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**Groundwater Monitoring and Limited Site
Investigation Proposal**

Onalaska Municipal Landfill Superfund Site

Sportsman Club Road

Town of Onalaska, La Crosse, County, Wisconsin

Prepared For

Wisconsin Department of Natural Resources

Project Number LC-13-01254

April 9, 2013

Braun Intertec Corporation

April 9, 2013

Proposal LC-13-01254

Mae Willkom
Project Manager, Hydrogeologist
Wisconsin Department of Natural Resources
1300 W Clairemont Avenue
Eau Claire, WI 54701

Mr. Jonathan Young Eagle
Contracting Coordinator
Wisconsin Department of Natural Resources
101 South Webster Street, PO Box 7921
Madison, WI 53707-7921

Dear Ms. Willkom and Mr. Young Eagle:

Re: Groundwater Monitoring and Limited Site Investigation Proposal (Rev. 4/9/13)
Onalaska Municipal Landfill Superfund Site
Sportsman Club Road
Town of Onalaska, La Crosse County, Wisconsin

Braun Intertec Corporation (Braun Intertec) has prepared this proposal for the referenced site. The scope of work presented in this proposal is based on the Wisconsin Department of Natural Resources (WDNR) February 2013, document entitled "Groundwater Monitoring and Limited Site Investigation Scope of Work" and supporting documents (attached), as well as discussions during the pre-bid meeting on February 26, 2013.

Qualifications, Skills and Experience

Founded in 1957, Braun Intertec's headquarters are located in Bloomington, Minnesota. A satellite office is located in La Crosse, WI, approximately 10 miles from the project site. Braun Intertec is a regional consulting engineering firm specializing in environmental and construction projects. Braun Intertec has a history of successfully completing large, complex projects due to our ability to provide qualified staff, equipment, and other resources of a large firm while providing client service on a local level.

Proposed Project Team

The members of the proposed project team have extensive experience in their respective disciplines and considerable experience participating on projects of this type and magnitude. Professional resumes are included. A summary of the proposed project team is provided in the following section.

Project Manager

**Kevin D. Nestingen, EIT
Staff Engineer**

As project manager, Mr. Nestingen will be responsible for the day-to-day management of the project. He brings over 6 years of experience to this role, much of it involving remediation and redevelopment sites including numerous sites participating in various WDNR programs. He also currently manages the state lead Westby Dry Cleaners Project located in Westby, WI. His responsibilities will include overseeing all phases of the project, serving as the primary contact with the WDNR and other involved parties and managing field personnel, project quality control, and the project schedule and budget. Kevin's previous experience includes site investigation, remediation, and long-term monitoring of sites managed by the WDNR's Remediation and Redevelopment program.

Technical Resource

**Mark L. Gretebeck
Principal**

Mr. Gretebeck has 23 years of experience as an environmental consultant. He has managed and provided design services on more than 80 environmental remediation projects throughout Wisconsin and Minnesota. Remediation technologies used on these projects include air stripping, dual phase pumping systems, vapor extraction, air sparging and free product recovery. In addition, he has worked on several landfill gas extraction system projects providing design and construction supervision services. Mr. Gretebeck is the Braun Interec, La Crosse office manager and will provide technical support throughout the project.

Technical Resource

**Michael T. Beck, PE
Senior Engineer**

Mr. Beck's experience includes investigation and remediation of numerous chlorinated solvent release sites under jurisdiction of the US EPA and environmental agencies from several other states. He has prepared several CERCLA-consistent feasibility studies and many less formal decision documents for selection of cost-effective remediation strategies. He has designed and implemented remediation strategies for sites with impacted soil and groundwater utilizing monitored natural attenuation, enhanced bioremediation, in-situ chemical oxidation, in-situ thermal remediation, and several other remediation technologies.

Technical Resource (sub-contracted)

**Norman Timothy Glover
Senior Environmental Scientist, AMEC**

Mr. Glover will be sub-contracted to provide supplementary interpretation of site redox conditions and their effects on concentrations of inorganics in groundwater. He is a former colleague of Mr. Beck (listed above with Braun Intertec) and has extensive knowledge and experience in evaluating monitored natural attenuation parameters at landfill sites.

Mr. Glover has more than 25 years of experience in environmental data analysis and management with emphasis on naturally occurring carbonate hydrogeochemical systems and innovative numerical methods of data analysis. His specialized skill areas include: hydrogeochemistry, hydrology (surface and groundwater), advanced statistical data analysis, numerical modeling of groundwater flow, contaminant adsorption, geochemical interaction, and solute transport, geographical information systems, environmental forensics with emphasis on past industrial practices, electronic data management systems and database administration, karst geomorphology and geochemistry.

A representative project that Mr. Glover worked on was the Dodge Hill landfill site in Ft. Sill, OK. He was the senior geochemist and statistician who statistically analyzed monitoring data for compliance to EPA and state monitoring regulations and geochemically assessed intermittent exceedances in sulfate, chloride, and monitored metals.

Field Technician

David M. Bradshaw

Environmental Field Technician

Mr. Bradshaw has conducted field work for numerous environmental investigations. His responsibilities will include collecting groundwater samples for field and laboratory analysis, collecting and documenting field data and reducing and analyzing field data. He has direct knowledge of the Onalaska Landfill site as he has been conducting the gas monitoring project for the past 7 years and also resides in the Town of Onalaska, less than 2 miles from the site.

Analytical Laboratory

Pace Analytical

Green Bay, Wisconsin

As one of the largest analytical laboratories in the U.S., Pace provides the scientific expertise and instrumentation to support variant analytical testing requirements. We will utilize the Pace laboratory in Green Bay, Wisconsin. Their Wisconsin certification number is #405132750.

Scope of Work

The scope of work presented in this proposal is based on the WDNR, February 2013, document entitled "Groundwater Monitoring and Limited Site Investigation Scope of Work" and supporting documents, as well as discussions during the pre-bid meeting on February 26, 2013.

Groundwater Monitoring Well Sampling and Analysis

- A brief Quality Assurance/Quality Control (QA/QC) Plan, as described by Section 2.10.1 of the WDNR Groundwater Sampling Desk Reference (published by the WDNR Bureau of Drinking Water and Groundwater) will be prepared and submitted for approval prior to initial sampling. Proper sampling, handling and QA/QC procedures set forth in the Groundwater Sampling Desk Reference will be referenced.

- Conduct groundwater elevation measurements from groundwater monitoring wells as depicted on the attached site map. Groundwater elevations will be obtained from each monitoring well prior to purging, according to s. NR 140.16, Wis. Adm. Code and WDNR guidance.
- Properly purge each monitoring well before sampling, according to s. NR 140.16, Wis. Adm. Code. Monitoring well purge water will be discharged to the ground per the WDNR. Dedicated whale pumps and tubing are present; however, some may require replacement. Costs for sampling equipment assume ten (10) whale pumps and tubing will require replacement.
- Measure field parameters and collect groundwater samples from the monitoring wells as depicted on the site map, for analysis at a Wisconsin Certified Laboratory. Field parameters (dissolved oxygen, ORP, specific conductance, temperature, and pH) will be measured using a multi-meter with a flow-through cell at monitoring wells from which lab samples are scheduled to be collected. Alkalinity samples for laboratory analysis will be collected during each April sampling event.
- Collect and analyze groundwater samples from the monitoring wells specified and for the parameters and frequencies listed in Attachment A. Sampling will be done in accordance with s. NR 140.16, Wis. Adm. Code. It was also assumed that one duplicate and one field blank will be analyzed for VOCs during each sampling event (8 samples total). The locations of all site monitoring wells are depicted on the attached site map.
- Analyze groundwater samples from the monitoring wells during both April sampling rounds for calcium, magnesium, sodium, potassium, chloride and sulfate. These parameters were not in the original scope of work provided by the DNR, but were approved in an e-mail correspondence on April 9, 2013.

Water Supply Sampling

- Collect samples for VOCs, metals, calcium, magnesium, sodium, potassium, chloride and sulfate from the private supply wells of four nearby residences during each April sampling event. Samples will be collected from an outside tap (before any household treatment system) after purging for a minimum of ten minutes.
- Arrange access permission from each homeowner prior to each and every private well sampling event.
- Pursuant to NR 507.26(2), Wis. Adm. Code, submit paper copies of the analytical results from the private residential water supply wells (only) within 10 days of your receipt of the data. These results will be submitted directly to the WDNR Waste and Materials Management Program Environmental Program Associate at WDNR West Central Regional Headquarters, 1300 West Clairemont Avenue, Eau Claire, WI 54701.

Reporting

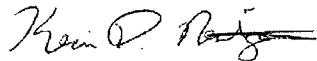
By June 30 of each calendar year (2 reports total during this contract period), submit one copy of an annual groundwater monitoring report to Mae Willkom, WDNR Project Manager, at WDNR West Central Regional Headquarters, 1300 West Clairemont Avenue, Eau Claire, WI 54701, and one copy to Demaree Collier, U.S. EPA Project Manager, at U.S. EPA Region 5, SR-6J, 77 Jackson Blvd., Chicago, IL 60604-3590, unless otherwise directed. The reports will NOT include narrative discussion of site history and background. Groundwater monitoring reports will include the following:

- Brief documentation of the monitoring procedures and activities, including any site conditions noted to be in need of attention.
- Laboratory and field analytical results by well, including a table summarizing groundwater elevations from each monitoring event, in cumulative tables in a format consistent with the existing data tables for the site. Each report will also contain the results of the private supply well sampling.
- Groundwater table contour maps from each monitoring event based on interpolation of groundwater elevations at monitoring locations. "S" and "PZ" wells will be used to contour the water table. Only "M" wells will be used to contour the mid-depth potentiometric surface.
- Water elevation contour maps for the shallow and medium depths of the aquifer and isoconcentration maps for manganese and arsenic in the shallow and medium depths of the aquifer for each round of the most recent data.
- Interpretations regarding site redox conditions and their effects on metals concentrations in groundwater. Reports will include maps and/or narrative discussion of observed redox zones, delineation of their extent, and interpretation of their relationship to known source areas and to the pattern of inorganic concentrations observed in groundwater.
- A statement from each sampling event as to the presence or absence of any ponding observed or storm water directed toward the general area of MW-5S.
- In addition to the printed groundwater monitoring reports, analytical data will be reported electronically to the WDNR GEMS database in accordance with WDNR guidance. Analysis results will be submitted to the WDNR GEMS database following each groundwater sampling event on compact discs in a data format supplied by the Department.

We appreciate the opportunity to present this proposal. Our estimated costs to complete the described scope of work are attached. Also included is an authorization for services and the Braun Interotec General Conditions, which provide additional terms and are a part of our agreement. If you have any questions or concerns, please contact Kevin Nestingen at 608.781.7277.

Sincerely,

BRAUN INTERTEC CORPORATION



Kevin D. Nestingen, EIT
Staff Engineer



Mark L. Gretebeck
Principal

Attachments:

Resumes

Attachment A – Groundwater Sampling Schedule

Attachment B – Site Plan

Attachment C – Cost Estimate, Authorization for Services, General Conditions (6/15/06)

Attachment D – Groundwater Monitoring and Limited Site Investigation Scope of Work

Resumes

EDUCATION

Bachelor of Science Environmental
Engineering
University of Wisconsin - Platteville

PROFESSIONAL CERTIFICATIONS

Wisconsin Department of Commerce,
Certified Site Assessor
No. 1043189

Minnesota Department of Transportation
Certified Concrete Technician Level I
No. 14671

American Concrete Institute Concrete Field
Testing Technician
No. 01140975

Certified Asbestos Inspector in Wisconsin,
Minnesota, Iowa

40-Hour Hazardous Waste Operations
and Emergency Response

Nuclear Moisture/Density Gauge
Radiation Safety and Operator
Training

Radioactive Materials Transportation
Training
49 CFR 172 Subpart H

Confined Space Entry Training

Fall Protection Training

e-Rail Safe CP

8 Hour HAZWOPER Refresher
Training
29 CFR 1910.120

Mr. Nestingen assists in environmental consulting and engineering. He works directly with clients and serves as the liaison between clients and regulatory officials. His responsibilities include: site investigations, groundwater monitoring, soil screening, remedial excavations, underground storage tank removal site assessments, vapor intrusion assessments, Phase I and Phase II Environmental Site Assessments and asbestos inspections.

PROJECT EXPERIENCE

- *Westby Dry Cleaner Project, Westby, WI* – State lead remediation project through the Wisconsin Department of Natural Resources. Completed remedial excavation, monitoring well installation, environmental sampling and semi-annual reporting.
- *VSC and Dorprop Dry Cleaner Environmental Response Fund Sites, La Crosse, WI* - Completed remedial excavation, drilling, environmental sampling, groundwater flow analysis, laboratory analysis, preparation and implementation of remedial action plans, vapor intrusion assessments, sub-slab depressurization system installation oversight and reporting for each site. Evaluated the extent of groundwater impacts at each site and contribution to municipal well contamination, implemented cost-effective remedial action plans with adherence to the DERF program guidelines.
- *Kwik Trip Store #753, Eyota, MN* — Completed remedial excavation and regulatory sampling for Underground Storage Tank (UST) closure. Provided scheduling for subcontracted services, and over-site of the project which included discovery of orphan tank during excavation.
- *Kwik Trip, Parkersburg, IA* — Completed project management of UST closure. Responsible for project management during UST site closure which included dewatering of a remedial excavation requiring off-site soil disposal.

WORK EXPERIENCE

- *Upper Midwest Environmental Sciences Center, La Crosse WI* — Physical science technician in the chemistry and physiology branch. Was assigned to a U.S. Geological Survey regulated study to evaluate an analytical method for determining concentrations of isoeugenol in fillet tissue from cold, cool and warm fish.

EDUCATION

Bachelor of Science, Chemistry
University of Wisconsin

**PROFESSIONAL
CERTIFICATIONS**

Certified OSHA Hazardous Waste Site
Worker and Supervisor
29 CFR 1910.120

ILHR 10 Underground Storage Tank
Removal Site Assessor

Troxler Nuclear Density
Testing Certification

Wisconsin PECFA Registered Consultant
LRA-16151

Confined Space Entry 29 CFR 1910.146
3031

Eight-Hour Hazwoper Refresher 26 CFR
1910.120 3031

American Red Cross Certified CPR and
First-Aid – Adult

Fall Protection Training

8-Hour HAZWOPER Refresher Training
29 CFR 1910.120

Mr. Gretebeck has 23 years of experience as an environmental consultant. He has managed and provided design services on more than 80 environmental remediation projects throughout Wisconsin and Minnesota. Remediation technologies used on these projects include air stripping, dual phase pumping systems, vapor extraction, air sparging and free product recovery. In addition, Mark has worked on several landfill gas extraction system projects providing design and construction supervision services.

Mark is responsible for managing environmental projects, directing and supervising field activities, coordinating contractors, and communicating with clients. Mark is also responsible for reducing and analyzing field and laboratory data, interpreting and applying regulatory statutes and guidelines, conducting environmental site assessments (Phase I/Phase II) and remedial investigations, designing corrective actions, overseeing remediation progress and preparing monitoring reports.

PROJECT EXPERIENCE:

- *Kwik Trip, Incorporated, La Crosse, WI* — As a project manager conducting environmental due diligence to facilitate real estate and property transactions throughout Wisconsin and Minnesota, Mark has helped this client with more than 50 successful commercial development sites. His responsibilities are to assess and reduce current and future environmental liabilities. Liabilities are assessed through Phase I and Phase II Environmental Site Assessments, hazardous building material inspections and geotechnical evaluations. Liabilities are reduced by assisting the client with contractual language, and by using voluntary regulatory programs. He is currently managing similar work for a variety of other commercial clients at Braun Intertec, and supervises this type of work performed by other staff members in his group.
- *Wisconsin Department of Natural Resources - Dry Cleaners Environmental Response Fund (DERF) Program, five sites in La Crosse, WI* — Mark managed the One Hour Cleaners and Boulevard Cleaners DERF projects. He has successfully defined the degree and extent of tetrachloroethylene (dry cleaning solvent) soil and groundwater impacts at both sites. He developed Remedial Action Options Reports and is currently implementing the long-term remedies to address the contamination while protecting impacted City of La Crosse municipal wells.
- *Village of Stratford, Stratford, WI* — Mark completed a remedial alternatives evaluation for the village of Stratford to address a municipal well impacted by a release of chlorinated VOCs. As part of the project, he evaluated remedial alternatives based on feasibility, costs and effectiveness, and provided recommendations for addressing the problem.

MARK L. GRETEBECK

Principal

- *Wausau Chemical Corporation Tetrachloroethylene (Dry Cleaning Fluid) Spill, Wausau, WI* — Mark completed a full scale performance evaluation, designed system modifications and adjusted operating parameters on an environmental remediation system installed by others. The system was failing to contain and remediate impacted groundwater, which was threatening the municipal water supply. Following Mark's improvement recommendations, system efficiency improved significantly, resulting in the subsequent attainment of remediation goals for the project.
- *Price County Highway Department Groundwater and Soil Remediation Site, Prentice, WI* — Mark completed a remedial investigation and risk assessment at a county highway shop where a private well had been impacted by a petroleum release. He developed and implemented a remedial action plan that addressed petroleum and chloride impacts to both soil and groundwater. He designed and operated the remediation system for four years, during which time soil and groundwater quality had been restored to levels that allowed the system to be de-activated. For this project, he also negotiated and obtained a WPDES discharge permit for discharging system effluent to an "exceptional resource" water body.
- *Jackson County, Portage County, and Town of Weston Sanitary Landfill Sites, WI* — Mark managed the operation, maintenance and performance optimization of methane gas extraction systems at these three landfill sites. Primary responsibilities and duties included: system construction supervision, coordinating O&M technicians, troubleshooting electrical and mechanical equipment, evaluating performance data to maximize system efficiencies, and regulatory reporting.
- *Wausau West High School Asbestos Abatement Project - Phases 1, 2 and 3, Wausau, WI* — Mark managed a multi-phase school building asbestos abatement project. Responsibilities included air quality and clearance sampling during abatement, developing and implementing a project safety program, and maintaining project budgets and schedules. He also was responsible for designing and testing abatement enclosures to ensure proper containment of asbestos materials.
- *Wisconsin Department of Commerce, Petroleum Environmental Cleanup Fund Act (PECFA), Statewide, Wisconsin* — Mark serves as project manager and client contact for numerous PECFA sites. Site investigation and remediation activities have led to regulatory closure at many of the sites.

EDUCATION

M.S., Environmental Engineering, Stanford University, Stanford, CA, 1993

B.S., Environmental Engineering, University of Minnesota, Minneapolis, 1991

PROFESSIONAL CERTIFICATIONS

Professional Civil Engineer, MN
No. 40470, 2000

Professional Engineer, WI
No. 34144-6, 2000

Professional Engineer, CA
No. C54860, 1995

Professional Civil Engineer, KY
No. 22506, 2002

Professional Engineer, ND
No. PE5478, 2005

Mr. Beck applies his background in civil and environmental engineering to soil and groundwater investigation and remediation projects. He has significant experience developing risk-based remediation strategies for redevelopment projects and has directed design and implementation of numerous redevelopment projects that involved soil and groundwater investigation and remediation, restricted waste abatement, demolition, and geotechnical soil correction to support site development. Mike has also led design efforts and performed construction oversight for several environmental restoration projects. He is proficient at designing and implementing remedial investigation programs and preparing feasibility studies following CERCLA guidance and less-formal remedial alternative decision documents. He has also designed and overseen construction of active remediation systems to address impacted soil and groundwater.

REDEVELOPMENT PROJECTS

- **Redevelopment of a Former Bronze Foundry, Real Estate Recycling, Milwaukee, WI* — Developed a remedial action plan (RAP) for an 18-acre former bronze foundry. Soil and groundwater were impacted with metals, polyaromatic hydrocarbons (PAHs), and trichloroethylene (TCE) from 90 years of foundry operations and placement of several feet of undocumented fill. The RAP included site-specific cleanup standards that allowed placement of impacted soils below future buildings and pavements in lieu of costly off-site disposal. The RAP outlined a plan for demolition of more than 350,000 square feet of existing buildings, including removal of asbestos and other restricted (universal) waste. Designed and managed implementation of geotechnical soil correction that included excavation and placement of more than 200,000 cubic yards of fill soils and recycled concrete. The remedial actions for site soils were integrated with soil correction and construction of four on-site buildings. Two soil vapor extraction systems were designed and operated to remove TCE from soil in two distinct source areas. A natural attenuation remedy is currently being implemented to address TCE-impacted groundwater.
- **Residential Redevelopment, Bridgecreek St. Paul LLC, St. Paul, MN* — Prepared detailed plans and specifications that facilitated excavation and reuse of up to 45 feet of undocumented fill and construction debris from a former landfill that was redeveloped into a four-story senior housing center. More than 70,000 cubic yards of fill and waste was excavated and reused on-site. An underfloor venting system was incorporated into the building design to prevent methane from migrating into the building from municipal solid waste that remains buried adjacent to the building. During construction, Mike worked closely with the contractor and a geotechnical subconsultant to ensure that compaction requirements were met below the building.

**While employed by another firm.*

MICHAEL T. BECK, PE
Senior Engineer

- **Remedial Design and Construction Oversight, Wisconsin Department of Natural Resources, West Milwaukee, WI* - Prepared a remedial design report and detailed plans and specifications that facilitated redevelopment of a 4-acre former steel foundry site into a commercial office building. Performed contract management and led the construction oversight team during construction. The project included removal and off-site disposal of fill material containing miscellaneous solid wastes; removal and off-site disposal of free-phase petroleum product by excavating impacted soils and pumping affected groundwater; and construction of an under-floor venting system below the new office building.
- **Remedial Design Incorporating Site Development, Real Estate Recycling, Milwaukee, WI* — Developed an environmental and geotechnical remedial design for a site impacted with foundry waste. A developer client intends to construct a 100,000-square-foot office/warehouse building on this site. Planned and managed implementation of environmental sampling that addressed data gaps related to the extent of lead and volatile organic compound impacts in soil and groundwater. Worked closely with a geotechnical engineering subconsultant and the client's civil engineer to plan and implement a geotechnical investigation that resulted in development of a soil management plan for the site. The soil management plan focuses on consolidating lead-impacted foundry waste below the future building and associated pavement areas to minimize costly off-site disposal. Geotechnically unsuitable soils with chemical impacts will be placed in landscaping areas below 3 feet of non-impacted soil. The remedial design was approved by the Wisconsin Department of Natural Resources.
- **FS/RAP Preparation and Implementation, City of Emeryville, Emeryville, CA* — Prepared a feasibility study and remedial action plan following CERCLA guidance for selection of a remedial alternative for a former pesticide manufacturing and packaging facility. Implementation of the selected alternative was complicated by extremely high concentrations of heavy metals and hydrogen sulfide in soil, which posed a potential threat to nearby industrial and residential receptors. Mike developed a perimeter air monitoring program and designed engineering controls to prevent airborne chemicals of concern from migrating off site. Also prepared plans and specifications for remediation contractor selection, and performed contractor oversight activities during remedial construction.

REMEDATION PROJECTS

- **Corrective Action Plan Implementation at former Motor Pool, Presidio Trust, San Francisco, CA* — Prepared a Corrective Action Plan Implementation Work Plan and construction bid specifications for removal of petroleum impacted soil. The impacts were related to motor pool operations by the U.S. Army at this former military installation. Mike developed a plan for realignment of a

**While employed by another firm.*

MICHAEL T. BECK, PE
Senior Engineer

major street and presented the plan at a National Park Service (NPS) Board meeting. Mike led the construction oversight team during 9-month long field program and presented confirmation sampling results to state regulators and the NPS at weekly data meetings. He led efforts to improve the laboratory's silica gel cleanup process, develop protocols for distinguishing a petroleum release from asphalt and coal, and fingerprinted ambient metal conditions to determine background concentrations of metals in fill.

- **CERCLA Response Action, Presidio Trust, San Francisco, CA* — Prepared a Remedial Action Plan Implementation Work Plan and construction bid specifications for removal of impacted soil at 12 CERCLA Sites scattered throughout the Presidio. Mike managed the construction oversight team during a 12-month long field program that included excavation of over 20,000 cubic yards of soil impacted by former U.S. Army operations. Mike presented confirmation sampling results to state regulators and other project stakeholders during regular data meetings. Unexploded ordinance (UXO) was encountered in the field and Mike developed a plan for monitoring active work areas for UXO, which allowed the work to proceed in a safe manner without impacting the project schedule.
- **Corrective Action Plan Implementation at Former Gas Station, Presidio Trust, San Francisco, CA* — Amended a Corrective Action Plan Implementation Work Plan and construction bid specifications for removal of petroleum impacted soil in the vicinity of a former gas station. The project schedule for this work was accelerated due to the Doyle Drive freeway relocation project that was about to get underway at the Site. Management of utilities located within the extent of the excavation was a significant challenge during this project. To streamline the regulatory approval process, Mike presented a summary of the project to project stakeholders on the Client's behalf during a public meeting. Mike led the construction oversight team during a 2-month long field program.
- **Remediation Near Existing Child Care Facility, Commercial Client, Poughkeepsie, NY* — Managed an environmental remedial action that involved excavation of approximately 7,000 cubic yards of petroleum-impacted soil resulting from a UST release. Because impacted soil extended onto an operating child care facility, construction was performed during the facility's winter break. Notable technical challenges during this project included performing construction (including dewatering) during winter conditions and utilizing shoring to protect adjacent buildings and associated utilities. Mike prepared detailed plans and specifications for selection of the remediation contractor, performed construction oversight and contract management during construction, and communicated with the site owner, city engineers, and the operator of the adjacent child care facility.
- **Construction Oversight and Site Operation and Maintenance, Commercial Client, Salisbury, MD* — Directed construction oversight activities at a 60-acre former wood treating site. The remedial solution at this site included

**While employed by another firm.*

construction of a 6,000 foot long slurry wall to contain DNAPL; an associated hydraulic control system that incorporates phytoremediation; relocation of a creek that crossed the planned hydraulic barrier location; injection of air into impacted groundwater areas to promote in situ bioremediation; extraction of DNAPL with recirculating groundwater wells; and construction of a surface cover system to minimize potential exposure to affected surface soils. Remedial construction was particularly complex due to the presence of geotechnically unstable, organic soils. Following remedial construction, managed the start-up of the active remediation components, and managed the operation and maintenance activities at the site for 5 years.

- **Paper Sludge Landfill Closure Design, Commercial Client, Eau Claire, WI* — Designed a modified closure plan for a 6-acre paper sludge landfill cell in western Wisconsin. The landfill cell was not filled to capacity and paper sludge had not been added to the landfill in more than five years because the operating company filed bankruptcy. Because no temporary cover was present on the landfill cell, the paper sludge was saturated with rain water and exhibited very low strength. Mike developed a modified closure plan that addressed unstable sludge conditions by reducing the final landfill grades, incorporating a geosynthetic clay liner (GCL) in lieu of compacted clay, and incorporating light-weight fill material to minimize long-term settlement. Mike also developed plans for landfill gas venting, leachate collection, and storm water control and prepared technical specifications and design drawings that presented the details of the closure design and obtained approval from the Wisconsin Department of Natural Resources.

REMEDIAL INVESTIGATION/FEASIBILITY STUDIES

- **Managed Site Investigation at Former Explosives Manufacturing Facility, Developer Client, Hercules, CA* — Managed soil characterization activities and for a 104-acre site under a voluntary site cleanup agreement with the California Department of Toxic Substances Control (DTSC). This site was formerly used as an explosives manufacturing facility. Prepared and managed the implementation of work plans, which involved (a) performing freshwater bioassay testing to determine site-specific remediation criteria for metals in existing and future wetland areas at the site, and (b) efficiently characterizing the presence of nitroaromatics and metals in soil in upland portions of the site using a screening-level analytical technique. After completion of site characterization activities, worked closely with the client and its technical consultants to develop a remediation plan, which accommodated the client's plans for future development of the site.
- **Alternatives Evaluation for a Solvent Release Site, Office Park Owner, Menlo Park, CA* — Prepared a FS/RAP following CERCLA guidance for selection of a groundwater remediation remedy for a site under a Site Cleanup Order by the California Region Water Quality Control Board (Water Board). Developed

**While employed by another firm.*

several candidate alternatives and evaluated each alternative with respect to the nine evaluation criteria specified under CERCLA. As part of this evaluation, prepared detailed capital and operational cost estimates for each alternative. Monitored natural attenuation was selected as the most appropriate groundwater remediation alternative. After approximately four years of groundwater monitoring, final closure of this site was obtained from the Water Board.

- **Feasibility Study for Solvent Release Site, Industrial Client, Fullerton, CA* — Developed a feasibility study (FS) for selection of an in-situ remediation technology to address TCE-impacted groundwater. Mike developed site-specific approaches for in-situ chemical oxidation, enhanced bioremediation, and treatment with zero-valent iron and compared the approaches with respect to effectiveness, impermeability, and cost. An enhanced bioremediation remedy was selected in the FS and approved by the state regulators. He also designed and implemented pilot study and incorporated the results into the design for full-scale treatment.

REMEDATION SYSTEM DESIGN AND OPERATION OVERSIGHT

- **Oversight of SVE System Operation and Client Advocacy for Site Closure, Commercial Client, Menlo Park, CA* — Provided oversight of soil vapor extraction system operations at a former helicopter manufacturing facility. The oversight included reviewing quarterly sampling and monitoring reports, supervising maintenance activities, and communicating with the client regarding system operation. Prepared a report showing that full-time SVE system operation was no longer cost-effective at this site, which resulted in regulatory agency approval to operate the SVE system in a “pulsed” mode. Pulsed SVE system operation consisted of seven-week “resting” periods, followed by one week of normal SVE system operation. After approximately one year of “pulsed” SVE system operation, Mike prepared a report proposing permanent shutdown of the SVE system, which resulted in regulatory agency approval to terminate SVE system operation at this site.
- **Design for Treatment System Relocation, Commercial Client, Palo Alto, CA* — Prepared civil-site drawings for relocation of a soil and groundwater treatment system. The treatment system relocation was required to accommodate a site redevelopment project. The drawings outlined specifications for demolishing the existing treatment system, which consisted of a soil vapor extraction system and a groundwater extraction and treatment system. The drawings also included specifications for constructing a similar system several hundred feet from the original location. The new system treats groundwater using a low-profile air stripper and vapor-phase granular activated carbon (GAC). After treatment, the groundwater is reused for landscape irrigation.
- **Free Product Recovery System Design, LAX Airport, Los Angeles, CA* — Designed layouts for the above-grade and below-grade portions of six

**While employed by another firm.*

MICHAEL T. BECK, PE
Senior Engineer

extraction wells for a free-phase jet fuel recovery and groundwater treatment system at a major international airport. The recovery system consists of a groundwater suppression pump and jet fuel recovery pump installed within each extraction well at depths greater than 100 feet. The recovered jet fuel is pumped directly into storage tanks. The extracted groundwater is pumped through a low-profile air stripper and GAC vessels prior to discharge.

- **Technical Specifications for Catalytic Oxidizer and Air Stripper for VOC Treatment, Commercial Client, St. Thomas, U.S. Virgin Islands* — Prepared plans and specifications for a catalytic oxidizer and air stripper constructed to remediate soil and groundwater containing VOCs at a site in the U.S. Virgin Islands. Additional work on this project included communicating with selected equipment suppliers and reviewing shop drawings submitted by the equipment suppliers prior to construction.

**While employed by another firm.*



Norman Timothy Glover
Senior Environmental Scientist

Experience

Mr. Glover has more than 25 years of experience in environmental data analysis and management with emphasis on naturally occurring carbonate hydrogeochemical systems and innovative numerical methods of data analysis.

Specialized skill areas include: • hydrogeochemistry • hydrology (surface and groundwater) • advanced statistical data analysis • numerical modeling of groundwater flow, contaminant adsorption, geochemical interaction, and solute transport • geographical information systems • environmental forensics with emphasis on past industrial practices • electronic data management systems and database administration • karst geomorphology and geochemistry.

Education

B.S., Chemistry (American Chemical Society Approved Program) Florida State University, Tallahassee, Florida, 1983

Representative Projects

Brunswick County Landfill, Brunswick County, NC – Senior geochemist and statistician. Statistically analyzed monitoring data for compliance to EPA and state monitoring regulations based on U.S. EPA guidance documents: "Statistical Analysis of Ground-water Monitoring Data at RCRA Facilities, Interim Final Guidance," dated April 1989 and the "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance", dated July 1992.

Dodge Hill landfill, Ft. Sill, OK - Senior geochemist and statistician. Statistically analyzed monitoring data for compliance to EPA and state monitoring regulations and geochemically assess geochemistry of intermittent exceedances in sulfate, chloride, and monitored metals

State of Michigan, Department of Natural Resources – Senior Geochemist. Developed data management system, GIS, and three-dimensional model of contaminant distribution for an industrial landfill site.

Presidio, San Francisco – Senior geochemist – Through the use of spatial statistics, inorganic geochemical modeling using PHREEQC, and advanced 3D visualization techniques determined anomalous spikes in arsenic concentrations in groundwater were likely due not to releases but were the reaction of the aquifer to hydrocarbon spills affecting redox conditions. Reduced conditions released naturally-occurring arsenic bound to the soil that was slow to re-precipitate once oxidizing conditions were restored.

Doha Utilities, Doha, Qatar – Senior geochemist, review of monitoring results for aquifer storage and recovery project to determine potential for gypsum caprock dissolution and leakage to overlying drinking water aquifer.

Former Sulfuric Acid and Fertilizer Plant, Athens, Georgia – Senior geochemist. Developed a geochemical site conceptual model encompassing the disposal of previous raw materials and demolition debris from removal of the facility, site geology and surface water and groundwater hydrology. Developed equilibrium models (using USGS phreeQC) to assess multiple sources of contamination, their eventual mixing with off-site surface water, and results of various potential remediation efforts, along with modeling of adsorption of metal contaminants to geomaterials at various pH values. Also developed a 3D geographical information system representation of the site using Equis data management system and Arcview to present results and assess further investigation goals

Theissen Krupp Stainless Steel – Senior geochemist and groundwater modeler. Developed analytical element groundwater flow model (Bluebird) and 3D finite difference flow model (MODFLOW) for design of supply well network in a surficial sand and gravel aquifer strongly influenced by river recharge. Also assessed geochemistry of test production well to assess production water quality issues relative to process criteria including dissolved chemical effects of nearby intruded salt dome.

Power Plant, Bahamas – Senior Geochemist. Geochemical investigation and analysis that determined severe scaling, brass fixture corrosion, and odor problems in and around cooling water system due to interactions of saline groundwater, sulfate-reducing bacteria, and hydrocarbons from possibly multiple sources including on-site disposal methods (drainage wells) and nearby petroleum refinery practices.

Georgia Environmental Protection Division, Emerson, Georgia, U. S. – Technical lead responsible for developing a groundwater basin delineation plan for a spring used as a public drinking water supply. The spring is in a partially-exposed, fractured dolostone aquifer overthrust by metamorphic thrust sheets in a barite and ocher mining district in northern Georgia. Assessment included inorganic geochemical water typing, hydrogeologic constraints, and tritium water dating for identification of recharge areas for the spring.

Shale gas Producer, Pennsylvania, U.S. - Senior geochemist/statistician – Developed inorganic geochemical groundwater comparison methodology to compare pre- and post-development groundwater sampling information in assessing possible effects of shale gas drilling and hydraulic fracturing on private drinking water supply wells and surface water bodies, taking into account local prior petroleum drilling and coal mining activities, seasonal variability of recharge, and proximities to groundwater recharge and discharge areas.

Metal fabrication client, Michigan - Senior Geochemist. Responsible for statistically interpreting surface soil analyses using geostatistics to plan the

next phase of investigation and investigating the geochemistry involved in remediating slag from a site that used a thorium-magnesium alloy. Also determined most likely chemical form of thorium residue as input to NRC hazardous material model for site closure.

Former fertilizer packing and shipping location, Little Rock, AR – Senior Geochemist developed inorganic geochemical analysis of arsenic mobilization in groundwater from changing redox conditions and desorption from soils due to competing phosphate ions.

Presidio, San Francisco, CA, U.S. - Senior Geochemist. Determination of probable source of mercury in groundwater near former NIKE anti-missile system silos. Monitoring well in question was drawing water from serpentinite bedrock affected by localized hydrothermal alterations including addition of low-grade mercury mineralization.

Former mercury mine, SW Alaska, US. Senior geochemist/statistician responsible for developing plan for conformational sampling of soils and sediments after removal of ore processing residues and equipment, along with petroleum spills. Also developed background target values and assessed bioavailability of naturally-occurring mercury in ore remnants based on sequential extraction methodologies.

Honeywell electronic equipment manufacturer, Ft. Washington, PA - Senior geochemist/statistician – Geochemically assessed chlorinated solvent plume for evidence of natural biodegradation and preliminary feasibility of monitored natural attenuation for as remediation. Process included spatial distribution of parent and daughter product ratios, application of USEPA's protocol for assessment of chlorinated solvent degradation, and interpretation of redox and geochemical conditions along with plume stability.

Former metalworking shop, Atlanta, GA - Senior geochemist/statistician – assessed efficacy of sparging remediation efforts and the possibility of an off-site contamination source based on parent/daughter molar ratios and total moles of contaminants before and after treatment, plus the spatial and temporal fingerprinting of parent/daughter ratios.

Chemical Producer Client, Southeastern U.S. – Senior geochemist/statistician – Developed and applied parametric and non-parametric biostatistical methods for assessing the effects of mercury on wildlife along a river corridor. Tasks included assessing environmental concentrations and co-located tissue concentrations, breeding efficiency, hatching and fledging efficiencies, determining biological concentration factors at various trophic levels, morbidity rates, and comparison of tissue concentrations upstream and downstream of the site. Subjects included bats, songbirds, and predatory birds, several trophic levels of fish, crayfish, shellfish, earthworms, and periphyton.

Southwire copper processing facility, Carrolton, GA – Senior geochemist and statistician. Developed site-specific metals background values for metals associated with secondary smelting of copper scrap. Statistical evaluation

included parametric and non-parametric tools to determine upper defensible prediction limits for metals.

Southwire copper processing facility, Carrolton, GA – Senior geochemist and statistician. Used methods in AFCEE's MAROS package to determine efficiency of existing monitoring well plan to optimize analytes being sampled and spatial redundancy of monitoring wells for proposed permit modification to optimize compliance.

Secondary Metal Manufacturer, southeast US (secondary lead smelter) – Senior geochemist and statistician. Developed regional background data set to assess ambient lead concentrations from natural sources, traffic exhaust fallout, and paint pigment washdown. Data set included city-wide random-origin grid to assess regional values plus additional sampling along various roads with varying traffic loads and ages to determine distance of auto-exhaust lead effects.

Presidio, San Francisco – Senior geochemist/statistician – Developed site-specific background concentrations for metals and PAHs for setting cleanup goals based on site samples and regional studies.

Chemical Manufacturer, Southeastern U.S. – Senior geochemist/statistician – Developed and applied parametric and non-parametric biostatistical methods for assessing the effects of mercury on wildlife along a river corridor. Tasks included assessing environmental concentrations and co-located tissue concentrations, breeding efficiency, hatching and fledging efficiencies, determining biological concentration factors at various trophic levels, morbidity rates, and comparison of tissue concentrations upstream and downstream of the site. Subjects included bats, songbirds, and predatory birds, several trophic levels of fish, crayfish, shellfish, earthworms, and periphyton.

Chemical Manufacturer, Mid-Atlantic States, U.S. – Senior geochemist/statistician – Developed and applied biostatistical methods for assessing biological accumulation factors for several organisms, comparison of tissue concentrations between trophic levels of fish, and comparisons of concentrations correlations between fish and sediment contaminant concentrations.

Honeywell Chromium ore processing site, Hudson County, NJ – Senior geochemist. Consulting geochemist for investigation and remediation of chromium ore processing residue disposal sites across the county.

U.S. Navy – Senior Geochemist. Developed statistical, geochemical and graphical methods to delineate extent of congener-specific dioxin contamination from an Agent Orange storage facility. Demonstrated extent of facility-related contamination based on different congener mixtures from storage activities, off-site activities, and regional dioxin background.

ThermoKing, Louisville, Ga – Senior Geochemist. Developed and implemented a geochemical investigation and dye trace study to assess the likelihood of cross-contamination of two aquifers by chlorinated solvents and 1,4 Dioxane.

State of Florida Department of Environmental Protection - Senior groundwater modeler. (acting as technical resource for the Department) Reviewed and critiqued 3D finite difference flow model (MODFLOW) submitted by permittee for a beryllium fabrication plant. Worked with Department and permittee to develop a plan to address model's many shortcomings and generate an acceptable model to support further site remediation. Also reviewed development of MT3D solute transport model for chlorinated solvents and 1,4 Dioxane based on the flow model.

State of Florida Department of Environmental Protection - Senior groundwater modeler. (acting as technical resource for the Department) Reviewed and critiqued 3D finite difference flow model (MODFLOW) submitted by permittee for a phosphate mine and processing plant complex. Worked with Department and permittee to develop a plan to generate an acceptable model to support further site remediation.

State of Florida Department of Environmental Protection - Senior groundwater modeler. (acting as technical resource for the Department) Reviewed and critiqued 3D finite difference flow model (MODFLOW) submitted by permittee for a former manufactured gas plant. Worked with Department and permittee to develop a plan to generate an acceptable model to support further site remediation and overcome shortcomings in initial conceptual site model.

Honeywell Fairfield Tar Plant, Fairfield, AL – Senior geochemist. Developed sample plan and geochemical model for investigation of 100 year old tar plant before plant demolition

Grand Gulf, MS – Senior groundwater modeler. Developed analytical element groundwater flow model (Bluebird) for initial design and 3D finite difference flow model (MODFLOW) for final design to assess efficacy and range of influence of construction dewatering system for building foundations for a nuclear reactor building

State of Florida Department of Environmental Protection - Senior groundwater modeler. (acting as technical resource for the Department) Reviewed 3D finite difference flow model (MODFLOW) submitted by permittee for a closed phosphate mine and processing plant. Worked with Department and permittee to develop an acceptable model to support further site remediation

Power4Georgians – Senior groundwater modeler. Developed analytical element groundwater flow model (Bluebird) for initial design and 3D finite difference flow model (MODFLOW) for final design to assess effects of 16

MGD of groundwater withdrawal for cooling and optimize county-wide well network to minimize drawdown effects.

Defense Logistics Agency, Richmond, Virginia – Senior geochemist, responsible for data interpretation, report generation, and review. Applied nonparametric statistical, geostatistical, and hydrogeochemical methods of data analysis to the contaminant extent, transport, hydrostratigraphy, remediation feasibility, geophysical exploration, surface water and groundwater hydrology and interaction, and groundwater flow paths in saprolitic piedmont terrains. Developed Arcview-based geographic information system of the site and surrounding hydrologic basins. Particular emphasis was placed on biotic and abiotic dehalogenation of chlorinated solvents and methods of developing a statistically-valid background data sets in an industrial complex.

U.S. Navy, Jacksonville, FL – Senior Geochemist. Developed inorganic geochemical site conceptual model for leachate from a domestic waste landfill being advectively transported to a surface water discharge point.

Comprehensive Long-Term Environmental Action, Navy (CLEAN), Tallahassee, Florida. Senior geochemist responsible for data interpretation, data management and report generation and review. Applied nonparametric statistical, geostatistical, and hydrogeochemical methods of data analysis to the contaminant extent, transport, hydrostratigraphy, and groundwater flow paths in coastal plain and buried karst terrains. Developed a central data repository and sample tracking system based on Oracle and MS Access. Developed graphical information systems (GIS) in ESRI's ARCVIEW for data presentation and interpretation. Developed nonparametric statistical methods to determine background concentrations of potential contaminants for industrial sites. Developed nonparametric statistical population comparison methods to demonstrate delineation of contaminant extents. Applied methods of geostatistics (kriging) to guide direct-push technology (DPT) investigations based on onsite analysis of just-acquired samples to determine new sample locations, thereby minimizing investigation costs. Helped develop and analyze community surveys for exposure quantification and risk assessment. Used geostatistical methods to determine most probable volumes of contaminated soils at an abandoned munitions disposal area. Prepared and reviewed descriptions of contaminant fate and transport for a wide range of contaminants including volatile and semivolatile organics, naturally occurring and anthropogenic inorganics, solvents, polychlorinated biphenyls pesticides, fuels, heavy metals, and naturally occurring and synthetic radioactive isotopes.

U.S. Navy – Senior Geochemist. Developed data management system for tracking witnesses, documents, and individual land parcels for litigation support.

Metal working client, South Carolina, US – Senior Geochemist. Developed geochemical model, data management system, and GIS for in-situ chromium passivation system.

Environmental restoration consultant – Senior Geochemist. Developed three computer-generated three-dimensional videos depicting models of stratigraphy and contaminant extent for a site with complex history on buried karst.

Pesticide manufacturing client, California – Senior Geochemist. Developed a statistically rigorous methodology to calculate exposure point concentrations for risk assessment of residential exposure to DDT.

Ft. Campbell, Kentucky – Senior Geochemist. Developed a comprehensive environmental quality GIS, combining legacy CAD and analytical data format loaders and a simple user interface.

Chemical manufacturing client, Michigan - Senior Geochemist. Responsible for statistically interpreting subsurface soil analyses to rule out presence of remaining contamination on property in use as a manufacturing site for over 100 years, prior to it being sold.

Pesticide manufacturing client, Tampa, Florida - Senior Geochemist. Responsible for statistically interpreting multiple rounds of surface soil analyses using geostatistics and GIS to plan the next phase of investigation.

Iron mine, Upper Peninsula, Michigan - Senior Geochemist. Responsible for investigating the geochemical parameters necessary to implement innovative anoxic limestone drains to remediate acid runoff from an abandoned iron ore mine.

Florida Department of Environmental Protection acting for Escambia County (Florida) Utilities Authority - Senior geochemist. Responsible for the development and population of a geographical information system to combine current site investigation data and existing historic investigation data. Also responsible for the determination of the likely sources of contamination now being found in three municipal supply wells, and to identify existing data gaps and future directions of investigation in this determination.

Pinellas STAR Center, Pinellas Co., Florida – Senior Scientist. Former Dept. of Energy nuclear weapons trigger assembly plant. Responsible for senior review of flow model (MODFLOW) and oversight of solute fate and transport model (MT3D) for site-wide model of chlorinated solvent plumes, including biodegradation, natural attenuation, and active remediation pathways.

Representative Projects While With State of Florida, Department of Environmental Regulation, Tallahassee, Florida, 1984-1993

Environmental Specialist, Ambient Groundwater Quality Monitoring Network. In charge of data management and data analysis for the Groundwater Quality Monitoring Network, a project of over 2000 wells sampled regularly for over a hundred organic and inorganic parameters. Developed a microcomputer-based data management system with graphical pre and postprocessing capabilities to manage over 250,000 records and allow ad hoc real time querying. Operated first electronic bulletin board in FDER to give the general public access to project data. Developed and implemented advanced statistical analysis methods, both parametric and nonparametric, for data reduction purposes. Was one of two coadministrators on a thirty-two node peer-to-peer local area network. This included hardware and software installation and debugging and daily administrative duties. Also was Divisional Personal Computer Administrator. Duties included advising Bureau of Information Systems and Senior Management on microcomputer policy for hardware and software purchasing, agencywide networking, standardization of software, user support, and also included first-line support for Bureau and Divisional users with hardware and software problems. Was Section hydrogeochemist, specializing in karst geochemistry and chemical reactions in natural groundwater.

Publications and Presentations

- 1985. "A Generalized Well Information Inventory System", Practical Applications of Groundwater Models, National Water Well Association, Columbus, Ohio, August.
- 1986. "Organization and Implementation of Florida's Statewide Ambient Groundwater Quality Monitoring Network", Southeastern Ground Water Symposium, Florida Water Well Association, Orlando, Florida, October (with Humphreys, C. L., G.L. Maddox., R. Copeland).
- 1986. "Data Management for the Ambient Groundwater Monitoring Network", Southeastern Ground Water Symposium, Florida Water Well Association, Orlando, Florida, October.
- 1987. "A Comparator Value for Targeting Monitor Networks", Southeastern Ground Water Symposium, Florida Water Well Association, Orlando, Florida, October (with G. Maddox).
- 1988. "Graphical and Statistical Methods of Outlier Determination in Background Water Quality", Southeastern Ground Water Symposium, Florida Water Well Association, Orlando, Florida, October.
- 1989. "Data Management, Cleanup, and Analysis for Florida's Ambient Background Ground Water Monitoring Network", National Symposium on Water Quality, United States Geological Survey, Orlando, Florida November.
- 1990. "Editing, Managing, and Analysis of Data for Florida's Groundwater Quality Monitoring Network", Fourth National Outdoor Action Conference on Aquifer Restoration, Ground Water Monitoring, and Geophysical Methods, National Water Well Association, Las Vegas, Nevada, May.
- 1994. "Confirmation of Ground-Water Flow Direction and Delineation of Contaminant Source Area at a NPL Site using Ground-Water

- Hydrochemical Data", 1994 Annual Meeting of the Association of Engineering Geologists, Williamsburg, Virginia, October (with Daniel, J. H., P. McGuire, K. Stricklan).
1995. "The Use of Geochemical Methods in the Investigation of a Hazardous Waste Site in Covered Karst Terrain", Fifth Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst, Gatlinburg, Tennessee, April (with Daniel, J. and A. Lonergan).
1995. "The Use of Geochemical Methods in the Investigation of Hazardous Waste Sites", National Ground Water Association's 1995 Outdoor Action Conference, Las Vegas, Nevada, May (with A. Lonergan and J. Daniel).
- 1996 "Soil and Sediment Dioxin Analytical Variability at Risk-Based Concentrations", Thirty-fifth Annual Meeting of the Society of Toxicology, Anaheim, California, March (with Dulaney, M., P. Baxter, G. Watson, and A. Conrad).
2000. Co-taught "Using Data Quality Objectives to Optimize Data Collection", Twenty-first Annual Meeting in North America of Society of Environmental Toxicology and Chemistry, Nashville, Tennessee, November, 12-16, 2000. (With B. DeShields and A. Blake)
2001. Co-taught "Using Data Quality Objectives to Optimize Data Collection", Twenty-Second Annual Meeting in North America of Society of Environmental Toxicology and Chemistry, Baltimore, Maryland, November, 11-15, 2000. (With B. DeShields and A. Blake)
2001. "Consequences of Misapplying Confidence Limits When Determining EPCs", Twenty-Second Annual Meeting in North America of Society of Environmental Toxicology and Chemistry, Baltimore, Maryland, November, 11-15, 2000.
2002. "Consequences of Misapplication of Confidence Limits" in Learned Discourse Section of *Globe*, Society of Environmental Toxicology and Chemistry, July-August, 2002.
2005. "Using GIS to Assess Potential Abiotic Degradation of Chlorinated Ethenes", Joint Services Environmental Management Conference, Tampa, Florida, April 11-15, 2005.
2007. "Chromium Transport Under Complexly Inhomogeneous Redox and pH Conditions", Battelle's Ninth International In-situ and On-site Bioremediation Symposium, Baltimore, Maryland, May 10, 2007. (With T. Toskos)

Last Updated 7 March 2013.

EDUCATION

B.S., Geography and Earth Sciences
University of Wisconsin –
La Crosse, La Crosse, WI

**PROFESSIONAL
CERTIFICATIONS**

Asbestos Inspector
Initial Training Course
TSCA 206 Title II
No. 5LM07270503II

40-hour HAZWOPER Certification and
annual refresher training

Site Assessor for UST Removal
State of Wisconsin
No. 996481

OSHA 29 CFR 1910.120
Hazmat Training

OSHA 29 CFR 1910.132
Personal Protective Equipment Training

OSHA 29 CFR 1910.134
Respiratory Protection Training

8 Hour HAZWOPER Refresher Training
29 CFR 1910.120

American Red Cross Certified CPR – Adult

Confined Space Entry Training

Fall Protection Training

American Concrete Institute
Concrete Field Testing Technician Grade I
No. 01051838

Nuclear Density Gauge & Radiation Safety
Training

Radioactive Materials Transportation
Safety Training

Mr. Bradshaw's responsibilities include Phase I and Phase II environmental site assessments. His duties include client communication, project reporting, conducting field studies, site reconnaissance, historical research, data collection, soil and water sampling for various parameters, soil screening, asbestos inspections, hazardous building materials surveys and construction materials testing.

PHASE I ENVIRONMENTAL SITE ASSESSMENTS

Mr. Bradshaw has completed over 100 Phase I and Phase II environmental site assessments throughout Iowa, Minnesota, Ohio, Nebraska, Colorado, Arizona and Wisconsin in accordance with the ASTM-1527 standards and 40 CFR Part 312.21.

David's Phase I investigations have included:

- Institutions
- Brownfield sites
- Various commercial and industrial properties
- Developed/undeveloped farmland
- Bulk fuel storage/gas stations/convenience stores

**ASBESTOS/LEAD AND HAZARDOUS BUILDING MATERIAL
INSPECTIONS**

David has conducted and/or managed more than 150 asbestos, lead and hazardous material/special waste inspections at Braun Intertec. These inspections have been performed for property transactions, renovation/demolition projects, and general building health and safety.

**PROPERTY EXPANSION PROJECTS AND OTHER SERVICES FOR
CLIENTS**

- Phase II Environmental Site Assessments
- Site Investigations
- Underground Storage Tank Removal Site Assessments
- Dewatering Projects during UST removal and placement
- Emergency Spill Response, Oversight and Cleanup

PROJECT EXPERIENCE*

- *Wisconsin Department of Natural Resources* — Project oversight for Leaking Underground Storage Tank (LUST) facilities. (1994-1995)

**While employed by another firm.*

Attachment A

Groundwater Sampling Schedule

ATTACHMENT A

Groundwater Sampling Schedule – Onalaska Landfill

The first round of sampling should be conducted during April, 2013. Sampling frequencies and wells to be sampled for VOCs, metals, alkalinity (April round only), and field parameters are:

April & Oct: MW-4S, MW-5S, MW-17S, PZ-3

April: MW-2S, MW-6S, MW-6M, MW-8S, MW-8M, MW-14S, MW-15M, MW-16S, MW-16M, MW-17M

Wells to be sampled for metals, alkalinity, and field parameters only (no VOCs) are:

April: MW-1SR, MW-2M, MW-7M, MW-9M, MW-10M, MW-11M, PZ-1, PZ-2, PZ-4, PZ-5, AW-28

A brief Quality Assurance/Quality Control (QA/QC) Plan, as described by Section 2.10.1 of the WDNR Groundwater Sampling Desk Reference will be required to be submitted for approval, prior to initial sampling.

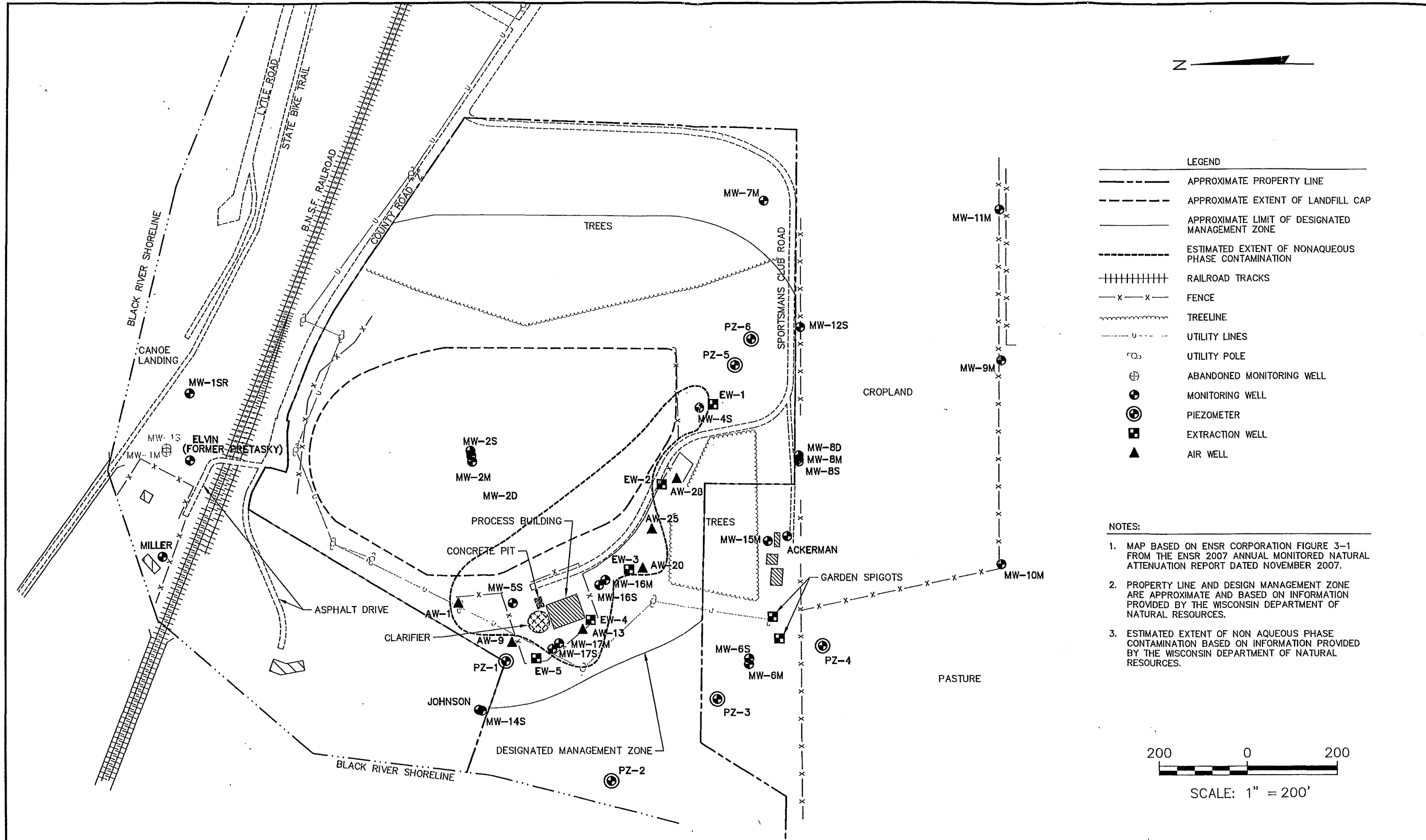
Samples for metals analysis shall be field filtered. Alkalinity shall be analyzed during the April round of sampling only. Field natural attenuation parameters (ORP, dissolved oxygen, pH, specific conductance, and temperature) shall be measured using a down-hole instrument or a flow-through cell, in all monitoring wells from which VOC or metals samples are scheduled to be collected. Groundwater elevations are to be collected in April and in October at all the above listed wells, plus MW-12S and PZ-6.

Four nearby private water supply wells [Ackerman, Miller, Elvin (formerly Pretasky), and Berkich (formerly Johnson)] shall be sampled during the April round of sampling for VOCs and metals only. Ensure accessibility of Ackerman well before conducting sampling (may need to delay until late April). The contractor will be responsible for access arrangements.

Attachment B

Site Plan

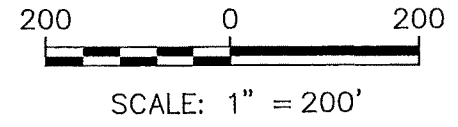
Attachment B



LEGEND

	APPROXIMATE PROPERTY LINE
	APPROXIMATE EXTENT OF LANDFILL CAP
	APPROXIMATE LIMIT OF DESIGNATED MANAGEMENT ZONE
	ESTIMATED EXTENT OF NONAQUEOUS PHASE CONTAMINATION
	RAILROAD TRACKS
	FENCE
	TREELINE
	UTILITY LINES
	UTILITY POLE
	ABANDONED MONITORING WELL
	MONITORING WELL
	PIEZOMETER
	EXTRACTION WELL
	AIR WELL

- NOTES:**
- MAP BASED ON ENSR CORPORATION FIGURE 3-1 FROM THE ENSR 2007 ANNUAL MONITORED NATURAL ATTENUATION REPORT DATED NOVEMBER 2007.
 - PROPERTY LINE AND DESIGN MANAGEMENT ZONE ARE APPROXIMATE AND BASED ON INFORMATION PROVIDED BY THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES.
 - ESTIMATED EXTENT OF NON AQUEOUS PHASE CONTAMINATION BASED ON INFORMATION PROVIDED BY THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES.



PROJECT NO. 25211605.00	DRAWN BY: SAS	 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	CLIENT	ONALASKA LANDFILL ONALASKA, WISCONSIN	SITE PLAN	FIGURE 1
DRAWN: 02/01/12	CHECKED BY: RL		SITE			
REVISED: 02/02/12	APPROVED BY: RL 02/02/12					

I:\25211605\Drawings-General\DMZ Site.dwg, 2/2/2012 11:12:52 AM

Attachment C

Cost Estimate, Authorization for Services, General Conditions (6/15/06)

Braun Intertec Corporation

Client: Wisconsin Department of Natural Resources
Project: Onalaska Municipal Landfill, Onalaska, WI

Braun Intertec Proposal #: LC-13-01254

Prepared: 04/09/2013

Phase Total

GW Sampling and Limited SI

Ground Water Sampling	7,371.00
Groundwater Chemistry	9,210.00
Project Management & Reporting	6,016.00
Expenses	7,000.00
Phase Total:	29,597.00

Estimated Project Total: 29,597.00

Braun Intertec Corporation

Client: Wisconsin Department of Natural Resources

Project: Onalaska Municipal Landfill, Onalaska, WI

Braun Intertec Proposal : LC-13-01254

Prepared: 04/09/2013

	Quantity:	Units:	Unit Price:	Extension:
GW Sampling and Limited SI				
Ground Water Sampling				
Technician III	64.00	Hours	84.00	5,376.00
YSI 556 Water Meter, per day	8.00	Days	105.00	840.00
Field filtering water, per sample	66.00	Sample	17.50	1,155.00
	Ground Water Sampling Total:			<u>7,371.00</u>
Groundwater Chemistry				
Chloride, water	58.00	Tests	9.00	522.00
Sulfate, water	58.00	Tests	9.00	522.00
Metals, SW 846 6010B	66.00	Tests	56.00	3,696.00
Additional Metals, water	58.00	Tests	20.00	1,160.00
Alkalinity, EPA 310.1	50.00	Tests	9.00	450.00
VOC, GC/MS SW 846-8260	52.00	Tests	55.00	2,860.00
	Groundwater Chemistry Total:			<u>9,210.00</u>
Project Management & Reporting				
Project Assistant	4.00	Hours	72.00	288.00
Staff Scientist	40.00	Hours	108.00	4,320.00
Project Scientist	8.00	Hours	132.00	1,056.00
CADD/Graphics Operator	4.00	Hour	88.00	352.00
	Project Management & Reporting Total:			<u>6,016.00</u>
Expenses				
Subcontracted Professional Services	1.00	Each	7,000.00	7,000.00
<i>Geochemical Evaluation, per report</i>	2.00	Each at	2500.00	
<i>Dedicated whale pumps and tubing, each</i>	10.00	Each at	200.00	
	Expenses Total:			<u>7,000.00</u>
GW Sampling and Limited SI Total:				29,597.00
Estimated Project Total:				<u>29,597.00</u>

Authorization for Services

BRAUN INTERTEC IS AUTHORIZED TO PROCEED
ACCORDING TO THE TERMS STATED HEREIN.

PROJECT DATA

Client Name: Wisconsin Department of Natural Resources
Contact: Mae Willkom
Address: 1300 W Clairemont Ave.
Eau Claire, WI 54702
Phone: 715-839-3772 Fax: 715-839-6076

Braun Intertec Project #: LC-13-01254
Project Name: Onalaska Municipal Landfill
Service Description(Scope):
GW Monitoring and Limited SI
Location: Sportsman Club Road, Onalaska, WI
Client Project / PO #: _____

TERMS

We will perform services according to our attached
General Conditions. Pricing will be:

- Actual costs depend on services performed.
Budgeted at: \$ 29,597.00
Lump Sum of: _____
- Per Master Service Agreement dated: _____
Change Order
- Other: _____

Authorizer's Signature: X _____
Print Name: _____
Date: _____ Title _____

Authorizer responsible for payment unless alternate
Invoicee provides written confirmation and until
accepted by Braun Intertec.

Invoicee Confirmation: X _____
(if different than authorizer)
Print Name: _____
Date: _____ Title _____

Company: Wisconsin Department of Natural Resources
Address: 1300 W Clairemont Ave.
Eau Claire, WI 54702
Phone: 715-839-3748 Fax: 715-839-6076

A signed copy of this authorization must be received by Baun
Intertec via fax or mail before work can proceed.

	Initials:	Date Sent:	Fax Or Mail?
Sent to Authorizer:	<u>KDN</u>	<u>4/9/13</u>	<u>MAIL</u>
Sent to Invoicee:	<u>↓</u>	<u>↓</u>	<u>↓</u>
General Conditions sent:	<u>↓</u>	<u>↓</u>	<u>↓</u>

SCHEDULING RESPONSIBILITY

Braun Intertec: _____ Phone: _____
Client Contact: _____ Phone: _____
Scheduled Start Date: _____

BRAUN INTERTEC CONTACT INFORMATION

Project Manager: Kevin Nestingen
Address: 2309 Palace Street
La Crosse, WI 54603-1814
Phone: (608) 781-7277 Fax: (608) 781-7279

METHOD OF PAYMENT (check one)

- Upon receipt of Invoice
 Prepay (attach check)
 VISA prepay MasterCard prepay
 VISA with invoice MasterCard with invoice

Card Holder Signature: X _____
Card Holder Name: _____
Card Number: _____
Expiration Date: _____

SPECIAL REQUIREMENTS, NOTES

Our agreement ("Agreement") with you consists of these General Conditions and the accompanying written proposal or authorization.

Section 1: Our Responsibilities

1.1 We will provide the services specifically described in our Agreement with you. You agree that we are not responsible for services that are not fairly included in our specific undertaking. Unless otherwise agreed in writing, our findings, opinions, and recommendations will be provided to you in writing. You agree not to rely on oral findings, opinions, or recommendations without our written approval.

1.2 In performing our professional services, we will use that degree of care and skill ordinarily exercised under similar circumstances by reputable members of our profession practicing in the same locality. If you direct us to deviate from our recommended procedures, you agree to hold us harmless from claims, damages, and expenses arising out of your direction.

1.3 We will reference our field observations and sampling to available reference points, but we will not survey, set, or check the accuracy of those points unless we accept that duty in writing. Locations of field observations or sampling described in our report or shown on our sketches are based on information provided by others or estimates made by our personnel. You agree that such dimensions, depths, or elevations are approximations unless specifically stated otherwise in the report. You accept the inherent risk that samples or observations may not be representative of things not sampled or seen and, further, that site conditions may change over time.

1.4 Our duties do not include supervising your contractors or commenting on, overseeing, or providing the means and methods of their work, unless we accept such duties in writing. We will not be responsible for the failure of your contractors to perform in accordance with their undertakings, and the providing of our services will not relieve others of their responsibilities to you or to others.

1.5 We will provide a health and safety program for our employees, but we will not be responsible for contractor, job, or site health or safety unless we accept that duty in writing.

1.6 You will provide, at no cost to us, appropriate site safety measures as to work areas to be observed or inspected by us. Our

employees are authorized by you to refuse to work under conditions that may be unsafe.

1.7 Estimates of our fees or other project costs will be based on information available to us and on our experience and knowledge. Such estimates are an exercise of our professional judgment and are not guaranteed or warranted. Actual costs may vary. You should allow a contingency in addition to estimated costs.

Section 2: Your Responsibilities

2.1 You will provide us with prior geotechnical and other reports, specifications, plans, and information to which you have access about the site. You agree to provide us with all plans, changes in plans, and new information as to site conditions until we have completed our work.

2.2 You will provide access to the site. In the course of our work some site damage is normal even when due care is exercised. We will use reasonable care to minimize damage to the site. We have not included the cost of restoration of normal damage in the estimated charges.

2.3 You agree to provide us, in a timely manner, with information that you have regarding buried objects at the site. We will not be responsible for locating buried objects at the site unless we accept that duty in writing. You agree to hold us harmless from claims, damages, losses, and related expenses involving buried objects of which you had knowledge but did not timely call to our attention or correctly show on the plans you or others on your behalf furnished to us.

2.4 You will notify us of any knowledge or suspicion of the presence of hazardous or dangerous materials in a sample provided to us. You agree to provide us with information in your possession or control relating to contamination at the work site. If we observe or suspect the presence of contaminants not anticipated in our Agreement, we may terminate our work without liability to you or to others, and we will be paid for the services we have provided.

2.5 Neither this Agreement nor the providing of services will operate to make us an owner, operator, generator, transporter, treater, storer, or a disposal facility within the meaning of the Resource Conservation Recovery Act, as amended, or within the meaning of any other law governing the handling, treatment, storage, or disposal of hazardous materials. You agree to hold us harmless and indemnify us from any such claim or loss.

2.6 Monitoring wells are your property, and you are responsible for their permitting, maintenance, and abandonment unless we accept that duty in writing.

2.7 You agree to make disclosures required by law. In the event you do not own the site, you acknowledge that it is your duty to inform the owner of the discovery or release of contaminants at the site. You agree to hold us harmless and indemnify us from claims related to disclosures made by us that are required by law and from claims related to the informing or failure to inform the site owner of the discovery of contaminants.

Section 3: Reports and Records

3.1 We will furnish reports to you in duplicate. We will retain analytical data for seven years and financial data for three years.

3.2 Our reports, notes, calculations, and other documents and our computer software and data are instruments of our service to you, and they remain our property but are subject to a license to you for your use in the related project for the purposes disclosed to us. You may not transfer our reports to others or use them for a purpose for which they were not prepared without our written approval, which will not be unreasonably withheld. You agree to indemnify and hold us harmless from claims, damages, losses, and expenses, including attorney fees, arising out of such a transfer or use. At your request, we will provide endorsements of our reports or letters of reliance, but only if the recipients agree to be bound by the terms of our agreement with you and only if we are paid the administrative fee stated in our then current Schedule of Charges.

3.3 Because electronic documents may be modified intentionally or inadvertently, you agree that we will not be liable for damages resulting from change in an electronic document occurring after we transmit it to you. In case of any difference or ambiguity between an electronic and a paper document, the paper document shall govern.

3.4 If you do not pay for our services in full as agreed, we may retain work not yet delivered to you and you agree to return to us all of our work that is in your possession or under your control. You agree not to use or rely upon our work for any purpose whatsoever until it is paid for in full.

Attachment D

Groundwater Monitoring and Limited Site Investigation Scope of Work

**GROUNDWATER MONITORING AND LIMITED SITE INVESTIGATION
SCOPE OF WORK**

**Onalaska Municipal Landfill Superfund Site
Sportsman Club Road, Town of Onalaska
La Crosse County, Wisconsin
February 2013**

I. PROJECT DESCRIPTION

A. Purpose

To conduct routine semi-annual groundwater sampling events at the Onalaska Landfill Superfund Site in April and October of each year; to conduct limited additional site investigation of inorganic contaminants using existing and formerly inactive monitoring wells; and to provide geochemical expertise and data interpretation for the purpose of gaining a better understanding of site redox conditions and their effects on concentrations of inorganics in groundwater. The first round of sampling is to be conducted no later than April 30, 2013.

The contract will be for a two-year period from the date of award.

This scope of work (SOW) sets forth the requirements to:

1. Collect and analyze groundwater monitoring well and private water supply well samples in accordance with Chapters NR 140 and NR 141, Wisconsin Administrative Code. Wells to be sampled, parameters and frequencies are shown on Attachment C.
2. Prepare groundwater monitoring reports, detailing groundwater monitoring data and providing interpretation of site conditions. Submit reports to the Wisconsin Department of Natural Resources (WDNR) and U.S. Environmental Protection Agency (EPA) Project Managers. A groundwater monitoring report will be due following the first round of sampling, by June 30, 2013, and annually thereafter on June 30 of each year of this contract.

B. Site Description and Historical Review

The Town of Onalaska Landfill is located approximately 10 miles north of the City of La Crosse near the confluence of the Mississippi and Black Rivers. The 11-acre site was mined as a sand and gravel quarry in the early 1960s. In the mid-1960s all mining ceased, and the Town of Onalaska began to use the quarry as a municipal landfill. Between 1969 and 1980 both municipal trash and industrial wastes were disposed in the landfill. The landfill was closed in 1980.

The primary industrial wastes disposed of consisted of naphtha-based solvents used in the metal cleaning process and wastes from paint spray, gun cleaning, and machine shop cleaning fluids. Small quantities of other wastes include paint and ink components, cutting oils, lubricating oils, and asphaltum.

In September, 1984, the Onalaska Landfill was placed on the National Priorities List. Subsequent remedial efforts at the site have included soil bioremediation and installation and operation of a remedial system for the pumping and treating of groundwater. Review of historical groundwater monitoring at the site indicated that contaminant levels were significantly reduced as a result of the remedial system operation. In November 2001, the system was shut down to observe subsequent contaminant migration and to monitor for natural attenuation and containment. During the natural attenuation study, four additional monitoring wells were constructed and added to the groundwater monitoring plan, other wells were eliminated because of data redundancy and/or sample quality, and some parameters were eliminated.

In September, 2012, a ROD Amendment was signed, formally modifying the remedy for volatile organic compounds (VOCs) in groundwater from groundwater pumping and treatment to monitored natural attenuation (MNA), and authorizing the permanent shutdown of the groundwater extraction and treatment system. The Town of Onalaska will assume ownership of the former remediation building and will be solely responsible for decommissioning of the contents of the building. Abandonment of the former extraction and treatment system is NOT a part of this SOW.

II. GROUNDWATER MONITORING AND LIMITED SITE INVESTIGATION GOALS

Although active treatment and MNA appear to have addressed most VOCs in site groundwater, reducing conditions beneath the landfill exacerbate the solubility and persistence of metals contamination. Investigation to date has been focused mainly on VOCs; however the promulgation of a new public health standard for manganese in 2011 has necessitated renewed focus on inorganic contaminants. The new manganese standard of 300 ppb is far exceeded in most site wells, as well as in private wells close to the landfill. An objective of this scope of work is to utilize data from the existing monitoring well network to gain a better understanding of site redox conditions and their effects on concentrations of inorganics in groundwater. Ongoing long-term monitoring of site monitoring wells will continue, in order to document the effectiveness of MNA on VOCs and to monitor concentrations of metals and redox conditions throughout the site. Sampling of private wells will also be conducted to ensure protectiveness.

A site layout map is attached.

III. CONTRACTOR RESPONSIBILITIES

- A. Conduct all activities at the site in conformance with local, state and federal ordinances, rules, laws and regulations.
- B. As the property owner, the Town of Onalaska is responsible for grounds maintenance for the fenced area surrounding the former remediation building, including mowing and snow removal. Access to monitoring wells in this area will need to be coordinated with the Town Chairman in a timely manner, well in advance of sampling activities.
- C. The consultant shall from time to time during the progress of the work confer with the WDNR and shall prepare and present such information and studies as may be pertinent and necessary or as may be required by the WDNR to enable it to pass judgment on the features of the work. The consultant shall make such changes, amendments, or revisions in the detail of the work as may be required by the WDNR. The WDNR reserves the right to select the remedy to be used and may request additional alternatives be studied.

At the request of the WDNR, and during the progress of the work, the consultant shall furnish such maps, portions of reports, or other information or data relating to this work under this contract as may be required to enable the WDNR to carry out or to proceed with related phases of the project not covered by this contract, or which may be necessary to enable the WDNR to furnish information to the consultant upon which to proceed further with the work.
- D. In addition, the consultant may be called upon to provide testimony in a legal action. Any costs associated with such testimony shall be contracted for separately.
- E. The work under this contract shall consist of performing those phases or portions of the investigation for the project necessary or incidental to accomplish the project, and which are elsewhere herein specified. Work by the consultant shall proceed continuously and expeditiously through the completion of each phase.

The consultant shall furnish all services and labor necessary to complete the work, and shall furnish all materials, equipment, supplies, and incidentals other than those which are hereinafter designated to be furnished by others.

- F. The work under this contract shall at all times be subject to the review and approval of the WDNR, shall be under the direction of its authorized representative, and shall be in accordance with the requirements contained in the WDNR's guidance documents.

Unless the contract has been terminated prior to the completion of the work, the contract shall not be considered terminated upon the completion and acceptance of the work, or upon final payment thereof, but shall be considered to be in full force and effect for the purposes of requiring the consultant to make such revisions or corrections in the work as are necessary to correct errors made by the consultant in the work, or for the purposes of having the consultant make revisions in the work at the request of the WDNR as a "change order."

- G. The consultant shall notify the WDNR project manager at least five (5) working days prior to the start of any sampling activities.

IV. MONITORING REQUIREMENTS

A. Groundwater Monitoring Well Sampling and Analysis:

1. A brief Quality Assurance/Quality Control (QA/QC) Plan, as described by Section 2.10.1 of the WDNR Groundwater Sampling Desk Reference (published by the WDNR Bureau of Drinking Water and Groundwater) is required to be submitted for approval prior to initial sampling. Proper sampling, handling and QA/QC procedures set forth in the Groundwater Sampling Desk Reference shall be referenced. Services provided as described in this SOW shall adhere to procedures described in the approved QA/QC plan. All sampling supplies and equipment are to be furnished by the Contractor.
2. The Contractor shall conduct groundwater elevation measurements from groundwater monitoring wells as depicted on the site map and listed in Attachment C. Groundwater elevations must be obtained from each monitoring well prior to purging, according to s. NR 140.16, Wis. Adm. Code and WDNR guidance.
3. The Contractor shall properly purge each monitoring well before sampling, according to s. NR 140.16, Wis. Adm. Code. Monitoring well purge water may be discharged to the ground. Dedicated whale pumps and tubing are present; however, some may require replacement. Costs for sampling equipment are part of the SOW.
4. The Contractor shall measure field parameters and collect groundwater samples from the monitoring wells as depicted on the site map and Attachment C, for analysis at a Wisconsin Certified Laboratory. Field parameters (dissolved oxygen, ORP, specific conductance, temperature, and pH) are to be measured using a multi-meter with a flow-through cell at monitoring wells from which lab samples are scheduled to be collected. Alkalinity samples for laboratory analysis are to be collected during each April sampling event.
5. The Contractor shall collect and analyze groundwater samples from the monitoring wells specified and for the parameters and frequencies listed in Attachments C and D. Sampling shall be done in accordance with s. NR 140.16, Wis. Adm. Code. The locations of all site monitoring wells are depicted on the attached site map.

B. Water Supply Sampling

The Contractor shall collect samples for VOCs and metals from the private supply wells of four nearby residences during each April sampling event. Samples shall be collected from an outside tap (before any household treatment system) after purging for a minimum of ten

minutes. The Contractor will be responsible for arranging access. **Note: Access permission from the homeowner is required prior to each and every private well sampling event.** Contact information for the four private residences will be provided.

NR 507.26(2), Wis. Adm. Code, requires that *paper* copies of the analytical results from the private residential water supply wells (only) be submitted **within 10 days** of your receipt of the data. These results should be submitted directly to the WDNR Waste and Materials Management Program Environmental Program Associate at WDNR West Central Regional Headquarters, 1300 West Clairemont Avenue, Eau Claire, WI 54701.

V. REPORTING REQUIREMENTS

- A. By June 30 of each calendar year, the Contractor shall submit one copy of an annual groundwater monitoring report to Mae Willkom, WDNR Project Manager, at WDNR West Central Regional Headquarters, 1300 West Clairemont Avenue, Eau Claire, WI 54701, and one copy to Demaree Collier, U.S. EPA Project Manager, at U.S. EPA Region 5, SR-6J, 77 Jackson Blvd., Chicago, IL 60604-3590, unless otherwise directed. The reports should NOT include narrative discussion of site history and background. Groundwater monitoring reports shall include the following:
1. Brief documentation of the monitoring procedures and activities, including any site conditions noted to be in need of attention.
 2. Laboratory and field analytical results by well, including a table summarizing groundwater elevations from each monitoring event, in cumulative tables in a format consistent with the existing data tables for the site. Electronic copies (CADD file for site map and Excel files for groundwater elevation and analytical results tables) will be provided. Each report shall contain the results of the private supply well sampling.
 3. Groundwater table contour maps from each monitoring event based on interpolation of groundwater elevations at monitoring locations. "S" and "PZ" wells are to be used to contour the water table. Only "M" wells are to be used to contour the mid-depth potentiometric surface.
 4. Water elevation contour maps for the shallow and medium depths of the aquifer and isoconcentration maps for manganese and arsenic in the shallow and medium depths of the aquifer for each round of the most recent data.
 5. Interpretations regarding site redox conditions and their effects on metals concentrations in groundwater. Reports should include maps and/or narrative discussion of observed redox zones, delineation of their extent, and interpretation of their relationship to known source areas and to the pattern of inorganic concentrations observed in groundwater.
 6. A statement from each sampling event as to the presence or absence of any ponding observed or storm water directed toward the general area of MW-5S.
- B. In addition to the printed groundwater monitoring reports, analytical data shall be reported electronically to the WDNR GEMS database in accordance with WDNR guidance. Analysis results will be submitted to the WDNR GEMS database following each groundwater sampling event on compact discs in a data format supplied by the Department. The Contractor shall be responsible for assuring that the electronic data submittals are accurate and in the correct format. The Contractor shall prepare, sign, and submit the required Environmental Monitoring Data Certification form for each groundwater sampling event.

VI. COMPENSATION

An original invoice for reimbursement of the Contractor shall be submitted along with each groundwater monitoring report. The format of the invoice shall be based on the format of the bid price list.

VII. WDNR RESPONSIBILITIES

The State of Wisconsin through the WDNR agrees to provide the following support:

- A. The WDNR assigns Mae Willkom as project manager to serve as an official representative of the WDNR who will resolve in writing any problems of policy and procedure issues and will provide information on the site.
- B. The WDNR project manager will be able to conduct on-site inspections with the consultant prior to proposal preparation and during limited site investigation activities.
- C. The WDNR will be responsible for all public information activities associated with the project. The WDNR retains sole rights to all data collected for this study. No data may be used by the consultant for any other purposes until the final report is released to the public by the WDNR.
- D. The WDNR retains the right to request a change of consultant's personnel if it determines those existing personnel cannot adequately perform the required tasks. Any such request will be submitted in writing to the consultant. Within 7 days of receipt of such request, the consultant will provide the WDNR with a list of proposed individuals and their qualifications. The WDNR will evaluate the list and choose a suitable replacement within 7 days. If the WDNR deems that none of the proposed substitutions are acceptable, the contract will be declared void and the contractor dismissed. The contractor will be reimbursed for time and materials expended to that point. All data collected will be turned over to the WDNR.

Attachments:

- A. Project Proposal Requirements
- B. Site Figure
- C. Groundwater Sampling Schedule
- D. Water Sample Collection and Analytical Requirements
- E. 2013-2014 Sampling Plan Modifications

ATTACHMENT A

PROJECT PROPOSAL REQUIREMENTS

A. Proposal

1. Prior to awarding the contract, the Consultant shall submit a Project Proposal based on the elements identified in this Scope of Work. The Proposal shall identify key personnel employed by the Consultant who will be working on the project. A summary of each key employee's educational and work experience shall be provided.
2. A meeting with the WDNR Project Manager is required before submitting a Proposal. The on-site meeting will be scheduled at a time to be determined.
3. The Consultant shall identify all subcontractors who will be working on the project. Substitutions of key personnel or subcontractors shall not be allowed without the prior written approval of the WDNR.

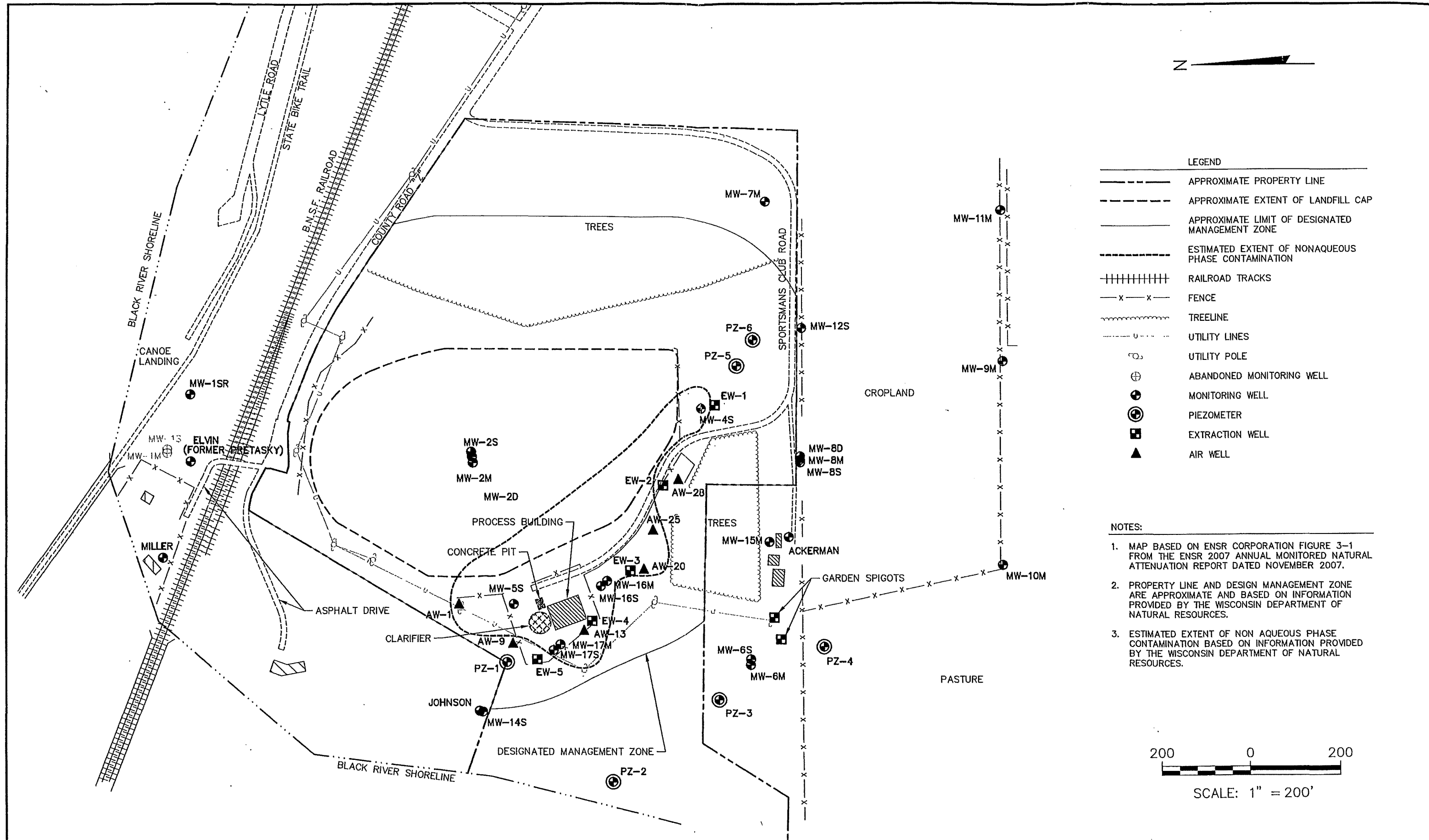
B. Cost Estimate

1. A cost estimate shall be included for the Proposal that itemizes the following for each work item:
 - a. Labor (staff position, title, and labor rates)
 - b. Time
 - c. Materials
 - d. Travel costs
 - e. Equipment and other rental costs
2. The cost estimate shall include costs to perform the following tasks:
 - a. Collect and analyze groundwater monitoring well and private water supply well samples in accordance with Chapters NR 140 and NR 141, Wisconsin Administrative Code. Wells to be sampled, parameters and frequencies are shown on Attachment C.
 - b. Prepare groundwater monitoring reports, detailing groundwater monitoring data and providing interpretations of site redox conditions and their effects on concentrations of inorganics in groundwater.

C. Site Safety Plan

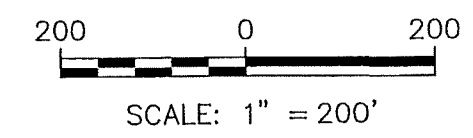
A site safety plan shall be developed and followed by the consultant and subcontractors. This plan shall reference all current Occupational Health and Safety Administration (OSHA) standards for worker safety. The consultant is solely responsible for site safety of its personnel, subcontractors and any bystanders. The consultant is not responsible for liability, claims and costs arising from activities of WDNR personnel or its agents. WDNR may review the plan but will not approve or disapprove of it.

Attachment B



- LEGEND**
- APPROXIMATE PROPERTY LINE
 - - - APPROXIMATE EXTENT OF LANDFILL CAP
 - APPROXIMATE LIMIT OF DESIGNATED MANAGEMENT ZONE
 - - - ESTIMATED EXTENT OF NONAQUEOUS PHASE CONTAMINATION
 - ++++ RAILROAD TRACKS
 - x - x - FENCE
 - ~~~~~ TREELINE
 - UTILITY LINES
 - UTILITY POLE
 - ⊕ ABANDONED MONITORING WELL
 - ⊙ MONITORING WELL
 - ⊕ PIEZOMETER
 - ⊠ EXTRACTION WELL
 - ▲ AIR WELL

- NOTES:**
1. MAP BASED ON ENSR CORPORATION FIGURE 3-1 FROM THE ENSR 2007 ANNUAL MONITORED NATURAL ATTENUATION REPORT DATED NOVEMBER 2007.
 2. PROPERTY LINE AND DESIGN MANAGEMENT ZONE ARE APPROXIMATE AND BASED ON INFORMATION PROVIDED BY THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES.
 3. ESTIMATED EXTENT OF NON AQUEOUS PHASE CONTAMINATION BASED ON INFORMATION PROVIDED BY THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES.



PROJECT NO. 25211605.00	DRAWN BY: SAS	SCS BT SQUARED 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	CLIENT	SITE	ONALASKA LANDFILL ONALASKA, WISCONSIN	SITE PLAN	FIGURE 1
DRAWN: 02/01/12	CHECKED BY: RL						
REVISED: 02/02/12	APPROVED BY: RL 02/02/12						

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ATTACHMENT C

Groundwater Sampling Schedule – Onalaska Landfill

The first round of sampling should be conducted during April, 2013. Sampling frequencies and wells to be sampled for VOCs, metals, alkalinity (April round only), and field parameters are:

April & Oct: MW-4S, MW-5S, MW-17S, PZ-3

April: MW-2S, MW-6S, MW-6M, MW-8S, MW-8M, MW-14S, MW-15M, MW-16S, MW-16M, MW-17M

Wells to be sampled for metals, alkalinity, and field parameters only (no VOCs) are:

April: MW-1SR, MW-2M, MW-7M, MW-9M, MW-10M, MW-11M, PZ-1, PZ-2, PZ-4, PZ-5, AW-28

A brief Quality Assurance/Quality Control (QA/QC) Plan, as described by Section 2.10.1 of the WDNR Groundwater Sampling Desk Reference will be required to be submitted for approval, prior to initial sampling.

Samples for metals analysis shall be field filtered. Alkalinity shall be analyzed during the April round of sampling only. Field natural attenuation parameters (ORP, dissolved oxygen, pH, specific conductance, and temperature) shall be measured using a down-hole instrument or a flow-through cell, in all monitoring wells from which VOC or metals samples are scheduled to be collected. Groundwater elevations are to be collected in April and in October at all the above listed wells, plus MW-12S and PZ-6.

Four nearby private water supply wells [Ackerman, Miller, Elvin (formerly Pretasky), and Berkich (formerly Johnson)] shall be sampled during the April round of sampling for VOCs and metals only. Ensure accessibility of Ackerman well before conducting sampling (may need to delay until late April). The contractor will be responsible for access arrangements.

ATTACHMENT D

Onalaska Municipal Landfill Superfund Site

Water Sample Collection & Analytical Requirements

Analysis	Method	Container	Preservation & Storage	Maximum Holding Time
Volatile Organic Compounds	GC/MS SW846 8260B	Three 40 mL vials	HCL to pH < or = 2, 4°C	14 Days
Metals Arsenic Barium Iron Lead Manganese Cadmium Cobalt Mercury Vanadium	SW846 6010B	250 mL bottles	HNO ₃ to pH < or = 2	180 Days
Alkalinity	EPA 310.1	100 mL polyethylene bottles	4°C	14 Days

ATTACHMENT E

Onalaska Landfill
2013-2014 Sampling Plan Modifications

Well	2011-2012	Proposed 2013-2014	Rationale
MW-1S	Abandoned		
MW-1M	Abandoned		
MW-1SR	Annual VOCs & metals	Annual metals	Up-gradient; may provide potential background data. No VOC exceedances since 2004. Metals exceedances.
MW-2S	One round VOCs at 5-yr. interval (April 2012)	Annual VOCs & metals	PAL exceedance for benzene. Metals exceedances.
MW-2M	One round VOCs at 5-yr. interval (April 2012)	One round VOCs at 5-yr interval (April 2017) Annual metals	No VOC exceedances since 2002. Metals exceedances.
MW-3 nest	Abandoned	Abandoned	Abandoned during RA construction
MW-4S	Semi-annual VOCs & metals	Semi-annual VOCs & metals	Near south perimeter of waste. Seasonally variable trimethylbenzene (TMB) concentrations. Metals exceedances.
MW-5S	Semi-annual VOCs & metals	Semi-annual VOCs & metals	Near west perimeter of waste. Seasonally variable TMB concentrations. Metals exceedances.
MW-6S	Annual VOCs & metals	Annual VOCs & metals	440' southwest of waste perimeter. Sentinel for VOC plume expansion. Metals exceedances.
MW-6M	Annual VOCs & metals	Annual VOCs & metals	440' southwest of waste perimeter. Sentinel for VOC plume expansion. Metals exceedances.
MW-7M	Annual VOCs & metals	Annual metals	350' southeast of waste. May provide potential background data. Metals exceedances.
MW-8S	Annual VOCs & metals	Annual VOCs & metals	310' south of waste and 260' south of MW-4S. Sentinel for VOC plume expansion. Mn exceedances.
MW-8M	Annual VOCs & metals	Annual VOCs & metals	310' south of waste and 260' south of MW-4S. Sentinel for VOC plume expansion. Metals exceedances.
MW-9M	Annual VOCs & metals	Annual metals	730' south of waste. For metals/redox characterization. PAL exceedance for As. Possible downgradient compliance point for WI NR 140.
MW-10M	Annual VOCs & metals	Annual metals	800' SSW of waste. For metals/redox characterization. Mn exceedances. Downgradient

			compliance point for WI NR 140.
MW-11M	Annual VOCs & metals	Annual metals	800' SSE of waste. For metals/redox characterization and potential background data.
MW-12S	Water levels only	Water levels only	305' south of waste. No exceedances.
MW-14S	Annual VOCs & metals	Annual VOCs & metals	310' west of waste. Metals exceedances.
MW-15M	Annual VOCs & metals	Annual VOCs & metals	350' south of waste. Metals exceedances. Downgradient compliance point for WI NR 140.
MW-16S	Semi-annual VOCs & metals	Annual VOCs & metals	90' west of waste. Metals exceedances. High Mn concentrations.
MW-16M	Annual VOCs & metals	Annual VOCs & metals	90' west of waste. Metals exceedances.
MW-17S	Semi-Annual VOCs & metals	Semi-annual VOCs & metals	200' west of waste. Seasonally variable TMB concentrations. Metals exceedances.
MW-17M	Annual VOCs & metals	Annual VOCs & metals	200' west of waste. Metals exceedances.
PZ-1	Annual VOCs & metals	One round VOCs at 5-yr interval (April 2017) Annual metals	175' west of waste. 130' down-gradient of MW-5S. No VOC exceedances since 2004. Metals exceedances.
PZ-2	Annual VOCs & metals	One round VOCs at 5-yr interval (April 2017) Annual metals	400' WSW of waste. 300' down-gradient of MW-17 nest. No VOC exceedances since 2004. Metals exceedances.
PZ-3	Annual VOCs & metals	Semi-annual VOCs & metals	440' SW of waste. 350' down-gradient of MW-16 nest. 1,2,4-TMB > PAL in 2012. Metals exceedances.
PZ-4	Annual VOCs & metals	One round VOCs at 5-yr interval (April 2017) Annual metals	540' SW of waste. No VOC exceedances since 2002. Mn exceedances.
PZ-5	One round at 5-yr. interval (April 2012).	One round VOCs at 5-yr interval (April 2017) Annual metals	130' south of SE corner of waste. No VOC exceedances since 2002. Metals exceedances.
PZ-6	Water levels only	Water levels only	175' SE of SE corner of waste. Retain for possible future sampling.
AW-1	Not to be sampled	Not to be sampled	Former air injection well – only 1' into water table.
AW-9	Not to be sampled	Not to be sampled	Former air injection well – only 1' into water table. Data from MW-5S and PZ-1 provide better assessment of groundwater quality & redox conditions in this area.
AW-13	One round VOCs at 5-yr. interval (April 2012)	Not to be sampled	Former air injection well – only 1' into water table. Data from MW-17S provides better assessment of groundwater quality & redox conditions in this area.
AW-20	Not to be	Not to be sampled	Former air injection well – only 1'

	sampled		into water table. MW-16 nest provides better data for this area.
AW-25	Not to be sampled	Not to be sampled	Former air injection well – only 1' into water table.
AW-28	Annual VOCs & metals	One round VOCs at 5-yr interval (April 2017) Annual metals	Former air injection well – only 1' into water table. No other data point in area. No VOC exceedances since 2004. Metals exceedances.
EW-2, EW-3, EW-4, & EW-5	Not to be sampled	Not to be sampled	Remediation wells. WDNR/U.S. EPA approved permanent shutdown of groundwater extraction and treatment system.
Ackerman, Berkich, Miller, & Pretasky private supply wells	Annual VOC & metals	Annual VOCs & metals	Purpose of sampling to assure protectiveness. Mn & As exceedances at Miller and Elvin (formerly Pretasky) wells. Ackerman well 300' deep. Berkich (formerly Johnson) well is side-gradient and of unknown construction.