figure 1. Three of the borings will be advanced on site, to the south, west, and north of the building. Two Geoprobe borings will be advanced on the Olson Outdoor Power Equipment property, and one boring will be advanced on the city of Muskego property.

The Geoprobe borings will be advanced to an estimated depth of 20 feet below ground surface (ft bgs). The borings may be terminated earlier if groundwater is encountered at a more shallow elevation. The soil borings will be advanced using a truck-mounted Geoprobe drilling unit to characterize the magnitude and extent of PCE and other VOCs. Two soil samples from each soil boring (12 total) will be submitted for laboratory analysis of VOCs.

Temporary monitoring wells will be installed in each of the Geoprobe borings, and groundwater samples will be collected from the temporary wells for VOC analysis. After the samples have been collected, the temporary wells will be removed and the boreholes abandoned in accordance with Chapter NR 141. It is noted the site is underlain with clay soils, which frequently exhibit low water production. Based on the soil types present, water may not enter the Geoprobe wells at a rate or volume sufficient for sampling.

Samples collected for laboratory analysis will be placed into clean, laboratory-supplied containers and preserved in accordance with the selected analytical methodology. The samples will be placed in coolers with ice and shipped to a

Wisconsin-certified laboratory in accordance with standard chain-of-custody procedures.

Installation of Monitoring Wells and Piezometer

The purpose of this phase of the investigation is to collect groundwater samples for an evaluation of groundwater quality. A total of four monitoring wells and one piezometer will be contracted. The proposed well locations are depicted on Figure 1. Three of the wells and the piezometer will be constructed on the Site. The fourth monitoring well will be constructed on the city of Muskego property. The well locations may be adjusted, based on the results of the Geoprobe investigation.

The monitoring wells and piezometer will be installed in boreholes using hollow-stem auger drilling techniques. Prior to well installation, soil samples will be collected from the borings at 2-1/2 foot vertical intervals to provide a continuous profile of the subsurface materials at each boring location. Logs will be prepared for each boring in accordance with WDNR requirements and will present both the classification and properties of the materials encountered. Field screening will be performed on each collected soil sample to assess the potential for soil vapor and to provide a preliminary assessment of soil impact at the drilling location. One soil sample from the monitoring well advanced near the northeast corner of the building will be submitted for laboratory analysis of VOCs. Since the remaining wells will be installed near Geoprobe boring locations, soil samples from these wells will not be collected for laboratory analysis.

The groundwater monitoring wells will be drilled to an estimated depth of 15 ft bgs for this investigation. The piezometer will likely be installed to a depth of approximately 40 ft bgs. Actual depths will be based on the location of the water table. Following completion of each boring, the wells will be constructed inside of the hollow-stem augers. Each monitoring 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. The piezometer will be constructed using a 5-foot length of 2-inch diameter Schedule 40 PVC well screen. Upon positioning the screen and riser within the boring, the annular space between the screen and boring 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 monitoring wells and piezometer will be developed in general accordance with the requirements of NR 141. Well development will consist of surging and purging the well, and removing approximately 10 well volumes of groundwater from each monitoring well. If the wells bail dry, then development will consist of bailing the wells dry four times.

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The soil sample collected for laboratory analysis will be placed into clean, laboratory-supplied containers and preserved in accordance with the selected analytical methodology. The sample will be placed in coolers with ice and shipped to a Wisconsin-certified laboratory in accordance with standard chain-of-custody procedures.

Surveying

ARCADIS will retain a surveyor to survey the well locations and elevations. The location, ground surface and casing elevation at each monitoring well and piezometer will be surveyed to determine relative elevations. The elevation data will be used to evaluate groundwater flow direction and gradients.

Collection of Groundwater Samples

After well development, groundwater samples will be collected from each of the monitoring wells and piezometer. 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. This technique also has the advantage of producing less water that requires disposal.

Prior to sampling, the water level in each well will be measured using an electronic water level meter. This data will be used to evaluate the direction of groundwater flow and gradients. A downhole probe will be lowered down each well to measure aquifer parameters such as temperature, pH, dissolved oxygen, and oxidation-reduction potential. Water will be pumped from the aquifer at a low flow rate until the probe readings stabilize. Samples will be placed in clean, laboratory-supplied sample containers, and placed in a cooler filled with ice. One round of groundwater samples will be collected from the monitoring well network. Samples will be analyzed for VOCs, TOC and dissolved gases (ethane, ethene, and methane).

Often, hydraulic conductivity testing is conducted to evaluate the horizontal hydraulic conductivity of the soil. This data is used to evaluate the flow rate of groundwater and dissolved phase constituents. Given the fine-grained soil at the site, it is assumed that low-conductivity soils are present, and conductivity testing is unnecessary. Further, completion of in-situ conductivity testing in such soils can produce inconsistent data due to the drastic difference between the particle size of the soil and the well filter pack.

Water Supply Well Evaluation

During the site visit, a water supply well was observed along the southwestern portion of the building. As part of the investigation, ARCADIS will contact the Wisconsin Geologic and Natural History Survey and Waukesha County to obtain information regarding the construction details of the well. ARCADIS will also collect a water sample from the well for analysis of VOCs.

Disposal of Investigative-Derived Wastes

During the installation of wells, auger cuttings are generated. These cuttings will be placed into 55-gallon drums and stored on the Site. Groundwater produced during development and sampling will also be placed into drums pending disposal. For estimating purposes, it is assumed that nine drums of soil and three drums of water will be generated during this phase of investigation.

ARCADIS will contact a licensed disposal facility and arrange for the transportation and disposal of the drummed materials. For estimating purposes, it is assumed that the investigative-derived waste can be disposed of as a solid waste. One soil sample will be collected from the soil cuttings for analysis of waste characteristics. Because the soil and water may contain chlorinated solvents, these investigative-derived wastes may need to be managed as a hazardous waste. The final disposal costs will be dependent upon the laboratory data and whether the material can be managed as a special waste or a hazardous waste.

Soil Vapor Investigation (Vapor Migration and Intrusion Assessment)

The WDNR has been focusing increased attention on the potential for VOCs to migrate from soil and groundwater into buildings and through utility corridors. To address this issue, ARCADIS will complete a migration pathway assessment and receptor survey. This assessment will include an evaluation of subsurface conditions and subsurface utilities located on and adjacent to the Site. This assessment will be completed in general accordance with the Guidance for Documenting the Investigation of Utility Corridors (PULB-RR-6499, March 2000) developed by the WDNR which outlines that evaluations be completed with respect to free product migration, vapor migration, and contaminated groundwater migration.

ARCADIS will also evaluate the potential for vapor intrusion inside the building. The evaluation will be conducted in accordance with the February 12, 2003 "*Chemical Vapors Intrusion and Residual Indoor Air*" guidance published by the Wisconsin Department of Health and Family Services. ARCADIS will install one subslab vapor probe in the flooring near the dry cleaning machine to collect a vapor

sample. The probe will be installed by drilling a ½-inch diameter hole through the floor slab and into the base coarse using a hammer drill. A stainless steel sample port will be placed into the hole and sealed with grout. To collect a vapor sample, the probe will be purged with a sample pump. The probe will then be connected to a summa canister. The canister valve will be opened, and the vacuum in the canister will withdraw a vapor sample. The canister will be sealed and submitted to a laboratory for analysis of VOCs using EPA Method TO-15.

Reporting

Based on the results of the investigation, ARCADIS will prepare a Site Investigation Report in accordance with NR 716. The report will outline the scope of work completed during the investigation, the procedures followed in the field, and a summary of the results. The report will present a summary of the geologic conditions, contaminant distribution, and an assessment of whether contaminants are naturally degrading.

The report will be prepared in draft format for review by you and Reinhart, Boerner, Van Deuren. Comments regarding the draft report will be incorporated into the final report, which will be submitted to the WDNR.

Costs associated with the investigation should be eligible for reimbursement under the DERP. Upon receipt of agreement from the WDNR that the investigation is complete, ARCADIS will prepare a reimbursement claim.

ARCADIS will provide periodic verbal status reports to you during the course of this investigation. These reports will consist of periodic calls to coordinate field activities and discuss the investigative data. The purpose of these discussions will be to provide you with information on progress, to amend the investigation as necessary, and to begin the development of a remedial strategy consistent with the long-term plans of the Site.

Project Schedule

ARCADIS will begin work immediately following receipt of written authorization to proceed from the WDNR and execution of a Services Agreement. Contractor bids will be obtained within 1 week of receipt of authorization to proceed. Scheduling of field activities will be dependent on the acceptance of the access agreements by the neighboring properties.

Estimated Costs

ARCADIS will conduct the proposed scope of work for an estimated cost of \$30,312. These costs include all labor and subcontractor services. Table 1 includes a breakdown of the project costs for the proposed work and the unit rates and estimates of hours to be worked by ARCADIS. In addition, Table 1 also presents unit rates and the estimated number of units (i.e., number of samples for analysis) for the subcontracted services. The proposed scope of work will be invoiced on a time and materials basis in accordance with the unit rates provided in Table 1. A specimen Services Agreement is presented in Appendix A.

Recent changes in the DERP program now require consultants to provide a breakdown of proposal costs on WDNR forms. A completed WDNR Form 4400-233 is included in Appendix B.

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 investigation activities at existing and former dry cleaning facilities.
- Technical expertise and experience with chlorinated and petroleum (i.e., stoddard solvent) 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 NR 169.21(2)(c). The project team members will work under the direction of Mr. Ed Buc, senior engineer, and Mr. Brian Maillet, staff hydrogeologist. Both Mr. Buc and Mr. Maillet are thoroughly familiar with technical and administrative issues associated with investigation and remediation aspects of dry cleaning projects, as well as the DERP. Mr. Michael Maierle, principal engineer, will serve as the project advisor. Resumes for all key personnel involved in the project are presented in Appendix C.

Certification

This proposal has been prepared in accordance with the requirements of NR 169.21. In accordance with 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 Chapters NR 700 to NR 728 of the WAC.
- 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 NR 169.21(6), ARCADIS' Certificate of Insurance is presented in Appendix D.

Qualifications

ARCADIS is a full-service environmental consulting company with over 40 years of experience in assessing soil and groundwater quality and developing cost effective solutions for achieving site closures. Our electronic mail system provides ready access to corporate resources and technical experts in ARCADIS offices across the world. 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 30 geologists, engineers, scientists and project support personnel.

The staff of the Milwaukee office has extensive experience in assessing and remediating chlorinated compounds and implementing cost effective remedial solutions. As members of the Wisconsin Fabricare Institute, we are active participants in the ongoing evolution of the DERP. Of the eight project closures issued under the DERP to date, ARCADIS managed four of the projects. Case study information for investigation and remediation activities on dry cleaning projects completed or currently in-progress by ARCADIS is included in Appendix E.

The experience and administrative systems described above will enable the ARCADIS project team to meet and exceed the following criteria established in Section NR 169.21(2)(c) 1 through 4:

- 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,

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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 are included in Appendix F.

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



Michael S. Maiерle, PE
Area Manager/Principal Engineer

This proposal and its contents shall not be duplicated, used, or disclosed—in whole or in part—for any purpose other than to evaluate the proposal. This proposal is not intended to be binding or form the terms of a contract. The scope and price of this proposal will be superseded by the contract. If this proposal is accepted and a contract is awarded to ARCADIS as a result of—or in connection with—the submission of this proposal, ARCADIS and/or the client shall have the right to make appropriate revisions of its terms, including scope and price, for purposes of the contract. Further, client shall have the right to duplicate, use, or disclose the data contained in this proposal only to the extent provided in the resulting contract.

Table 1. Cost Estimate for Investigation Services, Jill's Cleaners Property, 574 W16834 Janesville Road, Muskego, Wisconsin.

	Number	Unit	Rate	Unit	Totals
Preparation of Work Plan					
Staff Scientist II	8	Hrs @	\$84 /Hr		\$672
Project Staff I	2	Hrs @	\$98 /Hr		\$196
Project Assistant	1	Hrs @	\$68 /Hr		\$68
Senior Designer	1	Hrs @	\$68 /Hr		\$68
Subtotal, Preparation of Work Plan					\$1,004
Pre-Investigation Activities					
Staff Scientist II	10	Hrs @	\$84 /Hr		\$840
Project Staff I	2	Hrs @	\$98 /Hr		\$196
Senior Project Staff I	1	Hrs @	\$132 /Hr		\$132
Project Assistant	1	Hrs @	\$68 /Hr		\$68
Senior Designer	2	Hrs @	\$68 /Hr		\$136
Subtotal, Pre-Investigation Activities					\$1,372
Installation of Interior Borings					
Contractor Mobilization		Lump Sum	\$100		\$100
Utility Locator	3	Hrs @	\$100 /Hr		\$300
Coring	3	ea @	\$75 /ea		\$225
Interior Boring	24	LF @	\$22 /Foot		\$528
Concrete Patch	3	ea @	\$10 /ea		\$30
Decontamination		Lump Sum	\$75		\$75
VOCs (Soil)	3	Samples @	\$65 /Sample		\$195
Staff Scientist/Engineer II	8	Hrs @	\$84 /Hr		\$672
Project Staff I	1	Hrs @	\$98 /Hr		\$98
Field Expenses					\$500
Subtotal, Installation of Interior Borings					\$2,723
Installation of Geoprobe Borings					
Contractor Mobilization		Lump Sum	\$0		\$0
Borehole Drilling	120	LF @	\$8 /Foot		\$960
Well Installation	120	LF @	\$4.50 /Foot		\$540
Groundwater Sample Collection	6	ea @	\$35 /ea		\$210
Decontamination		Lump Sum	\$75		\$75
Abandonment	6	Boring @	\$25 /ea		\$150
VOCs (Soil)	12	Samples @	\$65 /Sample		\$780
VOCs (GW)	6	Samples @	\$65 /Sample		\$390
Staff Scientist/Engineer II	12	Hrs @	\$84 /Hr		\$1,008
Project Staff I	2	Hrs @	\$98 /Hr		\$196
Senior Project Staff I	1	Hrs @	\$132 /Hr		\$132
Field Expenses					\$500
Subtotal, Installation of Geoprobe Borings					\$4,941
Installation/Development of Monitoring Wells and Borings					
Contractor Mobilization		Lump Sum	\$250		\$250
Borehole Drilling	100	LF @	\$9 /Foot		\$900
Well Installation	100	LF @	\$12 /Foot		\$1,200
Well Covers	5	Covers @	\$135 /Cover		\$675
DOT Drums	12	Drums @	\$35 /Drum		\$420

Table 1. Cost Estimate for Investigation Services, Jill's Cleaners Property, S74 W16834 Janesville Road, Muskego, Wisconsin.

	Number	Unit	Rate	Unit	Totals
Installation/Development of Monitoring Wells and Borings (continued)					
Decontamination		Lump Sum	\$375		\$375
VOCs (Soil)	1	Samples	@	\$65 /Sample	\$65
Staff Scientist/Engineer II	20	Hrs	@	\$84 /Hr	\$1,680
Project Staff I	2	Hrs	@	\$98 /Hr	\$196
Field Expenses					\$500
Subtotal, Installation/Development of Monitoring Wells and Borings					\$6,261
Groundwater Sampling (monitoring wells, piezometer, and water supply well)					
VOCs	6	Samples	@	\$65 /Sample	\$390
TOC	5	Samples	@	\$25 /Sample	\$125
Dissolved Gases	5	Samples	@	\$75 /Sample	\$375
QA/QC Sample	1	Samples	@	\$65 /Sample	\$65
Staff Scientist/Engineer II	16	Hrs	@	\$84 /Hr	\$1,344
Project Staff I	2	Hrs	@	\$98 /Hr	\$196
Field Expenses					\$1,000
Subtotal, Groundwater Sampling					\$3,495
Survey					
Surveyor		Lump Sum	\$1,200		\$1,200
Subtotal, Survey					\$1,200
Waste Characterization and Disposal					
Staff Scientist/Engineer II	8	Hrs	@	\$84 /Hr	\$672
Project Staff I	2	Hrs	@	\$98 /Hr	\$196
Waste Profile Analysis (TCLP -VOC)	1	Sample	@	\$130 /Sample	\$130
Disposal Special Waste (Soil)	9	Drums	@	\$100 /Drum	\$900
Disposal Special Waste (Water)	3	Drums	@	\$120 /Drum	\$360
Subtotal, Waste Characterization and Disposal					\$2,258
Vapor Migration and Intrusion Assessment					
Staff Scientist/Engineer II	4	Hrs	@	\$84 /Hr	\$336
Project Staff I	1	Hrs	@	\$98 /Hr	\$98
TO-15 (air sample)	1	Sample	@	\$290 /Hr	\$290
Summa Canister Rental	1	Sample	@	\$50 /Hr	\$50
Field Expenses					\$125
Subtotal, Vapor Migration and Intrusion Assessment					\$899
Site Investigation Report and Claim Preparation					
Staff Scientist/Engineer II	4	Hrs	@	\$84 /Hr	\$336
Project Staff I	40	Hrs	@	\$98 /Hr	\$3,920
Senior Project Staff I	5	Hrs	@	\$132 /Hr	\$660
Principal Review	1	Hrs	@	\$155 /Hr	\$155

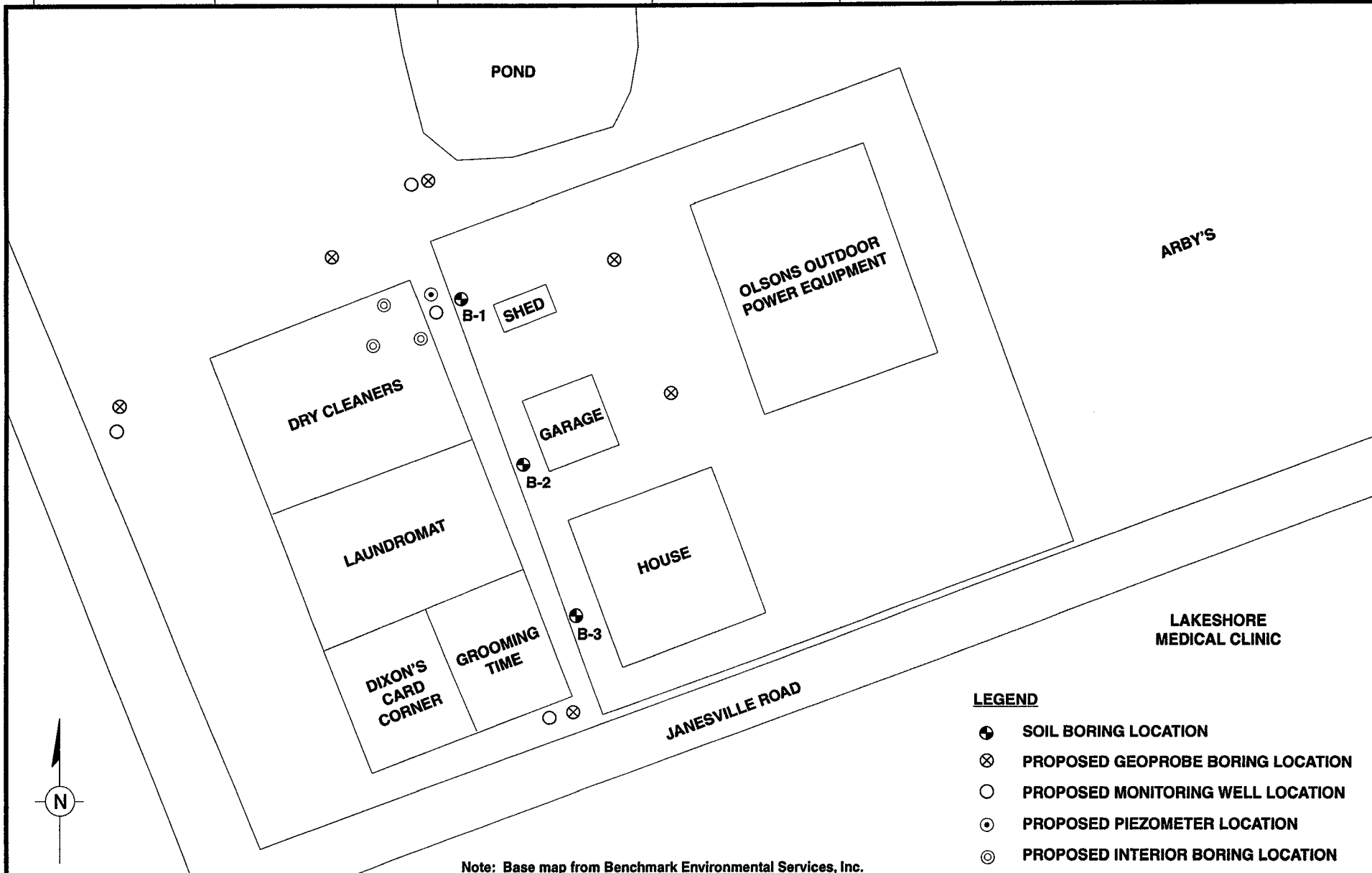
Table 1. Cost Estimate for Investigation Services, Jill's Cleaners Property, S74 W16834 Janesville Road, Muskego, Wisconsin.

	Number	Unit	Rate	Unit	Totals
Site Investigation Report and Claim Preparation (continued)					
Project Assistant	10	Hrs	@	\$68 /Hr	\$680
Senior Designer	6	Hrs	@	\$68 /Hr	\$408
Subtotal, Site Investigation Report and Claim Preparation					\$6,159
Total Estimated Costs					\$30,312

Costs for drilling are based on the assumption that no bedrock is encountered. If bedrock is encountered, then additional charges would apply.

Costs for investigative waste are based on the assumption that the material can be disposed as a special waste. If the waste is considered to be hazardous, or if the waste disposal facility requires Protocol A analysis in order to accept the waste, then additional charges would apply.

If the depth to groundwater is deeper than anticipated, then the costs to advance soil borings and groundwater monitoring wells would increase.



PROPOSED BORING LOCATIONS

JILL'S CLEANERS PROPERTY
MUSKEGO, WISCONSIN

FIGURE

1

ARCADIS

Appendix A

Service Agreement



PROFESSIONAL SERVICES AGREEMENT

APPROVED BY WORK AUTHORIZATION

This PROFESSIONAL SERVICES AGREEMENT (the "Agreement") is made as of _____, 20__ between _____ (hereinafter referred to as the "Client") and ARCADIS G&M, Inc., a Delaware corporation (hereinafter referred to as "ARCADIS"), jointly referred to as the "Parties."

ARCADIS represents that it is knowledgeable and experienced in providing professional technical, engineering and consulting services; and

The Client desires to have ARCADIS perform such professional services pursuant to and more particularly described in the General Scope of Work and/or approved Work Authorizations.

NOW THEREFORE, in consideration of the mutual covenants and promises and other good and valuable consideration contained herein, the receipt and adequacy of which are hereby acknowledged, the Parties agree as follows:

1. Services To Be Performed

ARCADIS agrees to diligently and professionally perform professional consulting services and produce all of the deliverables, described in this Agreement and all exhibits hereto for the proper completion of the General Scope of Services described in Exhibit A.

Services performed under this Agreement may also be detailed in and determined by Work Authorizations approved by the Client and ARCADIS in the form attached hereto as Attachment 1, which shall constitute a part of this Agreement.

ARCADIS shall have no obligation to commence the Services as stipulated in this Agreement and/or any associated Work Authorization until both this Agreement and the applicable Work Authorization are fully executed and delivered to ARCADIS. Any schedule requirements applicable to ARCADIS Services will be set forth in Exhibit A. Services shall include all the work necessary to perform the work described in the Work Authorization and this Agreement.

ARCADIS shall faithfully perform the Services required under this Agreement in accordance with standard of care, skill, training, diligence and judgment provided by competent professionals who perform work of a similar nature to the work described in this Agreement and any Work Authorization.

2. Payment for Services

Client agrees to pay for the Services performed by ARCADIS in accordance with this Agreement and any approved Work Authorization. Payment for Services are set forth and shall be subject to the ARCADIS standard invoicing practices in the attached Exhibit B, which is incorporated herein. Payment Terms shall specify Lump Sum Fees, Hourly Billing Rates, and Reimbursable Expenses, and provide for interest on



payments not timely made, and for the suspension of work and attorneys' fees in the event that payments are not made by the Client.

3. Term of Agreement

This Agreement will be effective upon the date a fully executed copy of this Agreement is delivered to ARCADIS or ARCADIS is authorized by Client to begin work. Unless terminated, this Agreement shall remain in effect until the scope of services defined in any Work Authorization has been fully performed. Upon completion of the Services and payment, this Agreement may be terminated by either Party.

4. Changes in the Work

At any time after execution of this Agreement, Client may order changes in ARCADIS Services consisting of additions, deletions, and revisions within the general scope of services being performed by ARCADIS under this Agreement and/or any applicable Work Authorizations. Whenever a change in the scope and/or time for performance of services occurs, or if Client has notified ARCADIS of a change, ARCADIS shall submit to Client within a reasonable time an estimate of the changes in cost and/or schedule, with supporting calculations and pricing. Pricing shall be in accordance with the pricing structure of this Agreement.

Notwithstanding the above, Client may direct ARCADIS in writing to perform the change prior to approval of price and schedule adjustments by Client. If so directed, ARCADIS shall not suspend performance of this Agreement during the review and negotiation of such change, as long as the change is a reasonably foreseeable alteration of the Services originally contemplated. In the event Client and ARCADIS are unable to reach agreement regarding changes in price and/or time associated with a change order, the matter shall be submitted to mediation as provided in Paragraph 15 of this Agreement.

5. Termination of Agreement

Termination for Convenience. Either Party may terminate this Agreement and any associated Work Authorizations without cause and/or for convenience after giving five (5) days' written notice to the other Party. However, ARCADIS shall not have the right to terminate this Agreement, without cause, prior to completion by ARCADIS of all Services required under the Agreement or any outstanding Work Authorizations. In the event Client terminates ARCADIS services without cause and/or for Client's convenience, Client shall be liable to promptly pay ARCADIS for all work performed through the date of termination, all of ARCADIS expenses directly attributable to the termination, including fair and reasonable sums for overhead and profit for work performed, and costs incurred by ARCADIS in terminating any contracts entered into in connection with the performance of its Services.

Termination for Cause. Either Party may terminate this Agreement for cause. Termination for cause shall be by written "Termination Notice" from the terminating Party, delivered to the defaulting Party at least thirty (30) days prior to the proposed "Termination Date." The defaulting Party shall have thirty (30) days from receipt of the Termination Notice within which to cure the alleged default, or the Termination Date shall be reasonably extended if the cure requires a period of time in excess of thirty days so long as the defaulting Party has undertaken such reasonably diligent efforts to cure such default. Any termination for

cause shall be without prejudice to any claims that either Party may have against the other Party, its agents or subcontractors.

6. Conflict of Interest

ARCADIS shall not perform, or enter into any agreement for, services for any other person, corporation or entity, except with prior written consent of Client, if, in the sole discretion of ARCADIS, the performance of the services could result in a conflict with ARCADIS obligations under this Agreement. ARCADIS represents that it has reasonably evaluated potential conflicts and has disclosed to Client in writing any prior or existing relationships which present, or could appear to present, a conflict with the Services to be performed.

7. Use of Documents

All documents provided by ARCADIS pursuant to this Agreement are instruments of service of ARCADIS, and ARCADIS shall retain an ownership and property interest therein (including the right of reuse) until Client has made full payment to ARCADIS for such documents pursuant to this Agreement. All documents generated by ARCADIS pursuant to this Agreement are not intended or represented to be suitable for reuse by Client or others on any other project, or other purposes other than that for which the same were created. Client agrees not to reuse said reports or materials on any other project, or for any other purpose other than that for which they were created, without the prior written consent of Consultant. Reuse of said reports or other material by Client for any other purpose or on other projects without written permission or adaptation by Consultant for the specific purpose then intended shall be at the Client's and user's sole risk, without liability on Consultant's part, and Client agrees to indemnify and hold harmless Consultant from all claims, damages and expenses, including attorneys' fees, arising out of such unauthorized reuse by Client.

8. Record Retention

Any and all files, data, records, reports and other information or work product generated in connection with or related to ARCADIS Services, shall be retained and stored by ARCADIS in hard copy and/or electronic form for a period of three (3) years from the completion of Services or such other period as specified by the Client. If Client decides to retain said records, it must notify ARCADIS no later than thirty (30) days prior to the expiration of the period. Any additional expense of retaining documents or transfer of documents to Client at the end of such three (3) year period will be at Client's expense. Provided however, that this provision shall not apply to drafts of plans, specifications, drawings or reports that shall be destroyed immediately upon being superceded in the project.

9. Proprietary Rights of ARCADIS

Client acknowledges that ARCADIS has developed systems, processes, apparatus, analytical tools and methods which are proprietary to ARCADIS and which are used in its business. Such systems, processes, apparatus, analytical tools and methods, including software, patents, copyrights and other intellectual property, and all derivations, enhancements or modifications thereof made by ARCADIS, including those as a result of work performed by ARCADIS for Client hereunder ("Intellectual Property"), shall be and remain

the property of ARCADIS. This Agreement shall not confer any grant of a license to any such Intellectual Property of ARCADIS, or right of use by the Client independently or other Client contractors.

10. Indemnification

ARCADIS shall indemnify, defend and hold harmless Client, its directors, officers, employees, shareholders and affiliates from and against any and all liabilities, losses, damages, costs and expenses (including attorneys' fees and court costs) which Client and its directors, officers, employees and agents hereafter may suffer in connection with any claim, demand, action or right of action (whether at law or in equity) brought or asserted by any third party because of any personal injury (including death) or property damage to the extent caused as a result of negligent acts, errors, omissions, or willful misconduct on the part of ARCADIS. ARCADIS shall not be liable to the extent that any liability, loss, damage, cost, and expense results from an act or omission, negligence or willful misconduct by Client or its directors, officers, employees or agents, or by any other person or entity not acting on ARCADIS' behalf or under ARCADIS' right of direction or control.

The Parties shall at all times remain entirely responsible for the results and consequences of their own negligence and agree to indemnify and hold harmless the other Party from and against any and all claims, losses, damages, costs and expenses, including attorney's fees, which may arise or result from such Party's negligence.

11. Limitation of Liability

The total liability, in the aggregate, of ARCADIS and its directors, officers, employees, agents, associates or subcontractors, and any of them, to Client or anyone claiming by, under or through the Client, for any and all injuries, claims, losses, expenses, including attorneys' fees, expert fees or court costs and damages whatsoever arising out of or in any way related to ARCADIS Services under this Agreement, from any cause or causes whatsoever, including but not limited to, negligent acts or omissions, professional negligence, breach of contract, strict liability, errors or omissions of ARCADIS, or the employees, directors, officers, agents, associates or subcontractors of ARCADIS, or any of them, will be limited to the total amount of fees paid to ARCADIS under this Agreement. In no event, however, shall any such liability to Client exceed the amount of applicable insurance that ARCADIS has agreed to procure and maintain under this Agreement.

ARCADIS agrees to correct, at its own expense, any services provided under this Agreement that do not conform to the standard of care hereunder for a period of one year following the completion of services. No other guarantee or warranty, express or implied, is intended by this Agreement.

The Client and ARCADIS waive incidental, indirect, or consequential damages, loss revenues or profits from claims, disputes or other matters in question arising out of or relating to this Agreement, whether such claims arise from negligence, breach of contract, or strict liability. This mutual waiver is applicable, without limitation, to all consequential damages due to either Party's termination in accordance with Paragraph 5 above.

12. Insurance

ARCADIS shall maintain for the term of this Agreement insurance policies covering:

Worker's Compensation and Employer's Liability insurance, statutory limits.

Comprehensive General Liability insurance, a total of \$1,000,000 each occurrence and \$2,000,000 in aggregate.

Comprehensive Automobile Liability insurance, a total of \$1,000,000 each occurrence and \$2,000,000 in aggregate.

Professional errors and omissions insurance with a per claim limit of not less than \$1,000,000.

13. Confidentiality

The Services are undertaken as an integral and necessary part of Client's activities at the Site. In order to protect the Client's confidential and proprietary commercial and financial information, any documents, records, data or communications provided by Client or produced by ARCADIS for Client shall be treated as confidential and proprietary. Such information shall not be disclosed to any third party, unless necessary to perform the Services, hereunder. Information will not be considered confidential if: (i) the information is required to be disclosed as a part of the Services, hereunder; (ii) the information is in the public domain through no action of ARCADIS in breach of the Agreement; (iii) information is independently developed by ARCADIS; (iv) the information is acquired by ARCADIS from a third party not delivered to ARCADIS in breach of any known confidentiality agreements; or (v) disclosure is required by law, court order or subpoena. In the event ARCADIS believes that it is required by law to reveal or disclose any information, prior to disclosure or production ARCADIS shall first notify Client in writing.

14. Notices

All notices required or permitted hereunder shall be in writing and shall be served on the Parties at the following address:

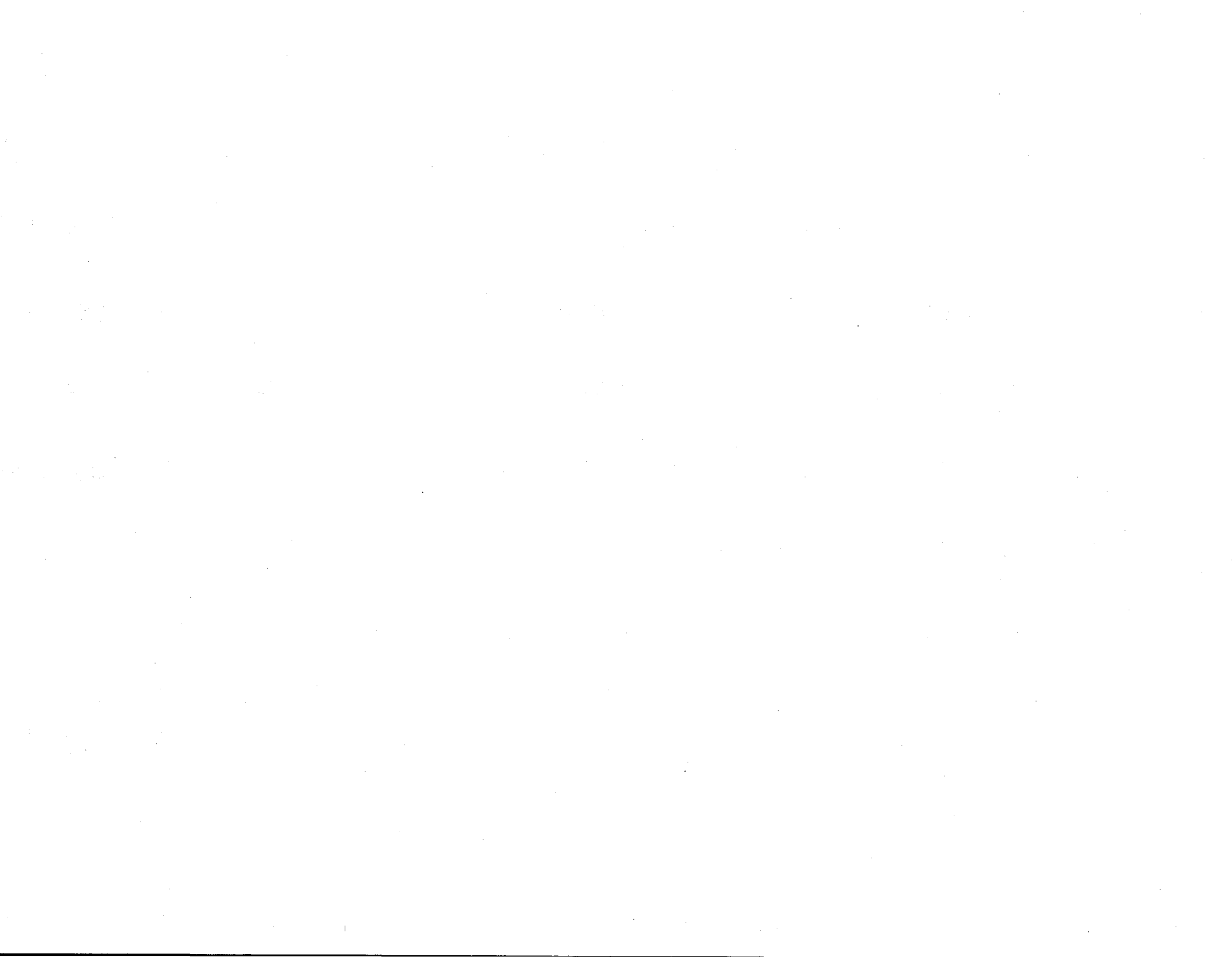
ARCADIS:

ARCADIS G&M, Inc.

Client:

Client
Address

Any such notices shall be either: (i) sent by certified mail, return receipt requested, in which case notice shall be deemed delivered three business days after deposit, postage prepaid in the U.S. Mail; (ii) sent by overnight delivery using a nationally recognized overnight courier, in which case it shall be deemed delivered one business day after deposit with such courier; or (iii) sent by personal delivery. The above addresses may be changed by written notice to the other Party; provided, however, that no notice of a change



of address shall be effective until actual receipt of such notice. Copies of notices are for informational purposes only, and a failure to give or receive copies of any notice shall not be deemed a failure to give notice.

15. Mediation

If any dispute arises out of or relates to this Agreement, or the breach thereof, and the dispute cannot be settled through direct discussions by the representatives of the Parties, the Parties agree then to submit the matter to mediation under the Construction Industry Mediation Rules of the American Arbitration Association before having recourse to a judicial forum. No written or oral representation made during the course of any settlement negotiations or mediation shall be deemed a party admission.

16. General Provisions

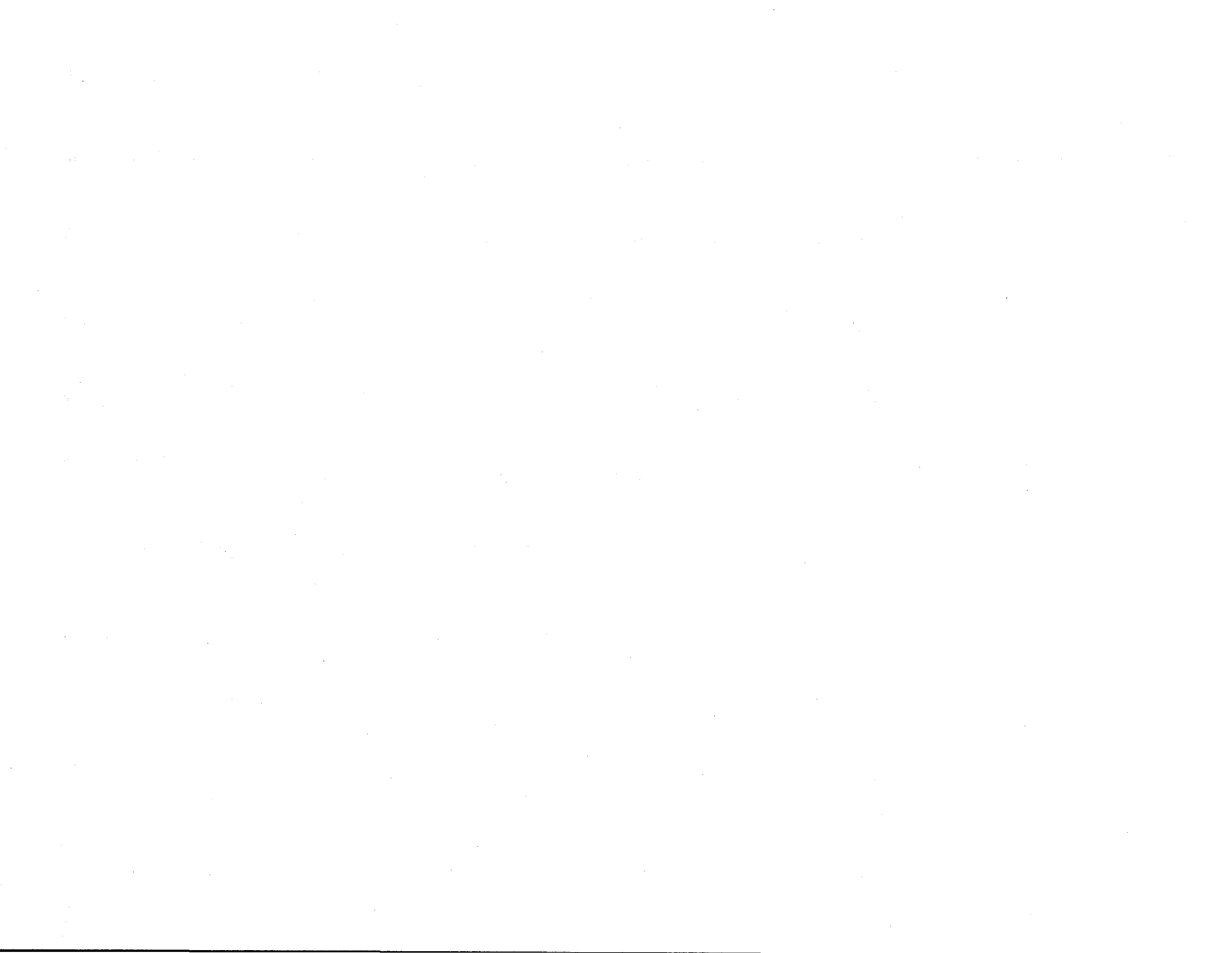
Special Conditions. The Client and ARCADIS agree that the **SPECIAL AND TECHNICAL CONDITIONS**, attached hereto as Exhibit C and incorporated herein by reference, are expressly made a part of this Agreement and all Work Authorizations approved by the Client and ARCADIS.

Entire Agreement. This Agreement constitutes the entire agreement between the Parties with respect to the Services, and supersedes all prior negotiations, representations or agreements relating thereto, written or oral, except to the extent they are expressly incorporated herein. Unless otherwise provided for herein, no amendments, changes, alterations or modifications of this Agreement shall be effective unless in writing, executed by Client and ARCADIS. There are no third party rights or benefits under this Agreement.

No Third Party Beneficiaries. The enforcement of the terms and conditions of this Agreement and all rights of action relating to such enforcement, shall be strictly reserved to the Client and ARCADIS, and nothing contained in this Agreement shall give or allow any such claim or right of action by any other or third person on such Agreement. It is the express intention of the Client and ARCADIS that sub consultants and any other person other than the Client or ARCADIS receiving any benefits from this Agreement shall be deemed to be incidental beneficiaries only.

Force Majeure. Except for the payment of money for Services already completed, each Party shall not be liable to the other for failure to perform its obligations hereunder if and to the extent that such failure to perform is caused by or results from causes beyond its control, including without limitation, strikes, lockouts, or other industrial disturbances, civil disturbances, fires, acts of God, acts of a public enemy, acts or omissions of subcontractors, compliance with any regulations, orders or requirements of any governmental body or agency, or inability to obtain transportation or necessary materials in the open market.

Severability and Waiver. If any portion of this Agreement is held invalid or inoperative, then so far as is reasonable and possible, the remainder of this Agreement shall be deemed valid and operative, and effect shall be given to the intent manifested by the portion held invalid or inoperative. The failure by either Party to enforce against the other Party any term or provision of this Agreement shall be deemed not to be a waiver of such Party's right to enforce against the other Party the same or any other such term or provision.



Governing Law. The laws of the State in which the Site is located shall govern this Agreement and the legal relations of the Parties.

Compliance with Law. ARCADIS and Client will use reasonable care to comply with applicable laws in effect at the time the Services are performed hereunder, which to the best of their knowledge, information and belief, apply to their respective obligations under this Agreement. Client shall cooperate with ARCADIS in obtaining any permits or licenses required for the performance of the Services.

Delegation and Assignment. Either Party may at any time delegate, orally or in writing, this Agreement, or any portion thereof, with the prior written consent of the other Party. No such delegation shall operate to relieve the Party of its responsibilities hereunder.

Headings. Headings of particular paragraphs are inserted only for convenience and are in no way to be construed as a part of this Agreement or as a limitation of the scope of the paragraphs to which they refer.

IN WITNESS THEREOF, the Parties have caused this Agreement to be executed on the day and year first set forth above.

Client

ARCADIS G&M, Inc.

By: _____

By: _____

Title: _____

Title: _____

Date: _____

Date: _____

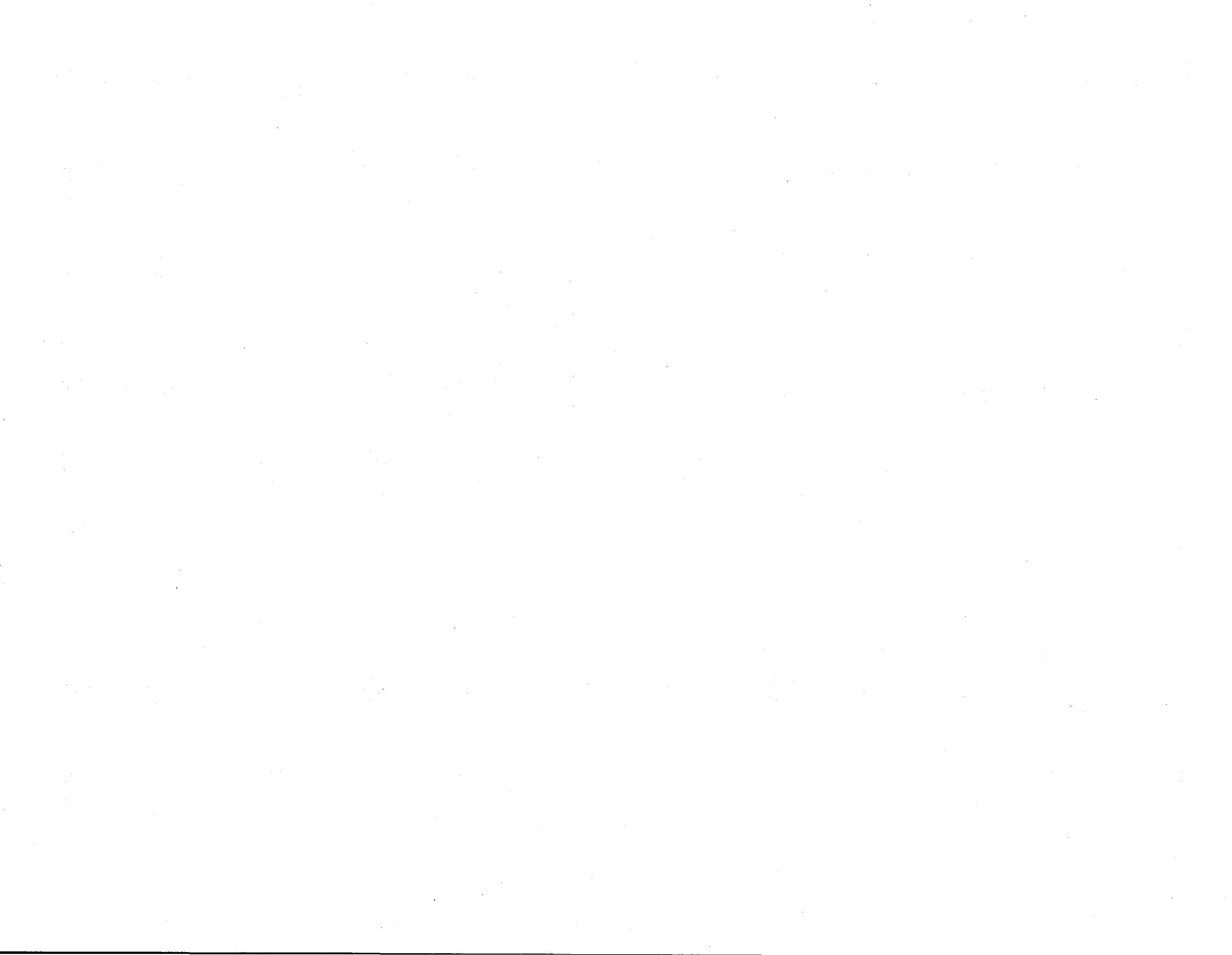


EXHIBIT A
General Scope of Work

This WORK AUTHORIZATION is entered into by and between ARCADIS G&M, Inc., a Delaware corporation ("Consultant") and _____ ("Client"). This Work Authorization incorporates by reference the SERVICES AGREEMENT entered into by the Parties dated _____ (the "Services Agreement"). The Services Agreement is hereby amended and supplemented as follows:

General Description of Basic Services

Client

ARCADIS G&M, Inc.

By: _____

By: _____

Title: _____

Title: _____

Date: _____

Date: _____

EXHIBIT B
Payment Terms

1. Payment Terms

ARCADIS shall invoice Client for Services in accordance with ARCADIS standard invoicing practices. Invoices are due and payable on receipt and should be remitted by check or wire transfer of immediately available funds as follows:

Lockbox:

ARCADIS G&M, Inc.
Dept 547
Denver, Colorado 80291-0547

Electronically (wire transfer):

Wells Fargo Bank
ABA 102000076
Account #1018164751, ARCADIS G&M

If Client fails to make any payment due ARCADIS for services and expenses within thirty (30) days after receipt of invoice, the amounts due ARCADIS will be increased at the rate of 1.5% per month (or the maximum rate of interest permitted by law, if less) from accounts not paid within thirty (30) days.

If Client reasonably objects to any portion of an invoice, Client shall provide written notification to ARCADIS of Client's objection and the basis for such objection within fifteen (15) days of the date of receipt of the invoice, and the Parties immediately shall make every effort to settle the disputed portion of the invoice. Client shall not offset amounts due ARCADIS under a Work Authorization for any credit or disputes arising under a different Work Authorization. Client shall waive any objections to ARCADIS invoice if it fails to timely provide such written notice to ARCADIS. If payment of invoices by Client is not maintained on a current basis, ARCADIS may, after giving seven (7) days' written notice to Client, suspend further performance until such payment is restored to a current basis. All suspensions shall extend the time for performance by a length of time equal to the duration of the suspension, and ARCADIS shall be paid for Services performed and charges incurred prior to the suspension date, plus suspension charges. Suspension charges shall include, without limitation, putting of documents and analyses in order, personnel and equipment rescheduling or reassignment adjustments, additional insurance/bonding coverage, extended overhead and costs, and all other related costs and charges incurred and attributable to suspension.

In the event of litigation or other proceeding to enforce performance of this Agreement or any payment obligation under this Agreement, the prevailing Party shall be entitled to recover from the other Party attorneys' fees and costs as may be reasonably incurred by reason of the litigation.

ARCADIS

Appendix B

WDNR Form 4400-233

DERF Site Investigation Bid Sheet

Consultant Bid Summary

Form 4400-233 (R 4/04) Page 2 of 6

Site Information

Site Name: Jill's Cleaners

Consultant Name: ARCADIS

Applicant Name: Jill Fitzgerald

Bid Summary

Drilling Costs Total =	6503
Analytical Costs Total =	2805
Consulting Costs Total =	15359
Misc Costs Total =	5645
Grand Total =	30312

I certify that the costs are an accurate estimate of my total projected costs for the site investigation and I understand and will adhere to s.292.65 Stats. and ch NR 169, Wis. Adm. Code.

Consultant Signature

Date

Please attach to these forms a written narratige specifying how the tasks outlined in these sheets will be performed.

Consultant Name:
 Site Name:
 BRRTS #:
 Date:

DERF Site Investigation Bid Sheet
Drilling Costs

Form 4400-233 (R 4/04) Page 3 of 6

Drilling Costs						
Task	Interval	Number of Borings or Wells	Number of Days	Total Number Feet Drilled	Cost/feet, Day or Well	Total Cost
Well installation and Completion						
Well installation	0 ft to 15ft	4	1	60	12	720
Piezometer Installation	0 ft to 40 ft	1	1	40	12	480
	___ ft to ___ ft					
	> ___ ft					
Decontamination Costs						375
Mobilization Costs						250
Auger Borings (continuous sampling)						
	___ ft to ___ ft					
	___ ft to ___ ft					
	___ ft to ___ ft					
	> ___ ft					
Decontamination Costs						
Mobilization Costs						
Auger Borings (specify split spoon sampling interval)						
Well Borehole	0 ft to 15ft	4	1	60	9	540
Piezometer borehole	0 ft to 40 ft	1	1	40	9	360
	___ ft to ___ ft					
	> ___ ft					
Decontamination Costs						
Mobilization Costs						
Direct Push Borings (per point)						
interior borings	< 8 ft depth	3	1	24	22	528
Geoprobos	0 ft - 20 ft depth	6	1	120	12.5	1500
	> ___ ft depth					
Decontamination Costs						150
Mobilization Costs						100
Well Development (if done by subcontractor)						
	Monitoring Wells					
	Piezometers					
	Recovery Wells					
Other						
Drums		12			35	420
Flush Mount Covers		5			135	675
Protector Pipes						
concrete cores		3			75	225
Abandonment/patches						180
Total Drilling Costs						6503

Consultant Name:

Site Name:

BRRTS #:

Date:

DERF Site Investigation Bid Sheet

Analytical Costs

Form 4400-233 (R 4/04) Page 4 of 6

Parameter	WI Certified Lab			Field Test/Field Kit			Mobile Lab			Total Costs
	\$/sample	# samples	Method Used	\$/sample	# samples	Method Used	\$/Sample \$/Day	# Samples # Days	Method Used	
Solids Analysis										
VOCs	16	65	8260							\$1,040.00
TCLP	1	130	8260							\$130.00
RCRA Metals										\$0.00
Duplicate Analyses										\$0.00
Blank Analyses										\$0.00
Other: (Specify)										\$0.00
Water Analysis (low flow sampling assumed unless otherwise indicated at bottom of this sheet)										
VOCs	12	65	8260							\$780.00
Nitrate*										\$0.00
Dissolved Oxygen*										\$0.00
Temperature*										\$0.00
Ferrous Iron*										\$0.00
Sulfate*										\$0.00
Sulfide*										\$0.00
ORP*										\$0.00
pH*										\$0.00
TOC*	5	25	--							\$125.00
Alkalinity*										\$0.00
Chloride*										\$0.00
Spec. Conductance*										\$0.00
Ethene/Ethane/Methane*	5	75	--							\$375.00
Hydrogen*										\$0.00
Carbon Dioxide*										\$0.00
RCRA Metals										\$0.00
Duplicate Analyses	1	65	8260							\$65.00
Blank Analyses										\$0.00
Other: (Specify)										\$0.00
Air Analysis										
VOCs	1	290	TO-15							\$290.00
TCE										\$0.00
PCE (minimum detection limit is <10 ppbv)										\$0.00
Other: (Specify)										\$0.00
Waste Analyses (soil/water)										
										\$0.00
										\$0.00
Miscellaneous (specify)										
										\$0.00
										\$0.00
Charge for Mobile Lab (indicate # days and daily fee)										
Total Analytical Costs										\$2,805.00

* Natural Attenuation parameters required for consideration of NA as remedy.

Consultant Name:
 Site Name:
 BRRTS #:
 Date:

DERF Site Investigation Bid Summary
Consultant Costs

Form 4400-233 (R 4/04) Page 5 of 6

Position (specify)	Hourly Rate	Hours/Task															Total Costs	
		Workplan Development	Access	Receptor Survey	Waste Determination	Drilling Oversight	Soil Sampling	Drilling sampling	Well Development	Hydraulic Conductivity Test	Groundwater sampling	Soil gas/vapor intrusion survey	SSRCL calculations (contained out or remedial actions)	SJ Report preparation	RAOR Report preparation	Project Management		Other (specify)
Professional Staff																		
Project staff I	98	2	1		2	4	1			2	1				32	9		\$5,292.00
Senior project Staff I	132		1			1									3	2		\$924.00
Principal	155														1			\$155.00
																		\$0.00
																		\$0.00
Field Staff																		
Staff Sci/Eng II	84	8			8	26	8		6	16	4				4	10		\$7,560.00
																		\$0.00
																		\$0.00
																		\$0.00
																		\$0.00
Office Support Staff																		
Project Assistant	68	1	1												10			\$816.00
Senior Designer	68	1	1												6	1		\$612.00
																		\$0.00
																		\$0.00
																		\$0.00
Total Consulting Costs																		\$15,359.00

Consultant Name:
 Site Name:
 BRRTS #:
 Date:

DERF Site Investigation Bid Summary Sheet

Miscellaneous Costs

Form 4400-233 (R 4/04) Page 6 of 6

Major Activity	Specifications	Commodity Unit (specify)	Unit Rate	Number of Units	Total Cost
IDW Disposal					
soil	Non-Hazardous	drum	100	9	900
	Hazardous				
water		drum	120	3	360
Equipment Rental (list and include shipping costs if applicable)					
FID		day	125	4	500
Peristaltic pump		day	35	2	70
water level meter		day	25	2	50
downhole probe		day	150	2	300
shipping charges		lump sum	400	1	400
air sampling equipment		day	300	1	300
Field Supplies (list)					
Expendables		lump sum	730	1	805
Surveying					
surveyor		lump sum	1200	1	1200
Personal Protection Equipment (list)					
expendables		lump sum	125		125
Sample Shipping Costs					
air sample		lump sum	75	1	75
Other (specify)					
Geoprobe groundwater collection		sample	35	6	210
Summa canister rental		sample	50	1	50
utility locator		hour	100	3	300
Total Miscellaneous Costs					\$5,645.00

Reminders: DERF does not reimburse for attorney, closure or GIS fees. Mileage and meals are also non-reimbursable. Also, costs to prepare a reimbursement application and discuss the application with the department are not reimburseable. No expedited shipping w/o prior PM approval.

ARCADIS

Appendix C

Resumes

ARCADIS

Michael S. Maierle, PE

Vice President
Principal Engineer

Mr. Maierle is a Principal Engineer with over 19 years of technical and project management experience. His areas of expertise include the development and application of innovative soil and groundwater remediation technologies, brownfield site assessment and redevelopment, environmental permitting and compliance, detailed engineering design, and the management of solid and hazardous waste. Mr. Maierle has designed and implemented numerous innovative in-situ remediation programs, managed multi-media environmental permitting and compliance programs, and has coordinated the remediation and redevelopment of complex brownfield sites. Mr. Maierle currently is responsible for managing ARCADIS operations in Wisconsin and Minnesota.

In addition to his expertise in remediation and brownfield redevelopment, Mr. Maierle has extensive expertise in the design and operation of water and wastewater treatment systems. Prior to joining ARCADIS, Mr. Maierle designed complete water and wastewater treatment facilities for both industrial and municipal applications. He has expertise in the preparation of plans and specifications, process monitoring and control, and physical, chemical and biological treatment techniques.

Fields of Specialization

- Soil and groundwater remediation technologies
- Brownfield site remediation and development
- Regulatory compliance and permitting
- Program/project management
- Water/wastewater treatment facility design

Key Projects

- Project Director for a multi-million dollar, fixed-price guaranteed remediation project at a brownfield site in suburban Milwaukee. The project involves the demolition of a dilapidated shopping mall and the investigation and remediation of widespread soil and groundwater

contamination. The remedial program consists of enhanced reductive dechlorination, soil vapor extraction, and the incorporation of site development features for engineered barriers. Coordinated geotechnical investigation, site grading, and other site civil support services to facilitate site redevelopment.

- Project Director for comprehensive engineering design and permitting support services for two natural gas pipelines constructed in 2003/2004 in southeastern Wisconsin.
- Project Director for a shallow soils remediation project at a former manufactured gas plant site in downtown Milwaukee. The remediation program involved building demolition followed by the excavation and on-site low-

Education

MS of Environmental Engineering, Illinois Institute of Technology, 1993

BS of Civil and Environmental Engineering, University of Wisconsin, Madison, 1985

Professional Registrations

Professional Engineer in Illinois and Wisconsin

Professional Associations

American Water Works Association

Water Environment Federation

temperature thermal desorption of over 90,000 tons of soil contaminated with polynuclear aromatic hydrocarbons and benzene, toluene, ethylbenzene and xylenes constituents.

- Project Manager for a fixed-price guaranteed remediation project at a brownfield site in Wisconsin. The remedial strategy includes source removal in conjunction with carbon enhanced reductive dechlorination to address tetrachloroethylene (PCE) contamination from a former dry cleaning facility. A no further action determination for site soils was received from the Wisconsin Department of Natural Resources (WDNR) within 9 months of project initiation. PCE concentrations in site groundwater were reduced from 4,000 micrograms per liter to below detection limits within an 18-month period. This expedited remediation project facilitated a \$10,000,000 retail development on the site.
- Project Manager for a large-scale remediation project at an operating industrial facility in Wisconsin. Designed and implemented a vacuum-enhanced groundwater recovery system to remove light nonaqueous phase liquids and dense nonaqueous phase liquids from the contaminant source area. Natural attenuation was selected and approved by the WDNR as the
- remediation process for the dissolved contaminants.
- Project Manager for an in-situ bioremediation project at an abandoned Brownfield Site in central Iowa. This project involved conducting a 9-month pilot study to establish the effectiveness of an in-situ biological reduction process for treating groundwater contaminated with high concentrations of hexavalent chromium. A 99 percent reduction in hexavalent chromium concentrations was achieved during the pilot study.
- Project Manager/Coordinator for remedial design/remedial action activities and principal author of a CERCLA feasibility study report for an abandoned municipal/industrial landfill National Priorities List (NPL) site in northern Indiana. Remedial components at this site include a 22-acre sanitary landfill cap, perimeter slurry wall, drum removal and low-temperature thermal desorption, and wetlands mitigation.
- Project Manager and Lead Process Engineer responsible for performing a comprehensive treatment and operation audit and assessment of a 15,000 gallon per minute (gpm) industrial wastewater treatment plant at a major steel mill in northwest Indiana. This on-going audit and assessment involves evaluating existing pH neutralization, oil

removal, iron oxidation, coagulant/polymer feed, flocculation, and final clarification processes and developing cost-effective system and operating procedure modifications to optimize the performance of the treatment plant.

- removal, iron oxidation, coagulant/polymer feed, flocculation, and final clarification processes and developing cost-effective system and operating procedure modifications to optimize the performance of the treatment plant.
- Project Manager and Lead Design Engineer responsible for the implementation of a new 250 gpm-capacity water supply system at an existing industrial facility in Dexter, Michigan. The system consists of a new groundwater recovery well located upgradient from an area of known groundwater contamination, vertical turbine pump, brick pump house, automated controls, and a 1,000-foot long force main that feeds an existing elevated storage tank.
 - Project Manager for a wastewater discharge characterization study at an industrial facility in Chicago, Illinois. The results of this characterization study were extremely beneficial in reducing past wastewater discharge user fees levied against the facility by the Metropolitan Water Reclamation District of Greater Chicago.
 - Project Manager and principal author of a CERCLA feasibility study report for an abandoned municipal landfill NPL site in Indiana. The development and assessment of remedial alternatives, which focused on source control measures, had to incorporate the placement of a new
- state highway over the surface of the landfill. The United States Environmental Protection Agency has approved institutional controls as the sole remedial action and has also approved placement of the highway over the landfill.
- Project manager and certifying professional engineer for the development and certification of spill prevention, control, and countermeasures plans at the Richards-Gebaur Air Force Base in Missouri and at several U.S. Coast Guard stations throughout the Midwest.
 - Lead Design Engineer of a multi-million dollar groundwater collection and treatment system for a confidential client in Kentucky. The system consists of six recovery wells, a 1,500-foot long sub-surface drain cut into weathered limestone, and an automated groundwater treatment system comprised of an oil/water separator, oil absorption system and activated carbon process. The system is designed to recover and treat groundwater contaminated with heavier than water polychlorinated biphenyl's laden oil.
 - Lead Design Engineer for a CERCLA Remedial Design involving the expansion of an existing 1,200 gpm groundwater recovery and treatment system at a chemical manufacturing facility in

Axis, Alabama. The modification work involves the addition of one 350 gpm recovery well, installation of 3,000 feet of additional force main, hydraulic balancing of the existing recovery and transmission system, and upgrades to an existing groundwater spray aeration pond.

- Certifying Professional Engineer (P.E.) on numerous underground storage tank (UST) closure projects executed in the State of Illinois. As certifying P.E. for these UST projects, was responsible for reviewing and approving hydrocarbon release investigation and remediation plans.
- Project Engineer involved in conducting closure studies for multiple RCRA solid waste management units at the Portsmouth Uranium Enrichment Plant, Piketon, Ohio. The closure studies focused on eliminating hazardous and mixed-waste releases from the RCRA units and investigated the applicability of numerous remedial technologies for contaminated soil and groundwater remediation.
- Project Engineer responsible for the design of a comprehensive leachate collection and transmission system that will be incorporated into an upgraded solid-waste landfill for a confidential industrial client. The leachate collection and transmission system will utilize dual components for separating primary and secondary leachate, electro-mechanical controls for automatic operation, and full instrumentation for monitoring and alarm condition annunciation. Also responsible for co-authoring the permit-to-install application for this upgraded landfill.
- Project Engineer responsible for the complete preliminary design of a turnkey 5.25 million gallons per day (mgd) municipal water treatment facility for the village of Montgomery, Illinois. This preliminary design, which incorporated air stripping, solids contact clarification, pH neutralization and multi-media filtration for treating ground water from seven municipal wells, was used to obtain a state construction permit for the facility.
- Project Engineer responsible for the complete final design of a turnkey 2.0 mgd municipal water-treatment facility for the city of Wilmington, Illinois. This final design required the coordination and implementation of a surface-water intake structure, a lime-softening treatment system, sludge-storage lagoons, a finished water-pump station, and a telemetry-control system. Principal author of the operation and maintenance manual developed for this facility.
- Conducted numerous process start-ups, on both the pilot and full-scale

level, at water and wastewater treatment facilities located throughout the country. Optimized treatment processes involving the removal of iron, calcium, magnesium, phosphorus, turbidity, suspended solids and organic compounds from various water and wastewater sources. Also performed several process audits at various water and wastewater treatment facilities for the purpose of ensuring process optimization and regulatory compliance.

Expert Witness Cases

- Alden Mose et. Al. v. Tedco Equities, et. Al. Case No. 95-CV-5882; plaintiff's expert on groundwater contamination and remediation.
- Gentile v. Wausa Underwriters, et. Al. Case No. 98-CV-303; defendant's expert on subsurface contaminant rate and transport and remediation technologies.
- Super Excavators, Inc. v. City of Milwaukee, Case No. 01-CV-001325; plaintiff's expert on construction-related groundwater dewatering methods, hydrogeologic interpretations, and geologic investigation studies.

**Selected Publications/
Presentations**

Complete PCE Degradation and Site Closure Using Enhanced Reductive Dechlorination, Maierle, M. and Cota, J., 6th Annual International Symposium on In-Situ and On-Site Bioremediation, San Diego, California, June 2001.

Guaranteed Remediation – A Sweet Success, Maierle, M., Cota, J., Suthersan, S., Pollution Engineering, January 2004.

Innovative Landfill Remediation Approaches Using Horizontal Wells, 20th International Madison Waste Conference, April 1998.

Landfill Design, Management and Closure, 7th Annual Environmental Sciences; A Primer for the Technically Challenged, American Bar Association Section of Natural Resources, Energy, and Environmental Law, Chicago, Illinois, November 1998.

Total Water Resources Management, American Water Works Association - Wisconsin Conference, Middleton, Wisconsin, September 1998.

ARCADIS

Michael S. Maierle, PE

Vice President
Principal Engineer

Utilization of In-Situ Reactive Zones for
Microbial Precipitation of Heavy
Metals and De-Nitrification,
Maierle, M., Suthersan, S., Palmer,
P., Superfund XVI Conference,
Washington, D.C., November 1995.

Mr. Buc is a senior engineer in the Milwaukee office of ARCADIS. He is experienced in the development and implementation of remedial strategies for multi-disciplinary environmental projects. These projects have included property transaction assessments, environmental permitting, and the investigation and remediation of a wide variety of organic and inorganic contaminants. In addition, Mr. Buc's responsibilities include managing project personnel and budgets, preparing technical reports, assisting staff in developing remedial strategies, and negotiating with regulatory agencies to define project objectives and obtain project closure.

Project Management

Manufactured Gas Plant Remediation

City of Beloit, Beloit, Wisconsin
Project Manager for remediation at this former manufactured gas plant (MGP) site. Contrary to most MGP remediation projects, concentrations and distribution of contaminants at this property have allowed a less aggressive remedy. A remedial strategy consisting of natural attenuation, limited source removal, and engineered barriers has been approved by the Wisconsin Department of Natural Resources (WDNR). The barriers will consist of future buildings, parking areas, and vegetative cover. To facilitate development, ARCADIS is currently working with the WDNR to obtain a No Further Action designation for the soil, and closure of the groundwater portion of the project.

Chlorinated Hydrocarbon Remediation

Quest Technologies, Oconomowoc, Wisconsin
Project Manager for remediation of trichloroethene (TCE) at an industrial site. Impacts migrated off-site and commingled with a release from a nearby former dry cleaner. The remedy consists of enhanced reductive dechlorination. A

recirculation system is being used to recover impacted groundwater, add a carbon substrate, and re-inject the amended groundwater. Initial injection activities achieved a target compound reduction of 50 percent within 8 weeks. This project was completed in accordance with the National Contingency Plan to facilitate potential future cost recovery.

Voluntary Part Liability Exemption Program (VPLE) Remediation

Freudenberg NOK, Necedah, Wisconsin
Project Manager for remediation activities at a manufacturer of industrial gaskets. A Phase I Environmental Site Assessment identified a dozen recognized environmental conditions (RECs), including a former employee trap range. Subsequent investigations eliminated many of the RECs from further consideration. The project was one of the first sites entered into Wisconsin's VPLE program. Remediation consisted of excavation of impacted soil, enhanced biodegradation of TCE-impacted groundwater using the application of a carbon amendment, and natural attenuation monitoring. A request for a Certificate of Completion is currently being prepared.

Education

MS, Civil/Environmental Engineering, Marquette University, 1995

BS, Chemistry, Michigan State University, 1987

Professional Registrations

Certified Hazardous Materials Manager

Professional Engineer in Wisconsin

Professional Associations

American Society of Civil Engineers

Institute of Hazardous Materials Management

Wisconsin Ground Water Association

Phytoremediation

Confidential Client, Central Wisconsin
Project Manager for remediation at an oil recycler. Impacts include separate phase product and petroleum-impacted soil. The remedy consists of periodic bailing of product and phytoremediation. Native deciduous and coniferous trees were planted to address impacted soil. Native species were selected over hybrid poplars for winter hardiness and to avoid pest-management issues associated with dense monocultures that typify most phytoremediation projects.

Corrective Action Program

Confidential Chemical Distributor, Southeastern Wisconsin
Project Manager for a hazardous waste storage and recycling facility. A corrective action program was developed in accordance with the Resource Conservation and Recovery Act and Chapter NR 635 to address twelve solid waste management units (SWMUs). Activities have included negotiations with regulators on the means and methods to be used in the corrective action process. Remediation of one of the SWMUs utilizes an innovative anaerobic biodegradation process. Surface application of nitrate to low-permeability soils is being used to remediate volatile organic compounds through cometabolic denitrification. Residual nitrate will migrate to the underlying groundwater, providing additional treatment to the affected groundwater.

Project Support

National Account Support

Confidential Petrochemical Company
Provide technical and administrative support for the ARCADIS business unit coordinating activities for this client. Disseminate information on client health and safety programs to ARCADIS personnel and subcontractors. These programs include a web-based incident reporting system and safety audits. Technical support also includes review of all documents to ensure compliance with settlement agreements, regulatory programs and consistency of approach.

Facility Auditor

Confidential Airline, Wisconsin Airports
Supported a nationwide audit of deicing activities for a major airline. Conducted reviews of chemical storage, use, permitting, and storm water management issues at three airports in Wisconsin.

Project Engineer

Confidential Printing Company
Supported nationwide preparation of Spill Prevention, Control and Countermeasure (SPCC) plans for over 20 facilities. Served as the Licensed Professional Engineer for SPCC plans at four Wisconsin facilities, and provided quality control review of other plans to verify consistency of recommendations.

Litigation Support

Confidential Clients, Wisconsin Sites
ARCADIS is periodically retained to provide third party review and litigation support for legal counsel. Support

activities have included the review and analysis of historical remediation data, preparation of documents for arbitration, and participation as a fact witness in administrative hearings.

Publications

R. Forbort and E. Buc, 2004. "*Use of Groundwater Recirculation to Enhance Biodegradation of Trichloroethene.*" Fourth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California.

E. Buc and R. Forbort, 2003. "*Using Risk-Based Standards to Balance Active Remediation with Monitored Natural Attenuation.*" First International Conference on On-Site Remediation, Montreal, Canada.

Managing Hazardous Materials.

Authored chapter on remediation technologies. Published by the Institute of Hazardous Materials Management in 2002.

J. F. Drought and E.A. Buc, 1999. "*Fate of Tetrachloroethene and Benzene at a Dry Cleaning Facility.*" The Fifth International In-Situ and On-Site Bioremediation Symposium, San Diego, California.

Mr. Maillet is a Staff Scientist in the Milwaukee office of ARCADIS, with more than 6 years of experience in planning, implementing, and managing numerous groundwater and soil investigation and remediation projects. He provides technical and field support for soil and groundwater investigations at underground storage tank, petroleum, and hazardous waste remediation sites. As a Staff Scientist, he has helped design and implement soil and groundwater investigation and remediation plans. He has supervised and conducted numerous water and soil sampling events for site investigation and routine monitoring events. He has experience with field data collection and interpretation as well as chemical data review and interpretation. In addition, Mr. Maillet also has over 8 years experience in environmental assessment which include pollution source determination, site threat assessment, site investigations, and removal and remediation assessments.

Environmental Assessments/Audits

Conducted over 75 Phase I and Phase II Environmental Site Assessments (ESA) on commercial and industrial properties throughout the United States for refinancing and property transfers.

Conducted over 50 Phase I with National Environmental Policy Act (NEPA) statements describing potential environmental impacts associated with a proposed telecommunication development.

Site Investigation and Remediation

Task manager for site investigation and remediation of perchloroethane releases at dry cleaning facilities. Remediation systems utilized included on-site groundwater treatment.

Task manager for a free product recovery system, conducted operation and maintenance and periodic groundwater monitoring program.

Task manager for periodic monitoring of sites impacted with benzene, toluene, ethylbenzene, and xylenes and methyl tertiary-butylether.

Task manager for two former asphalt testing facilities impacted with chlorinated solvents. Prepared additional soil and groundwater investigation, and well installations.

Supervised field sampling and remediation events with subsequent technical writing and data interpretation of petroleum and chlorinated solvent impacts at a 60-acre railway yard with history dating back to 1866. Areas of concern focused on frog shop, roundhouse, engine house, rail mill, car repair shop, and oil store house. Additional uses of leased portions of the rail yard property included three bulk petroleum product storage facilities, a lumber and coal supply company, warehouses and grain elevators for feed and fertilizer storage, and concrete product manufacturing.

Education

BS in Environmental Science, Louisiana State University, 1996

Profession Training

40-Hour OSHA Hazardous Waste Operations Course

40-Hour EPA Hazardous Materials Incident Response Course

40-Hour Asbestos Hazardous Emergency Response Act, Asbestos Supervisor Certification Course

8-Hour Asbestos Hazardous Emergency Response Act, Asbestos Inspector Certification Course

Guaranteed Remediation Program (GRiP)

Task manager for the Guaranteed Remediation Program (GRiP™) of 26 different Solid Waste Management Units (SWMUs) at the Fort Gordon Military Reservation. All SWMUs are under the Georgia Environmental Protection Division RCRA program. All sites involve reviewing and interpreting soil and groundwater data from previous programs and implementing a strategy to obtain SWMU closure using risk based rules or to use interim corrective measures to remove and/or remediate the site source. Mr. Maillet was responsible for scheduling and implementing sampling events, subcontractors, budget tracking, report preparation, coordination with the client and assisting the maintenance of reserve budgets. To date, 10 SWMUs have been closed.

- Coordination and supervision of remedial soil excavations.
- Geological mapping and stratigraphic interpretation.
- Preparation of technical reports.
- Aquifer testing including hydraulic conductivity and pump tests.
- Operation and interpretation of data from Geomagnetic surveyor and Pathfinder GPS surveyor.

Currently involved with a GRiP™ assessment of a former paper mill facility located in Appleton, Wisconsin.

Fields of Specialization

- Implementation of field investigations involving drilling, well installation, and sampling to assess soil and groundwater contamination.
- Site threat assessments involving the identification of sensitive ecosystems.
- Phase I and Phase II ESAs.

ARCADIS

Paul Lenaker

Scientist

Mr. Lenaker is a scientist in the Milwaukee office of ARCADIS, and has his Masters Degree in geology with an emphasis on glacial sedimentology and hydrogeology. He has experience performing a wide range of field tasks and report editing. Fieldwork includes groundwater and soil sampling, well installation, well development, aquifer testing, and groundwater injections. His familiarity with computer science enables him to utilize many programs including Geographic Information Systems and groundwater modeling applications.

Education

MS, Geology, University of Wisconsin-Milwaukee, 2002

BS, Geology, University of Wisconsin-Milwaukee, 1999

Professional Associations

Geological Society of America

Ground Water

Fieldwork

Amber Oil
Milwaukee, WI

Field oversight of AST Bulk Tank Farm decommissioning.

Former Crestwood Shopping Center

General Capital, Glendale, WI

Completed groundwater sampling tasks; performed molasses injections; and abandoned injection wells according to NR 141.25.

Cedarburg Cleaners

Cedarburg, WI

Performed Enhanced Reductive Dechlorination injections.

Middleton Cleaners

Middleton, WI

Completed groundwater sampling tasks using Bennett pump (for deep wells); Installation/development of groundwater injection wells; Performed injection and air sampling activities.

Canadian Pacific Railway

Tomah, WI

Completed groundwater sampling tasks; Performed discrete interval groundwater sampling investigation using geoprobe; Installation/development of groundwater monitoring wells utilizing rotosonic

drilling techniques; Draft geologic cross-sections, geologic interpretation; Performed/analyzed aquifer testing.

Arvin Meritor Facility

Oshkosh, WI

Oversaw Geoprobe drilling and classified soil samples. Performed sampling of soil and groundwater; Installation/development of extraction well.

Former Manufacturing Facility

Upper Peninsula of Michigan

Quality assurance and quality control of Remedial Investigation Report. Performed/installed vapor probes using hand auger for commercial methane monitoring program; Manifest documentation and organization; Installation/development/aquifer testing for 30+ groundwater extraction wells utilizing a rotosonic drill rig to depths of 200 feet.

Miller Brewing (Ball)

Milwaukee, WI

Performed groundwater sampling tasks.

ARCADIS

Paul Lenaker

Scientist

Quest Technologies

Oconomowoc, WI

Installation/Development of groundwater recirculation well network; recirculation injection system construction and injection activities; Groundwater sampling activities.

VPI

Sheboygan, WI

Supervised and interpreted Geophysical Investigation; Report preparation.

ARCADIS

Lori Schmidt

Scientist

Ms. Schmidt is a scientist in the Milwaukee office of ARCADIS. She has experience in performing field activities and project support. Her fieldwork responsibilities include groundwater sampling, soil sampling and classification, and well installation and development. Other responsibilities include data management.

Education

MS, Geosciences, University of Wisconsin – Milwaukee, 2004

BS, Geology, St. Norbert, 2000

Special Training

OSHA HAZWOPER 40-Hour Training

Professional Associations

American Water Resources Association

Wisconsin Ground Water

Fieldwork

EPA Cleanup Site: Moss-American

Kerr McGee Oil Co., Milwaukee, WI

Provided field support for soil sampling and classification.

Former Manufacturing Facility

Upper Peninsula, MI

Provide field support for 2 ½ square mile, \$26 million remediation project.

Activities include monitoring soil vapor probes and soil vapor extraction systems for soil gas composition, complete water sampling activities, and completed soil classification, soil sampling, and well installation with roto-sonic drill rigs in compliance with Michigan Department of Environmental Quality regulations.

Avenue Fabricare

Milwaukee, WI

Completed soil classification, soil sampling, and water sampling using Geoprobe technology.

Dry Cleaning Facilities

Various Clients

Completed water sampling activities using bailer and low-flow sampling techniques.

Dry Cleaning Facility

Green Bay, WI

Completed soil classification, soil sampling, and water sampling using

Geoprobe technology. Completed water sampling activities using bailer and low-flow sampling techniques. Survey well locations.

Canadian Pacific Railway

Canadian Pacific Railway, Tomah, WI

Completed water sampling activities, in-situ hydraulic slug testing, and well development at a 60-acre railway yard.

Confidential Client

Confidential Client, Menomonee Falls, WI

Completed water sampling activities using bailer techniques and whale pump, and completed system sampling on a quarterly basis at a large chemical manufacturing facility.

Project Support

WisDOT

Little Suamico, WI

Prepared status update for an environmental investigation and remediation project, which included the revision of existing databases, tables, and graphs using recently gathered data.

Confidential Client

Upper Peninsula, MI

Provided report, table, and figure review and revisions on a major Remedial Investigation Report and on a major Interim Remedial Action Plan. Created and maintain a spreadsheet of almost 100

field books. The spreadsheet was created to organize and facilitate access of the information regarding the project site.

Petroleum Environmental Cleanup Fund Act (PECFA) Claims

Various Clients

Prepared claims for the Wisconsin PECFA for cost reimbursement to our clients.

Dry Cleaner Environmental Response Program (DERP) Claims

Various Clients

Prepared claims for the Wisconsin DERP for cost reimbursement to our clients.

ACORD™ CERTIFICATE OF LIABILITY INSURANCE DATE (MM/DD/YY) 01/14/05

PRODUCER
 Aon Risk Services, Inc. of Tennessee
 720 Cool Springs Blvd
 Suite 680
 Franklin TN 37067 USA

PHONE: (866) 283-7124 FAX: (866) 430-1035

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURED
 ARCADIS G&M, Inc.
 Attn: Tim Myers
 630 Plaza Drive, suite 200
 Highlands Ranch CO 80129-2377 USA

INSURERS AFFORDING COVERAGE

INSURER A: Greenwich Insurance Company
 INSURER B: XL Specialty Insurance Co
 INSURER C:
 INSURER D:
 INSURER E:

COVERAGES This Certificate is not intended to specify all endorsements, coverages, terms, conditions and exclusions of the policies shown. SIR May Apply.

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

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE(MMDDYY)	POLICY EXPIRATION DATE(MMDDYY)	LIMITS	
A	GENERAL LIABILITY	GEC001076103 General Liability	01/01/05	01/01/06	EACH OCCURRENCE	\$1,000,000
	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY				FIRE DAMAGE(Any one fire)	\$1,000,000
	<input type="checkbox"/> CLAIMS MADE <input checked="" type="checkbox"/> OCCUR				MED EXP (Any one person)	\$10,000
					PERSONAL & ADV INJURY	\$1,000,000
					GENERAL AGGREGATE	\$2,000,000
					PRODUCTS - COMP/OP AGG	\$2,000,000
					GENL AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input checked="" type="checkbox"/> LOC	
A	AUTOMOBILE LIABILITY	AEC001075803 Auto (AOS) AEC001104703 Auto (Texas)	01/01/05	01/01/06	COMBINED SINGLE LIMIT (Ea accident)	\$1,000,000
	<input checked="" type="checkbox"/> ANY AUTO				BODILY INJURY (Per person)	
	<input type="checkbox"/> ALL OWNED AUTOS				BODILY INJURY (Per accident)	
	<input checked="" type="checkbox"/> SCHEDULED AUTOS				PROPERTY DAMAGE (Per accident)	
	<input checked="" type="checkbox"/> HIRED AUTOS					
	<input checked="" type="checkbox"/> NON OWNED AUTOS					
	GARAGE LIABILITY					
	<input type="checkbox"/> ANY AUTO				AUTO ONLY - EA ACCIDENT	
					OTHER THAN AUTO ONLY: EA ACC AGG	
A	EXCESS LIABILITY	UEC001075903 Umbrella	01/01/05	01/01/06	EACH OCCURRENCE	\$1,000,000
	<input checked="" type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS MADE				AGGREGATE	\$1,000,000
	<input type="checkbox"/> DEDUCTIBLE					
	<input checked="" type="checkbox"/> RETENTION \$10,000					
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY	WEC001076003 Workers Compensation	01/01/05	01/01/06	<input checked="" type="checkbox"/> WC STATUTORY LIMITS	OTHER
					E.L. EACH ACCIDENT	\$1,000,000
					E.L. DISEASE-POLICY LIMIT	\$1,000,000
					B.L. DISEASE-EA EMPLOYEE	\$1,000,000
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS
 Cancellation Provision shown herein is subject to shorter or longer time periods depending on the jurisdiction of, and reason for, the cancellation.

CERTIFICATE HOLDER	CANCELLATION
Specimen For Information Only Highlands Ranch CO 80129 USA	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES. AUTHORIZED REPRESENTATIVE <i>Aon Risk Services, Inc. of Tennessee</i>

Holder Identifier: 570012381807 Certificate No. 570012381807

ARCADIS

Appendix D

Certificate of Insurance

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE(MM/DD/YY)
01/14/05

PRODUCER
Aon Risk Services, Inc. of Tennessee
720 Cool Springs Blvd
Suite 680
Franklin TN 37067 USA

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

PHONE: (866) 283-7124 FAX: (866) 430-1035

INSURERS AFFORDING COVERAGE

INSURED
ARCADIS G&M, Inc.
Attn: Tim Myers
630 Plaza Drive, suite 200
Highlands Ranch CO 80129-2377 USA

INSURER A: Lexington Insurance Company
INSURER B:
INSURER C:
INSURER D:
INSURER E:

COVERAGES This Certificate is not intended to specify all endorsements, coverages, terms, conditions and exclusions of the policies shown. **SIR MAY APPLY**

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

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE(MM/DD/YY)	POLICY EXPIRATION DATE(MM/DD/YY)	LIMITS
	GENERAL LIABILITY <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY CLAIMS MADE <input type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC				EACH OCCURRENCE FIRE DAMAGE(Any one fire) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG
	AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON OWNED AUTOS				COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)
	GARAGE LIABILITY <input type="checkbox"/> ANY AUTO				AUTO ONLY - EA ACCIDENT OTHER THAN AUTO ONLY: EA ACC AGG
	EXCESS LIABILITY <input type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS MADE DEDUCTIBLE RETENTION				EACH OCCURRENCE AGGREGATE
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY				WC STATUTORY LIMITS OTHER E.L. EACH ACCIDENT E.L. DISEASE-POLICY LIMIT E.L. DISEASB-BA EMPLOYEE
A	OTHER <input checked="" type="checkbox"/> Contractor Poll	8782650 Prof Liab.-contractors Pollut	03/16/04	03/16/05	Each Claim \$1,000,000

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS
Cancellation provision shown herein is subject to shorter or longer time periods depending on the jurisdiction of, and reason for, the cancellation.

CERTIFICATE HOLDER CANCELLATION

Specimen
For information only
Highlands Ranch CO 80129 USA

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE *Aon Risk Services, Inc. of Tennessee*

Holder Identifier: 570012381824 Certificate No.

ARCADIS

Appendix E

Case Studies



Background

The property was historically developed with residences, and was later occupied by a post office. A dry cleaners then operated on the property through the early 1980s. Stoddard solvent was used as the dry cleaning solvent until 1973. Perchloroethylene (PCE) was subsequently used until cleaning operations ceased. The building has been used primarily for storage since 1989.

ARCADIS completed an investigation to evaluate soil and groundwater conditions. Work was completed in accordance with the Drycleaner Environmental Response Program (DERP). Limited concentrations of volatile organic compounds (VOCs) associated with Stoddard solvent were detected. However, PCE and associated biodegradation daughter products (i.e.,

trichloroethene, cis-1,2-dichloroethene) were detected above regulatory limits.

Due to the presence of a clay aquitard, the vertical extent of impacts was limited to a depth of approximately 15 feet. With the exception of an isolated area in the parking lot of the property, the lateral extent of impacts did not extend outside the footprint of the building. High concentrations of VOCs were present; PCE was detected in soil at concentrations approaching 13,000 milligrams per kilogram. A monitoring well located inside the building contained PCE at a concentration of 140,000 micrograms per liter. The detected concentrations suggested the presence of a dense nonaqueous phase liquid.

Remedial Program

ARCADIS subsequently evaluated potential remedial options. The evaluation included an enhanced

Photo Above:
A low-clearance excavator
removed impacted soil from
inside the building

biodegradation pilot test. A series of injection wells were installed inside the building. A carbon amendment solution was applied via the injection wells, and changes in VOC groundwater concentrations were monitored. Biodegradation daughter product concentrations increased, indicating that enhanced biodegradation was viable.

The recommended remedy consisted of targeted soil excavation to remove some of the source area, in conjunction with enhanced biodegradation of impacted groundwater. The existing building will serve as an engineered barrier to manage the remaining soil impacts. This remedy was approved by the Wisconsin Department of Natural Resources (WDNR).

Enhanced biodegradation remediates chlorinated hydrocarbons by manipulating the aquifer environment. The carbon amendment solution fosters the growth of microorganisms by providing an easily consumable food source. The increased population depletes dissolved oxygen in the aquifer and creates strong reducing conditions, which is the environment preferred by the microorganisms capable of dechlorinating VOCs.

The conceptual remedy included the excavation of impacted soil beneath the building, and the installation of a horizontal infiltration gallery for the carbon amendment solution. The remedy design also included a passive venting system to collect methane, a potential byproduct generated by enhanced biodegradation.

During implementation, approximately 180 tons of impacted soil was excavated

from beneath the building using low-clearance equipment. The infiltration gallery and venting system were installed within the excavation during backfilling. Field modifications were made as construction progressed, due to the presence of rubble and foundations from the former residences and post office that previously occupied the property.

Because the soil inside the facility contained PCE at concentrations above the Toxicity Characteristic Leaching Procedure limits, the excavated soil was managed as a hazardous waste. An additional 225 tons of impacted soil were excavated from a second area located outside the facility. ARCADIS demonstrated that the soil from the exterior excavation could be managed as a nonhazardous waste due to the WDNR's "contained out" policy, resulting in a cost savings for soil disposal.

Project Funding

The investigation and remediation costs were reimbursed through the DERP. In addition, ARCADIS assisted the property owner in identifying and securing other sources of financial support. These included state tax credits, an existing municipal tax incremental finance district, and federal tax deductions through the United States Environmental Protection Agency brownfields program.



ARCADIS was retained to complete the site investigation and develop recommendations for remediation. Due to releases from the USTs, portions of the cost associated with the investigation were eligible for reimbursement under the Petroleum Environmental Clean-up Fund Act (PECFA) program. The investigation was structured to maintain reimbursement, including the development of a cost allocation methodology to separate eligible costs. The investigation delineated two distinct plumes: one plume consisting primarily of benzene associated with the former petroleum tanks, and the second plume consisting of chlorinated VOCs. During the investigation, chlorinated VOCs were detected in a piezometer at concentrations that suggested the presence of a dense nonaqueous phase liquid (DNAPL).

Background

A former service station building was converted to a dry cleaning facility in 1969. In 1993, five underground storage tanks (USTs) were encountered during construction of a drop-off lane and were removed. Petroleum-impacted soils were encountered during removal of the USTs. Soil samples collected from one area of the site during the initial phase of investigation contained volatile organic compounds (VOCs) typically associated with petroleum (i.e., benzene, toluene, and xylene). However, tetrachloroethene and associated biodegradation products (i.e., trichloroethene, vinyl chloride) indicative of a release of dry cleaning solvents, were detected in a second area.

Remedial Program

Consistent with the requirements of the PECFA program, ARCADIS evaluated potentially feasible remedial action options. The evaluation included an air sparging/soil vapor extraction pilot test. The existing groundwater monitoring data was also reviewed to determine if natural attenuation could serve as a sole or partial remedy. Based on the evaluation, it was determined that natural attenuation could adequately address the plume of petroleum constituents, and may be suitable for addressing the chlorinated VOCs. A natural attenuation monitoring program was recommended to confirm the efficacy of natural attenuation and to build a database for pursuing site closure. The Wisconsin Department of Natural Resources

Photo Above: Carbon amendment solution is pumped to an injection well to enhance the biodegradation of chlorinated hydrocarbons

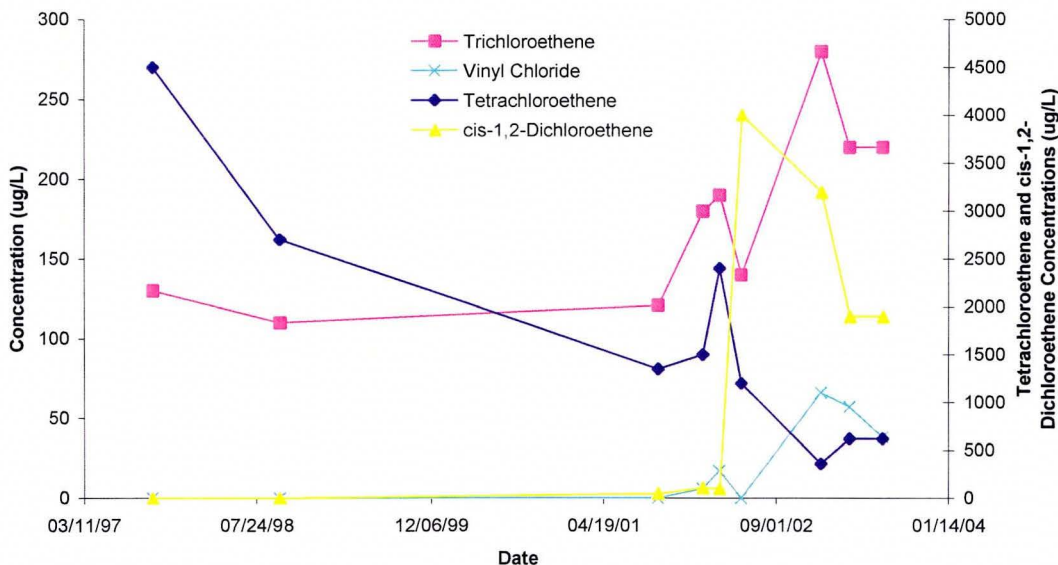
(WDNR) agreed with the recommendation, citing the project as “the first DNAPL tetrachloroethene site in Wisconsin where a monitoring program for natural attenuation was approved.”

Natural attenuation groundwater monitoring was completed from March 1997 to September 1998. During this period, the concentrations of benzene at the property decreased dramatically. By September 1998, the concentration of benzene had decreased from 220 micrograms per liter (µg/L) to below the NR 140 Enforcement Standard (5 µg/L). Based on the data, a request for closure of the petroleum hydrocarbon release was prepared. The WDNR granted closure of the petroleum remediation project in August 2000. The Wisconsin Department of Commerce also provided a final reimbursement of eligible costs through the PECFA program.

Availability of Funding through DERP

In 1997, the Dry Cleaner Environmental Cleanup Program (DERP) was created by the Wisconsin legislature. Because of the availability of additional reimbursement funds through the DERP program and the absence of significant decreases in chlorinated VOC concentrations, the remedy for the site was re-evaluated. Further, ARCADIS had succeeded in using enhanced biodegradation to remediate chlorinated hydrocarbons at other projects in Wisconsin. A pilot test of enhanced biodegradation was completed in 2001/2002, using an electron donor process patented by ARCADIS. A dilute carbon amendment solution was injected into the impacted groundwater during four monthly events, using three injection wells and portable pumping equipment. The results of groundwater sampling completed in conjunction with the injections found that concentrations of biodegradation products

Constituent Trends, Monitoring Well MW-1



trichloroethene and cis-1,2-dichloroethene increased by two orders of magnitude. The concentration of tetrachloroethene at the piezometer with DNAPL conditions decreased from 52,700 µg/L to 15,000 µg/L in 6 months.

Based on the pilot test results, ARCADIS recommended full-scale implementation of enhanced biodegradation. Following receipt of WDNR approval, the remedy was implemented in January 2003. In 8 months, the concentration of tetrachloroethene at the piezometer with historical DNAPL decreased from 15,000 µg/L to non-detect. Concentrations of the biodegradation daughter products increased as tetrachloroethene was transformed sequentially to trichloroethene, cis-1,2-dichloroethene, vinyl chloride, and ethene. Concentrations of these daughter products have begun to decrease as the biodegradation process continues to completion. It is anticipated that active remediation will be completed in 1 year; closure will be requested from the WDNR following the completion of post-remediation groundwater monitoring.



Cedarburg Cleaners is an active dry cleaning facility that has been in operation since the 1950s in Cedarburg, Wisconsin. In 1991, investigation activities were initiated at the site after an investigation being conducted on an adjacent property discovered a historical release of chlorinated volatile organic compounds (CVOC's). In October 1998, ARCADIS was retained by the owner of the property, Cedarburg Village Investment Partnership, to develop a remedial strategy for the site.

The investigation activities indicated concentrations of tetrachloroethene (PCE) and associated biodegradation daughter products (i.e., trichloroethene, cis-1,2-dichloroethene, and vinyl chloride) above regulatory limits. The analytical results indicated a concentration of PCE of up to 8,800 micrograms per kilogram in vadose zone soils, and up to 25,000 micrograms per liter in groundwater.

Remedial Program

Based upon the soil and groundwater investigation data, ARCADIS evaluated potential remedial options. The project was eligible for up to \$500,000 in funding under the State of Wisconsin Drycleaner Environmental Response Program (DERP). Thus, a significant consideration in the remedial evaluation was which technologies would remediate the site to the closure criteria while still remaining under the DERP cost cap.

ARCADIS subsequently evaluated potential remedial options. The final recommended remedy consisted of in-situ treatment of the impacted soil using heated forced air and mechanical mixing, in conjunction with enhanced biodegradation of impacted groundwater. This remedy was approved by the Wisconsin Department of Natural Resources in November 1998.

Cedarburg Village Investment Partnership

Scope of Services
Soil and Groundwater
Remediation Design and
Implementation

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Cedarburg Village Investment
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Start Date
10/1998

Completion Date
12/2004

Engineering Fee
\$200,000

Construction Cost
\$450,000

Key ARCADIS Staff
Wesley May

ARCADIS Project Number
WI000761.0001

Top photo: Place caption here

An in-situ forced-air desorption process was used to treat the CVOC impacted soils within two source areas. The process consisted of a chain trencher and a rotary powered cultivator to break up and pulverize the soil matrix. Heated air was then forced across the fine soil particles. The combination of soil agitation and pulverization along with forced hot air movement across the soil particles created thermally-enhanced volatilization of the VOCs present within the soil matrix.

The soil remediation activities resulted in the removal of approximately 96 percent of the pre-treatment contaminant mass from the vadose zone soils.

Conventional in-situ treatment techniques such as soil vapor extraction would not have been capable of reaching such a high level of removal, and excavation and disposal of the soils would have been prohibitively expensive.

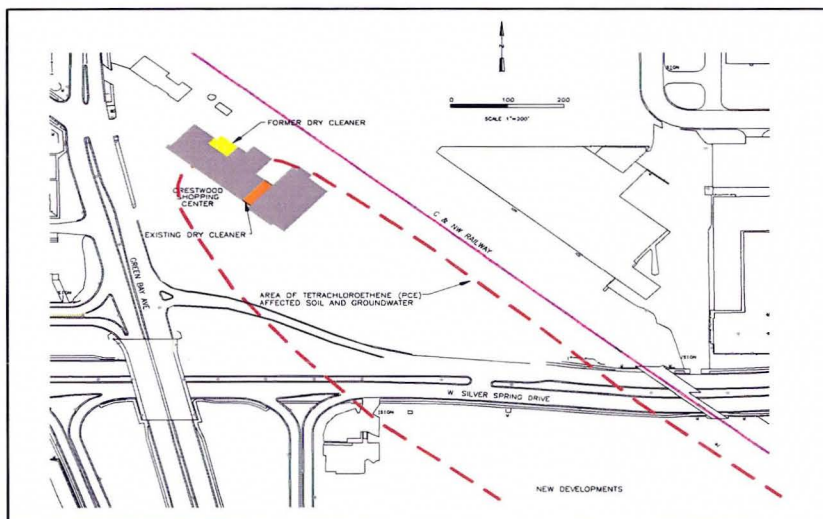
Enhanced biodegradation remediates chlorinated hydrocarbons by manipulating the aquifer environment. The carbon amendment solution fosters the growth of microorganisms by providing an easily consumable food source. The increased population depletes dissolved oxygen in the aquifer and creates strong reducing conditions, which is the environment preferred by the microorganisms capable of dechlorinating VOCs.

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™

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WDNR
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Background

Prior to 2000, the Crestwood Shopping Center was an underused and dilapidated 27,000 square foot strip mall. Chlorinated volatile organic compounds (VOCs), including tetrachloroethene, trichloroethene, dichloroethene and vinyl chloride, 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, 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

Table 1. Total Chlorinated VOCs Percent Reduction, Site Groundwater Monitoring Wells, Crestwood Site, Glendale, Wisconsin.

	Peak Total CVOCs	September 2003 Total CVOCs	Percent Reduction Total CVOCs
AGMW-108	28.57	0.0	100.0
AGMW-109	22,039	2.9	99.9
AGMW-110	13,000	2.2	99.9
AGMW-111	10,700	9.7	99.9
AGMW-112	148	14.9	89.9
AGMW-114	2,468	168	93.2
AGMW-115	1,304	225	82.7
AGMW-124	9,642	2,204	77.1
AGMW-125	20,580	20.4	99.9

Concentrations are presented in micrograms per liter (µg/L.)

CVOCs Chlorinated Volatile Organic Compounds.

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 In-Situ Reactive Zone (IRZ™) groundwater remediation program involves the periodic injection of an organic carbon solution to promote the biological degradation of the groundwater contaminants (i.e., enhanced reductive dechlorination [ERD]).

The IRZ was created through the periodic injection of a dilute molasses solution using temporary injection wells. By injecting a readily degradable organic carbon source, anaerobic and strong

reducing conditions were created within the IRZ to optimize the ERD process.

- The SVE system began operation in August 2001.
- The groundwater remediation program was initiated in June 2000. Over 300 temporary injection wells were installed at the site during this time period.
- June 2000 through December 2002 – 19 injection events completed (70,000 gallons of the dilute molasses solution injected)
- September 2003 – 77 percent to 100 percent reduction in total chlorinated VOCs at site monitoring wells within IRZ (Table 1).
- Concentration trends indicate the IRZ is effective in releasing the sorbed phase non-aqueous phase liquid (NAPL) present prior to remediation and achieving near complete degradation of that mass.



View of Medical Office Building Near Completion of Construction.

- Concentration trends indicate the IRZ is effective in releasing the sorbed phase non-aqueous phase liquid (NAPL) present prior to remediation and achieving near complete degradation of that mass.
- Ethene concentrations have increased up to 4 orders of magnitude from pre-remediation levels, indicating complete degradation of the contaminants.

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.

Redevelopment Activities

The former shopping center was demolished in June/July 2000 and new development activities were initiated in 2002. These developments include a new automobile dealership and a new medical office building. Both buildings are occupied and doing business today. A Tax Incremental Financing district was established to finance a portion of the property redevelopment.



Temporary Injection Wells Prior to Site Redevelopment

**Guaranteed
Remediation
Program,
Washington Square
Mall Redevelopment
Project**

Germantown, Wisconsin

Client
General Capital

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

Client Contact
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262-240-4400

Regulatory Contact
Margaret Brunette
WDNR
414-263-8557



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.

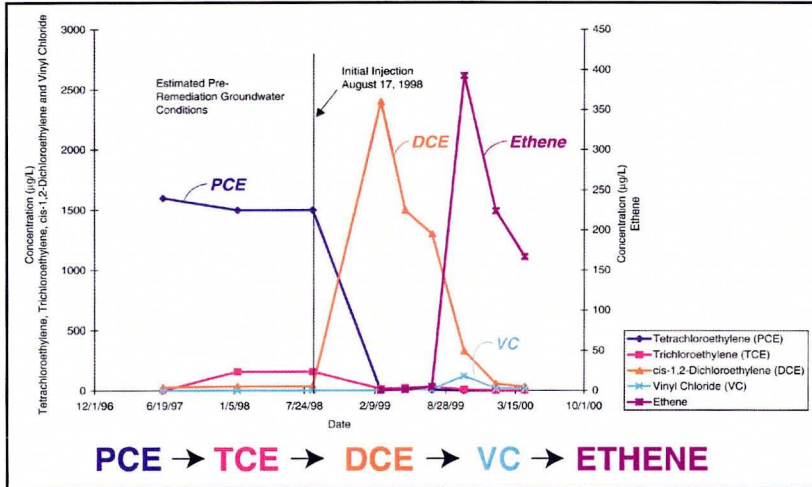
On behalf of General Capital the site developer, ARCADIS was able to formulate a cost-effective remedial strategy with a **fixed-price remediation guarantee** for site closure. In addition, ARCADIS was able to obtain several supplemental insurance policies for minimizing the developer's long-term

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 In-situ Reactive Zone (IRZ™) groundwater remediation program involved the periodic injection of an organic carbon solution to promote the biological degradation of the groundwater

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



Monitoring Well MW-13 Results



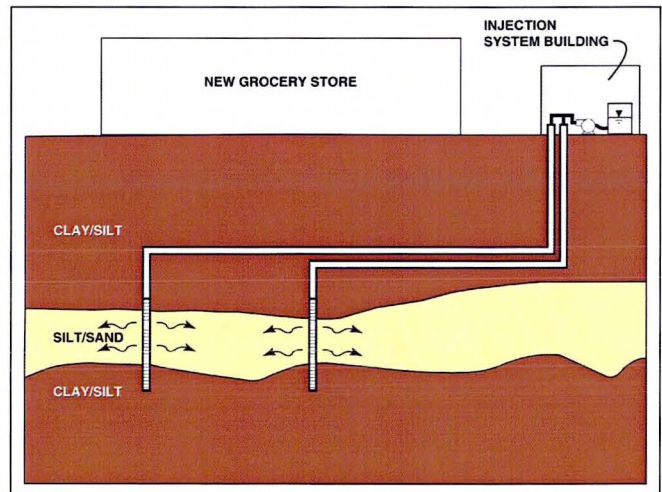
Initial carbon injection within partially backfilled excavation

contaminants through enhanced reductive dechlorination (ERD).

The IRZ was created through the periodic injection of a dilute molasses solution using both temporary injection wells (prior to shopping mall reconstruction) and sub-surface fixed injection wells (following shopping mall reconstruction). By injecting a readily degradable organic carbon source, anaerobic and strong reducing conditions were created within the IRZ to optimize the ERD process.

- >90% of PCE degraded to ethane/ethene within 20 months
- Strong decreasing trends for residual DCE and vinyl chloride

- August 1998 – completion of initial carbon injection event using 182 temporary wells
- August 1998 – 12 fixed injection wells installed underneath new grocery store
- March 1999 to September 1999 – 4 injection events using fixed wells
- Total solution volume injected ~ 6,175 gallons (~ 2% of groundwater volume)



Fixed Injection Well System Schematic



Financial/Liability Protection Highlights

- **Guaranteed Fixed-Price Remediation Contract** (for a guaranteed fixed-price, ARCADIS was 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

Project Accomplishments

- Design and implementation of the site remedy within a 10 week time frame
- Average PCE concentration within the groundwater plume decreased from 4,000 ppb to non-detectable levels within 20 months
- NR 726 *site closure letter* received from the WDNR in January 2001,



less than 30 months following initiation of site remediation

- WDNR issued a VPLE *Certificate of Completion* in September 2001, which exempts the site owner from future liability associated with the known contamination.
- Assessed value of the site increased from \$2,931,000 in 1997 (pre-development) to \$14,421,000 in 2001 (post-development). Annual tax revenues increased over 400 percent between 1997 and 2001.
- Project was recognized as **2002 Wisconsin Business Friend of the Environment Award Winner – Innovative Technology** category.

Photos:
Completed site development

ARCADIS

Appendix F

References

ARCADIS

Client References

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