



**Minnesota Pollution
Control Agency**

PROPOSAL FOR

REMEDIAL SERVICES MASTER CONTRACT
CATEGORY A: PETROLEUM, SUPERFUND, MDA, CLOSED LANDFILL
PROGRAM ENVIRONMENTAL SERVICES

MINNESOTA POLLUTION CONTROL AGENCY



Mary Heining
Pollution Control Agency
520 Lafayette Rd N
St. Paul, MN 55155-4194
651-757-2418
contracts.pca@state.mn.us

APRIL 11TH, 2018





Responsive partner.
Exceptional outcomes.

April 11, 2018

Ms. Mary Heininger

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Re: Request for Proposal for Remediation Master Contract - Category A. Petroleum, Superfund, MDA, Closed Landfill Program Environmental Services

Dear Ms. Heininger:

Wenck Associates, Inc. (Wenck) is pleased to submit this proposal for Category A. Petroleum, Superfund, MDA, Closed Landfill Program Environmental Services. Wenck accepts the Classification Levels and Rates- Schedules 1 and 2, and the Equipment and Supplies List, which lists equipment to perform services with prices. We have received and reviewed Addendum #1. Please find attached Wenck's proposal demonstrating expertise in all areas outlined in the RFP documents.

Contact Information for Questions Regarding This Proposal

Ms. Michelle Hosfield - Associate
mhosfield@wenck.com

Wenck Associates, Inc.
1802 Wooddale Drive
Woodbury, MN 55125
Office: 651.395.5224
Cell: 612.807.3249

Capabilities, History, and Organization Structure

Summary

Wenck is a leader in engineering, environmental, and business services. We provide state and federal agencies, as well as local and industrial clients, a full spectrum of services related to remediation, solid waste, infrastructure, water, and air.

Wenck's Mission: deliver strategic solutions with unmatched service. Strive to delight our clients by being responsive, reliable and proactive.

Ownership and History

Attesting to our success in achieving our Mission Statement, 95% of our business is from repeat clients.

Wenck is an employee-owned Minnesota corporation. Founded in 1985, we have grown to more than 300 engineers, scientists, and support staff at five offices in Minnesota, two offices in North Dakota, and several offices throughout the United States. Wenck has been

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under contract with the MPCA's Closed Landfill Cleanup Program continually since 1998, and with the MPCA's TMDL program since inception.

Capabilities

Wenck provides comprehensive engineering and environmental services to our clients. Wenck clients receive more than technical service. We introduce innovative technologies, lead public meetings, and provide insight on the complex technical issues of your projects. With the "big picture" in mind, we take the initiative to ensure a successful outcome to your project.

Investigation, remediation, and associated services are at the core of our service platform, making up over 20% of our annual business.

Wenck is a leader in Investigation and Remediation services. Other service areas Wenck is well-versed in include:

- Systems Operations and Maintenance
- Civil Engineering
- Geotechnical
- Industrial Hygiene and Safety
- Ecological Services
- Environmental Review & Permitting
- Construction Services
- Emergency Response
- Hydrogeology
- Water Resources
- Industrial Engineering & Design
- Wastewater Treatment
- Environmental Management/Compliance
- Solid Waste
- Transportation Engineering and Planning
- Air Quality

Organization

Not bound by departments, Wenck operates a flexible team-based approach. We are responsive to your needs—with the advantage of easily offering the most qualified staff for the project at hand. We have state-of-the-art support for computer-aided drafting, GIS, project management, modeling, word processing, and accounting. The key staff available for this project have years of experience completing the types of work outlined in the scope of services.

Location of Headquarters

Corporate Headquarters
Wenck Associates, Inc.
1800 Pioneer Creek Center
Maple Plain, MN 55359
www.wenck.com

Wenck looks forward to an opportunity to continue our partnership with MPCA.

Respectfully,

Michelle L. Hosfield
Wenck
Associate

Peter Miller
Wenck
Corporate Officer/Principal-in-Charge



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Resumes



YEAR ESTABLISHED: 1985
PROFESSIONAL DISCIPLINES:
Environmental
Engineering
Construction
Emergency Response

LEGAL STATUS: Corporation
OWNERSHIP: ESOP
SIZE: 300+ employee-owners

CONTACT:
Michelle Hosfield
Phone: 651-395-5224
Email: mhosfield@wenck.com

- LOCATIONS:**
- Golden Valley, MN
 - Woodbury, MN
 - Maple Plain, MN
 - Duluth, MN
 - Windom, MN
 - New Hope, MN
 - Fargo, ND
 - Mandan, ND
 - Fort Collins, CO
 - Denver, CO
 - Sheridan, WY
 - Cheyenne, WY
 - Roswell, GA



ABOUT US

Responsive partner. Exceptional outcomes. Wenck was founded more than 31 years ago and now features 13 branch offices in five states strategically located around the country to serve our clients and communities. Our united team of engineers, scientists, consultants, hazardous materials specialists, and construction professionals are prepared to deliver the outcome you need. We are known and trusted for our technical expertise and our experienced team can help manage every aspect of your most complex situations. Working jointly with all stakeholders, we are your responsive partner committed to producing exceptional outcomes.

Our range of services for MPCA/MDA includes investigation, design, construction management, permitting, and/or coordination for these services:

Environmental Management Systems, hydrogeologic studies and investigation, storm water treatment and NPDES, soil and groundwater contamination, environmental audits, air emissions studies and permitting, hazardous materials handling, solid waste management, cleanup, and disposal, investigation of releases affecting the property, UST/AST management, watershed management plans, SPCC plans and training, and spill response and testing of soil, water, air, and wastes.

The following pages include more detail on our services.

SECTION 2: QUALIFICATIONS AND CAPABILITIES

Section 2A: Overall Company Capabilities

SOIL, SURFACE & GROUNDWATER REMEDIATION

Wenck offers the State a unique advantage due to our understanding of site development, risk management, and the regulatory process. Whether the MPCA or MDA are performing small investigations or large Superfund remediations, we will assist through the process. We strive to understand your needs and produce deliverables that address your immediate need and your organization's goals as a whole. The depth of Wenck's expertise offers the MPCA or MDA every service discipline to complete the project.

Services:

- Site Assessment & Investigation
- Environmental Remediation (soil, sediment, groundwater & soil gas)
- Vapor Intrusion Investigation, Risk Assessment, Monitoring & Mitigation
- Groundwater Modeling & Hydrogeology
- Brownfield Development & Grant Writing Assistance
- Risk Management
- Environmental Construction - Asbestos & Hazardous Materials
- Under Utilized Property Redevelopment
- Sediment Investigations & Remediations
- Human Health & Ecological Risk Assessments
- QAPP/SAP Preparation
- SWPPP and other compliance support



ENVIRONMENTAL COMPLIANCE & PERMITTING

Wenck helps our clients navigate the world of regulations by developing integrated solutions that appreciate regulatory goals, achieve compliance, improve operations, and reduce costs. The goal is to keep clients informed while searching for solutions that manage total project costs and deliver the desired outcome.

Services:

- Emergency Response Plan Development
- Emergency Preparedness Training & Exercises
- Risk Management Program Planning Air Quality
- Hazard Mitigation & Emergency Operations Planning
- Health & Safety Compliance
- Spill Prevention, Control & Countermeasure Planning
- Hazardous Materials Planning & Flow Studies
- Environmental Compliance & Auditing
- Regulatory Compliance Consulting
- Environmental Review
- Risk Assessment
- Natural Resource Surveys
- Industrial Hygiene
- Environmental Management System/ ISO 14001
- Air Quality



SECTION 2: QUALIFICATIONS AND CAPABILITIES

WATER RESOURCES

Wenck guides our clients based on the insight and expertise we derive from understanding the balance between all the demands on water. We know water. Communities need water. Business needs water. People need water. Clean water is critical to environmental and human health. We are known and trusted for our award-winning and forwardthinking, practical and visionary water solutions. When waterways are impacted, Wenck is uniquely qualified to manage, clean, monitor and restore the site.



Services:

- Stormwater Management
- Stream Restoration & Remeandering
- Water Quality & Quantity Monitoring
- Ecological Assessment, Management, & Restoration
- Wetlands
- Agricultural Drainage
- Modeling
- Water & Natural Resources
- Water Resources Engineering
- Water Resources Permitting & Compliance
- TMDL Studies & Implementation/ One Water One Plan/ WRAPs
- Watershed District/WMO Engineering

WATER SUPPLY

Wenck understands the importance of a clean water supply. We help our clients secure, design, build, protect, and monitor their water supply. We have experience with surface and groundwater supply sources, treatment plants, storage tanks, and pumping and distribution systems. We have successfully completed surface water dams and reservoirs, intakes, infiltration galleries, water wells, well field expansions, and hydrogeologic studies, among many other water supply projects.

Services:

- Hydropower
- Dam & Reservoir Design
- Water Rights
- Water Reuse

WASTEWATER

Wenck knows that the generation of wastewater is an inevitable result of daily life and industrial processes. We help our clients protect public health and the environment while maintaining regulatory compliance.

Services:

- Planning & Design
- Building
- Monitoring
- Grant Writing

SECTION 2: QUALIFICATIONS AND CAPABILITIES

ENGINEERING DESIGN

Wenck will help manage your most complex projects and/or emergency situations from concept through completion. Our clients receive more than technical expertise. We lead public meetings, provide accurate construction and life-cycle cost estimates, and offer insight on the complex political ramifications of projects. We keep the “big picture” in mind and take the initiative to ensure a successful outcome.

Services:

- Drone Technology
- Civil Site Planning & Design
- Surveying
- GIS, Geospatial Analysis & Data Management
- Master Planning
- Site Planning
- Infrastructure Improvements
- Construction Oversight
- Infrastructure Planning & Design
- Municipal Engineering
- Traffic Engineering & Transportation Planning
- Construction Administration & Oversight
- Entitlement Process



EMERGENCY RESPONSE

Wenck provides 24/7/365 emergency response solutions. Wenck has extensive experience responding and managing major situations involving hazardous materials, addressing nonaccident releases (NARs), completing transfers of hazardous and nonhazardous commodities, mitigating leaks and spills of hazardous materials, liquids, solids and gasses. We provide training to local communities and fire departments.

Incident Command System (ICS)

Beginning in approximately 2014, Wenck began providing Incident Command for major events and training. Wenck’s team of ICS trained individuals and fully equipped incident command trailer provide seamless integration of site communication, planning, logistics and operations.

Soil Excavation & Waste Disposal Coordination

Spills of hazardous materials can be overwhelming in consideration of the many tasks necessary to gain regulatory site closure. Once the initial spill is contained and recovered, Wenck provides the necessary follow up tasks including regulatory coordination, work plans, excavation services, soil sampling, well installation (if necessary), air monitoring, and assistance with waste disposal and documentation. Our clients can be assured of a complete package to efficiently reach the endpoint of an unplanned event.



SECTION 2: QUALIFICATIONS AND CAPABILITIES

WENCK RESOURCES

Below we have identified the firm's headquarters, local facilities and satellite offices participating in the Contract now or in the future. Our Minnesota locations of Twin Cities metro, Duluth, and Windom combined with Fargo, ND, complete coverage of the state. This allows us to reduce mobilization costs on MPCA projects across the state.

MAPLE PLAIN, MN OFFICE
1800 Pioneer Creek Center
P.O. Box 249, Maple Plain, MN 55359

FARGO, ND OFFICE
3303 Fiechtner Drive, #100
Fargo, ND 58103

SHERIDAN, WY OFFICE
203 South Main Street, Ste 2003
Sheridan, WY 82801

ATLANTA, GA OFFICE
1080 Holcomb Bridge Rd
Bldg 100, Suite 190
Roswell, GA 30076-4346

FORT COLLINS, CO, OFFICE
4025 Automation Way, Bldg E
Fort Collins, CO 80525

WINDOM, MN OFFICE
1012 - 5TH Avenue, P.O. Box 453
Windom, MN 56101-1408

CHEYENNE, WY OFFICE
7000 Yellowtail Rd, Ste 230
Cheyenne, WY 82009-6110

GOLDEN VALLEY, MN OFFICE
7500 Olson Memorial Highway, #300
Minneapolis, MN 55427

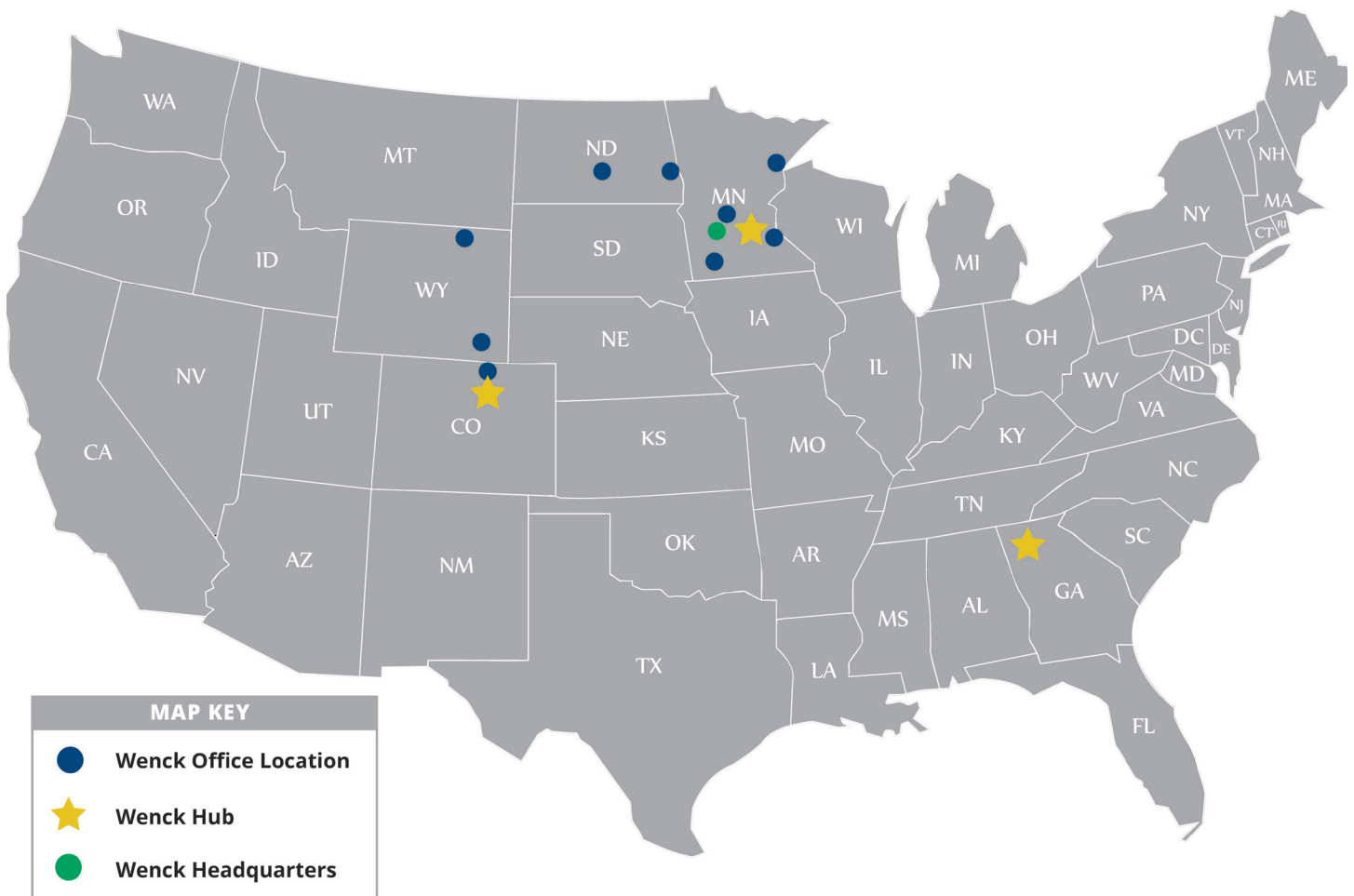
WOODBURY, MN OFFICE
1802 Wooddale Drive, #100
Woodbury, MN 55125-2937

DENVER, CO OFFICE
5445 DTC Parkway, P4
Greenwood Village, CO 80111-3045

MANDAN, ND OFFICE
301 - 1st Street NE, #202
Mandan, ND 58554-3370

DULUTH, MN OFFICE
Duluth Technology Village
11 E Superior St, Ste 565
Duluth, MN 55802

NEW HOPE, MN OFFICE
5130 N Winnetka Ave
New Hope, MN 55428-4233



SECTION 2: QUALIFICATIONS AND CAPABILITIES

Matrix and Resumes of Key Staff

On the following pages we have prepared a matrix for the Key Staff to be used on this contract. We have included a staff of more than 75 people. This staff was included to:

- Provide staff statewide to complete field work - including staff in the following Minnesota cities: Duluth, Woodbury, Golden Valley, New Hope, Windom and Maple Plain. In addition, staff from our Fargo and Grand Forks, North Dakota, offices have been included to provide additional support in northwestern Minnesota.
- Supply all the various expertise outlined in the Scope of Services (Section 3) of the Request for Proposal documents.

Wenck's staff has more than doubled over the last ten years. The experience shown throughout this proposal represents a small sampling of the depth found at Wenck. Our growth has been by design. We will help insure that the MPCA receives quality, responsive, cost-effective support on all projects that we complete.

Experience with Other Federal and State Agencies or Departments

Wenck has, or has had, contracts with several different federal and state agencies. For the scope of this proposal, we are only listing contracts relating to environmental support germane to the MPCA contract. Wenck has, or has had, environmental contracts with the following federal and State of Minnesota entities:

- MPCA Closed Landfill Program
- MPCA TMDL Master Services Contract
- MnDNR
- MnDOT
- Metropolitan Airports Commission
- US Army Corps of Engineers
- US General Services Administration (GSA)
- Minnesota Army National Guard
- US Department of Veteran Affairs
- Minnesota State Colleges and Universities
- Federal Reserve
- United States Forest Service
- US Fish and Wildlife Service
- US Bureau of Reclamation
- US Department of Interior, National Park Services
- US Department of Agriculture
- Metropolitan Council
- Metro Transit

In addition, Wenck has contracts with state agencies outside of Minnesota.

Wenck's experience with other state and Federal agencies has been extensive, dedicated and comprehensive. For example, Wenck has had a MPCA Closed Landfill Contract for over 20 years, and an MPCA TMDL Contract since the inception of the program. We understand how federal and state contracts work, and more specifically how contracting with the Minnesota Department of Administration and the MPCA works. We understand the requirements and needs; we will be a strong partner with the MPCA.

Knowledge of MPCA and MDA programs

We have worked in the environmental field before, during and after the creation of the Risk Based Site Evaluation Manual, and other guidance documents prepared by the MPCA. As each technical guidance has been drafted and

SECTION 2: QUALIFICATIONS AND CAPABILITIES

released to the public, Wenck has worked on projects that incorporate the requirements and guidance of each new document.

- i. Risk Based Site Evaluation Manual
- ii. UST and AST Release Cleanup Guidance Documents and Fact Sheets
- iii. VIC Guidance Documents
- iv. MDA Guidance Documents

As indicated above, Wenck has extensive experience with the above referenced manuals, guidance documents and fact sheets. Our staff routinely uses these documents for directing work for clients throughout Minnesota. We complete hundreds of projects a year that require either MPCA, MDA or both MPCA and MDA methods and procedures/guidance documents to be followed. Please see examples of projects that we have completed in Section 3 of this proposal, and review staff experience in their resumes for detailed examples of their use of these documents on projects.

Knowledge of MERLA, CERCLA, RCRA, NCP, and pertinent regulations to remediate hazardous substances or contaminants

Knowledge of federal regulations such as MERLA, CERCLA, RCRA, NCP are an integral part of the investigation and remediation process in Minnesota and other states. We have completed many projects calling for extensive knowledge of federal regulations. In addition to staff who regularly complete environmental investigations and remediation projects, we also have staff with a concentration on emergency response and service. This arm of Wenck regularly follows DOT requirements associated with the transport of hazardous materials and substances. We refer again to Section 3's examples of projects as well as staff resumes that go into more depth.

Two Remedial Investigations Conducted in the Past 3 Years:

Project Example #1

Former Advanced Machine Facility, Spring Park, MN (2002-present)

Nilfisk, Inc.

Client Contact: Chris McCullough, Nilfisk, 763-745-3680



Former Machining and Manufacturing, Circa 1960's

Site Description:

The historical manufacturing facility was the source of chlorinated releases to soil, groundwater and vapor. The contamination, primarily trichloroethylene, was the result of decades of vapor degreasing operations by numerous past operators. The site was redeveloped in the late 1990's into residential homes.

Project Description:

Wenck undertook a full remedial investigation of the site. The remedial investigation included soil, groundwater, surface-water, and soil gas to assess potential risk. The soil and groundwater remedial investigations have included traditional soil sampling as well as extensive source area evaluation using Gore-Sorbors. Groundwater evaluation vertical analytical profiling (VAP) for groundwater as well as Completion of Membrane Interface Probe (MIP) / Hydraulic Profiling Tool (HPT).

Wenck has utilized the following sampling and analysis methodologies:

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- Traditional soil, groundwater and soil vapor testing;
- Two-dimensional geophysical seismic survey;
- Completed numerous off-shore soil borings to assess the extent and magnitude of contamination beneath the lake surface;
- Membrane Interface Probe (MIP) – In-situ evaluation of both vadose zone and aquifer conditions;
- Vertical groundwater profiling;
- Development of hydraulic groundwater model;
- Soil gas, sub-slab and indoor air that resulted in the successful mitigation of dozens of residential homes;
- Sediment sampling and characterization on Lake Minnetonka to define the extent of impacts both vertically and horizontally.

Site remediation consisting of groundwater pump and treatment has been in operation since 2004. The groundwater pump and treatment operated seasonally during non-ice conditions. In April 2004, the treatment building was constructed and equipment was installed to complete the groundwater treatment system. The treatment building contains two GAC vessels that operate in series. Each vessel holds approximately 1,000 pounds (lb) of carbon. In the fall of 2016, Wenck designed and installed a water diffusion system allowing discharge to the lake during non-ice conditions allowing year-round operation of the groundwater pump and treatment system. Wenck is currently designing a significant expansion of the groundwater pump and treatment system to include two additional deep well systems for advance remediation.



Wenck Staff Included:

Personnel involved in the project included: Aaron Benker (Program Manager), Dan Larson (Project Manager-Reports), Mark Deady (Project Engineer), Cory Anderson, Kelly Jaworski, Tom Johnson, Ryan McElrath (field work), Hagen Kaczmarek (GIS), Dan Larson (field work), John Fox (field work), Jordan Shuck (GIS), and Aaron Benker (Investigations and remedial approach lead).

Subcontracted Tasks:

Items that were subcontracted include laboratory analysis and drilling and remedial specialty equipment construction.

Outcome Achieved:

The environmental activities conducted at the Site were completed to achieve the following objectives:

- 1) Long-term groundwater control, capture and remediation through groundwater pump and treatment. On-site carbon filtration and NPDES discharge monitoring.
- 2) Remedial investigation has extended over an area of nearly 25-acres of densely developed land to evaluate the unconsolidated upper aquifer and the deeper basal clay units to evaluate source and extent.
- 3) Vapor mitigation of two dozen residential homes.

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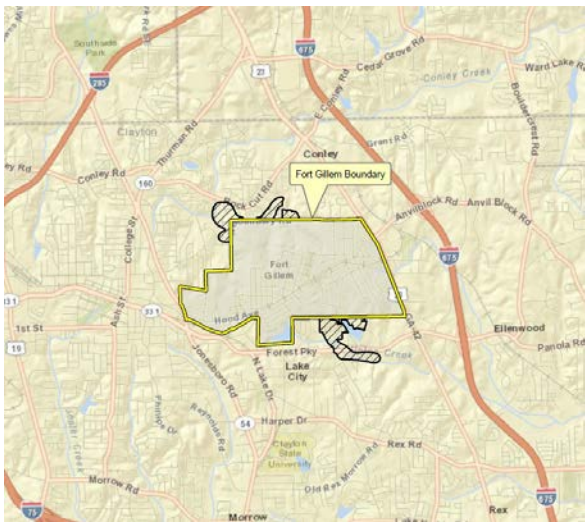
Project Example #2

Fort Gillem Vapor Intrusion Study, Atlanta, GA (2014-2016).

Client Contact: U.S. Army and U.S. Army Corps of Engineers. U.S. Army contact, Owen Nuttall, 404-469-3399

Site Description:

Fort Gillem was an active United States Army Installation between 1940s and 2011 until it closed under the Base Realignment and Closure. During its operation, Fort Gillem was used as a training and material supply depot through World War II and subsequent conflicts. Previous investigations at Fort Gillem detected volatile organic compounds (VOCs) in monitoring wells installed in residential and commercial areas located north and south of the installation boundary that originated from historical disposal and burial of wastes and hazardous constituents near the boundaries of Fort Gillem.



Project Description: Wenck performed a Vapor Intrusion (VI) Study on behalf of the Army to evaluate the vapor intrusion pathway at residential and commercial buildings located within the footprint of the off-base groundwater plumes. During the VI Study, the U.S. Army was issued a Unilateral Administrative Order (UAO) by the USEPA. This large-scale, high profile project received the attention of not only the U.S. EPA, GA EPD, but also the media and Army Headquarters. Wenck served as an integral part of this project working closely with the off-site residents, regulators, Army, and other Army contractors.

Wenck prepared and implemented several key documents as part of the project. Wenck prepared and implemented a Vapor Intrusion Study Work Plan (VI WP), a QAPP, a Community Involvement Plan (CIP), and a Response Action Plan. As part of the

CIP, Wenck prepared a community mailing list and distributed community mailers and fact sheets throughout the VI Study. At the beginning of the project, Wenck created a Fort Gillem VI Study Facebook page, Twitter account, email account, and telephone hotline to provide updates on scheduling and sampling efforts through multiple forums throughout the study. Wenck also held 6 public meetings during the course of the study to educate the public on what VI is and the scope of the Fort Gillem VI study as well as communicate results to residents participating in the VI Study.

Following execution of off-site access agreements, Wenck implemented the multiple media investigation at 102 buildings. The VI study included collection and analysis of groundwater, soil gas, crawl space, sub-slab, indoor, and outdoor air samples within the defined VI study areas. Throughout the two-year project, Wenck reported results, risk evaluations, and recommendations to the Georgia EPD and U.S. EPA Region 4. Data verification was performed by Wenck on 100% of project data, such as field logbooks and COC forms, to ensure proper handling of samples and adequate integrity of field operations. Independent third-party data validation included review of COCs, instrument calibration, instrument performance checks, internal standards, lab control standards, method blanks, and compound identification.

For each sampling event and building included in the VI Study, Wenck performed a VI risk assessment that consisted of evaluation of indoor air, sub-slab, and/or crawl space data from residents and businesses. Based on a comparison of the sample results to various tiers of screening levels, the investigative team made decisions regarding the need for immediate action, such as interim mitigation and/or additional sampling. The U.S. EPA and GA EPD were provided results within the prescribed reporting time frames dictated by the UAO and worked with the Army and their contractors throughout the risk evaluation process to ensure the regulatory agencies agreed

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with the decision-making processes during the VI study. This included conference calls and technical team meetings throughout the project.

Wenck Staff Included:

Personnel involved in the project included: Aaron Benker (Program Manager/technical support), Katie Ross (Project Manager- Community outreach/Reports), Christine Mayo (field work/community outreach), Katie Swor (technical support/risk assessor), Diane Short and John Huntington (Laboratory QA/QC), Jordan Shuck (GIS), Dan Larson (field work), and Shane Waterman (Plan preparation).



Outcome achieved:

The environmental activities conducted at the Site were completed to achieve the following objectives:

1. Fulfill the Army's obligation to evaluate the VI pathway in off-base properties;
2. Document that the vapor intrusion pathway was incomplete and did not pose unacceptable risk;
3. Facilitated communication of highly technical information to the community, regulators and Army representatives.

The EPA approved the investigation and findings on June 6, 2016.

Wenck Matrix of Staff for MPCA Remediation Master Contract

Name, Location, and Years of Service at Wenck/Total Years of Experience	Education	Ecological Risk Assessor 2	Ecological Risk Assessor 3	Engineer 1	Engineer 2	Engineer 3	Engineer 4	Field Technician	GIS/CAD Specialist	Human Health Risk Assessor 2	Human Health Risk Assessor 3	On-Site Inspector	Project Manager	QA/QC Officer	Scientist 1	Scientist 2	Certifications and Licences
Ahlm, Patrick Woodbury, MN 2/13	BA, Governmental Affairs												X		X	X	
Anderson, Cory Maple Plain, MN 3/4	BA, Geology							X				X			X		*1
Ballavance, Brett Duluth, MN 1/25	BChE, BCE, MBA			X	X	X	X						X				*9
Barthel, Joel Maple Plain, MN 1/1	BS Hydrology							X				X			X		
Bazewicz, Chantell Maple Plain, MN 5/14	BA, Biology & Environmental Studies											X	X		X	X	*1, *2, *3
Beck, Brian Golden Valley, MN 5/11	MS, Water Resource Science BS, Environmental Science	X											X		X	X	*1
Beehler, Matt Maple Plain, MN 5/11	BS, Technology Mgmt/ Construction Mgmt							X				X					*1, *2, *3
Benker, Aaron Maple Plain, MN 5/20	BA, Biology & Environmental Studies												X			X	*1, *2
Berndt, Sam New Hope, MN 3/3	BS, Environmental Sciences							X				X			X		*1
Beyer, Megan Maple Plain, MN 12/12	BS, Civil Engineering			X	X								X				*1, *4, *9
Bischoff, Joe Golden Valley, MN 15/20	MS, Ecology BS, Biology	X	X										X			X	
Boell, Jim Maple Plain, MN 17/44	Civil Engineering Tech, Mechanical Engineering Tech								X								
Boll, Wes Maple Plain, MN 17/19	BA, Environmental Studies														X	X	*1, *6
Bowers, Matt Maple Plain, MN 28/28	BS, Civil Engineering				X	X	X						X	X			*1, *9
Cannan, Catharine Fort Collins, CO 2/5	MS, Groundwater Hydrogeology, BS, Geology & Geographic Information Systems												X		X	X	*1
Carlson, Rebecca Golden Valley, MN 18/25	BS, Geologic Engineering			X	X	X							X				*9
Coyle, Jason Woodbury, MN 6/18	BS, Environmental Geology & Technology												X			X	*1
Cruey, Bryce Golden Valley, MN 7/12	BS, Environmental Resource Engineering			X	X	X							X				*9
Ecklund, Chris Maple Plain, MN 5/5	AS, Architectural Draft and Design							X	X								*1
Enzenauer, Carl Maple Plain, MN 10/13	BS, Chemical Engineering			X	X	X							X				*1, *9
Feia, Andrew Fargo, ND 10/16	BA, Environmental Studies												X		X	X	*1

Wenck Matrix of Staff for MPCA Remediation Master Contract

Name, Location, and Years of Service at Wenck/Total Years of Experience	Education	Ecological Risk Assessor 2	Ecological Risk Assessor 3	Engineer 1	Engineer 2	Engineer 3	Engineer 4	Field Technician	GIS/CAD Specialist	Human Health Risk Assessor 2	Human Health Risk Assessor 3	On-Site Inspector	Project Manager	QA/QC Officer	Scientist 1	Scientist 2	Certifications and Licences
Fox, John Golden Valley, MN 5/32	BS, Geology							X				X			X	X	*1, *2, *10
Fryzek, Todd Golden Valley, MN 3/30	MS, Civil Engineering, BS, Geology & Mathematics			X	X	X	X						X			X	*1, *2, *4
Graham, Mike Woodbury, MN 6/30	BS, Recreation, Parks and Leisure Services												X		X	X	*1, *6, *7
Grieme, Roshaan Golden Valley, MN 6/7	BS, Civil Engineering			X	X			X	X								*9
Hayes, Adam Atlanta, GA 2/18	BS, Civil Engineering, MS Geophysical Sciences, MBA			X	X	X							X				*1
Hegland, Steve Maple Plain, MN 8/8	BS, Civil Engineering			X	X			X	X								*1, *9
Helland, Brad Maple Plain, MN 1/30	MS, Environmental Engineering, BS, Chemistry			X	X	X	X						X				*1, *9
Hosfield, Michelle Woodbury, MN 13/20	BS, Environmental Sciences							X				X	X		X	X	*1, *2, *3
Huntington, John Maple Plain, MN 1/35	Ph.D., Physical Organic Chemistry, BA, Chemistry													X			*9
Jaworski, Kelly Maple Plain, MN 3/6	BS, Geology							X				X	X		X	X	*1, *2
Johnson, Suzanne Maple Plain, MN 5/24	BS, Biology & Environmental Science, BA, Journalism												X			X	*1, *5
Kaczmarek, Hagen Maple Plain, MN 4/7	MS, Forest Hydrology & Watershed Mgmt., BS, Physical Geology & Political Science							X	X			X					*1
Ketelsen, Ethan Maple Plain, MN 4/4	BS, Civil Engineering			X				X				X					*1, *4, *8
Kinney, Patrick Golden Valley, MN 4/21	MPH, Environmental Health, BS, Geology							X		X			X		X	X	*1
Kramka, Ben Woodbury, MN 1/5	BS, Geological Engineering							X				X			X		*1, *8
Kuphal, Stephanie Golden Valley, MN 15/25	BS, Chemical Engineering											X	X		X	X	*9
Lammers, Christine Fargo, ND 3/3	BS, Geology							X				X			X		
Langer, Tom Golden Valley, MN 3/9	MS, Conservation Biology, BS, Environmental Science											X	X		X	X	*1
Larson, Dan Maple Plain, MN 4/24	BS, Geology							X				X			X	X	*1, *2, *10
Larson, Joanna Maple Plain, MN 25/36	MS, Civil Engineering, BS, Civil Engineering			X	X	X	X										*9

Wenck Matrix of Staff for MPCA Remediation Master Contract

Name, Location, and Years of Service at Wenck/Total Years of Experience	Education	Ecological Risk Assessor 2	Ecological Risk Assessor 3	Engineer 1	Engineer 2	Engineer 3	Engineer 4	Field Technician	GIS/CAD Specialist	Human Health Risk Assessor 2	Human Health Risk Assessor 3	On-Site Inspector	Project Manager	QA/QC Officer	Scientist 1	Scientist 2	Certifications and Licences
Louwagie, Shawn Maple Plain, MN 6/8	BS, Civil Engineering, BS Construction Mgmt			x	x			x									*1, *9
Mackowick, Marlon Fargo, ND 15/17	BS, Civil Engineering			x	x			x	x			x					*1, *9
Madejczyk, Jeff Maple Plain, MN 13/21	MS, Fisheries Biology, BS, Ecology												x			x	*1
Massaro, Pamela Fort Collins, CO 16/21	BS, Geological Environmental Engineering			x	x	x	x						x				*4, *9
Matthiesen, Ed Golden Valley, MN 16/41	MBA, St. Thomas, MCE University of MN, BA, Biology			x	x	x	x						x				*9
Mayo, Christine Atlanta, GA 5/15	BS, Chemistry												x			x	
McCullen, Elizabeth Atlanta, GA 3/3	BS, Chemistry							x				x			x		
McElrath, Ryan Woodbury, MN 2/11	BS, Geological Engineering							x				x	x		x	x	*1, *2, *4, *8
Meehan, Chris Golden Valley, MN 6/18	MBA, MS Civil Engineering, BS Civil Engineering			x	x	x							x				*9
Nalven, Sarah Golden Valley, MN 1/5	MS, Earth, Ocean & Atmospheric Science, BA, Biology											x			x		*1
Olson, Mark Maple Plain, MN 5/37	BA, Environmental Studies, Geography and Geology												x		x	x	*1
Olson, Tony Maple Plain, MN 5/22	BS, Health Science							x				x					*1, *2, *3
Osterdyk, Eric Woodbury, MN 1/1	BS, Environmental Engineering, BS, Wildlife Ecology, Research & Mgmt			x				x				x			x		*4, *8
Otte, Joe Woodbury, MN 20/28	MBC, Business Communication, BA, Geology												x			x	*1
Otte, Joey New Hope, MN 4/4	BS, Sustainability							x				x			x		*1, *2
Parenteau, Dave Golden Valley, MN 28/28	BS Civil Engineering			x	x	x	x						x				*1, *9
Patullo, Carolyn Fargo, ND 9/13	BS, Civil Engineering			x	x	x										x	
Roberts, Haley Atlanta, GA 11/13	BS, Chemical Engineering			x	x	x											*1, *9
Rogers, Chad Woodbury, MN 5/10	Juris Doctorate, BA, Business Administration												x		x	x	
Ross, Katie Atlanta, GA 4/19	BS, Geology												x			x	*1, *10
Sanders, Kim Atlanta, GA 2/20	MS, BS Civil Engineering												x		x	x	
Schmidt, Rowdy Maple Plain, MN 9/25	BA, Construction Management							x				x			x	x	*1

Wenck Matrix of Staff for MPCA Remediation Master Contract

Name, Location, and Years of Service at Wenck/Total Years of Experience	Education	Ecological Risk Assessor 2	Ecological Risk Assessor 3	Engineer 1	Engineer 2	Engineer 3	Engineer 4	Field Technician	GIS/CAD Specialist	Human Health Risk Assessor 2	Human Health Risk Assessor 3	On-Site Inspector	Project Manager	QA/QC Officer	Scientist 1	Scientist 2	Certifications and Licences
Short, Diane Denver 1/30	MS Chemistry/Molecular Genetics, BS Chemistry/Biochem.												X	X			
Shoemaker, Todd Woodbury, MN 15/16	MS. Civil and Environmental Engineering, BS Civil Engineering			X	X	X											*9
Shuck, Jordan Maple Plain, MN 14/16	BA, Geography								X								
Sigterman, Louis Golden Valley, MN 4/9	MS, Environmental Engineering, BS, Biochemistry			X	X								X				
Stacy, Mark Fort Collins, CO 3/23	MS. Geology & Water Resources, BA, Geology												X			X	*10
Strom, Jeff Golden Valley, MN 10/14	MS, Water Resource Science, BA, Environmental Studies and Geology	X										X	X		X	X	
Sundbo, Erik Maple Plain, MN 5/34	BA, Biology												X		X	X	*1, *2, *3
Swor, Katie Woodbury, MN 7/14	MS, Civil Engineering, BE, Engineering Sciences, BA Engineering Sciences and Russian			X	X	X				X	X		X				
Thelen, Ryan Maple Plain, MN 10/12	BS, Civil Engineering		X	X				X				X					*1, *2, *4
Toso, Joel Mandan, ND 9/33	PhD., Hydraulics, MS, Civil Engineering, BS Civil Engineering			X	X	X	X						X				*9
Ward, Jake Maple Plain, MN 1/7	BS, Biology							X				X			X	X	*1, *2, *3
Waterman, Shane Woodbury, MN 7/21	MS, Geology, BS, Geology												X		X	X	*1, *10
Watson, Meaghan Golden Valley, MN 3/8	BS, Environmental Science												X		X	X	*1
Zobel, Adam Maple Plain, MN 5/16	BA, Biology											X	X		X	X	*1, *2

*1 = OSHA 40 HAZWOPPER trained
 *2 = Absbestos Inspector
 *3 = Asbestos Supervisor
 *4 = SWPPP Inspector/Designer
 *5 = CHMM

*6 = CWD
 *7 = PWS
 *8 = EIT
 *9 = PE
 *10 = PG



DETAILED DESCRIPTIONS OF WENCK'S EXPERIENCE

This section presents a summary of Wenck's experience as outlined in the RFP documents. It first presents experience with agriculture chemical investigations and cleanup followed by listing remediation technologies that Wenck and Wenck staff have experience with, followed by a detailed discussion of each of the roughly 50 scope of service items outlined in Section 3 for Category A. In addition to presenting a detailed description of Wenck's experience, for each item, as appropriate, one to several example projects is presented which involves the component associated with the specific scope of services. Most of the projects presented in addition to having the component listed, also involve several of the other components from the scope of services list. For example, a project presented under the "operate and maintain remediation systems" also has components for sampling, reporting, and previously included investigation, drilling, design, along with reporting, etc. It should also be noted that Wenck has grown significantly over the last ten years and more than doubled in size. The staff who have come to Wenck over these ten years bring significant experience in addition the Wenck project experience presented in this section.

i. Experience with Ag-Chem Investigations and Cleanup

Wenck has completed several agricultural chemical projects over the years. They have included large remediation/cleanup projects for fertilizer spills, along with long term investigations of AgVIC sites. Wenck staff also have extensive experience with AgVIC sites such as operation of remediation systems for the cleanup of Park Penta, a PCP/LNAPL Superfund Site, and remediation of dioxin impacted sites in other states.

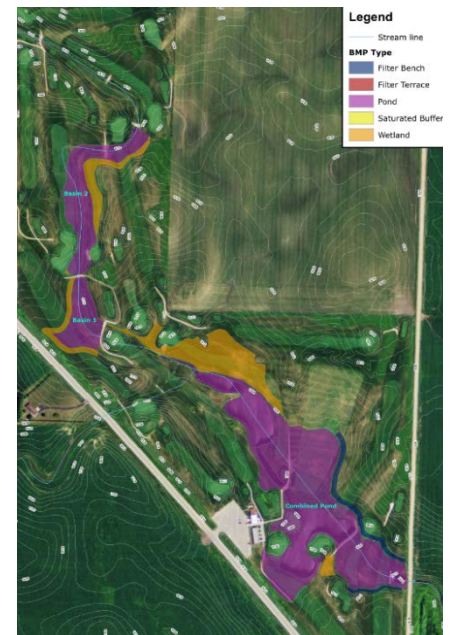
Example Projects:

Golf Course Redevelopment Projects

Redevelopment of a golf course can encounter elevated levels of metals, fertilizers, pesticides and herbicides specifically applied to greens and tee boxes at agronomical rates. Other chemicals of concern can be found in equipment storage areas, chemical storage areas and chemical mixing areas. With the use of the MDA guidance documents for golf course redevelopment, Wenck has used incremental sampling methods (ISM) to determine if a golf course has been impacted. The ISM sampling has been followed up with interval sampling to define the extent of the impacts for effective removal. Elevated chemicals of concern applied at agronomical rates are not considered to be an incident for which liability assurance letters cannot be issued by the agency. However, if an incident is discovered in loading, storage or mixing areas, those specific areas can receive liability assurances and reimbursement through ACRRRA.

S&B Trucking Fertilizer Investigation

A transport truck hauling a diammonium phosphate fertilizer overturned in the center median of Interstate I-35 near Glenville, MN. Three-quarters of the load (18.5 tons) were released on the roadway and median. The primary Contaminants of Concern (COC) were ammonia, nitrate, total phosphorus, TKN and soluble salts. The incident area was 40 feet west-to-east and approximately 250 feet long. South of the incident area was another 10 foot wide by 250 foot long area that may have been affected by product migrating through stormwater runoff. The responsible party hired an excavation contractor to remove and dispose of the top six inches of soil within the incident area. The MDA had concerns that soil contamination remained at the incident site. Wenck was able to prepare a Work Plan with the MnDOT Office of Environmental Stewardship and the MDA for soil testing in the median of I-35. An existing MnDOT right-of-way permit was used through the previous excavation contractors work. Traffic control was arranged by Wenck. Soil samples were collected in 10 sections outlined by the MDA. Within each section, five subsamples were collected in six-inch intervals. Each interval was composited



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together for a total of 30 samples. The first six inches were analyzed for each sample with the remainder placed “on hold”. Additional soil analysis was determined by the MDA and ultimately, the incident site did not require additional excavation activities. The project was turned back over to MnDOT to revegetate the incident area.

Liquid Fertilizer Release Emergency Response Train Derailment

Two trains collided head-on in Dresbach, Minnesota. Twenty-six cars were derailed during the incident. One of the train engines and two liquid fertilizer cars ended up in the Mississippi River. The accident resulted in thousands of gallons of liquid fertilizer, diesel fuel, and engine lube oil being released into the ground and river. In addition to the train wreckage, a propane cylinder associated with the railroad switch box was compromised. The Wenck HAZMAT Team mobilized emergency response equipment to the site to perform general emergency response and product transfer activities. Upon completion of the project, the Wenck HAZMAT Team transferred over 100,000 gallons of liquid fertilizer from damaged tank cars and over 15,000 gallons of a liquid mixture of fertilizer, diesel fuel, and lube oil from the ground surface. Our client was able to reopen the rail line in approximately two days.



Anhydrous Ammonia Train Derailment Emergency Response High Pressure Transfer

On a busy 4th of July holiday weekend the Wenck HAZMAT Team responded to a derailment that involved seven tanker cars of anhydrous ammonia in Glenwood, Minnesota. Holiday traffic on a major roadway was disrupted. The Minnesota Pollution Control Agency (MPCA), Department of Agriculture, and Homeland Security required immediate transfer operations. The Wenck HAZMAT Team contracted and coordinated high pressure transfer equipment and personnel for three ER companies to transfer 24 hours per day, seven days per week until complete. The response enabled the road to stay open for holiday traffic.

ii. List of Remedial Technologies Wenck has Experience with

Wenck has experience with a wide variety of remedial technologies. Including those listed below:

1. Vapor mitigation
2. Pump and discharge
3. Pump and treat with air stripper
4. Pump and treat with carbon filter
5. Pump and treat with ion exchange
6. Phytoremediation
7. Iron reactive barriers (zero valent iron)
8. Interceptor trenches
9. Barriers including grout and sheet piling
10. Vapor barriers
11. SVE (with and without thermal oxidation)
12. Bio-spargue with vapor extraction
13. Capping- both on land and for sediments
14. Landfill gas extraction systems, venting and flares
15. Air bubble barriers
16. Excavation and treatment prior to disposal due to hazardous levels including lead, PCE, TCE, arsenic

17. Excavation and disposal
18. Bio-augmentation for degradation of groundwater plume
19. LNAPL and DNAPL removal
20. Pump and treat with thermal oxidation
21. Horizontal drilling
22. Dredging- wet and dry dredging
23. Various wastewater treatment systems- both municipal and industrial
24. Carbon filters
25. ChemOX
26. In-situ thermal oxidation
27. Monitored Natural Attenuation
28. Hydrogen peroxide injection
29. BAM (carbon) injection
30. Excavation and thermal treatment
31. Excavation and disposal as hazardous waste due to PCB levels
32. Electrical Resistance Heating

iii. Detailed Experience as Bullets in Section 3

This section lists each of the bullets in Section 3, provides a discussion of Wenck's experience, and then presents select projects that include the bulleted item as a component of the project.

a. Prepare Engineering Evaluation Costs Analysis (EECA)

Wenck has completed numerous EECA and Feasibility Studies (FS) with a cost analysis component for clients over the years. This has ranged from completing full EECA and FS for large superfund projects, to preparing simple cost estimate comparisons for client consideration on small remediation projects.

Wenck routinely prepares cost estimates for environmental components of projects. This can be for simple projects, such as retroactively installing a vapor mitigation system under a building due to chlorinated solvent impacts to preparing EECA for complex remediation systems and landfills. We routinely do this work in association with design-build projects, design-bid-build projects, for landfills, for linear transportation and utility projects, for private clients needing to complete yearly and long-term budget planning, for sediment projects and for brownfield redevelopment projects, besides others.

Wenck will utilize our experience completing costing for these projects, in association with our experience with various remedial technologies in preparing EECA and FS to help the MPCA in competing EECA for projects under review by the MPCA.

Example Projects:

Twin Cities Army Ammunition Plant - Engineering Evaluation/Cost Analysis for Soil Remediation

Prepared the alternatives analysis for the engineering evaluation/cost analysis report prepared for remediation of metals-contaminated soils at a former grenade range at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. Alternatives evaluated included soil washing and soil leaching (including treatability studies), capping, and landfill disposal.

Twin Cities Army Ammunition Plant - Engineering Evaluation/Cost Analysis for Groundwater Remediation

Prepared an engineering evaluation/cost analysis report for chlorinated solvent-contaminated groundwater at a former ammunition manufacturing facility at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant)

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in Minnesota. Alternatives evaluated included groundwater extraction & treatment and monitored natural attenuation. The recommendation to implement monitored natural attenuation was approved by the regulatory agencies.

Twin Cities Army Ammunition Plant - Soil Investigation and Engineering Evaluation/Cost Analysis for Soil Remediation

Conducted site investigation and prepared an engineering evaluation/cost analysis report for remediation of PAH and metals-contaminated soils at five areas of concern at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. Alternatives evaluated included capping and landfill disposal. The five areas included former disposal, manufacturing, and storage/loading areas.

b. Oversee or Conduct Pilot Testing of Remediation Systems

Wenck and Wenck staff have been involved in both overseeing and conducting pilot testing of remedial systems. This has included the whole suite of remedial technologies with which Wenck has experience which is outlined previously. Conducting pilot testing is an integral part of the start-up process for several of the remediation technologies which may be under consideration for a site.

There are certain remedial technologies, such as soil vapor extraction or groundwater pump testing where completing pilot testing is an important component in helping to ensure that the correct final design is prepared. Without completing pilot testing of certain types of remedial systems, there is an increased likelihood of needing to complete additional modifications following installation of the system.

Example Projects:

Torrington Bearing, Heavy Industrial Facility in Indiana



During initial investigations of this industrial facility, Wenck identified soil and groundwater contamination resulting from surface spills.

A layer of cutting oil was identified floating on the water table with a maximum thickness of two feet. Soil and groundwater contamination were identified at concentrations of 55,000 and 60,000 parts per billion (1,1,1-trichloroethane), respectively.

Wenck evaluated cleanup options and provided the design, specifications, and construction quality control for the completion of a remedial action pilot study including the combination of air sparging with in-situ soil vapor extraction.

The data obtained from the completion of the pilot studies provided the necessary information to determine the feasibility and conceptual design of the full-scale remediation system including the necessary modification to remove the cutting oil.

Denver, Colorado Petroleum Contaminated Site - Soil and Groundwater Remediation Designed and started up a groundwater/free product recovery well and a soil venting system to clean up petroleum-contaminated soils and groundwater at a fire station in Denver, Colorado. Design included a dual extraction well (recovering groundwater and soil vapor) and a groundwater treatment system consisting of oil/water separation and air stripping.

c. Operate and Maintain (O&M) Remediation Systems

Wenck is currently involved in O&M of several remediation systems. In addition, Wenck has historically provided O&M support to the MPCA Closed Landfill program. Wenck has a full suite of vehicles, and support equipment

SECTION 3: SCOPE OF WORK

located in our New Hope office location. Wenck's New Hope office also provides emergency response services to a wide variety of clients, including railroads, pipeline companies, and others. This location has all the equipment and materials needed to provide support for O&M of remediation systems which the MPCA would like Wenck to provide support for. Wenck staff have experience in a wide variety of O&M systems varying from complex remedial technologies such as large pump and treat systems, to simple systems consisting of liners and caps.

Example Projects:

Sharpe Cleaners Former Dry Cleaner Remediation

The site is contaminated with dry cleaner solvents from a former dry cleaner that operated at the site for over 30 years. Wenck prepared a final Corrective Action Design (CAD) Amendment based on site investigation reports which were completed over the course of three years by others. Wenck is implementing the Minnesota Pollution Control Agency (MPCA) approved CAD including the installation of a Soil Vapor Extraction (SVE) system which includes six wells and a roof-mounted blower, operation, and maintenance.



The SVE system was brought on-line in July 2014. System monitoring includes: Monthly air sample analysis and working closing with the MPCA to ensure the system is operating at the most proficient level for soil venting in order to shut down the system and obtain MPCA No Further Action assurance in a timely manner.

Nilfisk-Advance - Groundwater Remediation. Designed a groundwater remediation system for chlorinated solvent contamination at a former manufacturing facility in Spring Park, Minnesota, located on the shore of Lake Minnetonka. System design included a recovery well, a treatment system utilizing activated carbon treatment, and a control system with remote monitoring capability. Provided construction and start-up oversight, and ongoing technical review for system monitoring, operation, and maintenance.

d. Prepare Corrective Action Design Documents (e.g., CAD design reports, pilot test reports, installation notification reports, monitoring reports, plans, and as-built reports)

Completion of CAD reports, pilot test reports, etc. is an important step in documenting the observations and results of the project at hand. Wenck routinely prepared CAD reports, pilot test reports, monitoring reports, installation notification reports, plans, as-builts, etc. We understand that the report will help provide a "snap-shot in time" of the project and/or system so that others in the future can understand what was completed, how the system is working, how the system is designed, what issues were identified and addressed, etc.

Example Projects:

Lejeune Vapor Mitigation



Wenck was retained to provide rapid action vapor assessment and vapor mitigation for a 20,000 square foot industrial building undergoing change in use. The building was a former industrial manufacturing operation that had historical releases of tetrachloroethylene (TCE) from past industrial



degreasing. Wenck was retained just 45 days before the industrial building was scheduled to open as a charter school. The site was under the MPCA's VIC program with a high level of interest due to the proposed use. Due to the short time frame and high profile of interest by regulators, Wenck implemented several initial testing phases to assess the vapor intrusion risk and to be sure the building was suitable for vapor mitigation. Wenck utilized real-time compound specific in-situ air monitoring to measure PCE concentrations throughout the interior and sub-surface. This real-time data analysis allowed Wenck to make quick reliable decisions about the Vapor Intrusion (VI) pathways ensuring the building was suitable for sub-slab vapor mitigation. This approach saved weeks of time and thousands of dollars from traditional sampling and analysis methodologies.

Once the vapor pathway was fully understood, Wenck conducted vapor mitigation system engineering and design, pilot testing, regulatory communication and provided all labor for the construction of the system. The system included a mixture of depressurization sumps and pits based on the buildings varying sub-surface conditions. This customized system is both efficient and effective. Within 30 days of being retained, the building was successfully mitigated with confirmation testing and performance evaluations underway.

Seward Commons Multi-Site Brownfield Redevelopment

Wenck was retained by Redesign Inc. for the Seward Commons Brownfield redevelopment. The project is a multi-phased redevelopment of approximately 3.2 acres of the former Bystrom Brothers machine shop campus near the Franklin light rail transit station. Bystrom Brothers closed in 2007 after operating on the site since the 1940's. Previous uses on the site included a barrel-making operation (known as a Cooperage), a potato chip factory, grain mill, and a lumber company.

Each phase of redevelopment has included extensive due-diligence to adequately assess risk and manage regulatory requirements with both MPCA VIC and EPA. The site investigation has included soil, groundwater and vapor assessments as well as asbestos, lead-based paint and hazardous material surveys. The site assessments of soil, groundwater, vapor and hazardous building materials identified the site as contaminated with petroleum, Stoddard solvent and chlorinated solvents in soil, groundwater and vapor.



e. Prepare Health and Safety Plans (HASP)

Health and Safety is paramount at Wenck. For all environmental projects Wenck prepares Site Specific Health and Safety Plans (HASP). For small projects the HASP may be a simple template plan with a route to the

SECTION 3: SCOPE OF WORK

hospital/emergency room added to the plan. For larger projects, a full comprehensive HASP is prepared. Wenck staff includes CIHs with OSHA audit experience who routinely complete health and safety audits of projects to ensure that Wenck staff are following the HASP for the project, and audit for OSHA safety compliance on the project. For Wenck, safety is Job #1.

Example Projects:

Confidential Client, Amherst SD (oil spill response)

Oil spill site support including oil and contaminated soil clean-up, vacuum truck operations, establishing decontamination stations, managing oil storage, building temporary roads and other miscellaneous duties. Wenck prepared the health and safety for the project and provided the Health and Safety Manager. Responsibilities included developing site-specific health and safety plans, job hazard analysis, and training.

Confidential Client, Morgan Hill Surface Cleaning

For this remediation of heavy metals including Arsenic, Lead and Chromium, among others Wenck followed standard Wenck practices and prepared a HASP to follow while completing the project.

H&S Management, Minneapolis, MN

Management of comprehensive workplace health and safety program, including program development and implementation, safety inspections (construction and general industry), job hazard analysis, exposure evaluations and injury/incident investigation. Provided safety training including safety orientation, HAZWOPER, and confined space.

Sodium Chlorate Spill Site, Brownsville, MN

Sodium chlorate spill support including clean-up of free product, vacuum truck operations, establishing work zones, and other miscellaneous duties. Wenck provided the health and safety manager for the project. Responsibilities included developing site-specific health and safety plans, job hazard analysis and safety support.

Onsite Health and Safety Manager, Becker, MN

Provided onsite health and safety program development and implementation, including confined space entry, hydrogen sulfide injury/fatality prevention program, chemical storage, and industrial hygiene exposure assessments. Provided exposure assessments for a variety of occupational exposures including noise, biological agents (mold, endotoxins), welding fumes, solvents, and particulates.

f. Oversee Site Investigation Services for Soil Boring Advancement, and Monitoring Well Installation Using Both Standard Drilling Methods, and Direct Push Methods

A routine part of environmental investigations is the completion of soil borings and installation of monitoring wells using Geoprobe, Hollow Stem Augers (HSA), and less frequently mud rotary and rotosonic technics. Wenck staff are familiar with these approaches, and Wenck completes soil borings and monitoring well installation as the consultant for our various clients. Completing oversight is an important service that Wenck will complete for the MPCA utilizing staff who have extensive experience in completing these tasks on numerous projects. Our staff routinely collects soil, develops wells following installation and collects groundwater samples, completes the logging of borings using a modified ASTM lithology methodology, and follows the MPCA's guidance documents for field observations and screening using a PID, or other methods dependent on the contaminants of concern for each site.

Example Projects:

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Former Manufacturing Facility - Soil and Groundwater Investigation and Remediation

Wenck completed a chlorinated solvent contamination investigation at a former manufacturing facility in White Bear Township, Minnesota. Site investigation included soil borings, geoprobes, on-site laboratory analysis, and installation of monitoring wells. Natural attenuation was recommended and approved.

g. Conduct Ground Water, Soil, Surface Water, Sediment, and Air Sampling and Monitoring

Collection of samples and monitoring of air is an integral part of environmental investigations. Wenck staff completes these components on many projects that involve soil, groundwater or sediment collection.

Air monitoring varies from the routine use of a 10.2, 106 or 11.7 eV PID; and 4-gas meter to the less common use of an FID, or other field instrument, such as TO-15 canisters, Draeger tubes, etc. The conduction of air monitoring is commonly completed for Health and Safety purposes and/or for determining vapor migration/risk. Most of these instruments along with other field instruments such as XRFs, are also used to help in field evaluating soils or sediments for impacts to help determine which sample locations and or intervals should be collected for laboratory analysis.

The collection of soil gas samples through TO-15 canisters has become an important part of a large quantity of projects where VOCs are one of the contaminants of concern. Soil gas impacts with VOCs and chlorinated solvents are driving a large amount of investigations currently.

Groundwater sampling from temporary well points is routinely completed by Wenck on projects where drilling intercepts water. When temporary wells are installed, the groundwater sample is collected directly from the boring at the interval the boring is completed. It is becoming common for Wenck to collect water samples from varying depths in a boring to help complete a profile of the groundwater contamination.

For permanent monitoring wells, Wenck and Wenck staff have completed direct sampling from the well points using a variety of methods and technologies. Some examples include collecting water from varying depths in wells using packers/bladders to help delineate the profile of groundwater impacts, completing low flow sampling of wells at various depths in a well, and completing "standard" sampling of wells using temperature, pH, and conductivity to determine when the water is stabilized.



For all sampling activities, Wenck staff coordinates access with property owners, interacts and plans with the selected laboratory to receive the sample containers prior to field work, collect the samples, complete the chain-of-custodies, and ships the sample back to the laboratory following sample collection.

SECTION 3: SCOPE OF WORK

Example Projects:

Former Van Der Steeg Greenhouse Property Environmental Due Diligence – Mound, MN

Performed a Phase I ESA and Phase II subsurface investigation of a 7-acre abandoned greenhouse property occupied by a residential dwelling, commercial-retail greenhouse, and wastewater treatment pond. The Phase I ESA identified an unpermitted dump historically operated at the property. Phase II investigation activities included completing six soil borings and installing two vapor probes to assess soil, groundwater, and soil vapor conditions, as well as sediment collected from the wastewater pond. Contaminants of concern included VOCs, RCRA Metals, PAHs, PCBs, and nitrates-nitrites. Additional project activities included data analysis and report preparation. Soil analytical data collected from the Phase II revealed the presence of a leaking 5,000-gallon fuel oil underground storage tank (UST) and the property was enrolled in the Petroleum Remediation Program.

Penn Avenue Union - Penn and Golden Valley Road, Phase I and II, RAP

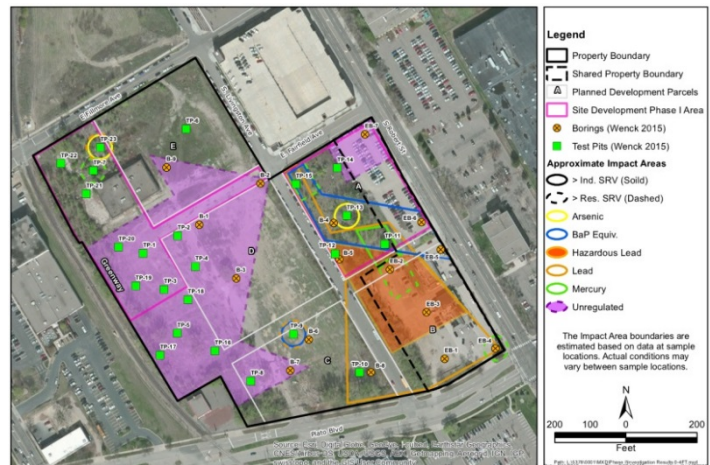
The project consisted of six adjoining parcels. Historical Sanborn® maps identified several former structures on the project including dwellings, an apartment building, a commercial shop and a filling station. A proposed four-story residential and commercial space is being developed on the property.



Wenck has prepared Phase I and II Environmental Site Assessments for the Site and a RAP. Wenck also has performed Asbestos and Hazardous Materials surveys for the existing houses to be demolished.

Fillmore Avenue Apartments (West Side Flats)

Wenck was retained by a national multifamily apartment developer to be the environmental consultant on a large 15-plus acre former industrial site historically known as the West Side Flats. The proposed redevelopment includes replatting the site into five separate development parcels, along with the creation of an area-wide stormwater management system known as the Greenway. As part of this work, Wenck has completed two Phase I ESAs on property. Wenck also completed a significant environmental and geotechnical investigation which included soil borings and test pits, a hazardous building materials survey on the lone remaining building and preparation of a comprehensive Phase II Investigation report.



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Wenck also prepared a Response Action Plan for the first phase of the proposed redevelopment site which includes methodologies for using and addressing soil within a portion of the Greenway as part of the response actions. Using our in-depth knowledge of the site, Wenck prepared cleanup cost estimates for the first phase of development, including portions of the Greenway and new public infrastructure. With this information, Wenck and the development team partnered with the City to submit successful environmental cleanup grant applications totaling \$1M for the project.

Wenck also evaluated the proposed greenway concept and prepared an engineer's estimate for the construction and design costs.

h. Conduct Vapor/Air Monitoring for Health and Safety and Air Quality Criteria

Wenck staff follow the HASP for each project, and this routinely includes completion of vapor/air monitoring for health and safety purposes. This monitoring can include a variety of instruments, and depending on the contaminant of concern routinely includes the use of a 10.2, 10.6 or 11.7 eV PID, 4 gas meters, LEL meters, Draeger tubes, FID, Landtec, etc.

For air quality purposes, these same instruments can be utilized to quickly evaluate air quality criteria in the project area, in buildings on the project site, and at the boundaries of the project. In addition, other testing for air quality purposes have been completed by Wenck staff with the most commonly utilized technique besides those outlined above consisting of the use of TO-15 VOC canisters. Wenck staff have also used other screening techniques for air quality such as the use of TO-13 for SVOCs, Draeger tubes for specific contaminants of concern, benzene specific field screening instruments, etc.

Example Projects:

Hampton Inn and Suites, Minnetonka MN

A former Stuart Anderson's Cattle Company Restaurant site was historically filled with demolition debris and refuse. Impacts noted included metals, DRO, PAHs, and methane.

Wenck prepared a Phase I ESA and enrolled the site into the MPCA Voluntary Investigation and Cleanup Program (VICP). Additional soil investigation activities and geotechnical work took place at the site in August 2011. A Development Response Action Plan/Construction Contingency Plan (DRAP/CCP) was prepared for the site and submitted to the VICP for review and approval.

In October 2011, excavation activities commenced at the site removing impacted waste from within the proposed building footprint, utility corridors, and parking areas. Removed waste was hauled to a permitted landfill for disposal. On-site field activities included excavation of impacted soils and debris, transportation, disposal, air monitoring, vapor monitoring, and confirmation soil sampling.

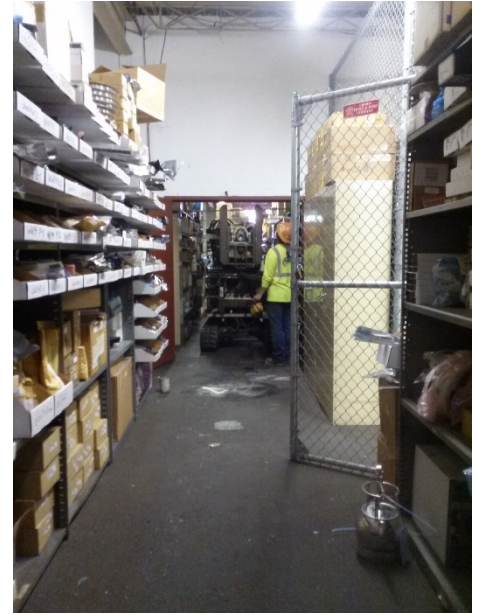
Approximately 25,644 tons of waste and debris was excavated from the Site. A sub-slab vapor barrier and venting system was installed below the proposed building footprint. Wenck designed the vapor system and provided oversight and documentation for the installation.

After the site work was completed, a DRAP/CCP Implementation report were prepared. Monitoring for the vapor system continued for two years.

i. Conduct and/or Oversee Site Assessment Activities (Phase I and Phase II), Limited Site Investigations and Remedial Investigations

With a staff of over 50 completing this type of work, Wenck completes hundreds of site assessments each year. These vary in size from simple small vacant rural parcels to large redevelopment projects in the inner city and large corridor projects. Most commonly, we complete Phase I ESAs following the ASTM standard. However, for large corridor projects such as those completed by MnDOT and the Met Council, a modified ASTM standard is followed.

Routinely when Phase I ESA's identify Recognized Environmental Concerns (RECs), a Phase II ESA or Limited Site Assessment (LSI) is completed. Wenck staff are familiar with all investigation approaches and concepts for completing Phase II ESAs including drilling, test pits, soil gas sampling, groundwater sampling, completing vapor assessments, etc. Wenck completes over 100 Phase II and/or LSI's per year, predominantly in Minnesota.



For larger more complex projects, Wenck will complete Remedial Investigations (RIs) under the oversight of the state regulatory agency. We have been involved in completing RIs for a large variety projects ranging from chlorinated solvent plumes, to large area with PCB impacts to addressing impacts from landfills and refineries.

Example Projects:

Kroger Company

A site investigation was conducted within a very short window of time and included the installation of over 200 direct push soil borings, 40 groundwater monitoring wells, and analysis of over 350 soil samples for a full list of potential chemicals of concern. The project also included comprehensive assessment and monitoring of site conditions during building demolition and earthwork construction activities. Site investigation and sampling activities identified several isolated areas which had been impacted with heavy metals and pesticides. These areas were rapidly delineated and remediation alternatives were evaluated that would not impact the construction schedule. Soil remediation activities included excavation, soil stabilization, as well as offsite disposal of over 350 tons of impacted soils.

Broadway Flats Redevelopment Project – Minneapolis, MN

Wenck provided environmental support for the redevelopment of a 2-acre property formerly occupied by a gas station and several residential properties. The property contained soil impacts from urban fill material, and contaminants of concern included asbestos, arsenic, volatile organic compounds (VOCs), and diesel range organics (DRO). Project activities included screening, segregating and managing over 15,000 cubic yards of contaminated soils in accordance with an MPCA-approved Development Response Action Plan (RAP)/Construction Contingency Plan (CCP). Additional project responsibilities included managing the disposal of over 66,000 gallons of petroleum contaminated



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groundwater and overseeing the construction of a passive vapor mitigation system.

Phase I ESA/II Investigation of the Proposed Hennepin County Services Building – Minneapolis, MN

Wenck conducted a Phase I ESA and Phase II surface investigation and completed reports for a property enrolled in the MPCA's Voluntary Investigation and Cleanup (VIC) program. The Phase I ESA identified historical uses of the property as a gas station and industrial building. Subsurface investigation activities included drilling 14 soil borings across the site to assess soil, groundwater, and soil vapor impacts conditions. Contaminants of concern included RCRA metals, PAHs, VOCs, PCBs DRO, and GRO.

Mill City Quarter Redevelopment

Wenck was retained by a local development team to assist in the redevelopment of a historically underutilized surface parking lot in proximity to the downtown core and the Mississippi Riverfront. The development consists of the construction of two multistory, mixed use buildings on each side of a centrally located outdoor common area and shared underground stormwater management infrastructure.

Wenck completed several Phase I ESAs on the property, completed additional groundwater investigation activities, and prepared a Response Action Plan that was reviewed and approved by the MPCA and implemented over the past 16 months. Wenck also assisted in obtaining \$2M in grant funds for the project from the Metropolitan Council LCA TOD program. Funds included approximately \$850,000 in cleanup funds and \$1.15M in project development funds. Response actions are largely complete. More than 20,000 tons of contaminated soil was segregated from the site and disposed of at a permitted industrial disposal facility.

Wenck provided technical guidance in evaluating perched groundwater conditions, contaminated and unregulated soil volumes and management assistance and other environmental assistance.

Beneath this parkway, a stormwater management system will be constructed that will provide rate and quality control for runoff from the Site.



j. Conduct Surface Water, Ground Water, Air and Vapor Receptor Surveys

For LSIs, Phase II ESAs and RIs, it is common to conduct surface water, groundwater, air and vapor receptor surveys. Wenck completes these components on projects as needed, and with the additional concerns for vapors, more frequently now than in the past.

Example Projects:

Norman County Demolition Landfill – Gary, MN

In response to concerns of groundwater performance standard exceedances, the MPCA asked Norman County Demolition Landfill to conduct a site groundwater investigation to determine the horizontal and vertical extent of present contamination. Wenck assisted the County during their initial planning and regulatory comment response

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for the investigation program. In general, the detailed investigation involved the drilling and geologic logging of shallow and deep soil borings, installation of temporary monitoring wells, surface water monitoring, and sampling of nearby residential wells for upgradient to downgradient water quality comparisons.

Wenck prepared the drilling and groundwater sampling workplan, conducted field oversight during the field investigation, and collected all required environmental sampling. Wenck installed six shallow temporary wells and two deep soil borings to nearly 100 ft. to allow for horizontal and vertical profiling of groundwater contaminant migration and further geologic characterization of the site. The field and laboratory data collected from the site borings and temporary wells were used to evaluate the potential and extent of groundwater contamination.



Wenck was successful in demonstrating the following:

- Underlying geology consisted of over 85 ft. of clayey till
- Local area is naturally elevated for suspect boron and manganese concentrations (surface water & groundwater)
- Limited contaminant migration was present in 3 of the 6 temporary wells
- Nearby wetlands complex is ultimate receptor of limited contaminant migration

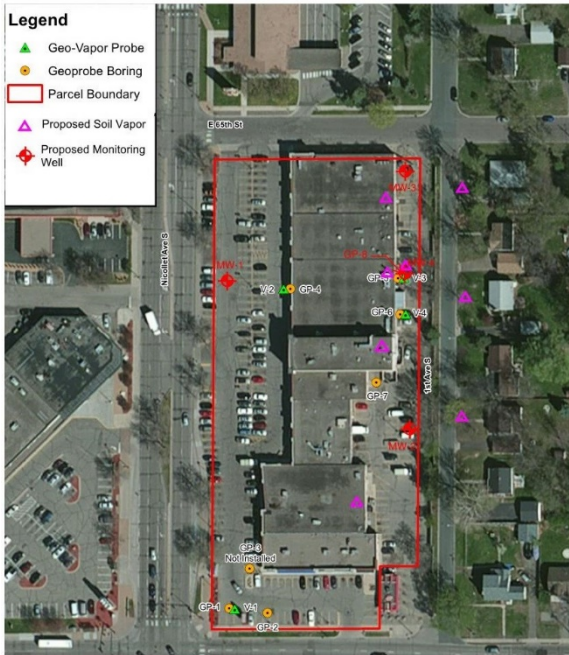


Shoppes North Former Drycleaner Investigation, Richfield, MN

Wenck prepared a Phase I Environmental Site Assessment that identified a former dry cleaner that operated at the site in the 1950s and 1960s and a former gasoline station that operated at the site in the 1950s through the 1970s. Based on the past uses at the site, Wenck performed remedial investigations, which consisted of soil borings, monitoring well installation and collection of soil, groundwater and soil gas samples and analysis.

The data revealed elevated chlorinated solvents in the soil, groundwater and soil gas at the site. The site was evaluated for risk based monitoring and natural attenuation as well as mitigation of vapor risk.

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Wenck assisted the client with enrollment into the Minnesota Pollution Control Agency's (MPCA) Voluntary Investigation and Cleanup (VIC) Program. Wenck prepared the Work Plan for supplemental investigation of groundwater and soil vapor in pursuit of a No Further Action letter. Wenck investigated the extent of impacts at the site, including installation of sub-slab soil gas samples, perimeter soil gas samples, and groundwater monitoring wells based on the MPCA approved Work Plan. Wenck worked with the MPCA to ensure that the impacts at the site were investigated in the most cost effective and timely manner on behalf of the client to obtain MPCA No Further Action assurance letter.

k. **Oversee Construction to Mitigate Vapors and Conduct Non-Construction Mitigation Measures Such as Using Fans, Etc.**

Wenck is involved in multiple brownfield redevelopment projects each year, and in large area wide assessments and remediation of vapor impacts. The most common drivers for these two items are

petroleum-based products and chlorinated solvents.

Wenck completes the design and provides oversight for the construction of vapor mitigation systems, both retroactive installation to existing buildings and for new construction on multiple projects each year. Common components may include vapor barriers, passive gas extraction systems, and active gas extraction systems with blowers. Wenck has also used SVE systems as an interim, quick initial response to address soil gas impacts under buildings, or for pending constructions.

If field screening and the HASP indicate elevated levels of contaminate in the air of the construction project, Wenck follows standard safety practices of first trying to reduce the exposure of workers by changing the work approach. If this does not address the issues sufficiently, then engineering controls such as installing fans are implemented to help address vapor impacts during construction. If engineering controls still do not address vapor impacts during construction, other alternatives are discussed, and can result in upgrading the project to requiring work to be completed in a higher level of PPE, such a Level C with respirators.



Example Projects:

Mill City Quarter Redevelopment Project – Minneapolis, MN

Wenck was the consultant for the redevelopment of a 4-acre former surface parking lot with a mixed use senior housing development consisting of two mid-rise buildings, underground parking, and unique stormwater management and public spaces joining the buildings in downtown Minneapolis. The property contained soil impacts from urban fill material, and contaminants of concern included polynuclear aromatic hydrocarbons (PAHs), Resource Conservation and Recovery Act (RCRA) metals, volatile organic compounds (VOCs), gasoline range organics (GRO), and diesel range organics (DRO). Project activities included obtaining all necessary regulatory approvals,

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coordination and management of environmental aspects of construction, including the management of over 10,000 cubic yards of contaminated soils in accordance with an MPCA-approved Development Response Action Plan (RAP)/Construction Contingency Plan (CCP). All environmental work was completed with the assistance of a Brownfield Investigation grant and a Metropolitan Council TOD Cleanup grant of \$2MM.

THOR Headquarters - Penn and Plymouth, Phase I and II, RAP, RAP Implementation

THOR purchased the Site from Hennepin County to develop a 166,666 SF building. Historical gas stations were present on the northeast and west portion of the Site at 2101 Plymouth Avenue North from at least 1924 until sometime between 1952 and 1963; and at 1250 Penn Avenue North from 1967 until 1976. All existing structures on the Site were razed by 1976, when a McDonald's restaurant and paved parking lot were constructed on the central portion of the Site. The restaurant was demolished in 1994.



Wenck reviewed historical site data and completed Phase I and Phase II Environmental Site Assessments for the Site. Based on the proposed development plans, Wenck prepared a Response Action Plan (RAP) for MPCA review and approval. The project included disposal of approximately 487 tons of stabilized lead contaminated soil and 6,300 tons of debris impacted and/or petroleum impacted soil. Wenck provided field oversight and RAP Implementation services for the project.

I. Install Stainless Steel Soil Gas Sampling Ports Using an Electric Drill to Bore Through Floor Slabs

Wenck has numerous staff who have installed vapor pins for soil gas sampling ports through boring through floor slabs.

Example Projects:

Leef Park Former Industrial Dry Cleaning Minneapolis, MN

Wenck was retained as the environmental consultant by Abdo Markethouse to conduct Brownfields assessment for redevelopment of an abandoned 88,000 square foot industrial dry cleaning facility. The site consists of approximately 3 acres of land in Minneapolis, MN. The site is contaminated with petroleum, Stoddard solvents and chlorinated solvents in soil, groundwater and vapor. The proposed use of the site included renovation of the 88,000 square foot industrial building into residential condominiums.



To mitigate the various forms of environmental contamination, the findings of the Phase I and II were utilized in the

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preparation of a comprehensive Response Action Plan which proposed the remediation and reuse of the site and dilapidated building. The RAP included soil management through excavation and soil vapor extraction, vapor mitigation of the industrial building, groundwater remediation and lead and asbestos abatement. The Minnesota Pollution Control Agency (MPCA) approved all response actions for the site and the intended future use of the building as residential. The site investigation, which consisted of more than 40 soil and groundwater boring locations, 20 soil gas and sub-slab vapor samples locations, and indoor air samples, was completed within a brief timeline to allow for the completion of the RAP and application of cleanup funding requests.

m. Oversee Construction to Complete Sediment Sampling and Conduct Non-Construction Sediment Sampling as Needed

Wenck staff have completed sediment sampling on numerous projects over the years. Project vary from simple projects where sediment sampling is completed to test sediment in stormwater ponds, to completing sediment sampling of large projects within large water bodies such as the St Louis River. Sediment sampling has been completed by use of both boats designed specifically for sediment sampling and through ice in the winter time. Wenck's experience with self-performed sediment sampling provides a qualified partner for the MPCA/MDA when performing sediment sampling oversight.

Example Projects:

Round Lake Sediment Investigation

Round Lake is located Arden Hills, Minnesota and received industrial discharges from the former Twin Cities Army Ammunition Plant (TCAAP). Wenck prepared an RI/FS documenting the investigation work conducted, presenting an updated risk assessment conducted by Oak Ridge National Laboratory, and evaluating sediment remediation alternatives. Alternatives evaluated included monitored natural recovery (MNR), enhanced MNR, capping, and dredging. Wenck served as representative to the US Army to lead a technical working group comprised on stakeholders from the US EPA, US Fish and Wildlife Service, Minnesota Pollution Control Agency examining the sediment contamination in Round Lake from previous industrial activities at TCAAP. Technical memos were developed examining heavy metals contamination in Round Lake sediments, including the development of



conceptual models examining the fate and transport of heavy metals within the lake sediments. Wenck then lead an effort to design a sample plan and conduct field sampling efforts to delineate the extent of the contamination within the lake. A grid of one-acre cells was developed for the entire lake and the field sampling included collection of one six-foot sediment core from each of the 115 cells across the basin. The six for cores were subdivided into six discrete samples each consisting of one foot of sediment. The samples were tested for a variety of metals and PCB's to determine the depth of sediment contamination within each cell. Wenck utilized the results of the field study to investigate and develop different remedial actions such as dredging and the development of new lake contours, capping contaminated areas with clean sediment and natural recovery. As part of the overall study Wenck conducted a literature review to investigate the mechanism of toxicity and biological risk due to heavy metals associated with lake draw-downs required to manage Round Lake as a waterfowl refuge.

n. Conduct or Oversee Operation and Maintenance on Remedial Systems (O&M Systems)

Wenck has multiple staff who have maintained O&M systems. Having this expertise, plus having our New Hope office, which has equipment needed to run and maintain O&M systems will ensure that Wenck provides excellent service to the MPCA for the O&M of remedial systems.

In addition to having staff who routinely complete O&M operation of remedial systems, Wenck also has several senior staff who have provided expert review on existing remedial systems to federal and private sector clients. This expert review has been credited by clients with significant savings on some of the O&M systems reviewed.

Example Projects:

Nebraska Army Ammunition Plant Groundwater Treatment System Construction and Operation

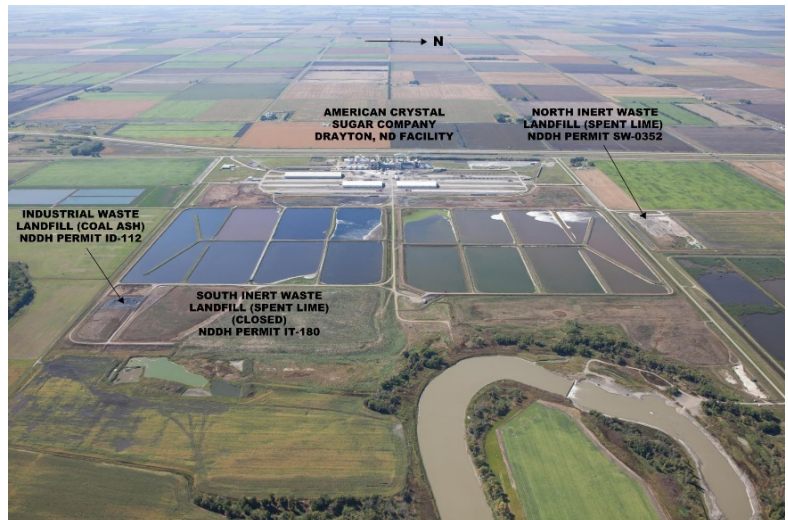
Wenck lead the construction, start-up, and the first 1½ years of operation for a \$3.5 million, 600 gallon per minute groundwater recovery and treatment system at the Former Nebraska Ordnance Plant Superfund site in Mead, Nebraska. The system installation provided containment of two chlorinated solvent/explosives plumes, utilizing granular activated carbon treatment to remove the contaminants.

Twin Cities Army Ammunition Plant - Soil and Groundwater Remediation

Wenck completed O&M for two groundwater recovery systems and an air sparging/soil venting system at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. One groundwater system provided containment of a chlorinated solvent plume that had migrated off-site. The other groundwater system prevented a lead plume from potentially impacting surface water. The treatment system also included lead removal using ion exchange and adsorption.

American Crystal Sugar Company Pump Maintenance for Solid Waste Areas – Drayton, North Dakota Facility

The ACSC-Drayton plant operates three permitted solid waste facilities; two inert waste facilities for the disposal of spent lime, and an industrial waste landfill for the disposal of coal ash. Wenck has performed routine pump maintenance for ACSC-Drayton's landfills for more than 10 years. The maintenance scope includes four existing ash landfill pumps, two pumps associated with the lime landfill, and newly refurbished lift station pumps associated with a groundwater collection system at a solid waste facility that is being permitted. Wenck conducts pump maintenance/repairs in the spring and fall to clean and service all components to keep them in peak condition. Wenck also provides an electrician to perform electrical diagnostics and perform repairs as needed. Upon completion of all maintenance events, Wenck provides a memo summarizing the work completed.



o. Arrange for Transportation, Storage, and Proper Management of Wastes

Transport, storage and management of wastes is critical component of environmental projects. Wenck's response below is separated into several components:

1. General Transport and DOT requirements

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2. Storage, management and transport on remediation sites- low level contamination
3. Storage, management and transport on remediation sites- levels of contamination above hazardous
4. Storage, management and transport of asbestos containing waste

Wenck has expertise in all these areas, and a summary of each is presented below.

General Transport and DOT requirement

Wenck not only has the knowledge for the general transport of waste, Wenck Response Services also has the expertise to address transport following DOT requirements on an emergency basis. Wenck provides these services to numerous private sector clients throughout the upper Midwest with most support coming from Minnesota or adjacent states, and our New Hope, MN office.

Low Level Contamination

Low level contamination is the most common type of impacted soils and debris that are encountered during remediation projects and usually involves trucking of the low level contaminated materials either to a disposal location on site, or off-site to a landfill which has approved disposal. Items commonly involved in these components are MPCA requirements to stockpile contaminated soils on and under 10-mil plastic, to have trucks properly tarped while transporting waste, etc.

Hazardous Level Contamination

There are many regulatory considerations when managing, transporting, and storing hazardous waste. Issues such as the 90-day rule may come into play.

Hazardous waste may be treated to attempt to reclassify the material as non-hazardous. For example, a phosphorus-based mixture may be added to soils with lead levels that are considered hazardous, to reduce the leaching potential of the soil and to relist of the material as non-hazardous.

Some material such as PCB impacted soils above 50 ppm PCB, cannot be treated, and will be considered hazardous no matter what additional approach is used. For this reason, plus the need to bring PCB impacted soils to the nearest hazardous waste landfill, which is several states away, care must be maintained to properly identify and segregate soils to ensure that impacted soils are shipped to the proper location and not mixed with other cleaner soils.

Asbestos Containing Waste

Management and shipping, including bagging of asbestos containing abated materials, follow specific rules that are similar to low-level contaminated materials. Asbestos requirements must be followed, including having staff that are certified for asbestos abatement oversight. Soils and debris with asbestos mixed in with other contaminated materials must follow management and disposal requirements for both components.

Example Project:

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University of Minnesota TCF Bank Stadium Contingency Plan

Wenck was the environmental consultant for the University of Minnesota's East Gateway Redevelopment Project, which included as its primary brownfield redevelopment feature, the \$288 million TCF Bank Football Stadium. The stadium construction required the investigation and cleanup of the former Republic Creosoting facility on the former Union Pacific railroad yards, trenching for utility work through the impacted soil under the former Standard Oil Bulk plant, and construction of the stadium over a former asphalt plant.



After conducting additional environmental investigation, Wenck was responsible to prepare the Construction Contingency Plan (CCP) that outlined the steps to be followed for dealing with contaminated soil and debris encountered during construction of the stadium, re- construction of related roadways, demolition of a grain elevator, removal and installation of utility infrastructure (including steam tunnels, natural gas mains, sanitary and storm sewers, and electrical systems). The CCP unified many previously existing plans that had been developed in a piecemeal fashion for small properties that had been acquired by the University. There were, in fact, 11 other VIC Program sites that were involved in the larger redevelopment project of the East Gateway District. Wenck's CCP incorporated each of those project sites in one CCP manual used by the construction team. The CCP included:

- Identifying the areas where contaminated materials were most likely to be encountered
- Providing information on the types of chemicals most likely to be encountered
- Plans for minimizing handling of the contaminated material to ensure project flow
- Details for sampling, analysis, and characterization of the contaminated materials
- Approved Special Waste Profiles for disposal of the contaminated material
- Triggers for communication with the client (University of Minnesota) and the MPCA
- Field oversight and confirmation testing during Response Action implementation and CCP implementation
- Preparation of the CCP Implementation Report

Como Park High School, Athletic Field Replacement, MN

During renovation of the Como Park High School Athletic Field it was discovered that a large portion of the soil profile below the existing field was impacted with asbestos materials left behind from the demolition of old structures. The asbestos was prevalent enough in the soils that the soil was required to be shipped off-site to a certified landfill.

Environmental and hazardous materials professionals at Wenck submitted permit applications to the relevant state authorities regarding the trucking of the materials. Wenck contacted multiple landfill sites that accept contaminated soils and selected the one that was the most time and cost effective. We coordinated the county permitting with the landfill operator and asked for manifests to be prepared for the shipping of these materials. Wenck staff provide both asbestos surveying and soil abatement oversight, including completion of appropriate paperwork with both the MPCA and the MDH, air sampling, bulk asbestos sampling etc.

In addition to this example project, a large portion of the other projects presented in Section 3 also involved management and transport of contaminated soils/materials.

- p. Evaluate the Need for and Oversee the Implementation of Alternative Drinking Water Supply, Including Point-of-Use Treatment (i.e. filtration)**

SECTION 3: SCOPE OF WORK



Water supplies are critical component to societal survival. Wenck understands this and the urgency which comes when impacts are identified in municipal water supply wells. We have evaluated several drinking water supplies over the years.

Example Projects:

Metropolitan Airports Commission – Response Action Plan,

Feasibility Study, and Point of Use Treatment

Wenck prepared a feasibility study to address chlorinated solvent contamination at the Baytown Township Groundwater Contamination Site, located east of Lake Elmo, Minnesota and extending to the St. Croix River. Alternatives evaluated included pump and treat, point of use treatment with activated carbon filters, well replacement, enhanced in-situ biodegradation, and distributed water supply.

Following selection of the point of use treatment alternative, Wenck prepared the response action plan to address chlorinated solvent contamination. This included preparation of specifications for installation and maintenance of activated carbon filters on over 100 private water supplies. The primary responses besides including point of use treatment with activated carbon filters, and a long-term monitoring and filter maintenance plans.

Schlage Lock Company, Manufacturing Facility in Colorado

Wenck provided investigation and cleanup design for one of Colorado's largest manufacturers. We identified contamination by the chlorinated solvent perchloroethylene in a large area of soil as well as a 4-mile plume of groundwater impacting a large municipal supply. Wenck evaluated cleanup options and provided the designs, plans, specifications, and construction quality control for a two-part cleanup program involving:

- Pilot testing for *in-situ vapor extraction* followed by the design of five separate vapor extraction systems (24 vents and five blowers with a total removal rate exceeding 12,000 pounds in two years).
- Design of two groundwater pumpout systems (on- and off-site), using a detailed single layer analytic element model (SLAEM) groundwater model, and entailing pretreatment to remove fines and dissolved metals, including iron, and then solvent removal using a low-profile air stripper and pressure carbon adsorption using disposable carbon containers. Treated water is injected into the aquifer upgradient and side-gradient of the plume.
- Extensive coordination with municipal staff and a feasibility study recommending the use of granular activated carbon treatment for perchloroethylene in the municipal drinking water supply.

The multiple cleanup components are controlled by a microprocessor-based unit that allows the client and Wenck to view system status and acknowledge alarms around the clock.

The remedial actions took place during a major plant expansion, requiring careful planning and scheduling of construction activities. Wenck is conducted on-going operations and maintenance support and annual evaluations of the remedial actions. Tests show that the treatment system is removing solvents to non-detectable levels below the part per billion range.

q. Evaluate, Monitor, Design and Remediate Contaminated Sediment and Other Necessary Restorative Actions

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Wenck and Wenck staff have extensive experience in evaluating, monitoring and preparing remediation options (EECA, Feasibility Studies, etc.), and completing remediation of contaminated sediments, and other restorative actions. A variety of approaches have completed including wet dredging, dry dredging, capping with clean sediments, capping with amended materials, etc.

Wenck also has staff that complete other restorative actions include staff with expertise in wildlife, threatened and endangered species, wetlands, wetland restoration, etc.

Example Projects:

Pond G- TCAAP, Surface Water Bench Scale Testing/ Feasibility Study and Remediation, MN

A pond located at the Twin Cities Army Ammunition Plant in Arden Hills, MN, was found to contain lead at a level that exceeded the State of Minnesota surface water standard. The lead standard is dependent on the level of hardness in the surface water, and since the hardness of Pond G was found to be unusually low, this resulted in a very low surface water standard for lead. Under contract with the U.S. Army, a feasibility study prepared by Wenck and approved by the MPCA and USEPA selected a remedy of treating the pond to raise its hardness level. Wenck worked with Aquatic Restoration and Research to design and conduct a bench test to determine the best treatment method and dosages. The bench test suggested that a combination of lime and calcium chloride should be added to attain the target hardness increase, and that the amount of chloride added would comply with the surface water standard for chloride. Monitoring shows that the target hardness was reached, which brought this pond into compliance with the lead standard.

Lakehead Pipe Line Company- Oil spill and Cleanup, MN

Wenck has designed remedial actions for five oil spills or leaks in multiple states, our most challenging project involved Minnesota's largest spill in history (1.7 million gallons). Rapid response was vital:

- The spill occurred in a town close to residences and college campuses.
- The spill entered a wetland that would soon thaw, allowing oil to sink into deep layers of peat and potentially contaminate a drinking water aquifer.
- Drain tile sent oil directly to a river that joins the Mississippi. The rising water and impending ice breakup would rapidly push oil downstream and contaminate a major Twin Cities water supply.

As part of the overall emergency response, Wenck performed exhaustive environmental studies, evaluated options, and designed a major cleanup program that was largely complete within six months. Highlights:

- **Approximately 100,000 cubic yards of contaminated sediment** from the wetland were excavated and placed in a specially-designed holding cell.
- A nearby power plant is incinerating this soil to take advantage of its high concentration of petroleum contamination—the first such project in Minnesota.
- The drain tile was flushed and removed, and the rinse water was treated in a lined retention basin designed and permitted by Wenck.

Thanks to the rapid response and thorough cleanup, this historic spill caused minimal river and groundwater contamination.

Minnehaha Creek Watershed District Stormwater Pond Assessments

Surveys of six existing Capital Project stormwater ponds within Minnehaha Creek Watershed District (MCWD) were conducted. There were two facets of the stormwater pond surveys. The first was to provide an estimate of sediment accumulation within each pond to determine if maintenance (i.e. sediment removal) would be necessary or advisable according to policy recommended by the District Engineer to maintain nutrient removal effectiveness (see attachment). The second was to assess the level of chemical contamination present within the pond sediments to determine State disposal restrictions. Contaminates of concern included RCRA metals and PAHs.



Minnehaha Creek Reach 14 Stream Improvement Project

Wenck partnered with the Minnehaha Creek Watershed District on their first ever residential-reach, streambank buffer project on Reach 14 of Minnehaha Creek that runs through the City of Edina. The goal of the project was to reestablish a 10' native vegetation buffer along the creek to improve habitat and the visual aesthetics on the stream.

South Saint Paul Forcemain Improvement Project

Beginning in July 2009, Wenck provided water resources, environmental evaluations and permitting assistance to Council and Howard R. Green Company necessary to acquire the environmental documents and permits to install a forcemain in the floodway through wetlands and crossing the Mississippi River. Permitting assistance included planning for construction dewatering, floodway construction emergency response, compensatory wetland mitigation, engineering hydraulic analysis resulting in issuance of a certificate of no rise for a proposed floodway structure, and seepage analysis for the levee work. We also completed review and comment of the project SWPPP and plans and technical specifications to comply with agreements made with federal, state, county and local agencies, as well as Ramsey Washington Metro Watershed District Rules and MPCA's Construction Stormwater Permit. Wenck was instrumental in the Council's receipt of U.S. Army Corps of Engineers' (USACE) initial and final proffered Clean Water Act Section 404 permit and approved jurisdictional determination using MN Board of Water and Soil Resources (BWSR) Wetland Bank Credits, and MN Wetland Conservation Act (WCA) Local Governing Unit (LGU) no-net-loss determination exemption for utilities. Wenck completed the annual monitoring for the 2013 and 2014 growing seasons, as required under the USACE permit, and provided the City of Saint Paul the information required to release the wetland temporary impacts performance bond.



r. Coordinate Remedy Planning, Restoration Planning and End Use Planning



Coordination of remedy planning, restoration planning and end use planning is an integral part of the restoration process on sites. Wenck will bring expertise acquired throughout the country to serve the MPCA and its projects.

Example Projects:

Village of St Anthony- Phase I, Phase II, Response Action Plan, Construction Oversight, Implementation Reporting

As lead environmental consultant, Wenck assisted in the remediation and redevelopment at the Village of St. Anthony in Minneapolis. The project included groundwater and soil investigations, hazardous materials building surveys, remedial design, and regulatory negotiations for the redevelopment of three city blocks. The redevelopment of Block 1 involved the rehabilitation of a building on the Historic Register, the removal of a blighted car dealership building, and new mixed-use construction containing several affordable housing units. Block 2 included demolition of a former auto-body shop and used car lot, Block 3 included the demolition of two commercial warehouses. Once cleared, Blocks 2 and 3 involved a large-scale remediation project dovetailed into the construction of new townhomes and twelve high-end brownstones. Soil and groundwater investigations completed by Wenck Associates established baseline conditions to provide liability protection for current and future property owners. Wenck completed Response Action and Contingency Plans to ensure the removal and proper disposal of affected soil and contaminated media encountered during demolition or redevelopment activities.



Nett Lake Outlet Modification Feasibility Study

Wenck completed a feasibility study that investigated options to more quickly lower Nett Lake, provide fish passage and restore meanders. The existing dam and channel excavation project was constructed in 1986 and had the unintended consequences of reduced wild rice production, created a barrier to fish migration and river channelization. The recommended mitigation is to install sluice gates 3' lower than the downward operating gates above the weir sections. A step wise fish ladder is proposed on the north abutment and the old meanders are to be reconnected to the river. XP-SWMM was used with an 8-year precipitation record to model various

gate and elevation options. The selected option is to install two 10' long by 3' high sluice gates. This will lower the lake from 1279.0 to 1275.0 in three months compared to the existing structure that can get the lake no lower than 1276.6 in three months. Several options were considered for the fishway such as vertical slots, Denil, Alaskan and field stone structures. In consultation with the MnDNR, the project was designed around field stone to both more closely replicate the local environment and to allow rice straw to pass through the structure more easily. Lastly, the meanders are to be reconnected to the channel by filling in the constructed straight sections and creating backwater pools.

Biomanipulation of Shallow Big Muskego Lake, WI

Big Muskego Lake, a 2,260 ac (2.6 mean depth) shallow system near Milwaukee, Wisconsin, had shifted to a turbid water state with a fishery dominated by carp, unconsolidated sediment that frequently resuspended in the absence of aquatic macrophytes, receding emergent plant communities that once included wild rice, and excessive metaphyton and cyanobacteria throughout the summer. Rehabilitation of Big Muskego was spawned by concerns for downstream Wind Lake, which was being impacted by increasingly greater suspended sediment and phosphorus loading.

Rehabilitation centered on an 18-month drawdown to consolidate sediments, remove rough fish, eradicate Eurasian watermilfoil, and stimulate cattail growth; installation of electric fish barriers, fish and invertebrate restocking; and implementation of nonpoint source watershed BMPs. Paralleling these management activities was an extensive monitoring program that examined fish, macrophyte, and sediment response to management.

Changes in ecosystem trajectory several-fold. Sediment consolidation occurred with only temporary increases in nutrient flux. The macrophyte community shifted from nearly 100% EWM dominance to cattail and Chara dominance, and trophic state declined from hypereutrophic (TSI-CHL often over 70) to mesotrophic-eutrophic (TSI-CHL = 55). Overall, total P, chlorophyll, and Secchi transparency improved by 70-80% post-treatment.

SECTION 3: SCOPE OF WORK

Big Muskego was the first shallow lake rehabilitation project in the State of Wisconsin that recognized the need for implementation of multiple management approaches to shift equilibrium to a native macrophyte, clear water state: removal of rough fish, drawdown for sediment consolidation and native macrophyte re-establishment, and biomanipulation.

s. Search, Gather, and Evaluate Bathymetric Data

Wenck staff routinely collects and evaluates bathymetric data for water resource and sediment projects. Staff routinely evaluate and present bathymetric data following collection.

Example Projects:

Chisago Chain of Lakes Outlet Project

This chain of seven lakes covers 5,000 acres and represents a major recreational attraction in central Minnesota. The lake chain had extremely high water levels that had damaged approximately 600 buildings. Wenck Associates was selected to design an outlet system for the lakes.

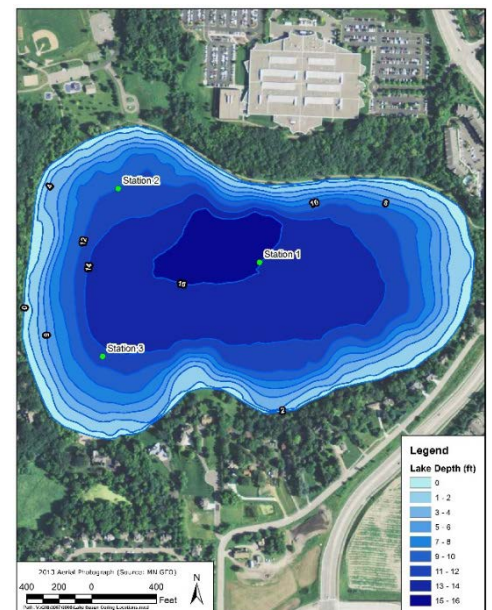
Wenck reviewed and assimilated ten years of historical data and engineering reports to develop a practical solution. The investigation, design, plans and specifications, and cost assessment method were completed within four months. Because of the various lake levels and regulated levels, a complex system of hydraulic structures was required. Design features:

- Two major outlet control structures (also serve as fish barriers to prevent carp from entering lakes).
- Routing through wetlands for natural water filtration.
- Storm sewers (2,600 feet of 48-inch pipe with cuts up to 40 feet deep).
- Ditch and channel improvements (4,500 feet) plus several new road crossings.
- Acquisition of mainland easements and permits.
- Comprehensive lake level management plan (includes level drops in anticipation of extreme snowmelt runoff).
- Concurrent alleviation of flood levels on five of the lakes.

The \$1.9 million project was planned, designed, and built in three months. Within nine months, the lake levels were lowered and there is now permanent level control on the entire seven-lake chain.

Lake Susan and Rice Marsh Lake Bathymetric Surveys, MN -

Wenck Associates was hired by Riley Purgatory Bluff Creek Watershed District (RPBCWD) to conduct a bathymetric survey and develop bathymetric maps of Rice Marsh Lake and Lake Susan. This work involved using an acoustic sonar unit to measure depths throughout each lake. The sonar measured depths were referenced to a surveyed lake level gauge. These data have been used to improve nutrient lake modeling and develop cost estimates for lake restoration projects.



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t. Coordinate and Cooperate with Other State-Contracted Services Such as Sampling and Analytical, Emergency Response Contractors, and Hazardous Waste Services

Wenck under our existing MPCA TMDL and Closed Landfill contracts has worked with other State-contracted services such as sampling and analytical, drilling, and hazardous waste services. Wenck also routinely works with the MPCA's emergency response contractors on projects where Wenck's emergency response staff are also involved. In addition, Wenck routinely uses the same contractors for work as those that have state contracts, such as Pace Analytical. Wenck will use this experience and relationships to help ensure a seamless interaction with other State-contracted services.

u. Arrange for Geophysical Activities

Wenck can and will arrange for geophysical activities to be completed on a project as needed and directed by the MPCA. When Wenck has needed to geophysical work completed in the past, we have subcontracted this work to third party firms.

Example Projects:

Whittaker Corporation -Soil and Groundwater Remediation, MN

Leaking barrels had contaminated soil and shallow groundwater with volatile organic compounds at this federal Superfund site in Minneapolis. Wenck took an aggressive approach that involved the following:

Remedial Actions

- Remedial action work plan prepared within one week of notification
- Cleanup guided by concurrent site investigation involving 11 monitoring wells, test trenches, and geophysical testing
- Excavation, inventory, and removal of 20 tanks, 600 drums
- Groundwater pumpout with treatment using air stripping (required detailed modeling using data from 13 wells)
- Excavation of 20,000 cubic yards of contaminated soil
- Thermal treatment of excavated soil using a drier bought from an asphalt plant, followed by landspreading for additional volatilization
- Elimination of long-term liability of shipping the soils off-site
- Reduction of typical soil remediation costs by more than 90 percent--total costs trimmed by \$3.5 million
- Schedule shortened from 33-month estimate to 3 months

v. Oversee Subcontractors and State Contractors During Investigation and Cleanups and Tank Removals

Wenck will provide oversight support for investigations and cleanups, including activities like tank removals and well drilling. Wenck will utilize staff with the level of expertise desired by the MPCA for staffing these projects (i.e. scientist 1, scientist 2, engineer 1, engineer 2, etc.).

Wenck is familiar with State subcontracting procedures outlined in the MPCA Purchasing Manual. We have worked with the State through the Closed Landfill and TMDL contracts for years. We routinely oversee State Contractors and subcontractors while working under these circumstances.

For example, Wenck completed the Houston County Landfill erosion repair project using a subcontractor to Wenck who performed erosion related construction activities. Wenck followed the appropriate subcontracting procedures

SECTION 3: SCOPE OF WORK

and subcontracted and oversaw the repair work. Wenck has also completed several investigations subcontracting both drillers under the State Drilling Contract and excavating contractors who were subcontracted to Wenck to perform cover and waste investigations at those sites.

w. **Prepare and Evaluate Reports (e.g., investigation reports, monitoring reports, free product recovery reports)**

Preparation of reports following investigation, remediation, or for routine monitoring is an integral part of the process which Wenck completes for practically all projects that we are involved with. Having prepared reports for all types of activities which may be involved with a need a review, Wenck, and Wenck staff are fully capable and ready to also provide evaluation and review of reports prepared by others.

Example Projects:

Former Blaine Gas Station Blaine, MN

The former Oasis Market site was an active leaking underground storage tank site throughout the 1990s. The site had been inactive for years until acquired by our client MF Blaine, LLC. Several existing petroleum leak reports were reviewed prior to beginning remediation on this project. Consultant tasks included the removal of five USTs, underground piping and seven dispensers. Petroleum levels were very high in the soil samples collected below the tanks and dispenser systems. An Excavation Report Worksheet was prepared for the MPCA. Petroleum detections were reported to the State Duty Officer and assigned a new leak number. Wenck conducted a Limited Site Investigation to define the extent and magnitude of the soil, groundwater, and soil vapor impacts.



Wenck performed an updated Phase I ESA for the site as well as a Development Response Action Plan/Construction Contingency Plan (DRAP/CCP) incorporating the unique site conditions along the final design plans. The site was enrolled in the MPCA Petroleum Brownfields Program. The MPCA approved the DRAP/CCP and building demolition and site work commenced. Wenck implemented the DRAP/CCP over the next three months which included the removal of unsuitable soils beneath the building pad, removal of contaminated soils within utility corridors, the installation of vapor barriers within utility corridors and the installation of a vapor venting system below the building. Wenck also assisted the owner in obtaining

dewatering permits from the City of Blaine and the Metropolitan Council. After the site work was completed, a DRAP/CCP Implementation report was prepared and sent to the MPCA for review and approval. Original schedule was based on the General Contractors schedule. The retail site, which is now occupied by Starbucks Coffee, Mattress Firm, and a dental office opened on time.

Trout Lake and Prairie River Sulfate Impact Study

In 2014, Magnetation, Inc began the permitting process for dewatering an abandoned mine pit near Coleraine, MN (Canisteo Mine Pit). As a part of this process the MnDNR and MPCA required Magnetation to assess the environmental impacts of dewatering the Canisteo Mine Pit on downstream receiving waters. Wenck was hired by

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Magnetation to write an Environmental Assessment Worksheet (EAW) describing the impact of dewatering the Canisteo Mine Pit on water quality of Trout Lake and the Prairie River near Coleraine, MN.

One part of the EAW document was assessing the impact of sulfate in the Canisteo Mine Pit on nearby streams (Prairie River) and lakes (Trout Lake). Sediment, water quality, and wild rice data from the Prairie River and Trout Lake was used to assess the impact of increasing sulfate concentrations on internal phosphorus loading and wild rice. Furthermore, sediment data was used, in conjunction with the Proposed Minnesota Pollution Control Agency (MPCA) Sulfate Standard, to determine if water quality standards would meet current and anticipated standards. Wenck worked with MPCA scientists to discuss data requirements, sampling protocol, and proposed standard timeline. This analysis concluded that temporary dewatering of the Canisteo Mine Pit would not result in sulfate exceedances under current rules in Trout Lake, but would result in sulfate exceedances in the Prairie River. Thus, Magnetation determined that discharge from the dewatering of the Canisteo Mine Pit would be directed into Trout Lake.



The EAW is one of the first projects in Minnesota to apply the proposed sulfate standard to receiving waters. This application may help MPCA staff in developing future sulfate standard application procedures.

x. Evaluate Invoices

Evaluation of invoices is routinely completed on projects to ensure that subcontractors and/or contractor who is being overseen, have invoiced following the agreed upon pricing and with the appropriate level of effort. It is common for entities such as laboratories to have varying prices which are not consistent with their agreed upon rates for a specific project.

On larger projects, such as remediation construction projects, capping projects, etc. evaluation of invoices requires a more robust and comprehensive review. We also routinely complete this service for clients and have done this many times in the past for the MPCA under our Closed Landfill Contract where we evaluate and provide recommendations of payment to the MPCA for the construction contractors work.

y. Collect and Manage Field and Laboratory Data for Electronic Submittal in a Format Specified by the MPCA

Wenck routinely follows MPCA guidance documents for the methods to collect and manage field and laboratory data for electronic submittal. We will follow guidance documents and format data as specified by the MPCA for electronic submittal to the MPCA.

Example Projects:

Twin Cities Army Ammunition Plant- Minnesota's Largest Groundwater Monitoring Program

Wenck worked for over 20 years with the Army to manage the largest groundwater monitoring program in Minnesota. This monitoring is extensive as the contamination threatened the drinking water supplies of 35,000 people. In addition, the underlying sandy soils and the fractured and eroded bedrock facilitate the spread of contamination.

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Program Components:

- Over 400 wells on and off the site
- Monitoring of a 6-mile plume of contaminated water beneath three communities
- Monitoring throughout 4-square mile plant with multiple source areas
- Largest groundwater database in Minnesota

Wenck responsibilities included gathering and analysis of extensive amounts of annual monitoring data, preparation of comprehensive annual report for Army and regulators and preparation of monitoring plan for the next year to reflect current monitoring results.

Highlights:

- Greater definition of wide-reaching contamination, allowing the Army to target cleanup activities more closely
- Measurement of the effectiveness of multi-million-dollar remedial actions, enabling the Army and MPCA to make sensible decisions on future needs



Identification of a probable second source off the plant with investigation that confirmed this hypothesis.

z. Evaluate Data Quality and Data Verification Reports

Data validation and data quality will be evaluated by Wenck staff with extensive experience in this area. The QA/QC of the data will be at the level of effort as directed by the MPCA, and may vary from being a simple review of the QA/QC data from the laboratory, to full Level 3 data validation, with review of the chromatographs, and other raw laboratory data. Wenck will utilize chemist with well over 10 years of experience in completing data validation and with extensive laboratory expertise when it is critical to have high confidence in the results from the laboratory. When a lower level of review is needed, work may be completed by lower level staff under the direction of chemist-QA/QC officer.

Example Projects:

Federal Cartridge Company - Quality Control and Data Quality Assessment

Part of this project included preparation of a Quality Assurance Project Plan for corrective action under RCRA at the Federal Cartridge manufacturing facility in Anoka, Minnesota. The project involved excavation, stabilization, and landfill disposal of nearly 10,000 tons of contaminated soil. Wenck completed data quality assessments for project data obtained from environmental laboratories.

Twin Cities Army Ammunition Plant - Quality Control and Data Quality Assessment

Wenck prepared numerous Quality Assurance Project Plans meeting the Uniform Federal Policy (UFP) requirements for various sites at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. These QAPPs included among others, contaminated soil investigations, soil removal actions, groundwater investigation, monitored natural attenuation of groundwater, brownfield redevelopment, and contaminated sediment investigation. For these projects, Wenck prepared data quality/usability assessments/data verification for the analytical data.

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U.S. Army Corps of Engineers - Quality Control and Data Quality Assessment

Wenck prepared two quality assurance project plans, one for water sampling related to a groundwater recovery and treatment system at the Former Nebraska Ordnance Plant Superfund site in Mead, Nebraska, and one for soil sampling related to a contaminated soil removal action at Fort Riley, Kansas. Wenck also managed preparation of data quality/usability assessment reports for the analytical data obtained.

aa. Arrange for Site Access

Without site access work on site cannot be completed. Wenck will work with the MPCA project manager to get site access as needed. Depending on the project, it can vary from Wenck preparing and sending out site access agreements to be signed for the site owner, and interacting with the property owner, to the site access already being in place and Wenck going to the site to complete work. Wenck routinely completes this type of support for Phase I, Phase II, LSIs, and RI's completed by Wenck.

Example Projects:

All the projects presented in this portion included the need for arranging or coordinating site access. Look to the other projects throughout this section for examples.

bb. Coordinate Utility Locates by Contacting the Appropriate Entity and if Applicable Coordinate Traffic Control

For all subsurface activities, a call to Gopher-1 is the first step need before work can begin. Routinely Wenck coordinates with the public locate companies to complete locates before undertaking excavation/drilling below the ground surface. In areas where private utilities are located Wenck routinely also subcontracts with a private locate company to identify any private utilities which may be encountered on the project.

For projects Wenck completes in roadways, such as projects for MnDOT, Hennepin County, and Metro Transit, we routinely also include a traffic control plan, and/or coordinate traffic control. Wenck has staff in-house that can prepare traffic control plans if needed for a project.

Example Projects:

All subsurface work completed by Wenck starts with an initial call for public utility locate, and if needed, also coordinating with a private locate. Look to other examples of subsurface investigations in this section for examples of projects where Wenck has coordinated with local utilities. Wenck has staff in-house who can prepare a traffic control plan if needed. We routinely work with the driller/excavator/contractor on preparation of traffic control and coordinate with them in completing this task.

cc. Prepare and Evaluate Bid Specifications

Wenck commonly prepares bid specifications for projects with environmental components, such as caps, liners, SVE systems, pump and treat systems, etc. Having extensive experience preparing bid specifications will allow Wenck to easily evaluate bid specifications prepared by others. Wenck clearly references the plan views to the appropriate sections and details, and provides enough detailed information to allow the contractors to bid and construct the various system components with a minimum of clarification by the design engineers.

For projects with excavation and capping components, Wenck develops our grading plans in three-dimensional format, which allows development of Digital Terrain Models (DTM's) for the various surfaces. The benefit of using DTMs is that accurate cut/fill quantities can be obtained, and the cut/fill information can be presented depending

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on the contractor's and the site operator's preference (cross-sections at regular intervals, cut/fills on a grid, cut/fill isopach contour maps, etc.). This allows the control-point information to be extracted in a variety of formats.

Example Projects include:

Xcel Energy Red Wing ADF

- Center Cell South Construction
- 2015 Closure Construction

Mar-Kit Landfill

- Cell 8 Construction
- 2014 Final Cover Construction using "Closure Turf"

Grand Rapids Public Utilities Commission

- Leachate Tank and Piping Project



Construction Cost Estimates

Each construction project we complete, including the projects that we completed construction plans for identified in the previous section, entails the preparation of a detailed engineer's estimate of probable construction costs. With our background in the development of bid documents and our relationships with area contractors, we have developed an extensive inventory of historical unit prices for relevant work. It has been our experience that in this market area, our knowledge of local contractors, and construction practices is more reliable than using a national reference such as Means to develop construction cost estimates. Our standard practice is to review the inventory of historical prices, and then discuss general market trends with a few contractors and specialty vendors to ensure that the pricing we are using is valid given the current economy, labor availability, and fuel prices.

Bidding Assistance

In a typical year Wenck prepares plans and specifications and provides bidding assistance on \$40-\$80M in environmental related construction projects. Typical bid assistance activities include:

- Bid Advertisement
- Posting of Bid Documents
- Clarification to bidders (addenda)
- Issue required agenda
- Conduct Pre-Bid meeting
- Document Pre-Bid Meeting

Wenck routinely uses the Quest Electronic Bidding system for publicly bid projects and is familiar with the requirements for uploading documents and distributing addenda, etc.

Paynesville Landfill Closure Project Engineer's Construction Cost Estimate

Item	Description	Qty	Unit	Wenck Cost Estimate	
				Unit Price	Item Total*
1	Mobilization and Demobilization	1	L.S.	\$ 85,000.00	\$ 85,000.00
2	Field Engineering	1	L.S.	\$ 20,000.00	\$ 20,000.00
3	Temporary Erosion Control	1	L.S.	\$ 10,000.00	\$ 10,000.00
4	Temporary Construction Facilities and Utilities (\$2k/Month)	1	L.S.	\$ 4,000.00	\$ 4,000.00
5	Permanent monuments/benchmark installation	1	L.S.	\$ 5,000.00	\$ 5,000.00
6	Strip and Salvage Topsoil (East Waste Placement Area)	1,600	C.Y.	\$ 1.25	\$ 2,000.00
7	Perimeter Berm Construction (Controlled Fill)	930	L.F.	\$ 3.00	\$ 2,800.00
8	Strip, Salvage, Segregate Existing Final Cover Soils (East Waste Area)	15,750	C.Y.	\$ 2.00	\$ 31,500.00
9	Strip, Salvage, Segregate Cover Soils (West Waste Area)	20,000	C.Y.	\$ 2.00	\$ 40,000.00
10	Remove and Salvage Existing Fencing	1	L.S.	\$ 2,500.00	\$ 2,500.00
11	Abandon Existing Gas Vents	4	EA	\$ 500.00	\$ 2,000.00
12	Remove and Salvage Existing Stormwater Piping/Catch Basin	1	L.S.	\$ 1,000.00	\$ 1,000.00
13	Remove Existing LLDPE	1	L.S.	\$ 2,000.00	\$ 2,000.00
14	Waste Excavation, Relocation, Placement	65,000	C.Y.	\$ 2.50	\$ 162,500.00
15	Segregation and Storage of Drums	10	EA	\$ 175.00	\$ 1,800.00
16	Buffer Soil Placement, salvaged (1 foot thick)	141,766	S.F.	\$ 0.10	\$ 14,200.00
17	40-mil Geomembrane (textured) LLDPE Supply and Delivery	141,766	S.F.	\$ 0.25	\$ 35,400.00
18	40-mil Geomembrane (textured) LLDPE Installation	141,766	S.F.	\$ 0.25	\$ 35,400.00
19	Geonet Drainage Geocomposite Supply and Delivery	141,766	S.F.	\$ 0.30	\$ 42,500.00
20	Geonet Drainage Geocomposite Installation	141,766	S.F.	\$ 0.30	\$ 42,500.00
21	Rooting Zone Soil Layer - Salvaged (1.5 feet thick)	141,766	S.F.	\$ 0.20	\$ 28,400.00
22	Topsoil - Salvaged (6-inches thick)	141,766	S.F.	\$ 0.25	\$ 35,400.00
23	Additional Topsoil Placement - Salvaged	4,700	C.Y.	\$ 13.50	\$ 63,500.00
24	Topsoil Removal and Replacement in Settlement Correction Area	3,300	S.Y.	\$ 2.25	\$ 7,400.00
25	Settlement Correction Area	2,200	C.Y.	\$ 1.80	\$ 4,000.00
26	Drainage Swales Lined with Erosion Control Blanket (ECB)	620	L.F.	\$ 10.00	\$ 6,200.00
27	Perimeter Drainage Tubing and Outlets	930	L.F.	\$ 5.00	\$ 4,700.00
28	Gas Vent Drilling	213	VLF	\$ 75.00	\$ 16,000.00
29	Gas Vent Installation	213	VLF	\$ 60.00	\$ 12,800.00
30	Fencing	1085	L.F.	\$ 10.00	\$ 10,900.00
31	Erosion Control Blanket	1090	S.Y.	\$ 1.50	\$ 1,500.00
32	Final Cover Turf Restoration	6.2	AC.	\$ 1,500.00	\$ 9,300.00
33	Waste Excavation Area Restoration	5.2	AC.	\$ 1,500.00	\$ 7,800.00

* Rounded to the nearest \$100

Total Estimated Construction Cost \$ 750,000.00

dd. Conduct and Review Human Health and/or Ecological Risk Assessments

Wenck has expertise in human health and ecological risk assessment. Wenck's water resources expertise is second to none in Minnesota in evaluating Total Maximum Daily Load (TMDL) to lakes and rivers. We have completed more TMDL's than any other firm in Minnesota. Our implementation plans for TMDL's include stream restoration, habitat restoration, and water quality improvement projects. We understand the potential for environmental habitat effects such as Great Lakes AOC remediations, and our team can address these ecological issues on forests, prairies, wetlands, rivers, and streams. Our endangered species experts can assess any alternative and the potential ecological environmental effects.

Example Projects:

Human Health Risk Assessment- Federal Ordnance Manufacturing Contractor (Confidential), SD

A confidential ordnance manufacturing contractor for the Federal government modified their facility to more efficiently destroy off-spec materials and contaminated personal protective equipment (PPE) and bags. The client had obtained a RCRA Part D permit for the modifications, which included a confined treatment unit (CTU) with air pollution control equipment (APCE), and a set of open-burning/open-detonation (OB/OD) destruction cells.

The client required assistance with a human health risk assessment as part of the RCRA Part D permitting of the facility. The permit required submittal of an HHRA work plan before operation could commence, and approval of the work plan before the equipment was placed into normal service. The review of the final HHRA was led by SD DENR in consultation with EPA Region VIII.

Wenck was the prime contractor on the HHRA work plan and final HHRA. Wenck was assisted by Jeff Stevens & Associates (J.B. Stevens) for toxicological review, test plan development assistance and quality assurance review on the HHRA deliverables. Wenck and J.B. Stevens developed a test plan to measure chemicals of potential concern (COPCs) from the Incinerator/APCE, in consultation with the client's stack testing contractor. The stack testing data was reviewed. A literature search was also conducted to develop emission factors for the OB/OD cells. Deposition modeling of the point and area sources was conducted by Wenck. These items were contained in the Work Plan, which was approved. Wenck executed the IRAP-h View™ model to assess exposure and evaluation of whether there was a potential for adverse human health effects. Wenck and J.B. Stevens prepared a final report for the client's submittal to the SD DENR. The client's RCRA Part D permitting is continuing.

Perham Resource Recovery Facility – Perham, MN

Wenck conducted a Human Health Risk Assessment as part of the Environmental Impact Statement for major modifications to a waste-to-energy facility in central Minnesota. The risk assessment followed the MPCA Air Emissions Risk Analysis (AERA) protocol, including both screening-level and refined risk assessments. Wenck conducted both the air dispersion modeling using AERMOD and the refined human health risk assessment using IRAP-h View™ software. For mercury analysis, Wenck followed the MPCA Mercury Risk Estimation Method (MMREM) guidance, which involved extended modeling and GIS analysis to determine the average estimated mercury concentration over a lake and its watershed. Wenck modeled air concentrations assuming a generic emission rate for the screening risk assessment, volatile phase, particle phase, and particle-bound phase fate and transport for the refined risk assessment, and estimated the concentration impacts of NO₂ emissions from facility traffic. The risk



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assessment supported the Environmental Impact Statement (EIS) and showed the proposed project will not adversely affect human health.

Contaminated Sediment Remediation for Round Lake - Arden Hills, MN

Wenck assisted the U.S. Army to conduct a lake sediment investigation on Round Lake in Anoka County, Minnesota. The USEPA and MPCA both required additional investigation and planning be done around sediment contamination and removal based on previous activities associated with the Twin Cities Army Ammunition Plant which had an associated groundwater plume which intersected with the lake. To improve the aquatic ecosystem and water quality, Wenck developed a hybrid approach to focus sediment removal while maximizing ecological lift. The lake was then broken into five aquatic sites based on their ecological function and proximity to the source. The matrix approach allowed for a targeted focus on areas for dredging and removal. Through the focused effort it resulted in the targeting of only 15,000 cubic yards (20% of the original estimate) for sediment removal while improving the habitat and benthic functionality of the lake.

ee. Prepare and Review Quality Assurance Project Plans (QAPP) and Sampling and Analysis Plans (SAP) in Accordance with State and Federal Requirements

For larger projects such as Superfund, Wenck has prepared QAPPs and SAP in accordance with both state and federal requirements.

Examples Projects:

Wenck has a nearly 30-year history of providing environmental services at the Twin Cities Army Ammunition Plant (TCAAP), through various contracting entities. Over the years, Wenck has worked closely with the TCAAP Staff, U.S. Army Corps of Engineers, TCAAP operators and tenants, as well as with local, state, and federal regulators. Project work has included remedial investigation and design, feasibility studies, and long-term monitoring and maintenance activities at various soil, groundwater, soil vapor, surface water, and sediment sites. As part of this project, Wenck has prepared many QAPP/SAPs with USEPA and MPCA approval, including:

- *535 Primer/Tracer Area Investigation and Removal Action:* This investigation QAPP/SAP (which was later modified and approved for a soil removal action) involved soil sampling for lead and PAHs.
- *Soil Area of Concern Investigation and Removal Action:* This investigation QAPP/SAP (which was later modified and approved for a soil removal action) involved soil sampling for metals, PCBs & PAHs.
- *Site A Vapor Intrusion:* This investigation QAPP/SAP involved collecting soil vapor samples for volatile organic compounds (VOCs) via push probes.
- *Marsden Lake and Pond G Investigation:* This investigation QAPP/SAP involved collecting monthly surface water samples for a one-year period in two water bodies.
- *Round Lake Sediment Investigation:* This investigation QAPP/SAP involved collecting sediment samples at 135 locations and multiple depths for analysis of metals and PCBs.
- *Building 102 Groundwater Investigation and Monitored Natural Attenuation:* This investigation QAPP/SAP included collection of groundwater monitoring well sampling for a VOC plume, which is updated annually for regulatory approval for ongoing groundwater sampling; we included an addendum for a special sampling event using push probe groundwater sampling techniques.
- *TCAAP Performance Monitoring:* This QAPP/SAP includes ongoing groundwater sampling (both monitoring wells and private wells) of approximately 125 wells for VOCs and metals, and is updated annually for regulatory approval. Surface water monitoring for metals is also included.



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- *TCAAP Brownfield Redevelopment:* This QAPP/SAP included soil remediation through a contract with Ramsey County for over 400 acres of TCAAP in coordination with the MPCA VIC program to receive a “Certificate of Completion” for soils on the site, allowing for redevelopment.

For the above projects, Wenck prepared data usability assessments evaluating field and laboratory data quality control results for presentation in documentation or annual reports.

ff. Perform Feasibility and Treatability Studies



Wenck has completed numerous Feasibility Studies (FS) and several Treatability Studies. FS are commonly completed by Wenck on larger projects involving larger potential costs, but are also sometimes completed on middle sized projects where cost considerations are important to the client. Treatability Studies have been completed by Wenck for a variety of projects, but most commonly is association with soils impacted heavy metals such as arsenic, lead or selenium which result in the soils being labeled as characteristically hazardous. Completing treatability studies on these types of projects has helped Wenck to identify the right amount of buffering, and the right amount of additional chemical to add, such as phosphate with lead, to stabilize the soil and allow the soils to be retested with results that allow the soil to be disposed of as non-

hazardous.

Example Projects:

Colorado Manufacturing Facility - Feasibility Study

Wenck prepared a focused feasibility study to address public supply wells impacted with chlorinated solvents and located in a major drinking water aquifer that supplied drinking water to five cities. Feasibility study recommendations included utilization of alternative sources of water and treatment of two public supply wells with a 1400 gallon per minute, granular activated carbon treatment system.

St. Cloud Housing and Redevelopment Authority - Feasibility Study

Wenck completed a Phase II investigation report and prepared a focused feasibility for a former dump site located on the edge of Mississippi River floodplain in St. Cloud, Minnesota. The study recommended installation of a protective soil cover.

Southeast Berrien County Landfill Authority - Feasibility Study

Wenck prepared an evaluation report for existing groundwater remediation systems and for potential alternative groundwater remediation systems to address chlorinated solvent contamination at a landfill in Southeast Berrien County, Michigan. Alternatives evaluated included additional recovery wells and slurry walls; ex-situ treatment using activated carbon, air stripping, spray treatment, or UV oxidation; and in-situ treatment using enhanced biodegradation, chemical oxidation, and air sparging/soil venting.

SCI Recycling Service, Anoka, Minnesota-Multiple-Phase Investigation and Remediation of Petroleum and Hazardous Wastes

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Wenck completed multiple remedial investigation/remedial actions at the 12.4-acre metal recycling facility. Project included the investigation and remediation of RCRA hazardous soils in a former area of the site that was impacted by a large fire. Other activities included the investigation and remediation of a shredder fluff berm found to contain hazardous levels of TSCA and RCRA wastes. Wenck completed the coordination and oversight of the removal and disposal of approximately 4,900 tons of hazardous shredder fluff waste. In addition, a total of approximately 52,600 tons of lead-impacted soil was bench scale tested for treatability prior to being stabilized on-site to ensure disposal of the material as non-hazardous solid waste. In all over 71,000 tons of impacted soil was removed from the site during the remedial actions.

gg. Design Comprehensive Remedial Action Remedies and Remediation Systems

Following the completion of the investigation of a site, and if needed, following pilot testing, treatability testing, the FS and/or EECA, a comprehensive and detailed remediation system needs to be designed. Wenck does this for the larger projects on which we are involved. The most similar example for which Wenck has worked with the MPCA for the numerous comprehensive systems, including liners, caps, groundwater collection systems, methane collection systems, and flares that Wenck has prepared for the MPCA Closed Landfill program. Examples of other remedial action systems Wenck has installed include a variety of remedial action remedies including numerous types of remediation systems, including SVE, building vapor mitigation, groundwater remediation, soil remediation, etc.

Example Projects:

Nilfisk-Advance - Feasibility Study

Wenck prepared a feasibility study for groundwater remediation alternatives for chlorinated solvent contamination at a former manufacturing facility in Spring Park, Minnesota, located on the shore of Lake Minnetonka. Cleanup alternatives evaluated included no action, groundwater pumpout with air stripping or activated carbon treatment, reactive walls, air sparging/soil venting, and enhanced in-situ biodegradation using Hydrogen Releasing Compound®. Groundwater pumpout with activated carbon treatment was selected, designed and installed for the west half of the plume.

Site Remediation at Railroad Facility

A car shop in a former rail yard in Waite Park near St. Cloud was placed on the national Superfund list for priority cleanup. The problem was soil in an industrial lagoon that had been impacted by lead, arsenic, cadmium, PCBs and PAHs. Wenck participated in a large-scale cleanup that involved excavation of 43,000 cubic yards of contaminated soil, design, and construction of a 2.2-acre lined disposal cell and on-site treatment of contaminated soil using fly ash and Portland cement to immobilize the contaminants.

This project was the first in Minnesota to use fly ash to solidify contaminated soil. The innovative treatment saved the client \$150,000 in costs.



hh. Conduct and Oversee Remedial Investigation (RI)

As indicated above, Wenck has complete numerous RIs over the years. These have varied in scope and size from small RI's to large comprehensive RI's such as those associated with chlorinated groundwater impacts and the plume from TCAAP.

Project Examples:

Thomas Lake Center, Dry Cleaner Site, Eagan, MN Remedial Investigation and Response Action

Wenck provided environmental services for a subsurface investigation of tetrachloroethene (PCE) contamination associated with a dry-cleaner tenant. Wenck was responsible for the coordination and management of subcontractors, soil and groundwater sample collection, well installation, data management and interpretation, hydrogeologic interpretation and soil-vapor extraction pilot testing, remediation system design, construction oversight and general operations and maintenance oversight. Project responsibilities also included client and regulatory maintenance and compliance with the Minnesota Voluntary Investigation and Cleanup staff.

Bay Side Recycling, Duluth, MN

Multiple-Phase Investigation and Remediation of Hazardous Waste Site

Wenck completed multiple remedial investigation actions at the facility. Project involved the investigation and assessment of metals and PCB-impacted soils at the facility. Other activities included the investigation and remediation of a shredder fluff stockpile found to contain hazardous levels of TSCA and RCRA wastes. Responsibilities during the remediation phase of the project included the coordination and oversight of the removal and disposal of approximately 11,000 cubic yards of hazardous shredder fluff waste.

Albert Lea Landfill

Under the Minnesota Pollution Control Agency's (MPCA) Closed Landfill Program (CLP), Wenck was retained to evaluate remedial alternatives and perform a subsurface investigation for a large remediation project at the Albert Lea landfill. The project's overall objectives were to investigate the feasibility of removing Vinyl Chloride contaminated soils that were adjacent to a recreational lake and re-locate the approximately 500,000 cubic yards of industrial waste that was buried at a former dump site now used as a park



Wenck performed a phased subsurface investigation at the contaminated soils removal area to first delineate the area of concern, and then to evaluate constructability concerns related to seepage and excavation stability due to the influence of the lake adjacent to the excavation. Once the investigations were complete, a removal plan was developed and seepage and stability analyses were completed to see if mass excavation was a possibility or if other in-site means of remediation would be required.

For the relocation of the industrial waste disposed of at the park, Wenck evaluated several remedial alternatives and costs associated with each alternative. Wenck ultimately developed a preliminary design for a containment cell located adjacent to the existing Albert Lea Landfill, approximately ½ mile away.

Both investigations and subsequent analyses served as preliminary designs that were ultimately incorporated into the final design and construction bidding documents that Wenck prepared for the project. The project entailed a lined cell for the relocated industrial waste and contained a "cell within a cell" for the relocated contaminated soils, essentially placing those soils on a double composite liner. The site design incorporated an active gas extraction system. The cell was then capped with a traditional FML composite cover, utilizing a geonet geocomposite drainage layer.

Construction of the containment cell and relocation of the waste and contaminated soil required 12 months to complete.

ii. Oversee Installation of Remedial Actions and Remedial Systems

SECTION 3: SCOPE OF WORK

While Wenck has not provided oversight for the installation of remedial actions and remedial systems by others, our experience installing these systems for clients, will allow our seasoned staff to provide this service to the MPCA under this contract.

Example Projects:

Former Manufacturing Facility - Soil and Groundwater Investigation and Remediation

Wenck completed a chlorinated solvent contamination investigation at a former manufacturing facility in White Bear Township, Minnesota. Site investigation included soil borings, geoprobes, on-site laboratory analysis, and monitoring wells. Natural attenuation was recommended and approved.

Westling Manufacturing - Soil and Groundwater Remediation

Wenck completed soil venting and air sparging pilot studies and which was followed by full-scale system design. Wenck also completed an evaluation of enhanced in-situ biodegradation using Hydrogen Releasing Compound®, to clean up solvent-contaminated soils and groundwater at this manufacturing facility in Princeton, Minnesota.

jj. Conduct Surface Water, Ground Water, and Hydrodynamic Modeling

Wenck has extensive experience with surface water, groundwater and hydrodynamic modeling. Each of these three areas is discussed separately below.

Surface Water Modeling

Wenck has completed surface water modeling on over 280 projects in Minnesota. Wenck staff has used several different models to complete these assessments. The table below shows years of experience using the primary models used for these projects:

Model	Years
P8	30+
SWAT	30+
BATHTUB	30+
QUAL2K	15
Flow/Load Duration Curves	13
Unit Area Loads	30+
GWLF	10
HSPF	6
CADDIS	8
SWMM	30+
WINSLAMM	8
RUSLE	20

Example Projects:

Excess Nutrient Site Specific Standard Application for Lake Winona

SECTION 3: SCOPE OF WORK

Lake Winona is in the North Central Hardwood Forest ecoregion near the City of Alexandria in Douglas County, Minnesota, and receives wastewater effluent from the Alexandria Lake Area Sanitary District. Because Lake Winona is very shallow and infested with common carp, ALASD recognized that the shallow lake nutrient standards are not directly applicable. In response, ALASD retained Wenck to develop a lake nutrient site specific standard application for Lake Winona.



Wenck and HydroQual developed an excess nutrient site specific standard that accounted for the extremely shallow nature of Lake Winona and the relatively recent carp infestation following the failure of a carp barrier. The analysis demonstrated that Lake Winona could reach the intended response variables and clear water state at much higher total phosphorus levels than the ecoregion standard assumed. These analyses demonstrated the importance of fish management and submersed aquatic vegetation in shallow lake restoration. Because of this study, internal phosphorus loading, carp management, and whole lake drawdown were included in the NPDES permit as required elements of restoring Lake Winona.

Public Policy Impact: The proposed nutrient site-specific standard helped guide the MPCA's and EPS's development of a site-specific standard for Lake Winona that was used for the basis of a TMDL and ALASD's NPDES water-quality-based effluent limit. It helped guide an innovative NPDES permit where carp and other biological factors were addressed in the permit.

Groundwater Modeling

Wenck has significant expertise in developing analytical and numerical models to evaluate groundwater scenarios for project planning and design. Depending upon the rigor required to answer your groundwater questions, model development and calibration efforts can range from complex and intensive 3D MODFLOW models, to simple This analysis or spreadsheet models using analytical approximations. Models developed by Wenck's skilled and practical hydrogeologists will help the MPCA to fully understand the groundwater flow through the site, estimate influence of existing pumping wells on proposed nearby wells, groundwater – surface water interactions, predict pumping rates, wellfield layout design, dewatering impacts on neighboring wells or contaminant plumes, contaminant fate and transport, and predict impacts on water levels under various pumping scenarios.

Example Projects:

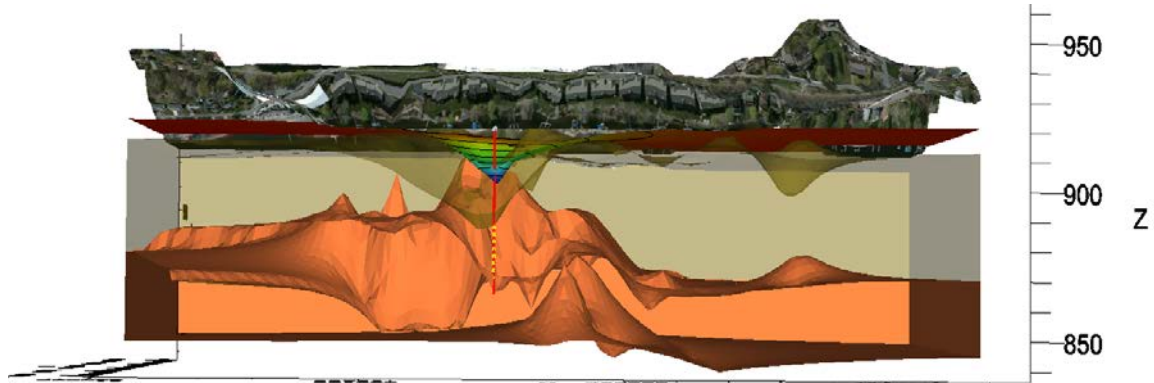
Nilfisk, Spring Park, MN

Wenck completed an extensive groundwater model in support of contaminant remediation at a trichloroethylene (TCE) contaminated former manufacturing site in Spring Park, Minnesota. Groundwater modeling was performed using the USGS code MODFLOW 2005 and the graphical user interface Visual MODFLOW Flex (Flex). A three-dimensional model was created to predict the hydrologic impact of an existing recovery well on the TCE contaminant plume. The model was also used to determine the most effective locations for two additional recovery wells and the respective effect of each in combination with the existing well. The combined modeled pumping effects of all three recovery wells indicated that significant TCE recovery could be accomplished, and that it would create a cone of depression sufficient to prevent offsite contaminant transport.

Using Flex, information from 69 available wells and test holes was interpolated to construct a three-dimensional representation of the subsurface geology beneath the existing recovery system. Three major geologic layers were identified – an upper clay, a sand layer, and a basal clay. Aquifer characteristics were calculated from short-term test pumping data from the existing recovery well. The initial groundwater conditions were determined to be in

SECTION 3: SCOPE OF WORK

equilibrium with the surrounding lakes. Location and well completion information were loaded into the model for the existing recovery well, RW-1, as well as for five monitoring wells. The model's hydraulic parameters, including hydraulic conductivity and the storage coefficient, were calibrated using water levels during the pumping test at the five monitoring wells, and the parameter estimation script within Flex. The model and estimated parameters were validated using long term water level observations from the monitoring wells.

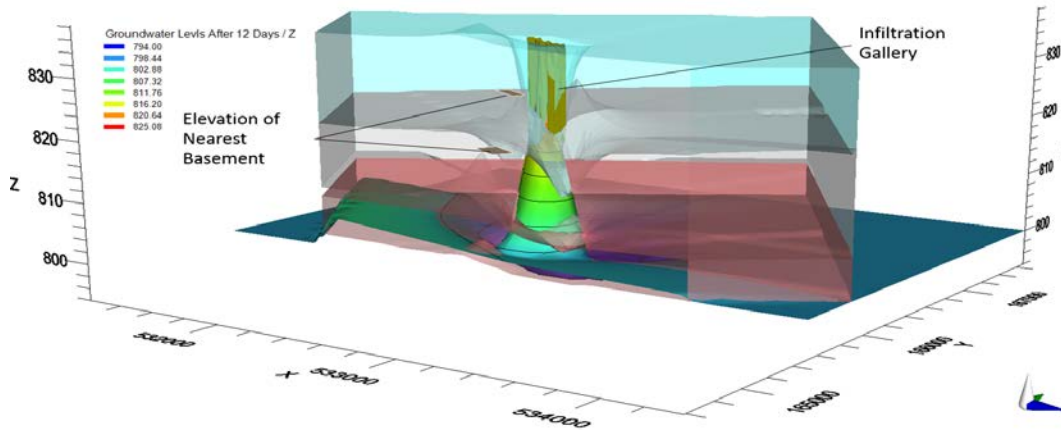


Steady state groundwater elevation with recovery wells

U.S. Bank, Minneapolis, MN

Wenck completed a hydrogeologic model investigating the impact of groundwater mounding and delayed mound dissipation beneath a stormwater infiltration gallery. A three-dimensional model was created to evaluate the existing infiltration system, designed to re-infiltrate water removed by urban dewatering activities and stormwater. The goal of the model was to assess the risk of flooding adjacent buildings under various re-infiltration scenarios. The results for the scenario that included residual mounding from either previous storm events or dewatering activities indicated that the 20-ft. deep partially lined infiltration system has the capacity to handle flows for a 100-year storm event lasting up to 21 days, but that the groundwater mound could take over five months to fully dissipate. Due to delayed mound dissipation, flooding of the nearest basement could be a concern if storms occur with high frequency. When the system begins at regional groundwater conditions (no residual mounding), however, the infiltration gallery is sufficient to prevent flooding from heavy intensity and long durations storms.

Groundwater modeling was performed using the USGS code MODFLOW 2005 and the graphical user interface Visual MODFLOW Flex (Flex). Using Flex, a three-dimensional representation of the subsurface geology near the infiltration system was created from previously interpolated geological cross-sections. Eight major geologic layers were identified, however, only the layers above the confining clay were found to have a significant impact on groundwater levels. The model's hydraulic parameters were calibrated using water levels at the 14 nearby monitoring wells during a 22-day period of steady water injection into the infiltration gallery. Calibration was completed within Flex using the Parameter Estimation (PEST) script which continuously adjusts hydraulic parameters until modeled water levels agree with the recorded water levels at the monitoring wells.



Petroleum Refinery, Petroleum Free-Product Recovery

Phillips Petroleum Company contracted with Wenck to conduct a Resource Conservation and Recovery Act (RCRA) investigation and the design of the large-scale recovery of an estimated 100,000 barrels of free product and emulsified hydrocarbons. The extremely complex geology complicated the work.

Highlights:

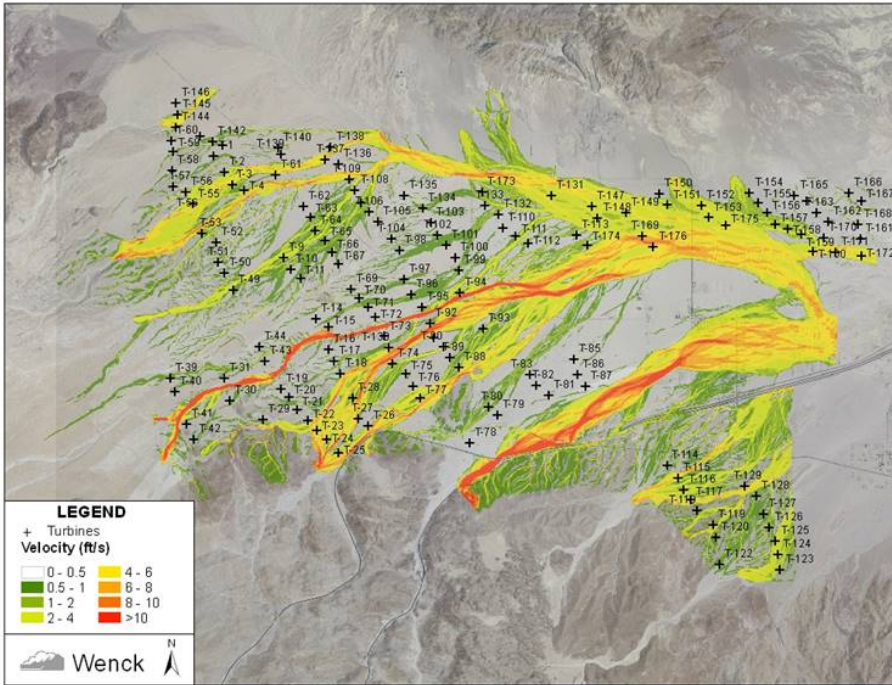
- Extensive remedial investigation, including evaluation of off-site hydrocarbon migration over an 800-acre area
- Groundwater modeling (SLAEM and MODFLOW) to simulate two areas to evaluate different product recovery scenarios
- Designs, plans specifications, and construction and start-up services for groundwater pumpout/product recovery systems at three sites, including:
 - Over 30 large-diameter wells
 - Tankage
 - Two explosion-proof compressor buildings
 - Pneumatic explosion-proof pumps and controls
 - Electrical controls
 - All piping
 - Systems to store and transport recovered product to the refinery for reuse and separated water to the wastewater treatment plant.
- Investigation and cleanup of releases from underground tanks; cleanup involved soil incineration and groundwater monitoring



Hydrodynamic Modeling

SECTION 3: SCOPE OF WORK

As is noted above, Wenck Associates has a long history with flow modeling. The company started as a water resources firm and is known for flow modeling. For a recent technical paper prepared for MnDOT, we defined recent tools for hydrodynamic modeling. Wenck has used these tools for flow modeling for river intakes to address sedimentation issues. Another example is FLO-2D. FLO-@D was created to estimate flow characteristics in conditions where the flow spreads out in separate channels and returns together further downstream. It is useful



for estimating flood flows breaking out of the main channel of rivers and spreading out into the floodplain. The model will estimate flow rates, velocities, and depths anywhere in the model domain. It is capable of routing flows through developed municipal areas.

FLO-2D was recently used to assist with site design flooding considerations for wind farms. Flow modeling of an entire 50 square mile site helped determine which wind turbine foundations needed protection from flood conditions. The modeling results were also used for design of road crossings.

kk. Perform Asbestos Identification and if Necessary Oversee Asbestos Abatement and Removal

A large portion of Wenck's environmental field staff have certification as asbestos inspectors, and subsequently collect samples for asbestos analysis as needed during investigation activities. In addition, Wenck has several staff who focus primarily of providing asbestos and hazardous material assessment services, along with providing asbestos abatement oversight for clients. Wenck's staff completes asbestos abatement oversight and has the ability to complete air sampling on-site during abatement activities. The staff documents and insures that the proper level of PPE is being utilized during the abatement process. It is common to encounter potential asbestos containing material (PACM) during investigation where dumps or debris is encountered. If the material is determined to

contain asbestos, Wenck is prepared, and once again, has staff currently certified to complete this work. Certifications of Wenck staff for asbestos sampling and abatement oversight are presented in the staff matrix.

Example Projects:

Metropolitan Airports Commission (Mac) – Minneapolis/St. Paul International Airports & Surrounding Twin Cities Reliever Airports - MN

Client: Metropolitan Airports Commission, 6040 28th Ave. S., Minneapolis, MN 55450

Wenck provided surveys, abatement & demo design specifications, bid administration, and environmental construction services for the 17/35 NS Runway Expansion Project located at MSP, including demo oversight of 35 commercial and industrial buildings.



Ramada (Former Thunderbird) Hotel Demolition Project – Bloomington, MN

Client: City of Bloomington and Port Authority, Bloomington, MN

Wenck provided surveys, abatement & demo design specifications, bid administration, and environmental construction services for the Ramada Hotel adjacent to the Mall of America, in Bloomington, Minnesota.

II. Conduct Third Party Review and Analysis of Technical Information for the Purpose of Providing Conclusions and Recommendations to the State

Wenck has completed third party reviews for many of clients, with most frequent client being various attorneys. Third party and expert reviews of existing and proposed remediation systems can help clients to save significant costs and reduce the potential liability of misinterpreted data. Examples of a third-party review completed by Wenck for Met Council, has been the review of the MPCA's consultant's proposed actions for the landfill at Pig's Eye. Wenck staff can easily provide this review and analysis for the state using the level of effort and expertise, as requested.

Example Projects:

North Area Interceptor Rehabilitation – Phase 5 (Site 3, Fridley)

Wenck provided VIC and Superfund program assistance for a Met Council sewer interceptor rehabilitation project, a portion of which traverses a known Superfund site. Responsibilities included soil investigation and construction alternative evaluations to mitigate potential hazardous waste excavation and handling before construction bidding, preparation of several work plans for regulatory approvals, and completion of a No Association Determination request for known contaminants. Wenck also prepared a RAP and Site CCP and provided environmental monitoring, documentation and assistance during the project construction.

Schlage Lock Company-Manufacturing Facility, NC

A major U.S. manufacturer in North Carolina asked Wenck Associates to provide third-party review of a State-enforced investigation of soil and groundwater contamination. Subsequently, Wenck was asked to perform further investigation and remedial action design.

SECTION 3: SCOPE OF WORK

The contamination consisted of a chlorinated solvent so prevalent that it was present as a “dense non-aqueous phase liquid” (DNAPL). Complicating the problem was a geologic setting with two discontinuous aquifers with varying depths, plus interbedded clays, silts, and sands. To know where to recover the solvent, this maze required an investigation involving:

- Approximately 100 soil borings
- Field collection/screening of thousands of soil samples
- Submittal of approximately 100 samples for laboratory analysis
- Soil-gas survey beneath existing plant (performed with minimal disruption)
- Approximately 50 monitoring wells
- Planning and implementation of comprehensive monitoring program
- Aquifer stress testing
- Analytic element groundwater modeling
- Abandonment of 4 wells suspected to be cross-contaminating the aquifers
- Abandonment of 16 wells found to be unnecessary.

This investigation by Wenck successfully delineated the extent of soil and groundwater contamination, including areas where DNAPL had pooled. Groundwater modeling was used to optimize recovery well locations and pumping rates, leading to a unique dual-aquifer pumping design that did not induce flow from the upper to lower aquifers.

mm. Provide Support for the Analysis and Development of Program Policy and Guidance, Including Developing Health or Ecological Risk Criteria/Standards (including technical report preparation).

Wenck staff besides environmental engineers and environmental scientist also includes staff with expertise in statistics and risk assessment. We will utilize the expertise we have in house to help the MPCA in development of program policy and guidance.

Example Projects:

Development of a Selenium Site Specific Standard Application for the Lower Minnesota River, MN

The lower Minnesota River receives selenium discharges from the Seneca wastewater treatment facility (WWTF) that recently triggered reasonable potential for exceeding the current selenium standard. However, the Environmental Protection Agency (EPA) is in the final stages of developing an updated selenium standard that is based on fish tissue selenium concentrations instead of water column toxicity. The industrial discharger hired Wenck to develop a fish-tissue-based site-specific selenium standard for the Minnesota River reach receiving discharge from the Seneca WWTF. The Metropolitan Council determined that the industrial discharger was the primary contributor of selenium to the Seneca wastewater treatment facility.



Wenck Associates developed a water column and fish tissue sampling plan to collect data in the Minnesota River to support a site-specific water quality standard based on EPA documentation and scientific literature. This data was summarized in a site specific standard application that outlined fish tissue and water column selenium concentrations in the Minnesota River that would be protective of aquatic life. The site-specific standard was

SECTION 3: SCOPE OF WORK

submitted to the Minnesota Pollution Control Agency (MPCA) in December 2015, which was the first effort in Minnesota to use the proposed EPA methodology to develop a selenium site specific standard.

Wenck worked with the MPCA to develop the application procedure for developing and implementing one of the first selenium fish tissue criteria in Minnesota.

Vermillion River Watershed

The Vermillion River Watershed is a 355 square-mile watershed in the southern Twin Cities Metropolitan Area. The main stem of the Vermillion River begins in Elko New Market, MN in Scott County, flows through Dakota County, and ends at its confluence with the Mississippi River near Red Wing, MN in Goodhue County. The river and its tributaries are classified as class 2A cold-water and 2B warm-water stream in places, and are home to a naturally reproducing, trophy-sized brown trout population. The class 2A cold-water sections were recently converted from class 2B warm-water because of the presence of a naturally reproducing trout population. However, the history of the Vermillion River is unclear on whether the trout were historically present or began reproducing after introduction through a stocking program. Furthermore, the trout portions of the Vermillion River are quite atypical of other Minnesota trout streams and therefore may demonstrate significant ecological differences from their Southern Minnesota counterparts.

In 2007, Wenck was hired by the Vermillion River Watershed Joint Powers Organization (VRWJPO) to develop a biological monitoring plan and ecological assessment of the Vermillion River Ecosystem to establish an ecological baseline for the Vermillion River. The purpose of the monitoring is to provide a description of the current ecological conditions in the Vermillion River and assess differences in the cold-water and warm-water sections of the river. The intent of the VRWJPO is to evaluate the development of site specific standard for the Vermillion River that highlights the ecological differences between the Vermillion River trout streams and other, more typical trout streams. Since



2009, Wenck has been assisting the VRWJPO conducting biological monitoring focusing on fish and macroinvertebrates. The VRWJPO is also collecting habitat and stream geomorphology data.

In 2012, Wenck was retained by the Minnesota Pollution Control Agency to develop a Stressor Identification study (SI) for the Vermillion River including both the cold- and warm-water sections of the river. The purpose of the SI is to evaluate the conditions that may limit the ecological conditions in the stream and develop links between those stressors. Another aspect of the analysis was an evaluation of the biological communities in cold- and warm-water streams to identify areas that might be site-specific conditions and require alternative standards.

nn. Perform Five Year Reviews / and Site Reviews

Wenck has performed five-year reviews on sites throughout the United States, primarily associated with Federal Superfund Sites. Wenck staff have also been involved in providing expert reviews of existing and proposed remediation systems for various clients. The most notable five-year reviews that Wenck has done in Minnesota were for TCAAP.

Site reviews can be completed at any time by clients. Wenck routinely completes site reviews when we are hired as new consultants on a project, and at intervals as requested by our clients.

Example Projects:

SECTION 3: SCOPE OF WORK

Twin Cities Army Ammunition Plant - CERCLA Five-Year Reviews

Wenck prepared the first three successive five-year reviews for the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant), and provided technical review for the fourth five-year review. These reviews involved assessment of ongoing and planned remedies at 16 different sites to determine that the selected remedies remain protective of public health and the environment and that they remain cost-effective.

Twin Cities Army Ammunition Plant - Annual Performance Evaluation Reports

Wenck completed annual performance reports for the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota, for four years, provided senior technical review of these reports in several other years, and provided overall project management for reports prepared from 2011 to 2016. The reports evaluate performance and summarize progress of soil and groundwater remedial work at 16 sites.

oo. Prepare Draft Decision Documents and Other Documents Such as Grant Applications, Draft Institutional Controls, Permit Applications

Wenck routinely completes grant applications, drafts institutional controls and completes permit applications for remediation and investigation projects. Wenck completes and submits more than its fair share of grant applications to both DEED and local grant acceptance entities such as Met Council, Hennepin County and Ramsey County. An example of institutional control draft document submitted by Wenck were draft institutional control documents submitted by Wenck for Site C, an area impacted with high levels of lead and various other contaminants at TCAAP. Wenck routinely completes permit applications for drilling permits to various public entities such as MnDOT and various municipalities; completes permit applications for discharges to the sanitary to the Met Council, or other LGUs in outstate Minnesota, and as needed prepares permit applications for NPDES discharge permits of contaminated groundwater, and for SWPPPs associated with general NPDES construction permits, among others.



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pp. Perform Operation and Maintenance System Review and Optimization

Whenever there is an operating remediation system, review of the system is a paramount to insuring that the system is running properly. Optimization can vary with some examples being from needing to increase the speed of a blower, to changing the amount of vacuum on part of a system, or re-balancing the extraction levels of groundwater being removed from a system. Wenck routinely completes O&M reviews of the remediation systems it is operating and focuses on the optimization of the systems.

Example Projects:

Colorado Manufacturing Facility - Soil and Groundwater Remediation

Wenck completed a groundwater investigation and construction of two groundwater pump-out and treatment systems involving filtration, softening, air stripping, granular activated carbon adsorption, and treated water re-injection, to address chlorinated solvent-contaminated groundwater. Wenck designed and managed the construction of a later expansion of one of these two systems. Also, Wenck prepared annual reports on the effectiveness of the groundwater treatment systems and soil venting systems at the site.

Colorado Manufacturing Facility - Soil Remediation

SECTION 3: SCOPE OF WORK

Wenck prepared a design, implementation, and evaluation of an operational pilot test of soil venting systems to determine the most effective mode of operation for removal of chlorinated solvents from soils.

qq. Research, Evaluate and Implement Innovative Technologies

Wenck understands that the environmental field is not static and innovation is on-going with new options always being presented in the market place. We routinely complete reviews of innovative technologies to help insure that we are bringing the best technologies forward for our clients to use, and to help provide our clients with the best scientific sound approach while also keeping in mind our client budget.

Example Projects:

TCAAP Incremental Sampling Methodology (ISM)

Wenck is proud to have been the first consultant to propose and implement Incremental Sampling (IS) on a brownfield project in Minnesota for evaluating shallow soils impacts at TCAAP.

Mar-Kit Landfill Cell 6 & 7 Construction and ClosureTurf™ Closure Project

The Mar-Kit Sanitary Landfill site is an 80-acre municipal solid waste (MSW) facility located in Thompson Township, Kittson County, Minnesota, operating under MPCA Permit SW-92.

In December 2014, Wenck Assisted Mar-Kit with preparation of a Demonstration Research Project (DRP) Application, to utilize an alternative final closure material (ClosureTurf™) for final closure of MSW Cells 3 – 5. The ClosureTurf™ technology results in a final cover system that is one inch or less in overall thickness. The MPCA granted approval of the DRP in June 2015.

ClosureTurf™ consists of:

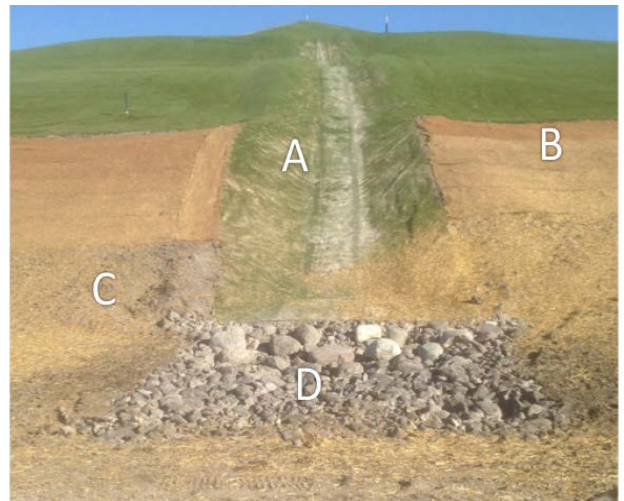
- 50-mil Super Grip Net which is a composite liner/drainage product consisting of LLDPE spiked with drainage “studs” on the top surface to provide high capacity drainage.
- Geotextile with engineered high-density polyethylene (HDPE) turf
- Sand infill, or alternatively Hydrobinder™ infill (top layer).

The sand infill weighs down the ClosureTurf™ to prevent uplift due to wind suction forces, while the Hydrobinder is a binder soil placed in the turf that has additional resistance to erosive forces. Hydrobinder is used in channels, swales and other areas where Erosion Control Blanket or Erosion Stabilization Mat would normally be used.



Since ClosureTurf™ provides an artificial turf, rooting zone and topsoil layers are not necessary to support vegetative growth. Artificial turf provides an aesthetically-pleasing surface with less maintenance and is designed for stability and longevity.

Construction of this cover system was complete in the fall of 2015 and the Construction Documentation Report was accepted by the MPCA shortly thereafter



A) Hydrobinder Downslope, B) ECB, C) Straw, D) Sediment Pond Inlet Rip-rap

CRA Closure of Burning Ground- TCAAP

Wenck was responsible for clean closure of a former burning ground contaminated with heavy metals and unexploded ordnance. The project featured the nation's first full-scale use of soil washing/leaching for treatment. Wenck provided drilling and sampling for both chemical and geotechnical data including the use of field x-ray fluorescence; design, including specifications for stockpiling and material handling requirements; closure permitting; treatability studies; remediation management; contractor quality control; surveys to document the field work; drawings; and closure certification. The remediation included removal, characterization, consolidation, packaging, manifesting, transportation, and disposal of UXO-related waste; excavation, treatment, and backfilling of 20,000 tons of soil; recycling at a lead smelter of the metals removed during treatment; demolition and debris removal of a former explosives bunker; and site restoration.

rr. Prepare Presentations and Present Information at Meetings

Wenck routinely prepares presentations and presents information at meetings for our clients. This most frequently occurs for public sector clients that we have included such entities as the Met Council, and various watershed districts.

Example Project:

TCAAP Groundwater Remediation

Wenck completed long-term operations and maintenance of two groundwater pump-and-treat systems; groundwater and surface water sampling; investigation and remediation of two former primer/tracer areas; and excavation/closure of a former debris pit with asbestos-containing material. The contract requires working knowledge of various activities including CERCLA/MERLA investigations and cleanup; RCRA permitting, storage, and generator issues; EPCRA reporting; CAA emissions inventory; SDWA water supply testing; wastewater and storm water permitting, monitoring, and reporting; UST program; and OSHA (HAZWOPER and general facility issues). Serving in this role, Wenck interacted extensively with the Minnesota Pollution Control Agency (MPCA) and U.S. Environmental Protection Agency, as well as the public. Wenck was responsible for preparation of periodic community newsletters and participates in community meetings. Wenck received outstanding performance reviews from the Army for our responsiveness and level of expertise.

For many of the projects presented throughout this section presentations and presenting information at meeting is a part of the project. Please look at the other example projects for an indication of the areas where Wenck has presented information on projects.

ss. Oversee Stormwater Program Requirements During Construction Activities

SECTION 3: SCOPE OF WORK

Wenck has numerous staff with both SWPPP Construction Site Management and/or Design of Construction SWPPP through the University of Minnesota. Please see the staff matrix for select certifications. Wenck has numerous staff who have SWPPP certification and who complete SWPPP inspections and designs.

Example Projects:

An example of SWPPP inspections completed by Wenck staff includes completing all SWPPP inspections associated with construction projects in the Minnehaha Watershed District for the District. Other examples of SWPPP inspections completed by Wenck includes SWPPP inspections in association with re-closure of landfills that Wenck has been involved in with the MPCA Closed Landfill Program, and SWPPP inspections for MNDOT on several large corridor projects, such as the currently being constructed I-35 to Forest Lake Design/Build project.



tt. Provide Technical Assistance to the State in the Evaluation and Interpretation of Data and Information

Wenck will provide technical assistance to the State in evaluating and interpretation of data and information using staff involved in each project. We provide this service under other state contracts to MnDOT and Met Council on projects we are working on for them, and to the MPCA under our TMDL and Closed Landfill contracts.

Example Projects:

Wenck has been retained by the MPCA's CLP in the past to provide third party review in the Northwest Region to assist the MPCA's Regional Project Manager in the absence of an MPCA engineer in the region at the time. Another MPCA CLP project for which we have provided third party review is the East Bethel Landfill site's original treatment plant construction.

uu. Oversight of Responsible Party and Voluntary Party Contractors During Site Investigations or Response Actions

Wenck will utilize the same staff who routinely complete site investigations and response actions to also complete oversight of responsible parties and voluntary party contractors. For MnDOT, Met Council, Hennepin County Road projects, etc.; Wenck routinely provides oversight of Voluntary Party Contractors during response actions.

Example Project:

MnDOT TH 8 Environmental Construction Oversight

Wenck was hired by MnDOT to complete environmental construction oversight during the rebuilding of Trunk Highway 8 into Taylor Falls, MN. Environmental oversight was completed of the contractor completing voluntary actions under VIC through the south side of town through an area with petroleum contamination, heavy metals contamination and PAH impacted soils above the benzo(a)pyrene equivalent action level. Contaminated soils were excavated and hauled to an approved landfill.



SECTION 3: SCOPE OF WORK

vv. Oversee or Conduct Bench Scale Lab Treatability Studies, Pilot Testing and Field Demos

Pilot testing and bench scale treatability studies are important in many remedial options and can help to determine the feasibility of the potential option. They can help with preparing a more successful final design for the project. Wenck has completed both bench scale testing and pilot testing on numerous projects. Generally, a pilot study goes hand in hand with the selection of a remedial alternative to ensure proper implementation of a selected remedial alternative. Wenck is well versed in conducting pilot studies, as the examples below illustrate:

- Active landfill gas extraction: MPCA CLP – Hibbing Landfill, Watonwan County Landfill
- Soil remediation – BN Waite Park Car Shops site, TCAAP soil washing project
- Groundwater remediation – Junker Superfund site, Windom Superfund site, Washington County Landfill site (now in the CLP).
- Soil vapor extraction – Simonsons Properties in St. Cloud, Interplastic Corporation.

Example Projects:

An existing contractor yard, on the Mississippi River in South St Paul was proposed for redevelopment. Wenck's Phase I and Phase II investigations identified the western portion of the site to be a former dump. With the presence of the former dump, elevated levels of methane were present under a large portion of the site. A pilot SVE system was installed by Wenck to help determine the radius of influence for extraction well such that a final SVE extraction system could be installed under the site to help address the methane impacts.

An AMC site in Georgia is being remediated with Bioavailable Absorbent Media (BAM) and catalyzed hydrogen peroxide) via direct push and injection. Contaminants of concern include 1,4-Dioxane, 1,1,1-TCA, PCE and PCE daughter products. Prior to completing the full-scale injection which includes a barrier wall, prior to injection, a pilot study was completed by Wenck. The pilot test helped to ensure the initial remedial plan will be effective as designed and allowed for modification of the final plans, based on the results of the pilot test. All areas also utilized vacuum extraction.

ww. Assist and Provide Training as Requested by the MPCA or MDA. Training Must be Related to the Scope of this Contract

Wenck staff have provided a variety of training in the past and are willing to provide this service to the MPCA and MDA.

Examples:

Examples of training that Wenck has completed in the past includes OSHA 8-hr refresher training, various other Health and Safety Training, Environmental Compliance Audit Training, ISO 14001 audit support, SWPPP inspection training, SPCC training, etc.

xx. Follow MPCA Green Practices/Procedures for Remediation Projects

Wenck has a growing sustainability practice that is focused on developing projects and initiatives with a triple bottom line focus that improves environmental, economic and social considerations. In addition to serving clients, the firm's sustainability team is engaged with various coalitions including the Minnesota Sustainable Growth Coalition that is led by the Environmental Initiative and includes some of Minnesota's largest corporations. As a leader in the sustainability field, Wenck has played an important role in a wide range of projects related to renewable energy production, waste reduction and energy and water conservation. Waste reduction programs have

SECTION 3: SCOPE OF WORK

focused on responsible disposal strategies that optimize recycling opportunities, source reduction and composting. Energy and water initiatives primarily focus on conservation strategies, emissions reduction and recycling water resources when possible. The firm has multiple renewable energy clients including leaders in biofuel production, serving these clients has included both environmental permitting and facility design and comprehensive life-cycle modeling to demonstrate the reduction in greenhouse gas emissions their fuels offer. Wenck looks forward to using our expertise to help the MPCA staff utilize green practices on remediation projects.

Following please find project examples that demonstrate the depth and breadth of Wenck's sustainability expertise:



Greenhouse Gas Emissions Inventory at MSP Airport, Minneapolis, MN

The Wenck team assisted the Metropolitan Airports Commission (MAC) with preparation of a voluntary GHG emissions inventory for the Minneapolis-St. Paul International Airport (MSP). The project involved quantifying GHG Protocol Scope 1, 2, and various Scope 3 CO₂-e emissions associated with MSP including: airport-controlled sources, airlines and other tenant sources, and sources from the general public (private vehicles and mass transit). This inventory was one of the first few completed for an international airport in the US.

Emissions are also calculated on an ongoing basis moving from biennial to annual reporting to identify trends and progress towards reduction goals. The Wenck report went a step beyond an inventory and calculated the GHG emissions reductions associated with many of the recent capital improvement projects completed at MSP.

Sustainable Management Plan for the Metropolitan Airports Commission

As part of a multi-firm consulting team, Wenck is currently providing support in the development of a Sustainable Management Plan for the Metropolitan Airports Commission at the Minneapolis-St. Paul International Airport (MSP), including evaluation of actions to address sustainability priorities, stakeholder engagement, and sustainability report evaluation for alignment with the Global Reporting Initiative (GRI).

Life Cycle Analyses (LCA) for Gevo, Inc

Wenck has conducted extensive LCAs for Gevo examining different engineering strategies and feedstocks for biofuels production. These LCAs take a cradle-to-grave perspective to assess the environmental impacts associated with feedstock procurement, fuel manufacturing, distribution and use to demonstrate an emissions profile that qualifies for renewable energy credits under the federal government's Renewable Fuel Standard, California's Low Carbon Fuel Standard and the EU's Renewable Energy Directive.

Rochester, MN Energy Action Plan

Wenck was retained by the Rochester, MN Energy Commission to develop an Energy Action Plan (EAP) that scoped a range of opportunities for the City of Rochester to achieve target energy and carbon reduction goals.

yy. Oversee Hydrogeologic Investigations Including Fate & Transport Modeling, Capture Zone Analysis and Pump Tests

As indicated previously, Wenck staff have extensive expertise in completing hydrogeologic investigations, completing fate & transport models and associated with that capture zone analysis and pump tests. Completing oversight and reviewing reports and models completed by others will be completed utilizing staff with expertise in the area being evaluated.

SECTION 3: SCOPE OF WORK

Example Projects:

Please see project examples in other parts of this section including surface water and groundwater investigations, groundwater modeling, etc. which discuss our extensive experience with this category.

zz. Prepare and Determine if the Stormwater Pollution Prevention Plan (SWPPP) is Being Followed and Make Recommendations if Revisions are Needed During the Life of the Construction Project

Wenck routinely prepares SWPPP plans and completes the weekly and rain event driven walk throughs associated with SWPPPs for construction projects. As a part of the walk-through process, recommendations for revisions is the main purpose of completing the inspections.

Experience:

SWPPP Inspections- Various Projects

Wenck is the consultant who completes SWPPP inspections for several of the watershed districts located in the twin city metro area. In addition, Wenck completes a variety of SWPPP inspections for construction projects, primarily associated with redevelopment and for construction projects for industrial clients. In addition, Wenck has completed SWPPP inspections for several large linear MnDOT projects such as for over 30 miles of old Trunk Highway 14, over 60 miles of I-90, for the new on-ramp to I-35W from downtown Minneapolis to Highway 36 north of downtown Minneapolis, etc.



Construction Stormwater Compliance Assistance

Wenck provides construction stormwater compliance assistance for projects in the following municipalities: City of Jeffers, City of Lakefield, City of Windom, and City of Slayton. Wenck has conducted over 700 erosion control and sediment control inspections for three clients: the Metropolitan Airport Commission, Met Council 2011-2012, and Capitol Region Watershed District.



SECTION 4: PROJECT DESCRIPTIONS

4- Provide specific descriptions of three projects managed by Wenck within the past 5 years.

- i. One Hazardous Waste Site (Superfund, VIC, RCRA) – Twin Cities Army Ammunition Plant
- ii. One Ag-Chem Site - Winona River & Rail
- iii. One hazardous vapor mitigation (Superfund, MDA VIC) – Fort Gillem

Below please find specific descriptions of three projects managed by Wenck over the past five years.

i. Hazardous Waste Site Remediated through the VIC Program

Twin Cities Army Ammunition Plant (TCAAP)- 427 Acre Redevelopment (2016)

US Army and Ramsey County

Client Contact: Beth Engum, Ramsey County, 651-266-7115

Site Description:

TCAAP was constructed in 1941, originally occupying 4 square miles and containing 323 buildings. It was used for the manufacture of small caliber ammunition from World War II through the Vietnam War. Contamination was discovered in 1981, with 18 soil sites and 6 groundwater plumes.

Project Description:

Wenck and Carl Bolander & Sons, an earthwork and demolition contractor, were retained as the team selected to perform a guaranteed price demolition and cleanup contract. It involved the demolition of old manufacturing buildings from the 427-acre “plant” parcel, abatement of asbestos and other hazardous materials, underground steam lines (also asbestos-containing), sewer, water, natural gas lines, 300 overhead power poles, and six miles of railroad track. Under the contract with Ramsey County, remediation of soil had to meet agency unrestricted land use screening criteria.

Wenck developed a Quality Assurance Project Plan (QAPP) employing Incremental Sampling Methodology (ISM), a technique developed by the Interstate Technology Regulatory Council (ITRC) in 2012. The ISM approach allows characterization of “decision units” using sampling techniques more representative of a typical risk exposure scenario. This approach gives a high volume and detail in data results while simultaneously controlling laboratory costs. For a project site as large as the TCAAP facility, this approach was extremely useful for both the MPCA VIC staff as well as the contractors working on the project.

The cleanup activities addressed remaining TCAAP legacy soil contamination, which impeded the unrestricted use of the land. Residual impacts were largely mitigated through removal actions with off-site disposal of impacted media. The following presents a brief synopsis of the hazardous material abatement, demolition, recycling/re-use, investigation and implemented response actions completed as part of this project:



SECTION 4: PROJECT DESCRIPTIONS

- 9,281 tons of polychlorinated biphenyl (PCB) hazardous waste was removed and interred at the Wayne Disposal, Inc. landfill in Belleville, Michigan.
- 99,698 tons of non-hazardous impacted soil was excavated and transported for disposal at the Waste Connections landfill (formerly SKB) in Rosemount, Minnesota.
- 7,054.5 tons of asbestos-containing soil waste was excavated from below grade at former TCAAP structures.
- All buildings were abated of remaining asbestos-containing materials (ACM), lead paint, mercury switches and other hazardous materials prior to demolition.
- Over 9.36 miles of storm sewer were removed, including 295 structures.
- Over 9.84 miles of sanitary sewer were removed, including 238 structures.
- Over 13.47 miles of water service line were removed, including 1.28 miles of ACM pipe.
- Over 7.01 miles of natural gas line were removed, including 3.5 miles of asbestos wrapped pipe.
- Over 1.67 miles of ACM steam line and ACM condensate return line were removed (3,379 tons of ACM waste).
- Over 7.01 miles of railroad track and subgrade material were removed.
- Over 7.42 miles of chain-link fencing were removed.
- Three electrical power substations were removed.
- Over 2,400 shallow soil borings were advanced in order to conduct additional investigation and characterization of the soil.
- Over 900 tons of low-level petroleum-impacted soil were biologically treated to achieve MPCA “unregulated fill” criteria prior to off-site removal and re-use.
- Over 300,000 tons of concrete and recycled pavements were processed into recycled aggregate for on- and off-site re-use.



Wenck Staff Included:

Personnel involved in the project included: Joe Otte (Program Manager), Todd Fryzek (Project Manager- Reports), Eric Sundbo (Asbestos and Regulated Waste), Cory Anderson (field work), Chantell Bazewicz (asbestos and regulated waste), Aaron Benker (technical support), Ryan Thelen (field lead), Sam Berndt (field work), Matt Bowers (Sr Technical Support), John Huntington (Laboratory QA/QC), Hagen Kaczmarek (GIS), Dan Larson (field work), John Fox (field work), Pam Massaro (technical support), Joey Otte (field work), Diane Short (Laboratory QA/QC), Jordan Shuck (GIS), and Shane Waterman (Investigations and remedial approach lead).

Subcontracted tasks:

Wenck completed the work as a joint venture with Bolander. Items that were subcontracted include laboratory analysis and drilling.

SECTION 4: PROJECT DESCRIPTIONS

Outcome achieved:

The environmental activities conducted at the Site were completed to achieve the following objectives:

1. Facilitate U. S. Environmental Protection Agency (EPA) and MPCA approval of a revision to the LUCRD and UECE that will document a change to unrestricted land use/unlimited exposure for the 427 acres;
2. Allow the MPCA to ultimately issue a Site-wide Certificate of Completion for soil;
3. Fulfill the Army's obligation to remediate soil at the Site to MPCA Tier 2 Industrial SRVs under the Federal Facility Agreement; and
4. Support delisting of Site soil from the state and federal Superfund lists.

The project received a Certificate of Completion for soil on the site from the MPCA VIC program on July 12, 2016.

ii. **Agricultural Voluntary Investigation and Cleanup (AgVIC) Site**

Winona River & Rail Agricultural Investigation and Remediation Project (2009 to Present)

Client Contact: Provided upon request, confidential client

Site Description:

In 2009, a confidential client purchased the Winona River and Rail site located on the Mississippi River in Winona, Minnesota. The Site is approximately 16 acres and has been occupied by multiple industrial and bulk storage facilities since the 1930s. The Site is situated next to a main railroad line that once crossed the Mississippi River into Wisconsin. Between 1930 and 1980, the Green Bay & Western Railroad occupied the Site which included a round house and railroad yard. Between 1980 and 1993, the Site was occupied by Koch Winona, a bulk coal distributor. Since 1993, the Site has operated as a dry bulk fertilizer storage facility. Access to the river and adjoining railroad makes this site a prime location for off-loading and loading bulk fertilizer.

Project Description:

Wenck was retained to perform due diligence activities at the Site. A Phase I Environmental Site Assessment (ESA) and Phase II ESA revealed soils with elevated concentrations of nitrate and total kjeldahl nitrogen (TKN) above MDA cleanup criteria. Groundwater at the Site is within 20 feet of the surface and was found to be impacted with elevated concentrations of nitrates and boron. In addition, low concentrations of petroleum-related compounds were detected near a former Leaking Underground Storage Tank (LUST) location. The petroleum results did not appear to be indicative of a new release. Based on these results, the Site entered into the MPCA VIC and MDA AgVIC Programs.

Wenck developed a Remedial Investigation (RI) Work Plan for additional soil and groundwater investigation activities. The RI Work Plan was reviewed and approved by the MPCA VIC and MDA AgVIC Programs. The RI Work Plan followed the soil and groundwater sampling procedures outlined in MDA applicable guidance documents for several borings that were drilled at the Site. Other tasks included in the RI Work Plan included the installation of groundwater monitoring wells, hydraulic testing of the wells and groundwater sample collection. Data Submittal Reports were sent to the MPCA and MDA summarizing the RI Work Plan analytical results as they became available. All of the surficial soil and groundwater data were compiled and summarized in a RI Report and Correction Action Plan. As part of the RI Report, a Contamination Impacts Survey was also conducted to evaluate exposure pathways that may impact human health, surface water, groundwater and other potential receptors.

In addition, a Pesticide in Soils Work Plan was prepared by Wenck, reviewed and approved by the AgVIC Program to assess possible impacts from transferring metam sodium at the Site and to identify a source of bromomethane at the Site (both soil fumigants).

Corrective Actions proposed and implemented as part of this project:

SECTION 4: PROJECT DESCRIPTIONS

- Protection of the barge unloading area to minimize a release to the Mississippi River
- Installation of covers on the conveyors
- Purchase of a sweeper to sweep the site daily
- Covering of the truck unloading areas and extend spouts into trucks being loaded
- Reduction of the tracking of product by heavy equipment
- Paved high traffic and transloading areas
- Constructed a building to wash equipment and containment of wash water for off-site disposal
- Excavation and landfarming of soils with elevated levels of nitrate, TKN and phosphorus
- Monitoring of groundwater at the Site on a quarterly basis
- Removal and landfarming of sediment from the on-site stormwater pond

Wenck provided oversight of excavation activities and land application procedures as approved in a Corrective Actions Plan. The following excavation corrective actions were implemented:

- Approximately 2,080 gallons pond water containing fertilizer was land applied
- Approximately 473 tons of pond sediment was disposed at a permitted landfill due to debris in the sediment and high moisture content
- Approximately 4,591 tons of nitrate, TKN and phosphorus impacted soils were excavated and land applied

Wenck is currently working with the client on monitoring the stormwater and groundwater at the site as well as implementing the Stormwater Pollution Prevention Plan (SwPPP). Quarterly groundwater reports are submitted to the MDA for review and approval along with annual and quarterly stormwater reports.

Wenck staff:

Personnel involved with the project include: Hosfield (Project Manager and field work), Jordan Shuck (GIS), Jim Boell (CADD) and Shane Waterman, PG (technical support).

Subcontracted tasks:

Subcontractors for this project include Generation X Construction of Rushford, MN (excavator), Farmers Coop Elevator of Rushford, MN (land application personnel and equipment), Bergerson-Caswell (drilling contractor), MESA (drilling contractor) and Pace Analytical Laboratory.

Outcomes achieved:

The environmental activities conducted at the site were completed to achieve the following objectives:

1. Received a No Further Action/No Association Determination letters for manganese, boron, metam sodium and bromomethane.
2. Approval of Corrective Action activities through excavation and land application. The approval allowed the client to become eligible for reimbursement of the costs incurred for the approved work through the Agricultural Chemical Response and Reimbursement Account (ACRRA).
3. Support the client to implement physical plant upgrades and management practices to minimize releases to the environment.

SECTION 4: PROJECT DESCRIPTIONS



iii. Hazardous Vapor Mitigation (Superfund) Site

**Former Industrial Property, St Paul, MN (2009-2017)
Confidential Client**

Site Description:

The former manufacturing facility was the source of multiple solvent releases that resulted in the impact of site soil, groundwater and vapor. The solvent contamination was the result of historical chemical manufacturing and storage activities.

Project Description:

As a result of a previous limited scope investigation performed by others, two separate releases to groundwater were identified in areas where previous industrial chemical manufacturing previously occurred. Upon discovery, Wenck was contracted to conduct full remedial investigations of the two separate release sites. The remedial investigations included the assessment of soil, groundwater, and soil gas media to assess and evaluate risk pathways. The soil and groundwater remedial investigations included traditional soil, groundwater and vapor sampling.

Site remediation technologies utilized during the projects consisted of groundwater sparging, soil vapor extraction and chemical injection. The treatment systems included the following components:

- **System Housing:** An enclosed trailer housing the multiple SVE and air sparge system blowers and main control panel. The SVE blower and air-sparge systems were located in the rear (explosion-proof components) of the trailer and the control panel is situated in the front of the trailer.
- **SVE Vents:** There were nine SVE extraction vents associated with the with the two systems. The vents were connected to the system with over 4,000 feet of horizontal HDPE piping.
- **SVE blower systems:** The SVE systems were equipped with blowers, steel moisture knock-out tanks equipped with automatic float-activated interlock switches, inline air filters, manual drain valves and pressure-relief device. The SVE systems effluent was initially treated with an electrically-powered catalytic oxidizer unit (disconnected within two years of system startup).
- **Air Sparge Points:** Six, 76-foot deep air-sparge points.
- **Air-sparge blower system:** Air-sparge system consisted of a 10hp compressor to provide air to the sparge points.

The system components and trailer were removed from the site upon receiving regulatory closure.

Wenck Staff Included:

Personnel involved in the project included: Joe Otte (client manager – regulatory liaison), Shane Waterman (project manager – technical lead and report writer), Jason Warne (civil engineering), Michelle Hosfield (field work), Cory

SECTION 4: PROJECT DESCRIPTIONS

Anderson (field work), Jordan Shuck and Hagen Kaczmarek (GIS), Chris Ecklund (CADD) and Kathryn Anderson (air quality).

Subcontracted tasks:

Project tasks that were subcontracted include laboratory analysis, drilling, earthmoving, utility installation, chemical injection and remedial specialty equipment engineering and construction.

Outcome achieved:

The environmental activities conducted at the Site were completed to achieve the following objectives:

- 1) Soil, groundwater and vapor remediation of former industrial chemical releases.
- 2) Procurement of MPCA VIC liability assurances in the form of a No Further Action Determination and a Notice of Response Action Termination.



PATRICK AHLM

Sustainability and Renewable Energy

Mr. Ahlm has 13 years of experience on working with regulatory and government affairs as well as community relations. His experience includes coordinating lobbying efforts, developing and executing plans, budgets and schedules for regulatory filings, and developing community relationships.

EDUCATION

MPH, Major in Environmental Health, Industrial Hygiene Emphasis, University of Minnesota

BS, Geology, Utah State University - Logan, Utah

SELECTED EXPERIENCE

Government Affairs

- Coordinated state lobbying and government affairs regarding environmental, energy, tax and regulatory issues.
- Organized and attended meetings with Florida's Governor and Commissioner of Agriculture to resolve specific legislative and regulatory issues, and Florida's US Senator regarding federal legislation.
- Collaborated in leadership roles with trade organizations and peer companies to form a concerted lobbying effort for industrial algae efforts.
- Participated in regular and ad hoc meetings with federal and state legislators and/or their staff to encourage support or resistance to relevant legislation, programs and policies.
- Invited speaker at legislative briefings for federal legislators, staffers and other interested parties during industry fly-in events in DC.

Regulatory Affairs

- Developed and executed plans, budgets and schedules for regulatory filings including NEPA reviews and environmental resource permitting. Collaborated with executives, senior scientists and engineers to draft and otherwise assemble official correspondence, permit applications, presentations and other materials.
- Point person for site due diligence activities related to project development.
- Established, maintained and leveraged relationships and dialogue with various regulatory authorities having oversight responsibilities.
- Federal: U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), and US Department of Agriculture (USDA).
- State environmental agencies in Florida, Texas and Louisiana.
- Monitored relevant regulatory developments in the biotechnology industry and environmental permitting for Company and industry trade organizations.
- Led algae industry workshops with DOE, USDA and EPA representatives to educate and mitigate future challenges for commercialization.



AREAS OF EXPERTISE

Government Affairs
Regulatory Affairs
Community Relations

External and Community Relations

- Established relationships with economic development councils in Florida, Texas and Louisiana.
- Re-designed, re-wrote and updated website, presentations and marketing packages.
- Engaged with local organizations to ensure grassroots support for, and understanding of, operations, environmental safety and positive economic impact.
- Attended industry and community-sponsored conferences, seminars and workshops to bolster community outreach efforts.

Special Projects

- Assisted executives with public utilities engagement on carbon mitigation strategies.
- Worked with CEO and business development team on strategic relationships with refiners and fuels distributors.
- Assisted in drafting government grant and loan guarantee applications, resulting in two successful grants - \$25 million from US DOE and \$10 million from Lee County, Florida.
- Worked closely with Company executives throughout the due diligence process with several potential investors and the eventual closing of a \$90 million financing.

Paralegal Experience

- Directly assisted General Counsel with day-to-day operations of a small legal department.
- Assisted with successful applications for alcohol fuel producers permits.
- Monitored legislation and regulatory developments and prepared summaries.
- Worked closely with the General Counsel and Chief Financial Officer through an IPO, merger, acquisitions and the commissioning of large construction projects.
- Engaged with local landowners and shareholders on business transactions.
- Assisted with corporate governance compliance including drafting committee charters, calendars and policies. Drafted minutes for all Board and Board Committee meetings.
- Assisted Executive Director with diverse aspects of lobbying for the preservation of commercial air service in rural America.
- Conducted research and drafted documents for member newsletters, government filings and official correspondence.
- Monitored and researched relevant legislative and legal issues and interacted with US congressional offices and community officials.

CORY ANDERSON

Environmental Scientist

Mr. Anderson has experience working on diverse projects including such things as a hydrogeological study of a future landfill site, working with a team to geosteer oil wells, chemistry lab experience including performing many calibrations of gas chromatographers, and extensive report writing. Mr. Anderson has been a part of many projects that included collecting and analyzing a variety of geologic samples.

EDUCATION

BA, St. Cloud State University - St. Cloud, MN

SELECTED EXPERIENCE

Undergraduate Thesis

Researched Glacial Landforms in Northern Minnesota. Collected samples from several locations using a sediment auger. Classified samples performed both wet and dry sieve analysis. Used 1-2mm grain count method to determine origin of sediment. Constructed multiple grain mount thin sections in order to observe mineralogical properties. Presented research to the Earth and Atmospheric Science Department at SCSU, as well as the student research colloquium.

Petroleum Geology

Wellsite Geologist. Collected and described 30-foot samples in the vertical and horizontal sections of the well. Worked as a team to geosteer wellbore. Created well logs using the Mud Log program. Consistently performed calculations for the dip of the sedimentary rock formation, as well as things like annular velocity of drilling fluid in the borehole. Assembled end of well reports.

Hydrogeological Study

Geotechnical analysis. Collected samples using several methods including split spoon sampling. Described samples as well bore was advanced, and constructed well logs including diagrams of monitoring wells. Performed water level tests. Worked as a team to construct cross-section, and select samples for advanced testing.

Annual Reports

Annual Landfill Environmental Compliance Reports. Accurate entry of large amounts of field and lab data. Interpretation of soil chemistry information with regards to environmental compliance. Graphing and interpreting groundwater chemistry data with regards to environmental compliance. Interpreting data and writing reports and recommendations.



AREAS OF EXPERTISE

Sedimentation and Stratigraphy
Field geology
Chemical Hydrology
Surficial Hydrology
Surficial and Glacial Geology

BRETT BALLAVANCE

Regional Manager

Mr. Ballavance has over 25 years of experience in air, water, and waste permitting from both the government side (with the Minnesota Pollution Control Agency and Wisconsin DNR) and industry side (pulp and paper, taconite, and electric utility).

EDUCATION

BCheE, University of Minnesota - Duluth, MN

BCE, University of North Dakota - Grand Forks, ND

MBA, University of Minnesota - Duluth, MN

SELECTED PROJECT EXPERIENCE

Air-Water-Waste Management/Compliance/Engineering/Permitting

Duluth Landfill Superior – Superior, Wisconsin. Managed construction of a clay liner system for C&D landfill.

Larsmont Cottages Wastewater Treatment Plant with Spray Irrigation/Soil Disposal – Larsmont, Minnesota. Managed the engineering design and construction of a new wastewater treatment plant for vacation resort operation. System included both spray irrigation (summer) and soil-based disposal (winter).

Duluth Energy Systems – Duluth, Minnesota. Updated Stormwater Pollution Prevention Plan for facility and working on a Renewable Fuel Oil fuel conversion.

SKB Environmental Cloquet Industrial Landfill – Cloquet, Minnesota. Managed design and construction of a stormwater pond and updated SWPPP and SPCC plans.

Northshore Mining Company Industrial Landfill – Cloquet, Minnesota. Assisted plant with management of landfill leachate, overall landfill management, annual landfill reporting, and working on a leachate spray irrigation system/approval.

Silver Creek Township Alum Elimination Project – Cloquet, Minnesota. Assisted township with a permit addendum requesting elimination of alum addition for phosphorus treatment due to current land application system applying at agronomic rates.

Mesabi Metallics Air Permitting – Cloquet, Minnesota. Managed design and construction of a stormwater pond and updated SWPPP and SPCC plans.



AREAS OF EXPERTISE

Air, Water and Waste Permitting/Engineering and Compliance

PROFESSIONAL MEMBERSHIPS

American Society of Civil Engineers

Air & Waste Management Association

Minnesota Onsite Wastewater Association

Minnesota Wastewater Operators Association

Duluth Engineers Club, past board member

Past Board member for the Minnesota Professional Onsite Wastewater Recycling Association

Past Member of UMD Chemical Engineering Department Industrial Advisory Committee

Minnesota Power/ALLETE - Duluth, Minnesota. Supervised water and waste staff working with steam electric facilities, hydro facilities, T&D facilities, and wind facilities. Performed environmental audits at steam electric stations and environmental training along with due diligence efforts for new acquisitions. Provided environmental compliance assistance for air, water, and waste. Air quality permitting work for the five steam stations and other facilities owned by ALLETE/Minnesota Power.

Cliffs Natural Resources - Duluth, MN. Provided environmental management of permitting (air, water, waste) for the US iron ore operations. Worked with plant environmental managers on management of environmental permits.

Minnesota Pollution Control Agency - Duluth, MN. Performed technical reviews and permitting work for industrial and municipal facilities in northeast Minnesota in the areas of wastewater treatment and solid waste management including construction oversight. Wrote air quality permits for new and existing sources throughout Minnesota but mainly in northeastern Minnesota. Evaluated air emission estimates, reviewed regulatory requirements (both federal and state requirements) and created air emission permits.

Potlatch Corporation - Cloquet, MN. Implemented activities to insure compliance with the provisions of the facility air quality permit, SARA Title III and CERCLA chemical management programs and other applicable federal, state and local ordinances through completion of air testing, SOP development, reporting, recordkeeping, and other activities as mandated by permit and other state and federal regulations. Developed and implemented hazardous waste management plans and assured compliance with all hazardous waste regulations.

Wisconsin Department of Natural Resources - Superior, WI. Northwest District Permit Review Engineer. Processed air pollution control permits for existing and new sources, performed facility inspections, air toxic compliance plan reviews, maintained emission inventories, reviewed project proposals for soil and groundwater remediation projects, asbestos abatement work, and aided in information/education efforts.

Barr Engineering Company - Minneapolis, MN. Air quality permitting, landfill engineering/construction, hazardous waste/Superfund Cleanup. Performed emission estimates, air quality permitting, alternative chemicals analyses, SARA Title III reporting, cost estimates for landfills, BACT reviews, and soil cleanup of former coal gasification sites.

Instructor

University of Minnesota Duluth. Teaching in various programs in the Swenson College of Science & Engineering. Courses taught include thermodynamics; statics; environmental assessment; and a graduate course entitled "Legal, Ethical, and Environmental Issues in Engineering".

Viterbo University - LaCrosse, WI. Teaching statistics for the 4-year nursing program.

Publications

Contributing author of Minnesota Air Quality Handbook, Barr Engineering and Dorsey & Whitney Law Firm, September 1992.

Contributing author of Problems and Solutions to Title V Emission Inventories, ENSR Consulting and Engineering and Potlatch Corporation, March 1995.

Contributing author of Ecological Wastewater Management in Iowa – Hope for Iowa's Small Communities, Scott Wallace, P.E., Gene Parkin, Ph.D., P.E., Brett Ballavance, P.E., Ryan Brandt, July 2005

JOEL BARTHEL

Geologist

Joel is a geologist in the Real Estate & Development Services Group. Joel's main duties include field work planning and preparation, site audits, field sampling and documentation, project reporting and assistance with project management. Joel has previous experience in field work as a CMT and Geo-technical Drill Crewman.

EDUCATION

BS, Hydrology, Minors in Geology and Environmental Studies, St. Cloud State University - St. Cloud, Minnesota

PROJECT EXPERIENCE

Generated a 3-Dimensional hydraulic model of a 4-mile stretch of the Sauk River using a combination of ArcGIS, HECGeoRAS, and HEC-RAS. Throughout this year-long project, collected and analyzed field data, and used publicly available LiDAR and stream gauge data to build a model from the ground up. By using a collaboration of personal field data and public data, developed a hydraulic model that can be used to simulate hydraulic characteristics and flooding extents for any given rain event.

Experience with on-site wetland analyses and observation of groundwater wells to create groundwater maps.

Experience using EPASWMM 5.1 to model residential drainage-systems.

As an assistant research scientist at St. Cloud State University, conducted research pertaining to deep ocean turbidity currents and their relation to bed-form processes for Exxon Mobil. Gathered and analyzed data using an Acoustic Doppler Velocimeter and Refractometer.



AREAS OF EXPERTISE

Hydraulic Modeling
Wetland Analysis
EPASWMM & MODFLOW
ArcGIS
AutoCAD

CHANTELL BAZEWCZ

Project Manager/Environmental Scientist

Ms. Bazewicz has over eleven years of experience as an Environmental Scientist on diverse projects including building surveys, abatement oversight for renovation and demolition projects, Phase I and Phase II environmental site assessments, industrial hygiene, soil remediation and groundwater investigation. She has worked with both public and private industry in Minnesota, Wisconsin, Iowa, Arizona, North Dakota and South Dakota. Specialties include asbestos, lead-based paint, regulated/hazardous materials surveys, abatement oversight, air monitoring and sample analysis, indoor air quality assessments, employee exposure monitoring, site assessments, soil and ground water investigations/ remediation, project design and contract preparation.



EDUCATION

BA, Biology and Environmental Studies, University of St. Thomas

REGISTRATION

AIHA AAR Accredited Analyst #8775

SELECTED EXPERIENCE

Asbestos Services:

- Conducts asbestos surveys: material identification, condition assessments, sampling, quantifications and documentation
- Performs on-site asbestos project supervision, air monitoring, visual inspections, clearance sampling, PCM analysis and project documentation
- Prepares specification and AIA contract documents

Lead Services:

- Conducts lead surveys and risk assessments: performs paint chip sampling, XRF testing for lead-based paint, lead dust sampling, lead in water sampling
- Performs on-site lead project supervision, lead air monitoring, clearance sampling and project documentation

Hazardous Materials Services:

- Conducts hazardous/regulated material surveys: material identification, quantification and documentation
- Performs on-site hazardous project supervision and project documentation.

Industrial Hygiene and Health & Safety Services:

- Performs indoor-air quality assessments
- Performs industrial hygiene monitoring for employee exposure
- Performs drinking water sampling

AREAS OF EXPERTISE

Asbestos Surveys
Lead Surveys and Risk Assessments
Hazardous Materials Services
Industrial Hygiene and Health and Safety Services
Site Assessment and Remediation

CERTIFICATIONS

Asbestos Air Sampling – MN
Asbestos Building Inspector – MN, IA, ND, SD
Asbestos Contractor Supervisor – MN, ND, SD
Asbestos Management Planner – MN, IA, ND, SD
Asbestos Project Designer – MN, IA, ND, SD
Lead Inspector/Risk Assessor – MN
Lead Supervisor – MN
40 Hour OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER)
NIOSH 582
NITON Spectrum Analyzer Certified
Innov-X Spectrum Analyzer Certified
First Aid/CPR

BRIAN BECK

Water Quality Scientist

Mr. Beck has six years of experience working on water quality data analysis, water quality modeling, sulfate geochemistry, data processing and analysis, technical report writing, and water quality monitoring. Mr. Beck graduated from the University of Minnesota - Duluth in 2012 with a MS in Water Resource Science with an emphasis in Environmental Chemistry. He has worked as a hydrologic and water quality modeler to develop and write TMDLs for turbidity, bacteria, and nutrients in impaired water bodies. Mr. Beck has experience using BATHTUB, CEQUAL, HSPF, GWLF, FLUX32, PONDNET, ArcMap, and PHREEQC equilibrium geochemical modeling software. Prior to working at Wenck, Mr. Beck worked as a Research Assistant at the University of Minnesota Duluth on projects related to sulfur geochemistry and mercury fate/transport.

EDUCATION

MS, Water Resource Science (emphasis Environmental Chemistry), University of Minnesota - Duluth, MN

BS, Environmental Science (emphasis Water Quality), University of Minnesota - Twin Cities, MN

SELECTED EXPERIENCE

Water Quality Modeling and Monitoring

South Fork Crow Watershed TMDL. Mr. Beck is responsible for building BATHTUB models for impaired lakes in the South Fork Crow Watershed TMDL. This work involved obtaining watershed phosphorus loading from HSPF to build BATHTUB lake response models. Mr. Beck is also responsible for writing chapters related to water quality reductions.

Badger Lake Reservoir Water Quality Modeling. Developed a Generalized Watershed Loading Function (GWLF) model for Badger Lake Reservoir watershed. This model uses a modified version of the National Resources Conservation Services (NRCS) curve number approach to model watershed hydrology and runoff. Mr. Beck utilized flow and water quality monitoring data to calibrate the model's hydrology and pollutant loads. Output from the calibrated model was used as input to the BATHTUB lake response model to estimate water quality based on potential land use improvements. Mr. Beck was the lead author on the modeling report.

City of Egan Neighborhood Lake Management Plan. Mr. Beck helped author the management plan report and led modeling efforts to update the City's PONDNET model to predict watershed hydrology and phosphorus loads to impaired and protection lakes. The PONDNET model consisted of a complex network of storm sewers and city ponds. Model hydrology was calibrated using monitored outflow from the various pump and lift stations throughout the City of Egan.



AREAS OF EXPERTISE

Limnology
Water Quality Modeling
GIS
TMDLs
Aqueous Geochemistry
Hydrology

PROFESSIONAL MEMBERSHIPS

Society of Environmental Toxicology and Chemistry
North American Lakes Management Society

Lake Susan Use Attainability Analysis. Mr. Beck helped build and calibrated a BATHTUB model that was used to determine the necessary load reduction required for Lake Susan to meet water quality standards. Mr. Beck was also responsible for writing chapters related to water quality reductions.

North Fork Crow Turbidity, Bacteria, and Nutrient TMDL. Mr. Beck helped develop turbidity total maximum daily loads for multiple reaches in the North Fork Crow watershed. Mr. Beck was responsible for developing pollutant source assessments, calculating turbidity allocations, and writing the turbidity chapters of the TMDL.

Sauk River Bacteria and Nutrient TMDL. Mr. Beck is developing bacteria and nutrient TMDLs for multiple streams and lakes within the Sauk River watershed. Responsibilities included development of hydrologic flow duration curves and rigorous accounting of fecal coliform sources in the watershed to help understand the linkages between watershed hydrology, seasonal land management practices and bacteria sources throughout the watershed. Mr. Beck is also responsible for using Hydrologic Simulation Program—Fortran (HSPF) output to build BATHTUB lake response models to determine nutrient sources in impaired lakes. Mr. Beck is the primary author of the TMDL report.

Vermillion River Turbidity, Bacteria, Dissolved Oxygen, and Nutrient TMDL. Mr. Beck is responsible for developing bacteria, turbidity, and nutrient total maximum daily loads for the Vermillion River watershed. Responsibilities include water quality data analysis, pollutant source assessment, and water quality modeling.

Shingle Creek Routine Monitoring and Reporting. Mr. Beck conducts routine monitoring for streams and lakes within the Shingle Creek watershed boundaries. Responsibilities include collecting water quality samples, routine maintenance of field equipment, measurement of stream discharge, and analysis of field data. Mr. Beck is also responsible for writing annual water quality reports for the Shingle Creek Watershed Management Organization.

Aquatic Geochemistry

Metropolitan Council Environmental Services Water Quality and Solids Analysis. Mr. Beck is responsible for the analysis of water quality data and assessment of solids characteristics in the Minnesota River. This work involves predicting the concentrations of multiple geochemical parameters to assess the beneficial use of reused solids from the Minnesota River. Mr. Beck is also responsible for data analysis to determine water quality and geochemical characteristics at multiple locations, which will be used as a means to determine when and how to treat Minnesota River water for phosphorus reduction.

Minnesota River Selenium Site Specific Standard Development. Mr. Beck is the lead scientist developing a selenium site-specific standard in the Minnesota River. Mr. Beck has developed a sampling plan, foodweb model, and site specific selenium standard based on updated guidance from the Environmental Protection Agency (EPA). This work has involved assessing chemical speciation analysis, analysis of solid phase and aqueous partitioning, and spatiotemporal water quality data analysis. Mr. Beck is currently working with the industrial discharge, the EPA, and the Minnesota Pollution Control Agency (MPCA) to negotiate a selenium standard that is protective for the aquatic community.

St. Johns University Fire Water Quality Impacts. Mr. Beck was responsible for assessing impacts from a hazardous material spill on the campus of St. Johns University in Collegeville, MN. This work included comparing contaminant data from spill against Minnesota acute and chronic water quality. Additionally, Mr. Beck used the PHREEQ equilibrium modeling software to determine speciation of redox sensitive contaminants. These results were summarized in a technical memorandum, which ultimately was used to show that the hazardous material spill had little impact on nearby water bodies.

Pond Metal Treatment (Confidential Client). – Mr. Beck was the project geochemist that developed dosing levels to remove dissolved and particulate metals from a wood treatment facility. This work involved using novel flocculant products to assess the level of metals removal to meet effluent discharge standards. Data from this study were used to develop site-specific dosing levels to ensure that water quality standards are met in the receiving water

body.

West Fork Battle Creek Reservoir. – Mr. Beck was responsible for reviewing water quality data, existing model results, and geochemical data for West Fork Battle Creek Reservoir. The goal of this project was to determine if the building a reservoir on West Fork Battle Creek would reduce copper concentrations below Wyoming State water quality standards.

Minnesota River Nutrient Treatment. – Mr. Beck was the project scientist responsible for assessing how ambient water quality conditions in the Minnesota River will influence phosphorus treatment processes. This work involved extensive water quality data analysis of large datasets provided by the client. This analysis included data robustness analysis, aquatic geochemical partitioning analysis, and assessment of ambient water geochemistry on water treatment processes.

Sediment Contaminant Geochemistry

Red Cedar River and Lake Menomin Sediment Investigation. – Mr. Beck assisted sediment sampling efforts on the Red Cedar River and Lake Menomin as a response to a tractor-trailer spill in the Red Cedar River containing hazardous material. Mr. Beck led the data analysis of sediment results to determine the extent and degree of contamination. Mr. Beck also developed a basic degradation model to assess the timeframe required for contaminants to decay within the area of interest. These data were used to compare against Wisconsin Department of Natural Resources guidelines for sediment contaminants and literature toxicology values to determine the ecological impacts for the spill. Mr. Beck authored a technical memo summarizing the results of the sediment sampling, data analysis, and decay modeling.

Eden Prairie Stormwater Basin Improvement. – Mr. Beck was responsible for collecting sediment cores and determining depth to parent material in stormwater basins in the City of Eden Prairie. Mr. Beck used sediment probes and gravity coring equipment to determine the depth of accumulated sediment and collect sediment samples, respectively, to determine appropriate use for dredged materials. Mr. Beck was responsible for writing technical memos recommending dredged material disposal volume and appropriate disposal methods.

Brooklyn Park Sediment Dredged Material Sampling. - Mr. Beck helped sample and determine appropriate uses (residential, industrial, or landfill disposal) dredged material stockpiles for the City of Brooklyn Park. Mr. Beck sampled dredged material stockpiles to assess contaminant concentrations. Results were used to compare against State of Minnesota Soil Reference Values (SRVs). Mr. Beck summarized data results and recommendations within a technical memo for the City.

St. Louis River Area of Concern Sediment Sampling. – Mr. Beck assisted sediment investigation of the St. Louis River Area of Concern (AOC) for mercury and organic contaminants. Mr. Beck led field efforts to collect sediment samples using piston and gravity corers. Mr. Beck assisted in the interpretation and data analysis to help inform the City of Duluth, Minnesota Pollution Control Agency, and Army Corp of Engineers appropriate remediation techniques.

Sediment Nutrient Management

Bald Eagle Internal Load Analysis and Alum Application. - Mr. Beck was involved in developing specifications for an alum treatment on Bald Eagle Lake in the Northern suburbs of the Twin Cities. Mr. Beck assisted the development of the appropriate alum dose using modern dosing techniques that account for Al:P binding efficiency and depth of redox sensitive P. Mr. Beck also led jar testing, field observation of the alum application, and developed a follow-up monitoring approach for the application.

Alum Dosing Study for Riley Lake Sediments. - Mr. Beck was the project geochemist for the development of alum dosing recommendations for internal phosphorus load reduction in Riley Lake.

Mr. Beck assisted the development of the appropriate alum dose using modern dosing techniques that account for Al:P binding efficiency and depth of redox sensitive P. Mr. Beck assisted writing technical memos recommending appropriate alum dosing for Riley Lake

Alum Dosing and Engineering Specifications for Bald Eagle Lake Sediments. Mr. Beck was involved in developing specifications for an alum treatment on Bald Eagle Lake in the Northern suburbs of the Twin Cities. Mr. Beck assisted the development of the appropriate alum dose using modern dosing techniques that account for Al:P binding efficiency and depth of redox sensitive P. Mr. Beck also led jar testing, field observation of the alum application, and developed a follow-up monitoring approach for the application.

Golden Lake Internal Nutrient Load Control Feasibility Study (2015) - Mr. Beck was the lead geochemist for the development of a feasibility study to assess internal nutrient control options for Golden Lake. Options evaluated for cost and feasibility in the study included sediment alum application, hypolimnetic withdrawal, sediment dredging, and hypolimnetic aeration. Mr. Beck was the lead author on a technical report outlining feasibility, cost estimates, and recommendations.

Six Mile Creek Delta Investigation in Pierson Lake (2015) - Mr. Beck was the lead scientist in an investigation of a delta formation in Pierson Lake, MN due to land use changes within the Six Mile Creek watershed. This work involved collecting sediment cores within the delta formation, data analysis of sediment samples, and writing technical memos.

Schwanz and Blackhawk Internal Load Feasibility and Follow-up Study (2014) - Mr. Beck was a geochemist in a follow up study to an alum treatment in Blackhawk Lake and an assessment of internal load control options for Schwanz Lake in the City of Eagan. The Blackhawk Lake sediment investigation involved measuring the extent of internal load reduction from an aluminum sulfate application in 2013, while the Schwanz Lake investigation involved determining the feasibility and effectiveness of a potential aluminum sulfate addition.

Sulfate Geochemistry

Impacts of Sulfate Addition in the St. Louis River Estuary (2010-2012). Mr. Beck was responsible for developing and executing a study to determine the influence of increasing sulfate concentrations in the St. Louis River Estuary. Responsibilities included collecting sediment cores, conducting sulfate addition experiments, interpreting geochemical results, and writing reports.

MPCA Development of Wild Rice Sediment Porewater Sampling (2010-2011). Mr. Beck helped develop multiple methods for sampling and extracting sediment porewater samples for redox sensitive parameters (sulfide, sulfate, ferrous iron, etc.). Mr. Beck was responsible for testing methods, sample analysis, and reporting method results to superiors.

MnDNR Mercury Production and Transport in Northeastern Minnesota (2012). Mr. Beck assisted in the planning and execution of sampling events in lakes and rivers near the Minnesota Iron Range. Responsibilities included collecting sediment cores, stream and lake water samples, and analysis of collected sediment porewater samples.

Magnetation Environmental Assessment Worksheet (EAW). - Mr. Beck was the project geochemist responsible for determining the impact of dewatering the Canisteo Mine Pit into Trout Lake in northeastern Minnesota. Previous sediment data in nearby streams (Prairie River) and lakes (Trout Lake) were used to assess the impact of increasing sulfate concentrations on internal phosphorus loading and wild rice in the region. Mr. Beck was responsible for writing the sediment geochemical sections of the EAW.

Publications

Beck, B.F. et al., 2014. Geochemical factors influencing the production and transport of methylmercury in the St. Louis River Estuary. *Applied Geochemistry*. 51:44-54.

MATT BEEHLER

Project Manager/Environmental Scientist

Mr. Beehler has over ten years of experience on diverse projects including hazardous building materials surveying, air monitoring, mold and moisture investigation, soil investigation, municipal construction project inspection and corrective action and implementation involving abatement projects. He has worked with both public and private industry in Minnesota, Wisconsin, Iowa, South Dakota and North Dakota. Specialties include Phase I and II hazardous building materials inspections, project oversight during abatement projects, air monitoring during abatement projects, mold and moisture investigation.

EDUCATION

BS, Technology Management/Construction Management, St. Cloud State, St. Cloud, Minnesota

PROFESSIONAL MEMBERSHIPS

ATMAE – Association of Technology, Management, and Applied Engineering

American Industrial Hygiene Association; Asbestos Analysts Registry Accredited #9034

SELECTED EXPERIENCE

Asbestos Services

- Project related experience performing asbestos surveys, material assessments and quantifications, and project documentation; on-site asbestos air monitoring, clearance sampling, PCM analysis and project documentation; and hazardous material surveys/inventories, material quantification, and project documentation/oversight.

Hazardous Materials Services

- Experience conducting hazardous materials surveys, hazardous materials inventory, and project documentation/oversight.

Mold Investigation

- Experience performing mold investigations and moisture infiltration assessments, and project documentation/oversight

Lead Investigation

- Experience investigation lead-based paint and lead containing building materials and project documentation/oversight

Environmental Site Assessments Services

- Mr. Beehler has experience with Phase I and Phase II environmental site assessments. In addition, he has experience conducting soil and groundwater investigation, sampling, and project documentation.



AREAS OF EXPERTISE

Asbestos Services
Hazardous Materials Services
Mold Investigations
Lead Investigations
Environmental Site Assessment Services
Municipal Construction
Project Inspections

REGISTRATIONS

Certified Industrial Technologist – ATMAE & NAIT
Asbestos Building Inspector – MN, WI, IA, ND, SD
Asbestos Site Supervisor – MN, WI, IA, ND, SD
Minnesota Air Monitoring Professional
NIOSH 582E Certified
HAZWOPER Certified
Fluke Thermal Imagery Cameras Infrared Imaging Training

AARON BENKER

Principal Project Manager

Mr. Benker is the Real Estate Resource Group Manager for Wenck providing leadership in the real estate sector with emphasis on development, transactional and remedial projects. Mr. Benker has significant experience assisting a wide variety of clients navigating environmental programs and achieving regulatory compliance. Mr. Benker has managed and worked on projects in most all states in the United States and Canada.

EDUCATION

BS, Biology and Environmental Studies, Concordia College - Moorhead, MN

SELECTED EXPERIENCE

Phase I and II environmental site assessments; underground storage tank removals, assessments and remediation; survey/abatement projects for asbestos, lead-based-paint; property development and redevelopment of Brownfields sites. Mr. Benker has over fourteen years of experience managing Phase I and II environmental site assessments, including experience in environmental compliance assessments. These projects include a wide variety of compliance issues and have required familiarity with state and local hazardous waste management, water wells, asbestos, PCB, fuel storage tanks, and groundwater and soil impacts rules and regulations.

Mr. Benker manages property redevelopment and remediation of Brownfields sites. Management includes site investigations, cleanup plan preparation, project coordination, grant funding applications and development oversight.

Phase I Investigations

Conducts due diligence investigations on property types ranging from farmland to manufacturing facilities to bulk fuel storage facilities. The investigations include identification of a variety of environmental hazards including hazardous materials and petroleum impacted soils and groundwater, asbestos, PCBs, USTs, and other regulatory concerns.

Phase II Investigations

Coordinates remedial investigation activities including work plan preparation, implementation and generation of final reports. He is involved with the development of corrective action designs to successfully remediate impacted sites.

Asbestos

Has experience in providing a wide range of asbestos consulting services including abatement project management; third party review; and litigation support. Specific tasks accomplished include clearance air monitoring; OSHA monitoring; bulk and dust sampling; and building surveys. Clientele assisted include school districts; commercial and retail property management organizations; municipalities and industry.



AREAS OF EXPERTISE

Due Diligence Site Investigation
Brownfields
Redevelopment
Merger Acquisition
Real Estate Remediation
Environmental Compliance

TRAINING/REGISTRATION

OSHA Hazardous Waste Operations Health & Safety
Training, 29 CFR 1910.120
Troloxer Certified
Asbestos Building Inspector: Minnesota
Asbestos Air Sampling

Environmental Compliance Assessments

Conducts environmental studies for the purposes of assessing existing environmental programs and compliance status. The scope of assessments performed includes assessments of such issues as air quality, wastewater generation, storm water runoff, hazardous waste generation, aboveground/underground storage tanks, and OSHA compliance. Closely interacts with companies to assist them in achieving compliance and establishing a corporate environmental infrastructure. Has worked with industries including printing, paperboard manufacturing, commercial real estate construction/development, legal, container fabrication, plastic extrusion, foot wear manufacturing, chemical manufacturing, playground equipment manufacturing, and telecommunications.

Underground Storage Tank

Extensive experience managing UST projects, oversight of: UST pre-removal investigations, UST removal oversight, limited site investigations, preparation of remedial investigation/corrective action design (RI/CAD) reports and preparation of reimbursement applications to the Minnesota Petroleum Compensation Fund.

Third Party Review

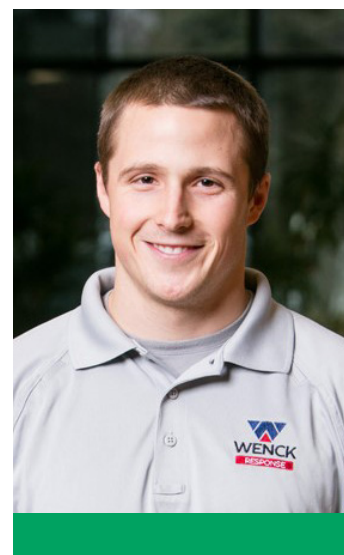
Assists clients with third party review of environmental site assessment reports, including providing consultation services in support of litigation.

SAM BERNDT

Liability Analysis Staff (Primary)

Mr. Berndt is an environmental scientist with 18 months of specialized experience in environmental investigation, and hazardous materials response. He has worked with several types of clients throughout his career including private, public, and contractors. His fundamental knowledge and experience completing environmental field work will allow for support and help in the office with a knowledge base grounded in real world experience completing environmental field work. This understanding of how field work is completed is invaluable in providing real-world basic knowledge in how work will be done for projects for MnDOT.

Mr. Berndt has completed field work, sampling and construction oversight for a variety of contaminants including PCBs, TCE, heavy metals, PAHs, DRO, etc. In addition, to soil sampling, he has also completed groundwater and surface water sampling. In addition, he has been involved in emergency response actions for releases and spills, including along MnDOT ROW.



AREAS OF EXPERTISE

Environmental Oversight
Groundwater and Surface
Water Sampling

EDUCATION

BS, Environmental Services, University of Minnesota - Duluth

PROJECT EXPERIENCE

Ramsey County Redevelopment of Twin Cities Army Ammunition Plant (TCAAP).

Provided construction oversight and documentation of remediation at TCAAP, one of the largest, if not largest Superfund cleanups in Minnesota. Completed 40-hour Hazwoper training and two subsequent refreshers.

- Performed medical monitoring, fit testing and calibration and operation of soil and vapor screening equipment.
- Conducted groundwater, surface water and soil sampling.
- Documentation of waste removal.
- Managed soil samples and logs; processed samples for analytical testing.
- Completed and processed Chain of Custodies for lab samples.
- Performed screening/testing for mercury, iron, arsenic, TCE, PCBs, chromium, DRO, etc.
- Extensive communication with engineers and construction personnel to resolve day-to-day issues.
- Completed oversight during removals of utilities including large quantities of asbestos wrapped steam piping.
- Completed oversight for contaminated soil removals.

Wenck, Emergency Response Assistance. Assisted Wenck Response Services (WRS) with calls involving railroad and roadway accidents.

- Traveled to hazardous material spill incidents and assisted WRS team with the assessment and the development of plans to properly clean up the spill; performed cleanup activities as directed.
- Assisted WRS with the assembly of the Canadian Pacific Emergency Response semi-trailer; assembled and fitted chemical hoses; ensured that hundreds of compartments within the truck contained the appropriate tools.
- Assisted with the build out of current WRS facility, minor construction, painting and general labor.

MEGAN BEYER, PE

Project Manager

Ms. Beyer has over ten years of experience in civil engineering. Her duties have focused in the areas of landfill design, construction, and permitting as well as water resources engineering, construction SWPPP preparation, and erosion and sediment control inspection and design. Ms. Beyer has taken on increasing responsibilities over these ten years and has been the Project Manager for our landfill work for Waste Management at Elk River for the past four years. She also acts in an assistant project manager role on many projects. She has had some involvement in nearly every MPCA CLP project Wenck has done since she was hired and immediately upon hire worked as a second field technician on the Winona County Landfill Closure project.



EDUCATION

BS, Civil Engineering, Minor in Construction Management, University of Minnesota – Twin Cities, MN

REGISTRATION

Professional Engineer: MN 48669

Professional Engineer: IA 22598

AREAS OF EXPERTISE

Project Management
Landfill Permitting, Design,
and Construction
Construction Management
Erosion/Sediment Control
Water Resources
Engineering

SELECTED EXPERIENCE

Waste Management Landfill Experience

Elk River Landfill. Served as the project manager for preparation of a notice of intent to apply leachate to the surface area at the working face of the landfill. The notice included a health risk assessment for VOCs based on parameters detected in the site leachate.

Served as the project manager and certifying engineer during the 2014 Closure Construction Project which included construction of approximately 10 acres of closure. Tasks included developing bid documents (construction plans, specifications, the construction quality assurance plan for construction, and the construction SWPPP). Provided bidding assistance for the project and also coordinated the construction observation and provided construction documentation as the certifying engineer including development of construction record drawings and drafting of the final documentation report. Construction administration duties during construction included review of construction material submittals, coordination with the onsite field technicians, coordination of construction documentation/project documents, and weekly meeting attendance and minute preparation.

Served as the project manager and certifying engineer during 2012, 2013 and 2014 gas system improvements projects. Tasks included preparation of bid documents (plans, specifications, and the construction quality assurance plan for construction), provided bidding assistance for the projects and also coordinating the con-

ADDITIONAL TRAINING

40 Hour OSHA Hazardous
Waste Operations and
Emergency Response
(September 06)
Nuclear Gauge Safety and
Use (October 06)
Erosion/Sediment Control
Inspector/Installer
Certification (December
06) - Expired
Design of Construction
Stormwater Pollution
Prevention Plans
Certification (November
09)
Dale Carnegie Skills for
Success (April 2012)
PSMJ Project Management
Bootcamp
(January 2013)

struction observation and construction documentation

Served as project manager for the 2014 Annual Operating report assistance (scope included financial assurance and volume calculations). Also served as project manager for the 2012 Annual Operating Report. Assisted with field data management and annual report compilation for multiple years. Annual reporting includes drafting of the Annual Operating Report as well as the Annual Leachate Recirculation Report and completion of MPCA required forms and checklists.

Assisted with the preparation of a solid waste permit reapplication for expansion of the facility in 2012. Tasks included assistance with development of a design report, leachate management plan, and completion of MPCA required forms and checklists.

Assisted in the preparation of bidding documents for the 2011 site improvement construction activities which include construction of and modifications to the active gas system and approximately 12 acres of closure construction, and cell berm lift extension (including geogrid reinforcement). Tasks included developing construction plans, specifications, construction quality assurance plans for construction, and the site specific SWPPP. Also provided bidding assistance for the project.

Responsible for construction oversight and monitoring, documentation and reporting on a 7.6-acre landfill closure construction project and construction of and modifications to the active gas system in 2011.

Responsible for construction oversight and monitoring, documentation and reporting for a construction project which involved construction of and modifications to the active gas system in 2010. Duties included overseeing trench excavation, gas well drilling and installation, fusing of HDPE piping, installation of a variety of pipe sizes, and pipe quality control testing. Tasks included providing daily field reports and weekly meeting minutes, acting as the day to day contractor/client liaison and drafting of the final documentation report.

Responsible for construction oversight and monitoring, documentation and reporting on a 20-acre landfill closure construction project in 2010. Duties included overseeing buffer soil placement, LLDPE geomembrane and geonet/geocomposite installation, cover soil placement, and various other site improvements. Performed liner installation documentation, provided daily field reports and weekly meeting minutes, acted as the day to day contractor/client liaison and produced the final documentation report.

Responsible for construction oversight and monitoring, documentation and reporting on a 10-acre demolition debris cell expansion. Duties included overseeing clay barrier layer placement, geomembrane installation, leachate piping systems, and granular drainage layer placement. Performed all nuclear gauge density testing, sample collection, and wrote the final documentation report.

Responsible for coordination of field staff for construction oversight and monitoring, documentation and reporting on an approximately eight-acre landfill cell construction project. Tasks included attending weekly construction meetings, preparing and distributing meeting minutes, coordinating laboratory testing of soil samples, and managing day to day construction oversight activities. Also performed submittal reviews and served as a knowledgeable point of contact for Wenck field personnel, the general contractor and the client.

Dickinson County Landfill (Iowa). Served as the project manager during construction responsible for scope, schedule, and budget (Assisted with the preparation of bidding documents for the 2014 Evapotranspiration Cover (ET) Construction Project which included construction of approximately 9 acres of closure.

Other Landfill/Solid Waste Experience

Campbell County, Wyoming. Provided solid waste strategic planning assistance for the Campbell County solid waste management system. Tasks included assisting with the following: review of existing operations, review of alternative solid waste management technologies, and development of multiple operational alternatives. Following

identification of the alternatives, also assisted with development of preliminary site layout, costs, equipment needs, staffing, and other related items for each alternative as well as development/population of decision matrices to compare each alternative. Also assisted with report preparation and participated in team meetings.

Republic Services - Flying Cloud Landfill. Prepared quarterly gas probe and flare monitoring reports for submittal to the MPCA.

Xcel Energy - Pawnee Generating Station (Colorado). Assisted with the preparation of bidding documents for the Porous Dike and Lime Solids Disposal Area Liner Construction Project. Tasks included developing construction specifications and the construction quality assurance plan for construction.

Xcel Energy - Red Wing Ash Disposal Facility. Assisted with the preparation of a solid waste permit reapplication for expansion of the facility. Tasks included development of a design report, operations and maintenance plan, closure, post-closure contingency action plan, and completion of MPCA required forms and checklists.

Provided bidding assistance for the project and served as project manager during construction coordinating the construction observation, soil sampling and testing and documentation including, providing weekly budget updates to the client).

Assisted in the preparation of bidding documents for the 2011 gas system and leachate system improvements project which included construction of and modifications to the site's active gas system and leachate pumping and storage system. Tasks included assisting with the development of construction plans, specifications, and construction quality assurance plans for construction.

Central Disposal Systems Landfill. Assisted with groundwater sampling data management and compilation. Also assisted with the drafting of the Annual Groundwater Monitoring Report for multiple years. Served as project manager and certifying engineer for the 2014 annual report.

Assisted in the preparation of bidding documents for the 2011 gas system improvements project which included construction of and modifications to the site's active gas system. Tasks included assisting with the development of construction plans, specifications, and construction quality assurance plans for construction.

Burnsville Sanitary Landfill, Inc. Assisted with the 2014 gas system improvements project. Tasks included preparation of bid documents (plans, specifications, and the construction quality assurance plan for construction). Also provided bidding assistance for the project.

Voyager Disposal and Processing, Inc. Provided 2014 Annual Operating report assistance for the Voyager demolition landfill located near Canyon, MN. Annual reporting included completion of the MPCA required forms via the ReTRAC online reporting system.

Oak Ridge Demolition Landfill, Inc. Provided 2014 Annual Operating report assistance for the Oak Ridge demolition landfill located in Aitkin County, MN. Annual reporting included completion of the MPCA required forms via the ReTRAC online reporting system.

MPCA Closed Landfill Program Experience

Buecker's #2 Landfill. Served as Project Manager for a field investigation project at the Buecker's #2 former landfill site. Investigation activities included soil borings to confirm the absence of waste, PID soil screening, and soil sample collection and testing.

Houston County Landfill. Served as Project Manager for a drainage repair construction project. Prepared bidding documents for construction activities to include gas vent drilling and installation, erosion repair, and ravine stabilization work. Tasks included developing construction specifications, construction drawings, and the site specific SWPPP. Also provided bidding assistance for the project.

Flying Cloud Landfill. Assisted in performing a file review and preparing an information summary memo for a 90-acre closed landfill site which housed an estimated 8 million cubic yards of waste. Also assisted in remediation alternative analysis and the drafting of a field investigation work plan. Tasks included development of cost estimates, site figures, and cover soil and waste quantity estimates.

Provided oversight, sampling, and documentation during the above-mentioned field investigation of current site conditions. Investigation activities included test pitting to delineate the perimeter of the waste as well as soil borings to determine waste and cover soil quantities. Performed air monitoring with a PID and Landtech gas meter during soil boring activities and prepared soil boring logs. Also assisted in the drafting of a summary memo detailing the results of the investigation.

Assisted in the preparation of bidding documents for construction activities to include excavation and relocation of approximately 2.5 million cubic yards of waste and closure construction over approximately 60 acres. Tasks included developing construction specifications, the construction quality assurance plan for construction, and the site specific SWPPP. Also assisted with construction administration duties during construction. Tasks included review of construction material submittals, coordination with the onsite field technicians, coordination of construction documentation/project documents, and weekly meeting attendance and minute preparation.

Hopkins Landfill. Assisted in the preparation of bidding documents for construction activities to include excavation and relocation of approximately 240,000 cy of waste and closure construction over approximately 14 acres. Also provided bidding assistance and assisted with construction administration duties during construction including review of construction material submittals, coordination with the onsite field technician, and weekly meeting attendance and minute preparation.

Anoka Landfill. Provided oversight and documentation during a field investigation to determine the gas generation potential at the site. Investigation activities included borings to determine the waste condition and moisture content. Additionally, the field investigation included examination of the integrity of the final cover geomembrane boots at several gas extraction well locations. Also assisted in the drafting of a summary memo detailing the results of the investigation and analysis of the gas generation issues at the site.

Paynesville Sanitary Landfill. Assisted in performing a review of available site information and preparing a construction alternatives analysis memo for the site. Tasks included development of cost estimates, site figures, and cover soil and waste quantity estimates.

Assisted in the preparation of bidding documents for construction activities to include excavation and relocation of approximately 65,000 cy of waste and closure construction over approximately 3 acres. Tasks included developing construction plans, specifications, the construction quality assurance plan for construction, and the site specific SWPPP. Also provided bidding assistance and assisted with construction administration duties during construction including review of construction material submittals, coordination with the onsite field technician, and weekly meeting minute preparation.

Gas Vent Installation at Four Sites. Assisted in the preparation of bidding documents, construction plans, specifications, and construction quality assurance plan for the installation of gas vents at the Chippewa County, Dodge County, Isanti/Chisago, and Woodlake Landfills. Provided bidding assistance and performed submittal review. Also provided construction observation and documentation of gas vent installation during construction and drafted the construction certification letter.

O&M. Assisted with a variety of tasks at multiple closed landfill sites across the state. These tasks include subcontracting assistance, weekly site inspections, and monthly and quarterly inspection summary report preparation. Performed pond sample collection, gas well field monitoring, and flare station troubleshooting.

Albert Lea Edgewater Park Dump Cleanup Project. Assisted with the preparation of bidding documents and provided bidding assistance for a project which involved the construction of two new containment cells covering eight acres at the Albert Lea Landfill, excavation and relocation of waste from the Edgewater Park dump site,

excavation and relocation of contaminated soils from the Landfill site, subsequent closure of the landfill cells, and restoration at Edgewater Park. Provided construction observation and documentation during excavation, berm embankment, base liner installation, leachate collection and removal system installation, cover soil stripping, waste excavation and relocation, cover soil placement, gas vent installation, cover liner installation, and site restoration activities. Duties included performing all nuclear density testing and sample collection, performing storm water inspections per the NPDES permits, providing daily field reports and weekly meeting minutes, and acting as the day to day contractor/client liaison. Also produced the final documentation report, revised the O & M plan for the Landfill site, and assisted with the drafting of the project record drawings.

Mille Lacs County Landfill. Provided oversight, sampling, and documentation during a pre-construction investigation. Investigation activities included test pitting to delineate the perimeter of the waste as well as soil borings to determine waste and cover soil quantities. Performed air monitoring with a PID and Landtech gas meter during soil boring activities as well as collected soil samples, water samples and air samples (SUMMA canisters).

Sibley County Landfill. Responsible for construction oversight and monitoring, documentation and reporting for a landfill closure involving waste reconsolidation and a cover system upgrade. The waste footprint at the site was reduced from approximately 13 to 6 acres and a geosynthetic cover lining system as well as a passive gas system installed. Duties including overseeing cover soil stripping, waste excavation and relocation, installation of the cover lining system, gas vent and probe drilling and installation, as well as the installation of a prefabricated bridge. Acted as day to day contractor/client liaison and produced the final documentation report.

Albert Lea Landfill/Edgewater Park Dump Site Investigation Project. Provided oversight and documentation during pre-construction investigations at both the Albert Lea Landfill and Edgewater Park Dump sites. Investigation activities included test pitting for waste and cover soil quantities, installation of several water monitoring wells, and PID soil screening and VOC water sampling during geoprobings in contaminated soils.

Winona County Landfill. Responsible for oversight and reporting of an eight-acre double composite lined landfill cell. Inspected and documented installation of the base liner system, GCL, granular drainage layer and leachate collection piping. Also responsible for oversight and reporting of a portion of the closure of the landfill cell. Inspected and documented installation of the cover lining system and site restoration.

Other Landfill/Solid Waste Experience

Campbell County, Wyoming. Provided solid waste strategic planning assistance for the Campbell County solid waste management system. Tasks included assisting with the following: review of existing operations, review of alternative solid waste management technologies, and development of multiple operational alternatives. Following identification of the alternatives, also assisted with development of preliminary site layout, costs, equipment needs, staffing, and other related items for each alternative as well as development/population of decision matrices to compare each alternative. Also assisted with report preparation and participated in team meetings.

Republic Services - Flying Cloud Landfill. Prepared quarterly gas probe and flare monitoring reports for submittal to the MPCA.

Xcel Energy - Pawnee Generating Station (Colorado). Assisted with the preparation of bidding documents for the Porous Dike and Lime Solids Disposal Area Liner Construction Project. Tasks included developing construction specifications and the construction quality assurance plan for construction.

Xcel Energy - Red Wing Ash Disposal Facility. Assisted with the preparation of a solid waste permit reapplication for expansion of the facility. Tasks included development of a design report, operations and maintenance plan, closure, post-closure contingency action plan, and completion of MPCA required forms and checklists.

Grand Rapids Public Utilities Commission - Sludge Landfill. Assisted with the preparation of a solid waste permit reapplication for a 16-acre sludge disposal facility. Tasks included development of a design report, operations and maintenance plan, closure, post-closure contingency action plan, and completion of MPCA required forms and checklists.

Assisted with the preparation of construction documents, including plans, specifications, and construction quality assurance plan, for construction of a new disposal cell (Phase 8) approximately five acres in size. Also prepared the site specific SWPPP for the project.

Xcel Energy - Wilmarth Ash Disposal Facility. Assisted with the preparation of a solid waste permit reapplication. Tasks included development of a design report, operations and maintenance plan, closure, post-closure contingency action plan, and completion of MPCA required forms and checklists.

Assisted in the preparation of construction documents, including plans, specifications, and construction quality assurance plan, as well as a site specific SWPPP for construction of a new one-acre disposal cell.

Assisted in the preparation of construction documents, including plans, specifications, and construction quality assurance plan, as well as a site specific SWPPP for a partial closure construction (approximately 1.5 acres).

Assisted with the preparation of a solid waste permit application for expansion. Tasks included review of a design report (including technical specifications and CQA plan), closure, post-closure contingency action plan, and completion of MPCA required forms and checklists.

American Crystal Sugar - Drayton, ND Facility Ash Cell 3. Performed construction observation and documentation during excavation, berm embankment and lime liner preparation of a new ash landfill cell. Tasks included nuclear density testing and Shelby tube sampling of the lime liner.

Olmsted County, Minnesota - Kalmar Landfill. Performed field data entry and management for various landfill construction projects. Other tasks included submittal reviews and construction documentation report compilation.

Other Related Experience

Eden Prairie, MN - Mitchell Village and Boulder Pointe Pond Expansions. Assisted in the preparation of bidding documents for construction activities to include excavation of pond sediments and expansion of pond footprints for two sedimentation ponds located in the City of Eden Prairie. Also provided bidding assistance, construction oversight services, and served as the point of contact for the contractor during construction activities.

Minnesota Pollution Control Agency/Minnehaha Creek Watershed District - Upper Minnehaha Creek Watershed TMDL Development. Assisted with project management duties, water quality data management and analysis, water quality modeling, and draft TMDL report preparation for twenty-two impaired waters (twenty-one lakes impaired for excess nutrients and a stream impaired for E. coli) within the Upper Minnehaha Creek Watershed.

Clearwater River Watershed District - Kingston Wetland. Assisted with project management duties, water quality data management and analysis, and feasibility study report preparation for the Kingston Wetland Complex Restoration Project. The Kingston Wetland Complex serves as a natural sink for particulate phosphorus however wetland sediments impose an oxygen demand that reduces DO levels in the main channel of the Clearwater River. The feasibility study report evaluated the feasibility of a design project to improve dissolved oxygen concentrations and reduce nutrient loads to downstream lakes.

Minnehaha Creek Watershed District - City of Excelsior Stormwater Retrofit. Performed an evaluation of several options within the City of Excelsior for stormwater management retrofits. Tasks included review of aerial photos, LiDAR data, and stormsewer outfall data. Tasks also included drainage area delineation, modeling of existing nutrient loads with P8 software, evaluation of possible BMPs utilizing HydroCAD software, and drafting of a summary memo of the evaluation with cost estimate tables and figures.

Sugar Lake Association - Stormwater Management Improvements. Performed an evaluation of several options to improve storm water management and modify existing conditions on the east side of Sugar Lake. Tasks included review of aerial photos and LiDAR data. Tasks also included drainage area delineation, modeling of existing nutrient loads with P8 software, evaluation of possible BMPs utilizing HydroCAD software, and drafting of a summary memo of the evaluation with cost estimate tables and figures.

Minnehaha Creek Watershed District - Hopkins/St. Louis Park Drainage Project. Performed an evaluation of opportunities identified to achieve Comprehensive Water Resources Management Plan (CWRMP) goals for the Minnehaha Creek sub-watershed with the cities of Hopkins and St. Louis Park, Minnesota. Tasks included review of aerial photos, LiDAR data, and stormsewer outfall data. Tasks also included drainage area delineation, modeling of existing nutrient loads with P8 software, evaluation of possible BMPs utilizing HydroCAD software, and development of cost estimate tables and drafting of a summary memo of the evaluation.

Vadnais Lake Area Water Management Organization - Gem Lake, Goose Lake, Gilfillan Lake, and Wilkinson Lake Nutrient TMDL Studies. Unnamed Creek (Lambert Creek) Bacteria TMDL Study. Assisted with project management activities, water quality data management and analysis, water quality modeling, and draft TMDL report preparation for several impaired waters within the VLAWMO watershed.

Bethel University - Drainage Improvements. Prepared bidding documents, including plans and specifications, for drainage improvements at two parking lot locations which included installation of area drains and associated piping, concrete curb and gutter, site restoration, and miscellaneous site improvements. Also provided bidding assistance and performed construction observation and documentation for the project.

Elk River Watershed Association - Mayhew Lake and Big Elk Lake Nutrient TMDL Studies. Elk River Bacteria and Turbidity TMDL Studies. Assisted with project management activities, water quality data management and analysis, water quality modeling, and draft TMDL report preparation for several impaired waters within the Elk River Watershed. The Elk River is impaired between Big Elk Lake and the St. Francis River for turbidity and bacteria. Big Elk and Mayhew Lakes are each impaired for nutrients.

Minnesota Department of Commerce - Essar Steel 230 kV HVTL Draft EIS. Assisted with the drafting of a draft Environmental Impact Statement (EIS) for a proposed 230 kV HVTL near Nashwauk, MN. Tasks included researching and assessing the proposed project's impacts on public health and safety, communication signal interference, proximate structures and displacement, agricultural land use, and the mining and forestry industries. Drafted report sections for the listed topics as well as engineering and operation design, construction methods, and required permits and approvals for the proposed project.

Itasca Soil and Water Conservation District - Jessie Lake Nutrient TMDL Study. Project tasks included assisting with project management activities, performing data analysis and preparing the draft TMDL implementation plan. The implementation plan preparation consisted of examining external and internal load reduction options such as lakeshore buffers, forestry management, stream restoration, hypolimnetic aeration, hypolimnetic withdrawal, and alum dosing. Provided cost estimates and annual phosphorus reduction estimates for the proposed implementation activities.

Minnehaha Creek Watershed District - Minnehaha Creek Gorge Restoration Phase I. Provided construction observation and documentation for installation of a Stormtech® subsurface stormwater management system. The project consisted of soil and rock excavation beneath an existing parking lot, installation of the subsurface stormwater system, and porous paver installation above the system. A stretch of roadway was also resurfaced with porous pavers. Concrete curb and sidewalk as well as a new catch basin were installed as well. Performed submittal reviews, provided daily field reports and acted as the day to day contractor/client liaison.

Bituminous Roadways, Inc. - Roseville, MN. Assisted with the drafting of an Environmental Assessment Worksheet (EAW) for a proposed asphalt production plant within the city of Roseville, MN. Tasks included researching and assessing impacts on land use, water resources, water quality due to surface water runoff as well as wastewater, geologic hazards, and hazardous materials.

Precision Testing. Interstate 35W St. Anthony Bridge Reconstruction. Performed and documented nuclear density testing during the construction of gabion walls.

Close Landscaping - City of St. Paul. Implemented a Construction Contingency Plan for the redevelopment of a former industrial site. Performed PID screening of potentially contaminated soils as well as took soil samples for laboratory testing. Completed waste profile for landfilling of contaminated materials.

City of Delano. Provided construction observation for multiple land development projects including storm sewer, watermain, and street construction as well as performed erosion control inspections.

JOSEPH BISCHOFF, PM

Aquatic Ecologist/Limnologist
Principal/Project Manager

Mr. Bischoff has over 20 years of experience in the fields of water resources and environmental assessment. Mr. Bischoff has served as project manager and technical lead for numerous multidisciplinary projects. His project and technical experience includes the following: water quality planning and analysis, water quality modeling, watershed assessment, wetlands ecology, stream ecology and restoration, lake restoration, nonpoint source pollution, Geographic Information Systems (GIS), and Total Maximum Daily Loads (TMDLs). Mr. Bischoff has experience using the P8 Urban Catchment Model, FLUX, GWLF, SWAT, QUAL2K and BATHTUB package models as well as using mass balance equations and statistics to analyze water quality.

EDUCATION

MS, Ecology, University of Louisville - Louisville, Kentucky

BS, Biology, University of Cincinnati - Cincinnati, Ohio

PROFESSIONAL MEMBERSHIPS

North American Lake Management Society
Policy Subcommittee Member

SELECTED EXPERIENCE

Total Maximum Daily Loads (TMDL)

Shingle Creek Total Maximum Daily Load for Biotic Impairments (Fish and Macroinvertebrates), Minneapolis, Minnesota. Mr. Bischoff is the project manager for the development of a multiple stressor analysis and TMDL for Shingle and Bass Creeks in Hennepin County, Minnesota. Mr. Bischoff is the technical lead in applying EPA's stressor identification process including the online application CADDIS. Shingle and Bass Creek are highly urban streams where current IBI reference sites are not applicable. Mr. Bischoff is working closely with the MPCA to develop reasonable endpoints that may help guide the State's Tiered Aquatic Life Use (TALU) process.

Shingle Creek Total Maximum Daily Load for Dissolved Oxygen, Minneapolis, Minnesota. Mr. Bischoff is the project manager for the development of a dissolved oxygen TMDL for Shingle Creek, a highly urbanized stream in the western suburbs of Minneapolis. The project includes the construction and calibration of a QUAL2K model. The TMDL is being conducted to support a stressor identification study to address both fish and macroinvertebrate community impairments. The goal is to develop stream restoration design criteria to protect dissolved oxygen concentrations in the stream.



AREAS OF EXPERTISE

Water Quality
Lake Management
TMDL
Stream Management
Watershed Ecology
Statistics

ADDITIONAL TRAINING

Modeling Water Quality in
Aquatic Environments,
University of Minnesota
BASINS Training, Utah
State University
SWAT Training, Texas A&M
University

Chippewa River Turbidity TMDL, West Central Minnesota. Mr. Bischoff is currently the project manager for the development of a turbidity TMDL for the Chippewa River basin. The TMDL includes the construction and calibration of a Soil Water Assessment Tool (SWAT) model as well as load and wasteload allocations using load duration curves.

Buffalo Creek Turbidity and E. coli TMDL, West Central Minnesota. Mr. Bischoff is the project manager for the development of a turbidity and E. coli TMDL for several reaches of Buffalo Creek which drains to the South Fork Crow River. A Soil Water Assessment Tool (SWAT) model is being developed for the Buffalo Creek watershed to support the turbidity source assessment. Turbidity and E. coli load and wasteload allocations are being addressed using load duration curves as well as the LoadEST model.

North Fork Crow River Dissolved Oxygen, Turbidity and E. coli TMDL, West Central Minnesota. Mr. Bischoff is the project manager for the development of a turbidity, E. coli, and dissolved oxygen TMDL for several reaches of the North Fork Crow River. The TMDL includes time of travel and synoptic surveys along with the development of a QUAL2K model for the reaches impaired for dissolved oxygen. Turbidity and E. coli are being addressed using load duration curves as well as the LoadEST model.

Ann Lake Excess Nutrient TMDL, Wright County, Minnesota. Mr. Bischoff is the project manager for the development of excess nutrient TMDLs for Ann Lake and Lake Emma in Wright County, Minnesota. The TMDL includes the development of a Generalized Watershed Loading Function model (GWLF) coupled with a BATHTUB lake response model. Mr. Bischoff is responsible for all aspects of the project including watershed and lake response modeling, internal nutrient release assessment, TMDL allocation and implementation planning.

Lino Lakes Chain of Lakes Total Maximum Daily Loads, Lino Lakes, Minnesota. Mr. Bischoff is the Project Manager for the development of excess nutrient TMDLs for the Lino Lakes Chain of Lakes (George Watch, Rice, Reshanau, Marshan, and Baldwin). All lakes are shallow lakes with the majority of the water budget coming from Peltier Lake. The project included the construction of a P8 model for the watershed to determine the influence of land use changes in the City of Lino Lakes on water quality in the Chain of Lakes.

Long and Farquar Lake Total Maximum Daily Loads for Excess Nutrients, Dakota County, Minnesota. Mr. Bischoff was a part of a team of agency staff, City staff, and consultants to develop excess nutrient TMDLs for Long and Farquar Lakes in Apple Valley. Long and Farquar lakes are urban, shallow lakes. The project identified nutrient loads and forward switches that are driving the lake into a turbid water state. Ultimately, the team developed a plan to address the nutrient loads and forward switches to bring the lake into a stable clear-water state.

Lake Margaret Total Maximum Daily Load for Excess Nutrients, Cass County, Minnesota. Mr. Bischoff conducted a preliminary screening for Lake Margaret to identify potential nutrient sources, data adequacy, and to recommend a modeling approach for the development of an excess nutrient TMDL. This study led directly into the development of an excess nutrient TMDL and implementation plan.

Upper Prior and Spring Lake Total Maximum Daily Loads for Excess Nutrients, Scott County, Minnesota. Mr. Bischoff is the project manager for the development of an excess nutrient TMDL for Spring and Upper Prior Lakes in Scott County, Minnesota. The project includes the development of a Unit Area Load (UAL) model for the watershed since the watershed is mixed in land uses including agriculture, residential, and commercial uses.

Carver County Total Maximum Daily Load for Fecal Coliform, Carver County, Minnesota. Mr. Bischoff, in conjunction with Carver County, recently developed a fecal coliform total maximum daily load for Carver, Bevens, and Silver Creeks. Mr. Bischoff is responsible for technical analysis of data and overall development of the TMDL. Wenck's TMDL approach includes rigorous accounting of fecal coliform sources in the watershed including all human, livestock, and wildlife sources. Mr. Bischoff also used Load Duration Curves to improve our understanding of the linkages between sources and stream loads. The Load Duration Curves provide a framework for identifying appropriate Best Management Practices (BMPs) for nonpoint source dominated pollutants.

Implementation Plan Development for the Vermillion River under the Lower Mississippi River Basin

Regional Fecal Coliform Bacteria TMDL, Dakota County, Minnesota. Mr. Bischoff was the project manager for the development of an implementation plan for the Vermillion River Watershed District. The purpose of the plan was to translate TMDL load allocations into actions in the Vermillion River watershed. The project resulted in a matrix of actions addressing the various fecal coliform sources by flow regime including responsible agencies.

Lake Nutrient TMDLs in Carver County, Carver County, Minnesota. Mr. Bischoff is currently the lead scientist for the development of 3 lake nutrient TMDLs for Carver County. Mr. Bischoff is responsible for completing a draft written nutrient TMDL for Reitz, Hydes, and Goose lakes to be submitted to the MPCA. The draft TMDLs will include all the review elements in the EPA guidance, such as load and wasteload allocation, margin of safety, reduction scenarios, implementation plan, reasonable assurance, and public process.

Lake Nutrient TMDLs in the Shingle Creek Watershed, Twin Cities, Minnesota. Mr. Bischoff is currently the project manager and lead scientist for the development of five lake nutrient TMDLs for the Shingle Creek Watershed Management Commission. Key aspects of the project include watershed modeling and load estimation using P8 and SWMM. All the lakes in the watershed were also screened for internal loads to determine the approach of the TMDLs. Mr. Bischoff is working closely with the MPCA to develop an approach that is cost effective and transferable to other watersheds in the Metropolitan region.

Shingle Creek Total Maximum Daily Load for Chloride, Twin Cities, Minnesota. Mr. Bischoff was the project manager and lead scientist for the development of a chloride TMDL for Shingle Creek. Mr. Bischoff directed a multidisciplinary team to collect field data, develop a SWMM model, and calculate chloride loads for the watershed. Mr. Bischoff developed a statistically rigorous approach for data collection using conductivity as a surrogate measure. Additionally, Mr. Bischoff was integral in the development of Load Duration Curves to rigorously assess the nonpoint source nature of chloride sources. Mr. Bischoff is currently working closely with the Minnesota Pollution Control Agency through the stakeholder process.

Vermillion River Total Maximum Daily Load for Fecal Coliform, Dakota County, Minnesota. Mr. Bischoff, in conjunction with the Dakota County Soil and Water Conservation District, recently developed a fecal coliform total maximum daily load for the Vermillion River. The study includes developing loading rates from land use categories, developing hydrologic data, calculating loads and developing reduction scenarios. Ultimately, these analyses were incorporated in the Southeast Regional Bacteria TMDL developed by the MPCA.

Lake Management

Six Mile Creek and Halsted Bay Restoration Diagnostic Study, Minnehaha Creek Watershed District. Mr. Bischoff was the lead scientist for the evaluation of Six Mile Creek watershed and Halsted Bay to develop an approach for restoring water quality and ecological conditions in over 15 deep and shallow lakes. Mr. Bischoff led the development of a watershed hydrologic and nutrient budget using XP_SWMM, P8, and BATHTUB to determine nutrient sources to the lakes. Mr. Bischoff also conducted an ecological evaluation of the lakes to determine physical and biological limitations to restoration. Ultimately, the study determined that carp, altered wetlands, and stabilized water elevations are the likely factors limiting ecological health in the watershed. Mr. Bischoff also evaluated the use of an off-line alum treatment facility to mitigate nutrient loads to Halsted Bay while watershed work is completed.

Lake Management Plans for the City of Eagan, MN. Mr. Bischoff was the project manager for two projects to develop diagnostic studies and management plans for 15 lakes in the City of Eagan. Excess nutrient TMDLs were also developed several of the impaired lakes in the group. The studies included developing nutrient budgets, evaluating fisheries and submersed aquatic vegetation plans

Alum Dosing and Engineering Specifications for Bald Eagle Lake, Twin Cities, Minnesota. Mr. Bischoff was the project manager for the development of specifications for an alum treatment on Bald Eagle Lake in the Northern suburbs of the Twin Cities. Mr. Bischoff led the development of the appropriate alum dose using modern dosing techniques (James 2011) that account for Al:P binding efficiency and depth of redox sensitive P. Mr. Bischoff also led jar testing, field observation of the alum application, and developed a follow-up monitoring approach for the

Alum Dosing and Engineering Specifications for Lake Riley, Eden Prairie, MN. Mr. Bischoff was the project manager for the development of specifications for an alum treatment on Lake Riley in the Southwest suburbs of the Twin Cities. Mr. Bischoff led the development of the appropriate alum dose using modern dosing techniques (James 2011) that account for Al:P binding efficiency and depth of redox sensitive P. Mr. Bischoff also led jar testing, field observation of the alum application, and developed a follow-up monitoring approach for the application.

Statistical Lake Trend Analysis for the Capitol Region Watershed District. Mr. Bischoff led a statistical trend analysis of four lakes in the Capitol Region Watershed District. Analyses include trend assessment using Kendall-Tau, autocorrelation assessment, and a multivariate assessment of lake factors affecting water quality.

Lake Management Plans for the Loeb and Crosby Lakes in the Capitol Region Watershed District. Mr. Bischoff was the project manager for the development of lake management plans for two lakes in the Capitol Region Watershed District. The assessment included a nutrient budget for the lakes, watershed P8 modeling, and lake response modeling using the Canfield-Bachmann model.

Aquatic Vegetation Management Plans for Lily, McKusick, and Long Lakes, Stillwater, Minnesota. Mr. Bischoff developed aquatic vegetation management plans for three relatively shallow lakes in the City of Stillwater, Minnesota. Plans included a robust citizen engagement process, development of harvesting and herbicide alternatives, and engineering cost estimates.

Aquatic Vegetation Management Plans for Red Rock, Mitchell, and Lucy Lake, Eden Prairie and Chanhassen, MN. Mr. Bischoff developed aquatic vegetation management plans for three lakes in the Cities of Eden Prairie and Chanhassen, Minnesota as well as the Riley-Purgatory-Bluff Creek Watershed District. The Aquatic Vegetation Management Plans included a robust citizen engagement process, development of harvesting and herbicide alternatives, and engineering cost estimates.

Crystal Lake Internal Nutrient Load Control Feasibility Study, Robbinsdale, Minnesota. Mr. Bischoff was the project manager for the development of a feasibility study to assess internal nutrient control options for Crystal Lake. Options evaluated for cost and feasibility in the study included sediment sealing with aluminum sulfate, hypolimnetic withdrawal, hypolimnetic aeration or oxygenation and artificial circulation. Ultimately, a hybrid option was chosen that included whole lake alum treatment along with an alum dosing station that can treat either withdrawn hypolimnetic water or stormwater from one of the largest contributing subwatersheds.

Lake Management Plans for Lily, McKusick, and Long Lakes, Stillwater, Minnesota. Mr. Bischoff was the project manager for the development of lake management plans for Lily and McKusick Lakes in Stillwater, Minnesota. The plan included the development of a P8 watershed model and BATHUB lake response model. These models were utilized to determine the cost and effectiveness of remedial actions for the lakes. The report identified restoration opportunities for the lakes that included watershed treatment, in-lake nutrient controls, fisheries recommendations, filamentous algae control, and aquatic vegetation management.

Lake Management Plans for 13 Lakes in the Shingle Creek Watershed, Twin Cities, Minnesota. Mr. Bischoff was the project manager for the development of 13 lake management plans in the Shingle Creek Watershed. The management plans focused on activities needed to address completed TMDLs for the water bodies. These plans will provide the basis for the Shingle Creek Watershed Management Commission's Third Generation Plan.

Twin Lake Management Plan and Diagnostic Study, Twin Cities, Minnesota. Mr. Bischoff was the project manager and lead scientist for the development of a diagnostic study and lake management plan for Twin Lakes in the Shingle Creek watershed. The diagnostic study included development of watershed phosphorus loads to Twin Lakes. One subwatershed was being monitored for phosphorus and flow. These data were used along with results from a SWMM model to calibrate a P8 model for the watershed. P8 was then used to generate phosphorus loading for each of the subwatersheds. These loads were then used in a BATHUB model to evaluate source of P in the Twin Lake ecosystem. Additionally, a large wetland complex in one of the Twin Lake subwatersheds was evaluated as a potential P source. Analysis included load calculations for the inlet and outlet of the wetland. Once the diagnostic study was completed, a comprehensive management plan was developed to address the restoration and protection of the Twin Lake ecosystem.

Watershed and Water Quality Management of Spring Lake, Minneapolis, Minnesota. Mr. Bischoff provided technical assistance to the Prior Lake-Spring Lake Watershed District to develop management actions to improve water quality of both the lake and its watershed. Technical assistance included water quality modeling using FLUX, evaluation of alum treatments to control internal phosphorus cycling, and technical water quality analysis.

Watershed and Water Quality Management of Cross Lake, Shreveport, Louisiana. Mr. Bischoff was involved in developing the Cross Lake Watershed Management Plan which focused on protecting the water quality of Cross Lake, a drinking water source for the City of Shreveport. The Cross Lake Management Plan was created to assess current water quality conditions and resources, evaluate the water quality of the reservoir, and recommend management priorities and best management practices. Water quality modeling included the use of FLUX.

Caribou Lake AUAR, Cook County, Minnesota. Mr. Bischoff conducted a lake water quality impact analysis for projected development in the Caribou Lake watershed. Modeling was conducted using GIS, spreadsheet calculations, and BATHTUB. Analyses included analyzing the lake in three unique cells due to the morphometry of the lake and the location of the inflow and outflow.

Water Quality Planning and Analysis

Coon Creek Water Quality Plan, Anoka County, Minnesota. Mr. Bischoff is the project manager for the development of a water quality model and plan for the Coon Creek Watershed District. The purpose of the plan is to evaluate the current effectiveness of District rules to meet new nondegradation standards and to provide a framework for development of new water quality rules. To accomplish this goal, a P8 model was constructed for the District to evaluate past present and future water quality conditions in the Coon Creek watershed.

Water Quality Monitoring Audit for the Sauk River Watershed District, Minnesota. Mr. Bischoff conducted a water quality audit for the Sauk River Watershed District. The purpose of the audit was to evaluate the current District monitoring program in comparison to District water quality goals and State standards. The audit included evaluating site and parameter selection as well as frequency of sampling.

NPDES Phase II Nondegradation Assessments for MS4s in Minnesota. Mr. Bischoff is the project manager for the development of nondegradation assessments for the Cities of Eden Prairie, Chanhassen, and Andover. The nondegradation plans are required under NPDES Phase II rules and includes the evaluation of water quality conditions in 1988, present and future. Mr. Bischoff used a P8 model to evaluate conditions over the three time periods and to evaluate compliance with nondegradation rules.

Watershed and Water Quality Management of Shingle Creek, Minneapolis, Minnesota. Mr. Bischoff leads the Shingle Creek Watershed Management Commission's water quality monitoring program. Mr. Bischoff is responsible for all lake and stream monitoring in the watershed including sample design, biological and chemical monitoring, QA/QC, statistical analysis, modeling and reporting. Mr. Bischoff recently developed a water quality-monitoring plan for the Shingle Creek Watershed Management commission to guide monitoring activities during the Second Generation Plan cycle. The plan also includes a capital improvement project list and schedule focused on improving water quality in the Shingle Creek Watershed.

City of Bloomington Water Quality Assessment, Minneapolis, Minnesota. Mr. Bischoff served as the project scientist for the finalization of the Airport District South Area (ADSA) AUAR in lieu of individual environmental assessments. The ASDA is a highly developed urban watershed that drains into an area of the Mississippi River floodplain currently managed by the USFS. The study included the use of the P8 Urban Catchment model to determine the effect of future development scenarios of storm water quality reaching Long Meadow Lake, and to assess BMPs to for minimizing impacts.

City of Eden Prairie Local Water Management Plan, Eden Prairie, Minnesota. Mr. Bischoff completed a comprehensive plan for managing water resources in the City of Eden Prairie, including development of an implementation plan and capital improvement plan.

Lower Wilson and Trask Rivers Urban Fecal Coliform Source Analysis, Tillamook, Oregon. Mr. Bischoff led a team of investigators to assess the urban contributions of fecal coliform from the city of Tillamook into the lower reaches of the Wilson and Trask Rivers. The research involved storm and reach-based sampling as well as incorporation of both point and nonpoint urban sources using GIS.

Fecal Coliform Analysis for the Wilson River, Tillamook Oregon. Mr. Bischoff, under contract to the Tillamook Bay National Estuary Project (TBNEP), analyzed bacteria sampling data collected by the TBNEP. Data analysis focused on land use contributions of fecal coliform bacteria to surface waters to develop appropriate Best Management Practices and identify source areas of fecal coliform bacteria.

Water Quality Analysis of the Tillamook Bay Watershed, Tillamook, Oregon. Mr. Bischoff was a part of a multidisciplinary team that conducted intensive water quality monitoring in the five rivers flowing into Tillamook Bay during a two-year period. The study included monthly monitoring at some sites and frequent-interval, storm-based sampling at others. Concentrations were measured and load estimates were calculated for fecal coliform bacteria, total suspended solids, and nutrients during six rainstorm events. Based on the monitoring data collected and the results of these analyses, a monitoring plan was prepared for inclusion in Tillamook Bay National Estuary Program's Comprehensive Conservation Management Plan.

Environmental Assessment

Evaluation of a Large-Scale Nutrient Removal Facility on the Minnesota River, Twin Cities MN. Mr. Bischoff is involved in assessing the feasibility of a large scale nutrient removal facility on the Minnesota River for Metropolitan Council – Environmental Services. Mr. Bischoff led analyses of raw water and solids of the Minnesota River to assess potential nutrient mass reductions, treatment feasibility, and solids reuse issues. Mr. Bischoff has also supported potential lake restoration as a part of the project for two shallow lakes on the Minnesota River. Mr. Bischoff also helped evaluate regulatory issues especially as it relates to the USFWS, Minnesota DNR and the Minnesota Pollution Control Agency.

Twin Cities Army Ammunition Plan (TCAAP) Aquatic Feasibility Study, Arden Hills, Minnesota. Mr. Bischoff was the lead aquatic ecologist for the development of a remedial investigation and feasibility study under CERCLA for surface waters affected by the TCAAP facility. The primary focus of the feasibility study was the remediation of sediments contaminated with heavy metals and PCBs from Round Lake. The feasibility study was based on the results of an environmental risk assessment that identified potential risk to five ecological receptors including benthic macroinvertebrates, fish and aquatic organisms, amphibians, waterfowl, and wildlife.

Minntac Tailings Basin Discharge Environmental Impact Statement (EIS), Iron Range, Minnesota. Mr. Bischoff was the Natural Resources Group Leader and developed the aquatic ecology section of an EIS to discharge water from a tailings basin to the Sandy and Dark Rivers. Mr. Bischoff was responsible for review of all natural resource analyses as well as identifying potential impacts to stream and lake ecological communities.

Forest Service Environmental Assessments, Eastern Region of the United States. Mr. Bischoff is currently the Project Manager for three United States Forest Service Environmental Assessments (EA). The EAs are for the construction of lab and housing facilities in the Experimental Forests of the Eastern Region of the USFS including the Ottawa, Nicolet and Mark Twain National Forests.

Crandon Mine Third Party Environmental Impact Statement (EIS), Crandon, Wisconsin. Mr. Bischoff developed the surface water quality impacts section of the Crandon Mine EIS. The Crandon mine project was a proposed zinc-copper mine in the Wolf River drainage of northern Wisconsin. Mr. Bischoff was responsible for the water quality work plan development, water quality data QA/QC, numerical water quality modeling, stream and lake water quality analysis, and impact analysis.

Aquatic Biology

Vermillion River Stream Assessment, Dakota County, Minnesota. Mr. Bischoff was a project biologist for the development of a stream assessment for the Vermillion River in Dakota County, Minnesota. Mr. Bischoff worked with a team of biologists to describe the habitat and geomorphological conditions in the Vermillion River to support the development of a Stressor Identification Study.

Vermillion River Biomonitoring Plan, Dakota County, Minnesota. Mr. Bischoff developed a biological monitoring plan for the Vermillion focusing on fish and macroinvertebrate communities. The purpose of the plan was to quantify the current biological community to support the development of a Site-Specific Standard for trout designated sections of the River and to provide a baseline for tracking changes in the biological community.

Evaluation of a Site-Specific Standard for Trout Designated Sections of the Vermillion River, Dakota County, Minnesota. Sections of the Vermillion River were recently changed from a warm-water fishery (2B) designation to a cold-water fishery (2A) designation based on the presence of a reproducing brown trout population. However, there is no evidence that the river historically supported a cold-water community or should support one today. Mr. Bischoff has been supporting the Vermillion JPO's efforts to develop site specific biological endpoints and a specific class under TALU for warm-water streams that support cold-water fisheries.

Shingle and Creek Stream Assessment, Minneapolis, Minnesota. Mr. Bischoff was a project scientist for the Shingle and Bass Creek Stream Assessments. The stream assessments utilized EPA Rapid Bioassessment protocols as well as the USDA Stream Visual Assessment Protocol. The goal of the project was to develop an overall vision for Shingle and Bass Creeks, which has predominantly urban watershed. Mr. Bischoff was involved in all aspects of the project including the biological monitoring and assessment of Shingle and Bass Creeks.

Environmental Compliance

Development of a Selenium Site Specific Standard Application for the Lower Minnesota River, Minnesota. The lower Minnesota River receives selenium discharges from the Seneca wastewater treatment plant that recently triggered reasonable potential for exceeding the selenium standard. However, EPA recently released a draft fish tissue-based standard based on significant scientific advancements in selenium toxicity in freshwater environments. Mr. Bischoff has been working with the industrial discharger and the MPCA to develop an approach for applying a fish tissue standard to the Minnesota River and translations of the fish tissue criteria for NPDES permitting.

Chloride Source Assessment for a Wastewater Treatment Facility, Alexandria, MN. Mr. Bischoff developed a chloride mass balance model for the Alexandria Lake Area Sanitary District to determine chloride reduction opportunities and costs. The model was used to estimate sources of chloride to the plant, evaluate reduction alternatives such as central water softening, upgrading water softeners, upgrading iron filtration, and industrial source softening to meet water quality standards. The MPCA has used this study to develop their state-side approach for WWTF chloride reductions and their expedited chloride variance process.

Evaluation of a Nutrient Site-Specific Standard for Lake Winona, Alexandria, Minnesota. Mr. Bischoff was the primary author for a lake nutrient site specific standard application for Lake Winona in Alexandria, MN. The proposed nutrient site-specific standard helped guide the MPCA's development of a site specific standard for Lake Winona that was used for the basis of a TMDL and ALASD's NPDES water quality based effluent limit.

Development of an Incidental Take Permit for Topeka Shiners, Southwest Minnesota. Served as a project biologist for a study that investigated the potential impacts of public water supply wellfield operations on the endangered fish the Topeka shiner. The goal of the project was to acquire a permit from the US Fish and Wildlife Service to allow for increased water use at the wellfield. The study included conducting biological surveys for Topeka shiners in streams, assessing available Topeka shiner habitat within streams, determining potential well field impacts on Topeka shiner populations, and developing mitigation options to create and/or protect shiner habitat. The habitat conservation plan and permit application were reviewed and approved by the US Fish and Wildlife Service. The application was the first approved habitat conservation plan and first issued incidental take permit for the Topeka shiner in the United States.

Municipal and Industrial Solid Waste Facility Annual Reports, Minnesota and North Dakota. Mr. Bischoff reviewed the analytical data from the surface and groundwater samples that were collected throughout the year as required by the Environmental Monitoring System as it was established in the facility's permit. Mr. Bischoff developed statistical analyses according to EPA guidance to assess potential contamination from solid waste facilities including trend analysis, parametric and nonparametric ANOVA, post hoc pairwise analysis, and general descriptive statistics.

Publications

Bischoff, J.M., M. Kocian, B. Beck, and W.F. James. In press. Restoring Water Quality in Bald Eagle Lake, Minnesota Through Adaptive Watershed and Lake Management. *LakeLine*, 2017 (4/4).

James, W.F. and J. M. Bischoff. 2015. Relationships between redox-sensitive phosphorus concentrations in sediment and the aluminum:phosphorus binding ratio. *Lake Reserv Manage.* 31 (4): 339-346.

Sullivan, T.J., K. U. Snyder, E. Gilbert, J.M. Bischoff, M. Wustenburg, J. Moore and D. Moore. 2005. Assessment of water quality in association with land use in the Tillamook Bay watershed, Oregon, USA. *Water, Air, and Soil Pollution.* 161 (1/4): 3-23.

Bischoff, J.M., P.A. Bukaveckas, M.J. Mitchell and T. Hurd. 2001. N storage and cycling in vegetation of a forested wetland: implications for watershed N processing. *Water, Air, and Soil Pollution.* 128 (1/2): 97-114.

K. Ohrui, M.J. Mitchell, and J.M. Bischoff. 1999. Effects of landscape position on N mineralization in a forested watershed in the Adirondack Mountains of New York. *Can. Jor. of For. Res.*, 29:497-508.

Invited Presentations

Why is watershed phosphorus loading so stubbornly persistent? Drainage and Water Conference. February 2018.

Limitations of using stormwater ponds for phosphorus control. Minnesota Stormwater Manual Webinar. January 2018.

Implementation of Water Quality Rules and Standards in Minnesota. Guest Lecture for the St. Thomas Law School. 2011-2015.

Restoration Techniques for Shallow Lakes. Bischoff, J.M. The Rice Creek Watershed District's Shallow Lake Restoration Symposium, Lino Lakes, Minnesota. February 2009.

Shallow Lakes Ecology. Bischoff, J.M. The Rice Creek Watershed District's Shallow Lake Restoration Symposium, Lino Lakes, Minnesota. February 2009.

Presentations

Using an Adaptive Aluminum Sulfate (alum) Application Approach to Improve Water Quality in Bald Eagle Lake, MN. Bischoff, J., W.F. James, B. Beck, and M. Kocian. EWRI World Environmental and Water Resources Congress. Minneapolis, Minnesota. June 2018.

Why is watershed phosphorus loading so stubbornly persistent? Bischoff, J.M, E. Macbeth, K. Dooley, Y. Christianson, B. Beck, and W.F. James. 37th International Symposium of the North American Lake Management Society, Denver, CO. November 2017.

An Ecosystem Service Based Health Evaluation Index for Deep and Shallow Lakes in the Minnehaha Creek Watershed District, Minnesota. Bischoff, J., K. Dooley, Y. Christianson, T. Langer, and D. Spector. 36th International Symposium of the North American Lake Management Society, Banff, AB. November 2016.

Common Misconceptions Regarding the Use of Aluminum Sulfate (Alum) in Lakes. J. M. Bischoff and B. Beck. Minnesota Association of Watershed Districts Annual Conference, Alexandria, Minnesota. December 2015.

Planning for an Aluminum Sulfate Treatment on Lake Riley, MN. B. Beck, J. M. Bischoff, W.F. James, and C. Bleser. 35th International Symposium of the North American Lake Management Society, Saratoga Springs, NY November 2015.

Planning and Implementing Nutrient Reductions to Improve Water Quality in Bald Eagle Lake, MN. J. M. Bischoff, W.F. James, and M. Kocian. 34th International Symposium of the North American Lake Management Society, Madison, Wisconsin, November 2014.

Common Misconceptions Regarding the Use of Aluminum Sulfate (Alum) in Lakes. J. M. Bischoff and B. Beck. Minnesota Water Resources Conference, Minneapolis, Minnesota. October, 2014.

Managing Chloride Sources to the Alexandria Area Sanitary District's Wastewater Treatment Facility. J.M. Bischoff, I. Peterson, and B. Nelson. Central States Water Environment Conference, May 2014.

Challenges in Predicting a Clear-water State for Shallow Lake Excess Nutrient Shallow Lake Total Maximum Daily Loads. J.M. Bischoff and J. Strom. 32nd International Symposium of the North American Lake Management Society, Madison, Wisconsin, November 2012.

Anoxic and Oxidic Release of Phosphorus from Sediments in Minnesota Lakes. Minnesota Water Resources Conference, Minneapolis, Minnesota. October, 2012.

Improved Approaches for Developing Excess Nutrient TMDLs in Shallow Lakes. J.M. Bischoff, B.A. Nelson, and T. Gallagher. Minnesota Water Resources Conference, Minneapolis, Minnesota. October, 2010.

The Complexities of Developing Excess Nutrient TMDLs for Shallow Lakes. J.M. Bischoff, J. Ramstack, M. Edlund, and W. F. James. Water Environment Federation TMDL Specialty Conference, August 2009.

Biological Endpoints for Shallow Lake TMDLs. J.M. Bischoff, J. Madejczyk, and S. McComas. Minnesota Water Resources Conference, Minneapolis, Minnesota. October, 2007.

Assessing the Role of Road Salt in Spatial and Temporal Chloride Dynamics in an Urban Watershed (Shingle Creek), Minneapolis, Minnesota. J. M. Bischoff. 25th International Symposium of the North American Lake Management Society, Madison, Wisconsin, November 2005.

Implementing Load Duration Curves in TMDL Development: Lessons from a Chloride TMDL in Minnesota. J. M. Bischoff. 25th International Symposium of the North American Lake Management Society, Madison, Wisconsin, November 2005.

JIM BOELL

CADD Specialist

Mr. Boell has 32 years of practical experience as a drafter, designer, and technician for civil and environmental engineering consultants. He has worked with both public and private industry, primarily in Midwestern states. His expertise was gained on the Intergraph Microstation PC and AutoCADD systems. He also has experience in AutoCADD Civil 3D, Geopak, and 3D drawing. He also has experience with ArcGIS beginning with training on ArcGIS version 3.3 and to present. Examples of his work follow.

EDUCATION

Civil Engineering Technician Degree, Mechanical Engineering Technician Degree
Rochester Community College - Rochester, Minnesota

SELECTED EXPERIENCE

Coon Creek Watershed District Streambank Restoration - Lead CADD Design. Responsible for CADD design and layout of numerous bank stabilization stream restoration projects in the Coon Creek Watershed District. Projects have incorporated a range of design criteria, including bioengineering, riprap, and pipe design.

Wood Creek Erosion Repair, Plymouth, Minnesota - Lead CADD Design. Responsible for CADD design and plan layout for erosion along Wood Creek. This project incorporated collected survey data and the use of aerial photography.

MPCA CLP: Flying Cloud Landfill - Lead CADD Design. The design required waste relocation and the demolition and replacement of the existing gas system. Responsible for all waste regarding, gas system layout and volume generating using AutoCADD Civil 3D.

Scanlon Demolition Landfill - Lead CADD Design. For permitting of expansion of demolition debris landfill in Scanlon, Minnesota. Work included establishing landfill base grades as well as closure plans for the site.

City of Delano, Minnesota - Water Treatment Plant. Responsible for construction plans and overall site layout of a 4.5 MGD water treatment facility. The facility was constructed for iron and manganese removal using pressure filtration. Duties included design and layout of site and some building mechanical systems.

Minnesota Zoo, Apple Valley, Minnesota. Civil design for the Bears of the Russian Far East exhibit. This work involved designing and coordinating site utilities for sanitary, water and storm sewer with the bear, leopard, otter, boar, and fox exhibit space.



AREAS OF EXPERTISE

Municipal Design/Layout
Construction plans/
Oversight
Permit Plans
Industrial Design/Layout
Wastewater Design/Layout
AutoCADD Civil 3D – 2010
Microstation Version 7-8
ArcGIS
Integration between
AutoCaDD and ArcGIS

Confidential Client. Assisted with engineering design of a 140,000 GPD wastewater treatment system for an oilseed processing facility. Components of the treatment system included an equalization tank, dissolved air flotation (DAF), sequencing batch reactors (SBR's), continuous backwash sand filter, and solids dewatering using a belt filter press. Assisted with layout of equipment and piping and preparation of Process & Instrumentation Diagrams (P&ID's). Coordinated structural design of concrete tanks with structural engineers.

East Bethel Water Reclamation. Prepared the conceptual design of groundwater infiltration galleries for the City of East Bethel, MN to infiltrate reclaimed water. The system is designed with a future vision of providing the reclaimed water to end users to conserve the state's water resources and avoid simply discharging wastewater into receiving waters. Duties included design and layout of infiltration galleries along with all interconnecting pipe runs. Also produced regional groundwater mapping with data collected in the field.

Murphy Warehouse. Retrofitting a 22-acre parcel of highly impervious property to reduce nutrient loading and runoff volume to improve downstream water quality. Duties included client meetings and along with design and layout of site stormwater collection system and pond layout for surface water and buildings runoff.

Confidential Client. Design and layout for a canola oil extraction processing facility which included conditioning, preparation and extraction canola oil. Duties included P&ID development, general arrangements, and preparation of building equipment layout drawings.

University of Minnesota, Bell Museum, St. Paul Campus. Civil design for the Bell Museum relocation from the Minneapolis to the St. Paul campus. The design concept calls for zero stormwater discharge by reuse and infiltration and connection with St. Paul utilities for sanitary and water supply. Duties included site design and layout for traffic flow and parking areas, stormwater control including pond design and layout, sanitary sewer and watermain design and layout.

WES BOLL, CWD

Wetland Scientist

Mr. Boll has been involved in a wide variety of professional duties focusing primarily on wetland management, biological inventories, and surface water quality monitoring. He is a Certified Wetland Delineator in the State of Minnesota and has performed wetland delineations throughout Minnesota, as well as in South Dakota, Wisconsin, North Dakota, Iowa, and Oklahoma. He is skilled at identifying and classifying wetland vegetation, hydric soils, and indicators of wetland hydrology.

EDUCATION

BA, Environmental Studies with Biology Emphasis, Geography, Gustavus Adolphus College - St. Peter, MN

Limnology course, University of Minnesota

SELECTED EXPERIENCE

MNDOT Highway Corridor Projects

CSAH 8, Chisago County. Performed wetland delineation and prepared wetland delineation report for expansion corridor along CSAH 8 in Chisago County. Estimated wetland impact for highway expansion project.

CSAH 70, Dakota County. Reviewed historic aerial photos and investigated potential wetland areas. Delineated wetlands along CSAH 70 expansion corridor in the Lakeville, MN. Mapped wetland boundaries with GPS and prepared wetland delineation report. Coordinated with City of Lakeville to assess wetland impacts and approve delineated wetlands.

US Highway 71, Beltrami and Hubbard Counties. Delineated wetlands and investigated areas of potential wetland along US Highway 71 expansion corridor in Bemidji, MN. Mapped wetland boundaries using GPS. Assessed wetland impact and prepared detailed wetland delineation report. Coordinated with County and Federal officials to approve delineated wetlands.

Other Project Experience

American Crystal Sugar. Delineated wetlands adjacent to the Red River near Drayton, ND. Prepared wetland delineation report and submitted to ACOE for review and approval. Delineated isolated wetlands in agricultural field near Hillsboro, ND and submitted delineation report for agency review.

Clearwater River Watershed District. Delineated wetlands on site, prepared and coordinated regulatory approval of wetland permitting documents, and prepared a design for the construction of the replacement wetland near Annandale, MN. Supervised the construction of the replacement wetland and conducted annual monitoring of the site.



AREAS OF EXPERTISE

Wetland Delineation
Wetland Permitting and Mitigation
Monitoring
Wetland Functions and Values
Assessments
Biological Monitoring and Inventory
GPS Surveying
Geographic Information Systems (GIS)

REGISTRATION

MN Certified Wetland Delineator
HAZWOPER 40 Hour Certification
Wetland Delineation 38 Hour Training
Advanced Wetland Delineation 40 Hour Training

Waconia School District. Delineated wetlands on the high school property in Waconia, MN. Prepared permit application and wetland replacement plan to mitigate for impacted wetlands on the site. Submitted delineation report and permit application for agency review and approval. Monitored mitigation wetlands on an annual basis (2005-present).

Ryan Companies. Delineated wetlands on the proposed site of a building expansion in Tomah, Wisconsin. Submitted delineation report to state and federal regulators for approval. Prepared a Wetland Compensation Plan meeting state and federal guidelines for mitigation wetlands constructed on the site. Conducted annual monitoring of mitigation site and prepared annual monitoring reports.

Southern MN Construction. Delineated rock outcrop wetlands and conducted vegetation inventory on property slated for gravel mining expansion in Renville County. Incorporated GIS to determine site characteristics and identify potential wetlands. Prepared figures and report for EAW on the site.

Howard Lake-Waverly-Winsted School District. Delineated wetlands on the site of a new school expansion project. Reviewed historical aerial photos and precipitation data to determine the presence of farmed wetlands on the site. Field verified and delineated wetland boundaries on the site. Prepared and submitted report to LGU for approval.

Molin Concrete. Conducted annual monitoring on a constructed wetland at a concrete production facility in Lino Lakes, MN. Delineated additional wetlands on property. Prepared permit application and wetland replacement plan for additional expansion on the property. Coordinated review and approval of project plans with LGU (2004-2007).

Loo-Con Wetland Bank. Assisted with the design of a 120-acre wetland and native prairie restoration in Southwest Minnesota. Prepared revegetation plan and conducted annual monitoring to document conditions of the site and prescribe vegetation maintenance activities.

Ducks Unlimited. Prepared Baseline Determination Reports for properties considered for Conservation Easements in Becker, Stearns, and Meeker Counties. Identified vegetation species, classified vegetation communities in forests, wetlands, and grasslands on the property, and classified overall ecological health of the properties.

MATTHEW BOWERS, PE

Senior Engineer, Principal

Mr. Bowers has over 28 years of experience on diverse projects encompassing project design, project management, feasibility studies, construction management, municipal engineering, and contaminated soil and groundwater investigation and remediation.

EDUCATION

BS, Civil Engineering, South Dakota School of Mines & Technology, Rapid City, SD

REGISTRATION

Professional Engineer: MN

SELECTED EXPERIENCE

Contaminated Site Assessment/Remediation

Twin Cities Army Ammunition Plant - Project Manager for Environmental Support Services Contract

Project Manager for the environmental support services contract for the Army at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. Responsibilities included investigation, feasibility study, remediation, and long-term monitoring and maintenance activities at various soil, groundwater, surface water and sediment sites located at TCAAP. This included preparation of annual performance reports, health and safety, community relations, and strategic support through extensive interaction with state and federal regulators.

U.S. Army Corps of Engineers - Groundwater Treatment System Construction and Operation

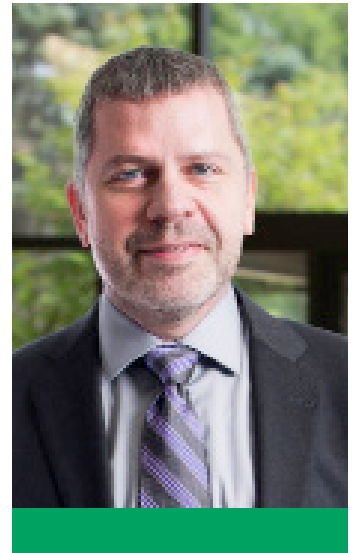
Project Manager for construction, start-up, and the first 1½ years of operation of a \$3.5 million, 600 gallon per minute groundwater recovery and treatment system at the Former Nebraska Ordnance Plant Superfund site in Mead, Nebraska. The system installation provided containment of two chlorinated solvent/explosives plumes, utilizing granular activated carbon treatment to remove the contaminants.

U.S. Army Corps of Engineers - Riverbank Stabilization Project

Project Manager for construction of a \$1.3 million riverbank stabilization project on the Republican River at Fort Riley, Kansas. The project halted the river's erosion into a former landfill, and utilized 34,000 tons of stone along a 1,200-foot section of the river.

U.S. Army Corps of Engineers - Soil Removal and Landfill Cap Improvement Projects

Project Manager for a \$0.6 million removal action at Fort Riley, Kansas, which included removal of metals-contaminated soils and construction of an 8-acre landfill cap. Project Manager for a \$0.6 million landfill cap repair project at two former landfills at Fort Riley, Kansas.



AREAS OF EXPERTISE

Senior Design Engineer
Feasibility Studies
Construction Management
Contaminated Site Investigation
Contaminated Site Remediation

PROFESSIONAL MEMBERSHIPS

American Society of Civil Engineers

Twin Cities Army Ammunition Plant - Soil Remediation. Project Engineer for soils remediation conducted to achieve RCRA closure of Site F at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. Site F was contaminated with heavy metals and ordnance-related debris, including unexploded ordnance. Remediation involved an innovative combination of soil washing and chemical leaching to achieve metals removal from 20,000 tons of contaminated soil and was the first known U.S. project to utilize this combined process. The site was available for unrestricted use following completion of this project.

Simonson Lumber Company - Soil and Groundwater Remediation. Project Engineer for soil and groundwater remediation at a former gas station site in downtown St. Cloud, Minnesota. Designed and conducted an air sparging/soil venting pilot study, and designed, provided construction oversight, and started up full-scale air sparging/soil venting systems at this site, along with installation of a groundwater pumpout and air stripping treatment system. Site cleanup was completed in less than two years.

Twin Cities Army Ammunition Plant - Soil and Groundwater Remediation. Project Engineer for O&M for two groundwater recovery systems and an air sparging/soil venting system at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. One groundwater system provided containment of a chlorinated solvent plume that had migrated off-site. The other groundwater system prevented a lead plume from potentially impacting surface water. The treatment system also included lead removal using ion exchange and adsorption.

Twin Cities Army Ammunition Plant - Soil Remediation. Project Manager for implementation of a soil removal action for excavation and landfilling of PAH and metals-contaminated soils at a former manufacturing facility for primer/tracer compounds at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota, including preparation of the project work plan (including the Quality Assurance Project Plan for verification sampling and the Site Safety and Health Plan) and preparation of the final documentation report for the project.

Twin Cities Army Ammunition Plant - Soil Remediation. Project Manager for implementation of a soil removal action for excavation and landfilling of PAH and metals-contaminated soils at five areas of concern at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota, including preparation of the project work plan (including the Quality Assurance Project Plan for verification sampling and the Site Safety and Health Plan) and preparation of the final documentation report for the project.

Twin Cities Army Ammunition Plant - Surface Water Remediation. Project Manager for remedial design and remedial action implementation for treatment of a pond to attain compliance with the state surface water quality standard for lead at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota, including preparation of the project work plan (including the Quality Assurance Project Plan for verification sampling and the Site Safety and Health Plan).

Twin Cities Army Ammunition Plant - Sediment Investigation. Project Engineer for implementation of a contaminated sediment investigation in Round Lake, related to the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. Prepared the project work plan (Quality Assurance Project Plan), and managed implementation of the field work (sediment core sampling for analysis of metals, PCBs, and TOC, and also sediment core dating and sediment toxicity testing). Currently preparing a feasibility study to address the contaminated sediments, including evaluation of alternatives such as monitored natural attenuation, enhanced monitored natural attenuation, capping, and dredging/disposal alternatives.

Interplastic Corporation - Soil and Groundwater Remediation. Prepared an evaluation of alternatives for remediation of soil and groundwater contamination at this plastics manufacturing facility in Minneapolis, Minnesota. Provided technical review on the design and implementation of a soil venting system pilot study and subsequent full-scale system design.

DuPont-Pioneer Seed – Stream Restoration & Erosion Mitigation, Johnston IA (2016). Construction documents for stream restoration: Plans, sections details and cost estimates. IA DNR, Army Corp., and City of Johnston permitting applications.

City of Plymouth – Elm Creek Stream Restoration (2016). Provided construction observation of Iron Enhanced Sand filtration shelf & stream corridor restoration activities.

Henningsgaard Channel – Alexandria (2016). Created construction documents and cost estimates for two restoration options in landowner hydrology dispute resolution.

Rush Creek – City of Dayton (2016). Provided construction observation of stream bank stabilization and tree thinning.

City of Dayton – Landscape plan (2016). Planting plan for proposed public works facility relocation.

Three Rivers Park District – Slope Failure Stabilization (2016). Prepared construction documents and cost estimates for slope stabilization.

City of Waconia – Street Reconstruction (2015). Designed eight curb-cut raingardens within the downtown district and worked with public works staff on planting layout and installation. Provided construction observation of curb castings and pretreatment structures.

Family of Christ Lutheran Church - Chanhassen (2015). Scoped, designed, bid, and observed construction of a 4,700 sq. ft. biofiltration basin capturing the 1.1 inch rain event runoff from an existing untreated parking lot before entering into Bluff Creek. Organized and oversaw planting and weeding events with congregation parishioners.

Riley Purgatory Bluff Creek Watershed District (2013 – 2015). Assisted Riley Purgatory Bluff Creek Watershed District with scoping documents for location for stormwater mitigation projects. Provided landowner meetings, conceptual design, construction documents and construction observation for cost-share funding program funded via the Clean Water Legacy program.

Carver County Water Management Organization (2013-2015). Construction plan reviews for all development over one acre for erosion & sediment control practices, vegetation establishment, and operations and maintenance manuals for Stormwater Best Management Practices.

HEI Collision & Iron Tap – (2015). Scoped, designed, and observed construction for porous paving parking areas in two adjacent parking lots. Created native plantings to obstruct views of maintenance entrance.

Wild One's Native Plant Group (2015). Presentation for the local chapter on how native plants are utilized in Stormwater mitigation design and highlighted various projects that have been implemented. Discussed the methods for selecting plants for specific purposes based upon their native habitats. Emphasized the role that native plants play in the current local market and introduced the catalogue of publications.

Nilfisk-Advance - Groundwater Remediation. Designed a groundwater remediation system for chlorinated solvent contamination at a former manufacturing facility in Spring Park, Minnesota, located on the shore of Lake Minnetonka. System design included a recovery well, a treatment system utilizing activated carbon treatment, and a control system with remote monitoring capability. Provided construction and start-up oversight, and ongoing technical review for system monitoring, operation, and maintenance.

Minnesota Manufacturing Facility - Soil and Groundwater Remediation. Provided technical review for design of an air sparging/soil vapor extraction system installed to remediate chlorinated solvent-contaminated soil and groundwater at a manufacturing site in New Hope, Minnesota.

U.S. Department of Justice Confidential Project - Soil Investigation. Project Manager for a soils investigation across a 1500-acre site to define lead concentrations in soil. Included preparation of a detailed QAPP, data validation and usability assessment, and documentation report preparation.

Carolina Freight - Soil Remediation. Project Engineer for treatment of petroleum-contaminated soils by land farming the soils on property at the contamination site, located near St. Cloud Minnesota.

Metropolitan Airports Commission - Soil Investigation. Project Engineer for a soils investigation conducted at two former debris disposal areas at the Lake Elmo airport, including preparation of a work plan and oversight of documentation report preparation.

Nilfisk-Advance - Vapor Intrusion Investigation and Response Action Plan. Provided senior review for investigation of solvent vapor intrusion into homes constructed on properties that were in the vicinity of solvent-contaminated groundwater, related to a former manufacturing facility in Spring Park, Minnesota, and also provided senior review of a response action plan to install sub-slab depressurization systems.

Twin Cities Army Ammunition Plant - Vapor Intrusion Investigation. Project Manager for implementation of a vapor intrusion investigation for a solvent contamination site at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. Prepared the project work plan (including the Quality Assurance Project Plan), and managed implementation of the field work (soil vapor probes) and investigation report.

Colorado Manufacturing Facility - Feasibility Study. Prepared a focused feasibility study to address public supply wells which had been impacted with chlorinated solvents and which were in a major drinking water aquifer, supplying drinking water to five cities. Feasibility study recommendations included utilization of alternative sources of water and treatment of two public supply wells with a 1400 gallon per minute, granular activated carbon treatment system.

St. Cloud Housing and Redevelopment Authority - Feasibility Study. Prepared a Phase II investigation report and focused feasibility for a former dump site located on the edge of Mississippi River floodplain in St. Cloud, Minnesota. The study recommended installation of a protective soil cover.

Southeast Berrien County Landfill Authority - Feasibility Study. Assisted in preparing an evaluation report for existing groundwater remediation systems and for potential alternative groundwater remediation systems to address chlorinated solvent contamination at a landfill in Southeast Berrien County, Michigan. Alternatives evaluated included additional recovery wells and slurry walls; ex-situ treatment using activated carbon, air stripping, spray treatment, or UV oxidation; and in-situ treatment using enhanced biodegradation, chemical oxidation, and air sparging/soil venting.

Metropolitan Airports Commission - Feasibility Study. Assisted in preparation of a feasibility study to address chlorinated solvent contamination at the Baytown Township Groundwater Contamination Site, located east of Lake Elmo, Minnesota and extending to the St. Croix River. Alternatives evaluated included pump and treat, point of use treatment with activated carbon filters, well replacement, enhanced in-situ biodegradation, and distributed water supply.

Metropolitan Airports Commission - Response Action Plan. Prepared the response action plan to address chlorinated solvent contamination at the Baytown Township Groundwater Contamination Site, located east of Lake Elmo, Minnesota, and extending to the St. Croix River. Primary responses included point of use treatment with activated carbon filters and long-term monitoring and filter maintenance plans. Also prepared the response action implementation report and subsequent annual reports.

Nilfisk-Advance - Feasibility Study. Prepared a feasibility study for groundwater remediation alternatives for chlorinated solvent contamination at a former manufacturing facility in Spring Park, Minnesota, located on the shore of Lake Minnetonka. Cleanup alternatives evaluated included no action, groundwater pumpout with air stripping or activated carbon treatment, reactive walls, air sparging/soil venting, and enhanced in-situ biodegradation using Hydrogen Releasing Compound®. Groundwater pumpout with activated carbon treatment was selected for the west half of the plume; however, by recommending and obtaining approval for no action for the east half of the plume, project costs were reduced for the client.

Twin Cities Army Ammunition Plant - Engineering Evaluation/Cost Analysis for Soil Remediation. Prepared the alternatives analysis for the engineering evaluation/cost analysis report prepared for remediation of metals-contaminated soils at a former grenade range at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. Alternatives evaluated included soil washing and soil leaching (including treatability studies), capping, and landfill disposal.

Twin Cities Army Ammunition Plant - Engineering Evaluation/Cost Analysis for Soil Remediation. Prepared an engineering evaluation/cost analysis report for remediation of PAH and metals-contaminated soils at a former manufacturing facility for primer/tracer compounds at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. Alternatives evaluated included capping and landfill disposal.

Twin Cities Army Ammunition Plant - Engineering Evaluation/Cost Analysis for Groundwater Remediation. Prepared an engineering evaluation/cost analysis report for chlorinated solvent-contaminated groundwater at a former ammunition manufacturing facility at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. Alternatives evaluated included groundwater extraction & treatment and monitored natural attenuation. The recommendation to implement monitored natural attenuation was approved by the regulatory agencies.

Twin Cities Army Ammunition Plant - Soil Investigation and Engineering Evaluation/Cost Analysis for Soil Remediation. Conducted site investigation and prepared an engineering evaluation/cost analysis report for remediation of PAH and metals-contaminated soils at five areas of concern at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. Alternatives evaluated included capping and landfill disposal. The five areas included former disposal, manufacturing, and storage/loading areas.

Minneapolis Community Development Agency - Response Action Plans. Prepared response action plans for two soil contamination sites located in downtown Minneapolis, Minnesota, both having metals and PAH contamination. Response actions were excavation and landfill disposal.

Metropolitan Airports Commission - Point of Use Treatment. Prepared specifications for installation and maintenance of activated carbon filters on over 100 private water supplies, implemented as a response action for chlorinated solvent contamination at the Baytown Township Groundwater Contamination Site, located east of Lake Elmo, Minnesota, and extending to the St. Croix River.

Junker Landfill - Point of Use Treatment. Prepared specifications for installation and operation of granular activated carbon treatment systems for 70 residential water supply wells impacted with chlorinated solvents from this Superfund landfill in Wisconsin.

Federal Cartridge Company - Quality Control and Data Quality Assessment. Provided oversight for preparation of a Quality Assurance Project Plan for corrective action under RCRA at the Federal Cartridge manufacturing facility in Anoka, Minnesota. The project involved excavation, stabilization, and landfill disposal of nearly 10,000 tons of contaminated soil. Prepared data quality assessments for project data obtained from environmental laboratories.

Twin Cities Army Ammunition Plant - Quality Control and Data Quality Assessment. Prepared or provided oversight for preparation of four Quality Assurance Project Plans covering soil, groundwater, and/or surface water monitoring at various sites at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. The QAPPs were prepared to meet EPA R-5 requirements. Also prepared the eventual update of this QAPP to meet Uniform Federal Policy (UFP) requirements. Also prepared or provided oversight of data quality assessments for project data obtained from environmental laboratories.

Twin Cities Army Ammunition Plant - Quality Control and Data Quality Assessment. Prepared six Quality Assurance Project Plans meeting the Uniform Federal Policy (UFP) requirements for various sites at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. These six QAPPs were for two contaminated soil investigations, a soil removal action, a groundwater investigation, monitored natural attenuation of groundwater, and a contaminated sediment investigation. Also prepared data quality/usability assessments for the analytical data obtained in these six projects.

U.S. Army Corps of Engineers - Quality Control and Data Quality Assessment. Project Manager for preparation of two quality assurance project plans, one for water sampling related to a groundwater recovery and treatment system at the Former Nebraska Ordnance Plant Superfund site in Mead, Nebraska, and one for soil sampling related to a contaminated soil removal action at Fort Riley, Kansas. Also managed preparation of data quality/usability assessment reports for the analytical data obtained in both projects.

Ramsey County, MN - Quality Control and Data Quality Assessment. Provided senior review for preparation of a Quality Assurance Project Plan for Ramsey County's site redevelopment work on former Twin Cities Army Ammunition Plant property in Minnesota. The QAPP was prepared to meet Uniform Federal Policy (UFP) requirements. This QAPP covered soil sampling for VOCs, PAHs, PCBs, metals, and other contaminants. Also provided senior review for data quality/usability assessments for the analytical data obtained in this project.

U.S. Army Corps of Engineers - Construction Quality Control. Prepared four construction quality control plans, one for construction of a \$3.5 million, 600 gallon per minute groundwater recovery and treatment system at the Former Nebraska Ordnance Plant Superfund site in Mead, Nebraska, and the other three for landfill-related construction projects (\$2.5 million total) at Fort Riley, Kansas. Also served as the alternate, onsite quality control manager for the Mead, Nebraska project.

U.S. Army Corps of Engineers - Site Safety and Health Plans. Managed or prepared four site safety and health plans, one for construction of a \$3.5 million, 600 gallon per minute groundwater recovery and treatment system at the Former Nebraska Ordnance Plant Superfund site in Mead, Nebraska, and the other three for landfill-related construction projects (\$2.5 million total) at Fort Riley, Kansas.

U.S. Army Corps of Engineers - Operation and Maintenance (O&M) Manual. Project Manager for preparation of an O&M manual for operation of a \$3.5 million, 600 gallon per minute groundwater recovery and treatment system at the Former Nebraska Ordnance Plant Superfund site in Mead, Nebraska, which was recovering chlorinated solvent/explosives-contaminated groundwater. The system consisted of two recovery wells, twin 20,000-pound activated carbon treatment vessels, a self-cleaning strainer, effluent transfer and backwashing pumps, settling tanks, a bag filter, and a programmable logic control system utilizing radio telemetry for recovery well operation.

Colorado Manufacturing Facility - Operation and Maintenance (O&M) Manual. Prepared an O&M manual for operation of two groundwater remediation systems that were recovering chlorinated solvent-contaminated groundwater. The two systems consisted of eight recovery wells; water treatment using filtration, softening, air stripping, and activated carbon adsorption; and treated water re-injection.

Simonson Lumber Company - Operation and Maintenance (O&M) Manual. Provided oversight for preparation of an O&M manual for operation of soil and groundwater remediation systems for petroleum contamination at a site in St. Cloud, Minnesota. The systems consisted of an air sparging/soil venting system, and a groundwater recovery well with an air stripping treatment system.

Twin Cities Army Ammunition Plant - Operation and Maintenance (O&M) Manual. Provided technical oversight for preparation of an O&M manual for operation of a groundwater recovery system at the New Brighton/ Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. The system included 8 recovery wells that were operated to contain a chlorinated solvent plume.

Twin Cities Army Ammunition Plant - Soil Remediation System Evaluation. Prepared an evaluation report for two soil venting systems that were removing chlorinated solvents from contaminated soils at Sites D and G at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. The two systems, which had originally been designed by Wenck, removed a combined total of over 200,000 pounds of chlorinated solvents. The evaluation included consideration of system effectiveness, mass removal, progress towards soil cleanup levels, potential operational modifications or system enhancements, costs, and lessons learned.

Twin Cities Army Ammunition Plant - Groundwater Remediation System Evaluation. Prepared a technical evaluation for a chlorinated solvent-contaminated groundwater extraction system operating at Site A at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. The recommendation to shut off the existing four extraction wells and allow natural attenuation under a monitoring and contingency plan was approved by the regulatory agencies.

Twin Cities Army Ammunition Plant - Groundwater Remediation System Evaluation. Prepared an evaluation report for a lead-contaminated groundwater extraction system operating at Site C at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota. The recommendation to shut off the existing three extraction wells and allow natural attenuation under a monitoring and contingency plan was approved by the regulatory agencies.

Twin Cities Army Ammunition Plant - Annual Performance Evaluation Reports. Prepared annual performance reports for the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant) in Minnesota, for four years, provided senior technical review of these reports in several other years, and provided overall project management for reports prepared from 2011 to present. The reports evaluate performance and summarize progress of soil and groundwater remedial work at 16 sites.

Twin Cities Army Ammunition Plant - CERCLA Five-Year Reviews. Prepared the first three successive five-year reviews for the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant), and provided technical review for the fourth five-year review. These reviews involved assessment of ongoing and planned remedies at 16 different sites to determine that the selected remedies remain protective of public health and the environment and that they remain cost-effective.

Twin Cities Army Ammunition Plant - Land Use Control Remedial Design. Assisted in preparation of the design document governing all land use controls within Operable Unit 2 at the New Brighton/Arden Hills Superfund Site (Twin Cities Army Ammunition Plant), and prepared the two most recent revisions of this document that allowed for changes in site land use that were desired by the current land owners.

Water Resources Projects

Minnehaha Creek Watershed District - Design and Construction Oversight. Prepared plans and specifications for improvement of one of the outlet control structures for Lake Minnetonka, Minnesota. Work included installing pilings, replacement of the existing 240-foot long weir, and placement of stone rip rap.

Minnehaha Creek Watershed District - Feasibility Study. Assisted in preparation of a feasibility study to evaluate water quality improvement alternatives for Jennings Bay in Lake Minnetonka, Minnesota, including evaluation of internal and external nutrient loadings.

Minneapolis, Minnesota Consultant - Permitting. Assisted in preparation of permit applications to the Corps of Engineers (404 permit), Wisconsin DNR (stream and wetland crossings), and local Watershed District permits for a 36-inch diameter, 75-mile-long, natural gas pipeline expansion project in northern Minnesota and Wisconsin. Also assisted in preparation of plans and specifications for the environmental protection procedures to be followed during the construction.

NPDES Permitting and Monitoring. Involved in acquisition of NPDES permits and/or discharge monitoring/reporting for discharge of treated groundwater from remediation systems at three groundwater contamination sites in Minnesota, and for discharge from filter backwash settling ponds for a water treatment facility in Delano, Minnesota.

Municipal Projects

Delano Municipal Utilities - Water Treatment Plant. Prepared construction plans and specifications for a six MGD municipal water treatment plant in Delano, Minnesota, and managed construction and start-up. The treatment plant removes iron, manganese, and arsenic using manganese greensand and anthracite pressure filters. The project included approximately one mile of water main.

Delano Municipal Utilities - Municipal Well. Provided senior design review for construction plans and specifications for Municipal Well No. 4 in Delano, Minnesota, and managed construction and start-up. The well capacity is over 3,000 gallons per minute. Also provided senior review of an aquifer pumping test for the Delano well field.

Delano Municipal Utilities - Water Main. Project Manager for design of water main replacement in two Minnesota Department of Transportation projects to reconstruct U.S. Highway 12 in Delano, Minnesota. The combined total length of water main replacement was over two miles, including installation of ductile iron, PVC, and directionally-drilled HDPE water mains, with sizes of six to 16-inch.

Delano Municipal Utilities - Master Water Study. Prepared a master water study to evaluate the water supply, storage, treatment and distribution systems for the water system in Delano, Minnesota. Provided guidance on the development and application of a WaterCAD model for the Delano water system that included a new water treatment plant, four supply wells, and the distribution/storage system.

Delano Municipal Utilities - Water Emergency and Conservation Plan. Prepared a water emergency and conservation plan for water system in Delano, Minnesota, for submittal to the Department of Natural Resources.

City of Delano, Minnesota - Sewer Interceptor / Water Main. Provided senior design review for plans and specifications for construction of over two miles of new sewer interceptor installation (18 to 27-inch diameter) and water main. Also conducted the pre-design, alternatives evaluation for the sewer routing, identifying a change in routing that avoided construction of a large lift station.

City of Delano, Minnesota - East Side Storm Water Lift Station. Provided guidance on application of storm water model results to the design of an 80 cfs storm water lift station that alleviates flooding problems related to the Crow River, which threatens 37 homes in Delano. Prepared plans and specifications for lift station construction and managed the lift station construction and start-up.

City of Corcoran, Minnesota - Sewer and Water System Planning. Project Engineer for review and optimization of the Corcoran water and sewer systems, including updating these portions of their Comprehensive Plan. The sewer evaluation identified a change in routing will avoid the need for future construction of a large lift station. Water system analysis included water distribution system modeling to optimize water main sizing and evaluate water tower and booster station needs and performance.

Developer - Senior Housing Project. Provided senior technical review for design and construction plans for two stormwater lift stations in Alexandria, Minnesota, along with review and approval of contractor construction submittals.

Red Rock Rural Water System - Rural Water Pipeline. Project Manager for design and construction of a new segment of rural water pipeline constructed from Red Rock's Lake Augusta Water Treatment Plant to Storden, Minnesota, including a pressure-reducing station at Storden. The total length of pipeline was over eight miles, constructed of 8- and 10-inch PVC, and included directionally-drilled segments beneath roads and streams to avoid disturbance. Also obtained permits for state and county highway crossings and DNR public water crossings.

City of McGrath, Minnesota - Mid-Sized Subsurface Sewage Treatment System. Project Engineer for design and construction of modifications to the main sewage lift station and for installation of new three-inch sewage force main from this lift station to the new treatment area. The lift station upgrade included new submersible pumps, new piping and valves, modification of controls, and addition of screening equipment on influent sewer pipes. The HDPE force main was installed by directional drilling to avoid disturbance of a county trail, county highway, and Bear Creek. Also obtained permits for the county highway crossing and the DNR public water crossing.

Publications

"Innovative Soil Treatment for Metals Contamination." Co-Author, October 1995.

10th Annual Conference on Contaminated Soils, University of Massachusetts at Amherst.

CATHARINE CANNAN

Water Resources

Ms. Cannan has 4 years of academic and professional experience in hydrogeologic investigations. Since joining Wenck over two years ago, she has worked on a wide range of projects including water quality sampling, production well development, aquifer testing and analysis, surveying, and data analysis. She has also completed groundwater modeling projects related to dewatering systems, infiltration gallery design, contamination remediation, and monitoring well assessments. Prior to joining Wenck, Ms. Cannan worked as a research assistant in the graduate program at Colorado State University where her MS thesis focused on the influence of subsurface heterogeneity on the performance of aquifer storage and recovery. She also attended the University of North Carolina for her undergraduate degree, where her research project involved surface water-groundwater interactions.

EDUCATION

MS, Groundwater Hydrogeology, Geosciences, Colorado State University

BS, Geology and Geographic Information Systems, Geosciences and Geography, University of North Carolina at Chapel Hill

SELECTED EXPERIENCE

Hydrogeologic Modeling

Former Advance Machine Company site, Spring Park, WY. Ms. Cannan developed a groundwater flow model of a TCE contaminated area in order to predict the hydrologic impact of an existing recovery well on the contaminate plume. The model was also used to determine the most effective locations for two additional recovery wells and the respective effect of each in combination with the existing well. The combined modeled pumping effects of all three recovery wells indicated that significant TCE recovery could be accomplished, and that it would create a cone of depression sufficient to prevent offsite contaminant transport.

Downtown East Infiltration Gallery, Minneapolis, MN. Ms. Cannan was heavily involved in the creation, calibration, and validation of a groundwater model investigating the impact of urban flooding and dewatering plans on groundwater levels at and around the Minnesota Vikings' U.S. Bank Stadium. Proposed designs for a surface water infiltration gallery were evaluated to determine the impact of water mounding and delayed mound dissipation on the groundwater levels beneath nearby buildings. The model was used to assess the risk of flooding for storms of varying durations and intensities.

Anderson Bar Floodway Analysis, Douglas County, OR. Ms. Cannan developed, calibrated, and analyzed a 1-dimensional flow model of the South Umpqua River to support the development of a revised mining plan for the Anderson Bar gravel mine. Ms. Cannan's work included the hydraulic evaluation of several options for addressing fish entrapment while maximizing available mining area. The design options considered included berm construction, leave strip alteration, and the establishment of a fish channel. She was also responsible for the design of a river



AREAS OF EXPERTISE

Groundwater Modeling
Hydrogeologic Investigations
Mapping and Analysis
Well Site Selection
Well Design and Development
Groundwater Contamination Remediation
Surface Water-Groundwater Interaction
Infiltration Gallery Assessment
Dewatering System Development
Aquifer Testing and Analysis
Water Quality Sampling and Assessment
Database Management and Design

TRAINING/ CERTIFICATION

40-HR HAZWOPER
1-D and 2-D HEC-RAS
ArcGIS
Visual MODFLOW Flex
MODFLOW
MODPATH
Hydrus
ArcGIS

connection channel, road culvert, and the proposed mining extent.

Groundwater Supply and Development

North Well Field Project, Pine Bluffs, WY. For the Town of Pine Bluffs, Ms. Cannan worked to evaluate the Town's existing groundwater supply and to tie in new municipal production wells at a property the Town acquired. Ms. Cannan was responsible for assessing the condition of several of the Town's Brule Aquifer wells and for characterizing the water level declines and sudden losses of production. Ms. Cannan was also involved in conducting a detailed hydrogeologic investigation of the acquired property to identify potential sites for the new production well. These wells now yield high quality water for drinking and Town irrigation.

London Mine Well Siting, Alma, CO. In support of a hydrogeological investigation, Ms. Cannan created a three-dimensional sub-surface model of the London Mine and used it to evaluate potential mine dewatering well locations based on drill depths, geologic contacts, aquifer thickness, land ownership and access. Results indicated that, due to the synclinal orientation of the aquifer, drill depths were similar across the site despite drastic surface elevation changes. Of the eleven sites evaluated, two were chosen for the bidding process. She later used this sub-surface evaluation as the basis for developing, calibrating, and analyzing a groundwater flow model of the area, to support dewatering of the mine workings using the additional wells.

Jackson Hole Regional Well Siting, Jackson, WY. Ms. Cannan completed a hydrogeological review of Jackson and nearby communities in support of a regional well siting investigation. Ms. Cannan reviewed available surface and groundwater data and baseline studies to determine potential locations for an alluvial production well. Based on geology, water quality, land ownership, and engineering concerns, three locations were chosen for wells that would supplement the regional municipal water supply.

Melody Ranch Groundwater Well Evaluation, Melody Ranch, WY. Ms. Cannan evaluated the hydrogeologic conditions associated with an existing Melody Ranch Improvement and Service District well. Currently the District obtains water from two wells, both completed in the alluvial aquifer of the Snake River. Downhole video logging and aquifer testing were completed in order to evaluate the sustainable yield of the higher capacity production well. Stepped and constant rate aquifer testing of the well indicated it would sustain an 800 gpm production rate, or approximately two times the current yield. However, results also indicated the well had experienced a 57% decline in specific capacity since its completion in 1996. Ms. Cannan made recommendations for operation and maintenance of both District wells, to minimize future losses and maintain well yield.

Water Quality

Uranium Surface Water Quality Monitoring, WY. Ms. Cannan participated in a field team for a surface water sampling, analysis, and water quality characterization program in support of post-reclamation environmental monitoring in the Shirley Basin of Carbon County and in the East, Central, and West Gas Hills and Day Loma areas in Fremont County. She also worked to program, update, and review the resulting groundwater quality database in order to visualize results and identify long term water quality trends.

Shagwa Lake Hydrogeologic Assessment, Red Feather Lakes, CO. Ms. Cannan completed an assessment of geologic and hydrogeologic conditions of Shagwa Lake and the surrounding area to evaluate the likelihood of contamination by sanitary sewage from nearby homes. Aerial photographs, geologic records, groundwater well information and county septic tank permits were reviewed and results indicate that there is a high probability that sewage contamination of the groundwater contributed to fish kills due to the shallow bedrock, shallow depth to groundwater, and groundwater flow directions.

Septic System Impact Analysis, Albany County, WY. Ms. Cannan developed the sampling analysis plan and quality control and quality assurance plan for the sampling of vadose zone water under a septic field in the Casper Aquifer Protection Area. The goal of the project was to monitor leach field denitrification over Casper Aquifer outcrop and assess the potential for nitrate contamination of the City of Laramie municipal wellfields. After reviewing available geologic and soils data, she helped narrow down the list of possible sites using Casper Formation outcrop locations, estimated thickness of unconsolidated material, septic system age, and anticipated use. She also developed a plan for the installation of one monitoring well and six porous cup lysimeters in angled holes beneath the chosen septic field.

Hydrogeologic Investigations

North Well Field Test Hole Drilling, Pine Bluffs, WY. Conducted a detailed hydrogeologic investigation to identify potential sites for an alluvial production well. Ms. Cannan was responsible for soil boring logging of over 20 test holes, maintaining field logs, and analyzing alluvial material thickness and groundwater elevations. Also completed the stepped and constant rate aquifer testing of an existing production well in the area.

Miller Lane Pilot Grouting, Glenrock, WY. Conducted a geologic investigation to characterize the need for and effectiveness of grouting in a sub-surface abandoned coal mine threatening infrastructure. Ms. Cannan was responsible for core logging for eight test holes in order to identify mine workings, grout filled voids, soil consolidation and risk of collapse. She also oversaw the construction of a monitoring well network for tracking the influence of grout injection on existing groundwater levels in the area.

Hunnicut Hill Estates, Cheyenne, WY. Completed a hydrogeologic investigation of Laramie County, Wyoming in support of a Chapter 23 Subdivision Application West of Warren Air Force Base. The investigation involved the design of septic systems, calculation of groundwater and wastewater travel times, subsurface characterization, and identification of nearby surface waters or potential contamination sources.

ANC Mill Tailings Pond Hydrogeologic Investigation, Gas Hills, WY. For the Wyoming Department of Environmental Quality, completed a hydrogeologic and water quality investigation to determine the extent of groundwater quality impacts at the former American Nuclear Corporation (ANC) Tailings site, within the Gas Hills Uranium Mining District. Field activities included the evaluation, drilling, and construction of 14 new monitoring wells, development of the wells, and subsequent water quality sampling and testing of the wells. Results indicate that groundwater contamination extends farther north than previously anticipated or measured, likely due to the presence of preferential groundwater flow-paths north of the tailings pond area.

Fridley Civic Center Hydrogeologic Investigation, Fridley, MN. Ms. Cannan was involved in a team planning the development of the mixed-use Fridley Civic Center in Fridley, Minnesota. Ms. Cannan was responsible for evaluating the surficial and bedrock geology, groundwater flow paths, and potential construction impacts on groundwater for the Fridley Civic Center location using information at a local and regional scale. By mapping bedrock, clay, and groundwater elevations in the perched aquifer, Ms. Cannan determined that the construction of stormwater ponds on site will cause a barrier preventing groundwater flow. Ms. Cannan was also involved in the design of a drain system upgradient of the ponds to route water away from this area and minimize the potential for shallow groundwater problems.

Geomorphic Analysis

Reconstructed Little Medicine Bow River Evaluations, WY. Evaluation, quantification, and modeling of sediment impairment on the Little Medicine Bow River, focusing on a 3-mile reconstructed river reach in the Shirley Basin uranium mining district. Ms. Cannan's project work included cross section surveying, soil sampling, and geomorphic assessments. She was also responsible for the creation of a HEC-RAS model to identify sediment loads being delivered to the river by smaller tributaries as well as cross-section, historic photographic comparison, and temperature data analysis and reporting.

Hydraulic Analysis of the Chief Looking Glass Park River Reach, Asotin, ID. Ms. Cannan performed a geomorphic analysis of a reach of the Snake River in the vicinity of the Asotin Boat Launch in order to predict the impacts river sedimentation and deposition would have on the boat launch inlet. Analysis involved the creation and validation of a hydrologic and sediment transportation model to predict sediment deposition volumes and assess the risk of basin fill for various ramp constructions.

Research

Aquifer Storage and Recovery Investigation, Denver Basin, CO. As part of her M.S. thesis Ms. Cannan researched influences on the performance of Aquifer Storage and Recovery (ASR) in order to increase understanding of future water alternatives, guide operational choices, and inform decisions on the feasibility of ASR in new regions. Her work involved the creation of defined performance metrics, including the extent of hydraulic head changes in the

aquifer, fate of injected water particles, and recovery efficiency, and the creation of a groundwater flow model to test the performance of each metric within the Denver Basin. Model results demonstrated that each metric is sensitive to the presence of subsurface heterogeneity.

Hydrogeologic Characterization of the Denver Basin near Highlands Ranch, CO. Evaluations of ASR performance often assume homogeneity in the subsurface, overlooking the existence of preferential flow paths created by the combination of transmissive and non-transmissive inter-beds. As part of Ms. Cannan's M.S. work she characterized the subsurface geology of the Denver Basin, with a focus on the presence of heterogeneous structures. Ms. Cannan synthesized geologic data in the vicinity of Highlands Ranch to create heterogeneous, three-dimensional aquifer analogs using multiple-point geostatistical simulation.

Water Storage Dynamics, Tarrawarra Catchment, Southeastern Australia. For her research at the University of North Carolina Ms. Cannan investigated wetting and drying dynamics at the point and catchment scale and the effect of hysteretic water storage relationships on surface water-groundwater interactions to better understand catchment response to rainfall. A physics-based hydrologic response model of the Tarrawarra catchment was used to examine differences in hysteresis for rainfall events with differing durations and initial conditions. Results show that areas of average topography can be used to represent the average hydrologic state of the catchment.

Publications:

Cannan, C. Evaluating the Performance of Aquifer Storage and Recovery in the Heterogeneous Subsurface of the Denver Basin. Master's Thesis.

Cannan, C. Assessing Water Storage Discharge Dynamics at the Catchment Scale under Complex Wetting and Drying Conditions. Honors Thesis

Presentations:

"Assessing Water Storage Discharge Dynamics at the Catchment Scale under Complex Wetting and Drying Conditions": Poster Presentation at the 12th Annual Anadarko Research Symposium, 2014, Chapel Hill, NC

"Assessing Water Storage Discharge Dynamics at the Catchment Scale under Complex Wetting and Drying Conditions": Poster Presentation at the American Geophysical Union Fall Meeting, 2014, San Francisco, CA

REBECCA CARLSON, PE

Project Manager, Principal

Ms. Carlson's work is focused on water resource management and protection with a specialty in watershed districts. Her other areas of interest and expertise include groundwater modeling and hydrogeology. She has volunteered her time to develop and participate in public education programs about water resource protection.

EDUCATION

BS, Geologic Engineering with environmental emphasis; minor in Geology

PSMJ, Project Manager Boot Camp Training & Regular Refreshers

ArcView GIS Training

XP-SWMM Hydrologic and Hydraulic Model Training

Analytic Element Groundwater Modeling (MLEAM) Training

Dale Carnegie Course, Wenck Public Speakers Training

REGISTRATION

Professional Engineer: MN

SELECTED PROJECT EXPERIENCE

Stormwater Capture and Reuse, Kimball, Minnesota. Ms. Carlson prepared the grant application to secure state funding to design and implement a stormwater capture and re-use facility in the City of Kimball. This small town in central Minnesota is surrounded by agriculture. The city's stormwater drained, untreated, into a trout stream and a chain of nutrient impaired lakes. The resulting project provides a source of irrigation water for an existing highly used baseball field while mitigating drainage and erosion issues in the park. Ms. Carlson went on author an additional grant to implement Phase II of the project to provide further stormwater BMP retrofits for the City of Kimball to enhance the impact of the first project phase.

Clearwater River & Kingston Wetland Restoration, Kingston, Minnesota. Ms. Carlson designed a restoration of a 500-acre riverine wetland complex in Kingston Minnesota. The wetland complex was exporting soluble phosphorus, and depleting oxygen in the Clearwater River due to historical agricultural loads. The restoration maintained and enhanced the wetlands beneficial sequestration of particulate phosphorus while reducing both oxygen demand and soluble phosphorus export downstream. First year monitoring results show greatly improved dissolved oxygen concentrations in that section of the Clearwater River compared with pre-project concentrations. Data in that section of the river now shows water quality is meeting the state standard for DO. Rebecca also prepared the grant application to secure federal funding for the project.



AREAS OF EXPERTISE

Watershed District Engineering with a Specialty in Agricultural Watersheds
 Water Quality Monitoring Program Design, Management, and Implementation
 Water Quality Data Analysis And Modeling
 Agricultural BMPs
 Bacteria in Surface Water
 Hydrologic & Hydraulic Modeling
 (XP-SWMM, Hydrocad, HEC-RAS, HEC- HMS)
 Watershed Management, Watershed District Rules, and Permit Review
 TMDL Study Design and Implementation
 Groundwater Modeling (MLEAM),
 Groundwater/ Surface Water Interaction
 Volume Management, LID, Urban and Agricultural Stormwater BMPs

PROFESSIONAL MEMBERSHIPS

National and Minnesota Groundwater Association
 Women in Agribusiness
 Toastmasters International

Targeted Fertilizer Application Project, Watkins, Minnesota. Ms. Carlson assisted the Clearwater River Watershed District in developing a program through which cost share is provided to farmers to conduct gridded test soils and variable rate fertilizer application. Rebecca authored the grant for the project and assisted in the coordination of the project. Local co-ops market the program with their existing clients to reduce administrative burden on the watershed district, and then provide the data back to the district for analysis.

Stearns County Ditches 15, 25, 51, and 11, Freeport, Minnesota. Ms. Carlson assisted the Drainage authority under Minnesota State Statute 103E through repair proceedings on these ditches. Work included field surveys to determine the ACSIC elevation, preparation of Engineers Reports, extensive work with regulators including the Minnesota DNR, USACE, and WCA authorities, coordination with residents, and construction support.

Sauk River Watershed District Comprehensive Plan, Sauk Centre, Minnesota. Ms. Carlson managed the Sauk River Watershed District comprehensive plan update. Through the planning process, Ms. Carlson helped the staff navigate through a stakeholder intensive process which identified obstacles and presented solutions. The plan lays out a management unit strategy to achieve water quality goals for lakes and streams within the 1,041 square mile agricultural watershed district in central Minnesota.

Clearwater River Watershed District Comprehensive Plan, Annandale Minnesota. Ms. Carlson managed the Clearwater River Watershed District comprehensive plan update. Following completion of its TMDL studies, the District undertook an early, proactive update to its comprehensive plan. The plan guides the District through policy associated with achieving lake and stream water quality goals in the 160 square mile agricultural watershed district in central Minnesota.

Chain of Lakes Improvement Project, Central Minnesota. Ms. Carlson has worked with watershed district staff and residents to isolate the cause of declining water quality in Cedar Lake near Annandale, Minnesota, and formulate a solution. Rebecca modeled water quality in each of the chain of lakes, and designed a suite of BMPs and innovative solutions to restore the ecological habitat of upstream shallow lakes, while protecting the water quality of the downstream water body. The project entailed extensive stakeholder involvement and coordination. The project is ongoing.

Clearwater River Watershed District-Wide TMDL Study. Ms. Carlson is the project manager for the ongoing Clearwater River Watershed District TMDL studies. For that study, Rebecca secured a series of grants for the CRWD to conduct TMDL studies of 14 impairments within the District including three on the Clearwater River and 11 lakes. Rebecca evaluated existing data, prepared the monitoring work plans and implemented monitoring. The project maximizes use of existing data and uses innovative modeling methods to minimize costs. Phase III of the project includes lake and in-stream water quality modeling and setting the TMDL. Ms. Carlson works closely with the Watershed District Administrator, Board of Managers, and MPCA staff to facilitate public meetings and coordinate the project. This project is ongoing.

Long Prairie River TMDL. Through this Clean Water Act study of the Long Prairie River, Wenck assessed the causes, spatial and temporal extent, and severity of dissolved oxygen depletion in the River. The Long Prairie watershed is host to predominantly agricultural land use, as well as some waste water point sources. Ms. Carlson analyzed existing data and identified additional data needs. Rebecca helped to develop a work plan for additional data collection and water quality modeling. She managed Phase II of the Long Prairie River TMDL study, the state's first DO TMDL. She coordinated a project team of local and state governments and implemented a monitoring program to meet data needs for future project phases. The intensive synoptic field studies included a time-of-travel dye study, continuous dissolved oxygen monitoring on the Long Prairie River.

Trout Hatchery, Southern MN. Ms. Carlson modeled hatchery discharge temperatures and recommended hatchery management strategies to protect a trout stream in an agricultural area and prevent pathogens from entering the hatchery.

Shell Rock River Watershed District. Ms. Carlson prepared hydrologic and hydraulic models of the District using HEC-RAS and HEC-HMS to design a new outlet for Albert Lea Lake which drains an agricultural watershed. Ms. Carlson also designed the Shell Rock River Watershed Districts adaptive water quality-monitoring program. She analyzes data and models water quality in District lakes annually to identify opportunities for water quality, ecological, and hydrologic improvements for the District. Data is used to set management goals, design water

quality improvement projects and direct CIP dollars efficiently for this newly formed watershed district.

Murphy Warehouse, Minneapolis Minnesota. The Murphy Warehouse Company manages several large storage buildings in an older, industrialized portion of Minneapolis. Richard Murphy, President and CEO, contacted Wenck because he was concerned about the potential environmental impact of ongoing operations and was looking for ways to make the operations more sustainable. In addition to retaining Wenck to investigate options to both reduce energy use and incorporate renewable energy sources at the facility; Wenck was tasked with evaluating on-site storm water management options. Wenck's comprehensive business approach to the client's problem resulted not only in a sustainable solution to reduce storm water discharges with minimal business disruption, it also provided the client with an annual savings of \$68,000 in utility fees and a savings of \$24,000 in fines. In fact, the project was so successful at providing an effective, attractive retrofit and sanitary sewer disconnection; it received an Engineering Excellence Honor Award from the American Council of Engineering Companies of Minnesota and in 2009 was applauded by Minneapolis Mayor R.T. Rybak as "the single best green value that I can see in Minneapolis."

Tennant Corp., Minneapolis Minnesota. Ms. Carlson analyzed the materiality of water to the Tennant Corporation. The evaluation assisted Tennant in determining the significance of water to their organization internationally. This allows company leaders to allocate sustainability funding to achieve the maximum benefit.

Other MPCA TMDL Studies. Ms. Carlson is the project manager and senior technical staff for several other TMDL studies including:

- Elk River Watershed Management Organization TMDL studies (two lake nutrient impairments, one bacterium and two turbidity impairment, and three Dissolved oxygen impairments).
- Jessie Lake Nutrient Impairment
- Vadnais Area Lake TMDL for five lake nutrient impairments and Lambert Creek bacteria impairment

Prior Lake Spring Lake Watershed District. In addition to providing technical review of development permit applications for the District, reviewing rules, and drafting new rules, Ms. Carlson completed a study to compare cost and effectiveness of traditional stormwater management designs, high-intensity Low Impact Development (LID), and practical LID Best Management Practices (BMPs) to reduce runoff volumes and pollutant loadings. The findings were used to draft model stormwater management rules to apply to LID, volume management BMPs and nontraditional development and to craft incentive programs that encourage cities and developers to incorporate these techniques into their projects.

Ms. Carlson also uses the District's XP-SWMM models in ongoing design efforts to support the District's Outlet Channel Restoration Project, and also to guide the District's efforts to control runoff volume by evaluating the effect of proposed rules and volume mitigation strategies.

East Bethel Water Reclamation. Ms. Carlson prepared the conceptual design of groundwater infiltration galleries for the City of East Bethel, MN to infiltrate reclaimed water. The system is designed with a future vision of providing the reclaimed water to end users to conserve the state's water resources and avoid simply discharging wastewater into receiving waters.

Minnehaha Creek Watershed District. Through adaptive management of the Minnehaha Creek Watershed District's on-going annual water quality and quantity monitoring program, Ms. Carlson helped the Board of Managers, District staff and residents visualize water quality and hydrologic data to aide in decision-making and design of capital improvements, public outreach and education, and policy making. She also:

- Coordinated the efforts of eight state and local government agencies and a team of Wenck field staff to collect more than 3,000 water quality samples annually. Designed and managed the MCWD's database, including management of continuously collected data
- Analyzed water quality trends and pollutant loading for lakes and streams
- Modeled water quality
- Compiled data and analysis into annual Hydrologic Data reports for presentation to District staff, Board of Managers, and the public

Other Minnehaha Creek Watershed District Projects

Lake Minnetonka Model. Coordination and oversight of water balance, and water quality Model of Lake Minnetonka

Pathogen Study. Ms. Carlson analyzed the District's existing bacteria data, and prepared a technical memorandum with recommendations that were the scientific basis for the District's Pathogen policy.

Camp Coldwater Spring. Ms. Carlson analyzed hydrologic data including ground-water surface water interaction for the Camp Coldwater Spring case. She coordinated and prepared a technical memorandum presenting findings on Camp Coldwater. Conclusions from this technical memorandum helped the District win legal proceedings.

Aquatic Macrophytes. Ms. Carlson provided the District with technical information on Eurasian water milfoil nutrient cycling in lakes that helped the MCWD allocate funding and set policies on Eurasian water milfoil harvesting programs.

Public Relations, Public Education, Stakeholder Involvement and Facilitation

- Facilitated stakeholder involvement and conducted public meetings for the Clearwater River Watershed District TMDL Study and Cedar Chain of Lakes Improvement
- Close coordination with MCWD Education Coordinator and PR firm to produce press releases, and educational materials to promote water resource education

Publications and Presentations

"Targeted Fertilizer Application- A Rare Win for Producers and Water Quality," Minnesota Water Resources Conference, St. Paul, MN, October 2013.

"Leveraging Multiple Benefits and Funding Sources for Stormwater Capture and Beneficial Re-Use: Three Case Studies," LID Conference, Minneapolis, MN, August 2013.

"Water Quality Data for Lake TMDLs: How much is enough?" Presented and published May 2008 Accepted paper and presentation for the ASCE World Environment and Water Resources Conference Honolulu, HI.

"Water Quality Local Regulations, Practices and Policies Analysis," 2005 prepared for the Prior Lake Spring Lake Watershed District by Shannon Lotthammer, Diane Spector, and Rebecca Carlson.

"When Public Health and Water Quality Issues Overlap: The Role of Watershed Districts in Bacteria Monitoring". 2003 MAWD Annual Conference, 2004 Water Resource Conference by Rebecca Carlson.

"Application of Hydroinformatics for Watershed Districts" 35th Annual Water Resource Conference by Rebecca Carlson and Pamela Kiel Massaro.

"Hydrology of the Minnehaha Creek Watershed District" MCWD's April 2000 Open House.

Co-authored "Designing Piping Networks for Multi-Phase Extraction Systems" by M. Peramaki, B. Granly, R. Carlson (Carlson), M. Nelson presented at the Battell Conference, May 2000.

Water Resources Education Curriculum for a 4th through 6th grade audience, Bakken Museum, Summer 2000.

"Technical Requirements for a Second General Watershed Management Plan" for the Pioneer.

JASON COYLE

Environmental Scientist

Mr. Coyle has over 16 years of professional experience as a project manager and scientist in the environmental consulting industry. He has technical experience across all environmental disciplines including: site investigation, soil and groundwater remediation, compliance plans and permitting, emergency preparedness and response and emergency response. In addition, Mr. Coyle has experience in business operations including: entrepreneur of new company, strategic planning, client management, risk analysis, business development, proposal preparation, personnel management, and marketing. His extensive experience with program and project management activities include: project initiation, project scope development and control, quality control, stakeholder interaction and support, technical and cost proposals, scheduling, project team development, and project delivery on diverse projects including soil and groundwater investigation, and corrective action design and implementation.

EDUCATION

BS, Environmental Geology and Technology – Water Resources Emphasis,
University of North Dakota

SELECTED PROJECT EXPERIENCE

Subsurface Investigations. Projects included subcontractor management, billing, soil boring oversight, monitoring well installation, impacted soil delineation, soil and groundwater sampling, soil vapor sampling, and report writing.

Environmental Compliance Consulting. Managed nationwide AST compliance inspections for an international communications company, Spill Prevention Control and Countermeasures (SPCC) Plans, Storm Water Pollution Prevention Plans (SWPPPs), and Tier II Reporting.

Supervised all Environmental Group projects with annual billings of approximately \$3 million and eight personnel.

Environmental Site Characterization. City Economic Development Authorities, Class I and Class II railroads, petroleum facilities, industrial facilities, dry cleaners, manufacturing, and construction.

Managed and Coordinated Field Operations for Railroad Projects. Projects include emergency response, Phase I/II investigations, and soil characterization for capital improvement projects. Prepared and reviewed final reports and proposals for submittal to the client and regulatory agencies.

Brownfield Redevelopment. Investigation, cleanup, and grant management of both petroleum and non-petroleum contaminants of brownfield redevelopment projects.



AREAS OF EXPERTISE

Site Investigation
Incident Command
Incident Response
Emergency Planning and
Response

TRAINING/

CERTIFICATIONS

HAZWOPER 40-Hour
HAZWOPER 8-Hour
Refreshers
eRAILSAFE Safety
Certificate
Hazardous Materials
Technician
FEMA ICA 100, 200, 300,
700 Certified
Tank Car Specialist

Project Management. Environmental, geotechnical, and construction materials testing projects. Performed marketing, proposal preparation, contract execution, produced work orders, reviewed field tests and results, report and letter writing, client liaison, managed billing and collections.

Companywide coordinator/supervisor of environmental and geotechnical drilling schedule, techniques, compliance, and equipment maintenance.

Manager of St. Cloud and Alexandria Minnesota offices. Complete oversight of eight employees and \$800K annual revenue.

Entrepreneur of environmental/geotechnical consulting company. Developed all components of environmental, materials testing and soil exploration company.

Operated and maintained of soil and groundwater treatment systems.

Provided field services and assistant project management for environmental, geotechnical, and construction materials testing projects.

BRYCE CRUEY, PE, CFM

Water Resources Engineer

Mr. Bryce Cruey has over ten years of project experience working for clients from both private and public industry throughout the Western and Midwestern United States. Areas of expertise are river engineering, flood plain management, river hydraulics, hydraulic modeling, and water resource management. He has worked on numerous projects that include hydrologic and hydraulic modeling, surface water management plans, best management practice design, dams, spillways, river engineering, stream restoration, sediment transport, water balance studies, water supply, flood studies, environmental assessments, and cost estimates. Mr. Cruey is proficient using the following hydraulic and hydrologic models: HEC-RAS, FLO-2d, HEC-6T, HEC-HMS, HydroCAD, SWMM5, and XP-SWMM. He is versed in programming languages such as VBScript, FORTRAN, Python, MatLab, and VBA for Applications.

Mr. Cruey is a Certified Floodplain Manager (CFM) having met the stringent training, experience and practical examination requirements of the Certification Program, which is recognized by the Association of State Floodplain Managers (ASFPM).

EDUCATION

BS, Environmental Resource Engineering-
Humboldt State University, Arcata, CA

SELECTED EXPERIENCE

Water Resources Engineering and Analysis

Oak Glen Creek Subwatershed Assessment (2017). Mr. Cruey was the lead engineer in the development of flood mitigation strategies that would benefit the Oak Glen Creek subwatershed as part of the Coon Creek Watershed Districts overall subwatershed assessment effort.

Coon Creek Watershed District Comprehensive Model Update (2014-2016). Mr. Cruey was the lead development engineer for a comprehensive updated watershed model for Coon Creek Watershed I Anoka County, MN. This project entailed georeferencing the model, linking it to a geo database, updating storage areas to reflect current LiDAR topography, replacement of large storage areas with cross sections surveyed by the District, and Atlas 14 hydrology. This model is no annually updated to reflect current design and development throughout the District and has been reviewed by the MNDNR.

Canesteo Pit Drawdown Feasibility (2014). Mr. Cruey developed an EPA-SWMM model that was used to estimate the drawdown timing of Canesteo pit in Northern MN.

Moccasin Creek Aesthetic Improvement Feasibility (2013-2014). Mr. Cruey Developed an update HEC-RAS model for this project to estimate the flood impacts of an aesthetic improvement to the channel.



AREAS OF EXPERTISE

River Hydraulics
River Engineering
Floodplain Management
Stormwater Management
Site Design
Hydraulic Modeling
Hydrologic Modeling
Water Resources
Management
Water Quality Modeling

REGISTRATION

Professional Civil Engineer:
CA (79869), MN
(49210), CO (0052677),
Certified Floodplain
Manager: MN (32869)

Apple Valley Pond Drawdown Feasibility (2012). Mr. Cruely was the lead engineer responsible for analyzing multiple scenarios to best improve the water quality in select stormwater ponds in Apple Valley, MN. Methods analyzed were pond drawdown, increasing dead storage, and iron enhanced filter benches/ modifying the outlet structure.

Lake Grace Drawdown feasibility (2012). Mr. Cruely was the lead engineer responsible for determining the feasibility of a lake drawdown for the Lake Grace chain near Chaska, MN in order to improve sediment entrainment, promote vegetation growth, and decrease invasive fish populations. An EPA-SWMM5 model was built to model the basin. Drawdown alternatives such as modification to the outlet structures were assessed. Lake drawdown timing and duration were analyzed.

City of Plymouth Feasibility Report (2012). Mr. Cruely was the lead water resources design engineer and modeler for a feasibility study done for the City of Plymouth, Minnesota. The goals of the study were to reduce total phosphorus to a set goal so that the City could receive funding for the project. Mr. Cruely developed alternatives with close coordination with the City staff.

Finch Ranch Aggregate Mining Project (2007-2008). Mr. Cruely was a project engineer responsible for the development of a hydrology report and site design for North Valley Rock's Mining and Reclamation Act Permit Application. Mr. Cruely developed hydrologic relationships for 300 acres of ranchland for pre and post project conditions to demonstrate compliance with the California Environmental Quality Act (CEQA), the California Mining and Reclamation Act requirements. He developed the pre and post project site plan with integrated mining schedules, access road placement, and monitoring well placement.

Design

South Creek Trout Stream Restoration Project (2016-2017). Mr. Cruely was the lead and signing engineer for the restoration of 1400 ft of rural trout stream near Farmington, MN. This design incorporated on site materials as well as rock to stabilize eroding slopes and to return the creek to a more natural state. Installation of rock vanes, root wads, cover bolder also provided instream habitat for native trout.

Eagan Project EP-2.01 Iron Enhanced Sand Filter Design (2015-2016). Mr. Cruely was the lead and signing engineer for this pond retrofit project. The purpose of this project is to target the removal of phosphorus from incoming stormwater before the pond discharges into North Lake. This project is part of the City's overall goal to reach water quality improvement City wide. Mr. Cruely led a team of engineers, surveyors and scientists to provide the City of Eagan full engineering design, survey, wetland delineation, permitting, and construction management services.

Eagan Project GP-1.2 Iron Enhanced Sand Filter Design (2016-2017). Mr. Cruely was the lead and signing engineer for this pond retrofit project. The purpose of this project is to target the removal of phosphorus from incoming stormwater before the pond discharges into Burr Oaks Lake. This project is part of the City's overall goal to reach water quality improvement City wide. Mr. Cruely led a team of engineers, surveyors and scientists to provide the City of Eagan full engineering design, survey, wetland delineation, permitting, and construction management services.

Eagan Project AP-42 Iron Enhanced Sand Filter Design (2016-2017). Mr. Cruely was the lead and signing engineer for this pond retrofit project. The purpose of this project is to target the removal of phosphorus from incoming stormwater before the pond discharges into Cliff Lake. This project is part of the City's overall goal to reach water quality improvement City wide. Mr. Cruely led a team of engineers, surveyors and scientists to provide the City of Eagan full engineering design, survey, wetland delineation, permitting, and construction management services.

Eagan Project LP-26.3/Lp-26.5 Iron Enhanced Sand Filter Design (2016-2017). Mr. Cruely was the lead and signing engineer for this pond retrofit project. The purpose of this project is to target the removal of phosphorus from incoming stormwater before the pond discharges into Fitz Lake. This project is part of the City's overall goal to reach water quality improvement City wide. Mr. Cruely led a team of engineers, surveyors and scientists to provide the City of Eagan full engineering design, survey, wetland delineation, permitting, and construction management services.

Treehouse Foods Iron Enhanced Sand Filter and Flood Mitigation Design (2015-2017). Mr. Cruely was the lead and signing engineer for this pond retrofit and flood mitigation project. The purpose of this project is to target the removal of phosphorus from incoming stormwater before the pond discharges into Oak Glen Creek. Mr. Cruely led a team of engineers, surveyors and scientists to provide the City of Eagan full engineering design, survey, wetland delineation, permitting, and construction management services.

Cottageville Park Underground Iron Enhanced Sand Filter Design (2014). Mr. Cruey was the design engineer responsible for designing an underground sand filter system.

City of Davenport Pond Design (Pond D) (2014). Mr. Cruey was the lead engineer on the design of a flood mitigation pond. This pond was designed to meet the City of Davenport's ultimate development goals for rate control.

Gopher Emergency Overflow Spillway Design (2014). Mr. Cruey designed a spillway overflow for an onsite pond at the Gopher site in the City of Eagan, MN.

Fox Hollow Golf Club Holes 16 and 17 Mass Grading Plan, Rock revetment, and Course Design (2015-2016). Mr. Cruey Designed rock revetment protection and water features for the remodeling of Fox Hollow Golf Club in St. Michael, MN. This project was in the floodway which created unique constraints for this project. This project was constructed in 2016.

Hay Creek Trout Habitat and Stream Restoration (2013-2014). Mr. Cruey was the lead design engineer and project manager for a design build project on Hay Creek, south of Redwing, MN. For this project Mr. Cruey and project team walked over 5,000 linear feet of stream and identified the problem areas for habitat, slope stability, and stream function. The design incorporated channel restoration/stabilization techniques that increased the function of the stream as habitat for wild trout.

Wright County Ditch 10 Plans and Specifications (2013-2014). Mr. Cruey was the lead engineer and project manager for the setup, and distribution of plans and specifications targeting ditch cleanout and maintenance for CD-10 in Wright County.

Hillshire Brands Rain Garden and Stormwater Improvements Design (2012-2014). Mr. Cruey was the lead design engineer and project manager for the design of a series of rain gardens to treat bacteria from one of the Hillshire Brands Turkey processing plants in Storm Lake Iowa. This project was part of an effort to improve the drainage on the site by reducing ponding during storm events and to treat bacteria in the stormwater so that the company could meet bench mark limits set by the City of Storm Lake and the Iowa DNR.

SADOFF Industrial Stormwater Pond Design (2013). Mr. Cruey performed storm sewer site design calculations and sized a pond for SADOFF. EPA SWMM was used for this analysis.

Bayside Industrial Stormwater Pond Design (2012). Mr. Cruey performed storm sewer site design calculations and sized a pond. EPA SWMM was used for this analysis.

Kingston Wetland Restoration and Channel Design (2012-2013). Mr. Cruey was the design engineer for a wetland restoration and channel design project for the Clearwater Watershed District. His efforts included development of a basin wide H&H model of the system that was used to determine peak flows and channel velocities that were to be incorporated as design parameters. He developed report sections, report figures, and the final plan set that was bid out to contractors.

Floodplain Management and Flood Risk Modeling

Spring Flood Forecasting (2014). Mr. Cruey modeled a spring snowmelt event on Minnehaha Creek in order to forecast flood risk inundation.

Fox Hills Development (2014). Mr. Cruey is the lead floodplain manager for this development in Watford City, ND. He facilitated the organization of materials and preparation of documentation for a conditional letter of map revision based on fill (CLOMR-F). He facilitated correspondence with the City in order to obtain preliminary floodplain development permits.

Fox Hollow Golf Club No Rise Analysis (2013). Mr. Cruey was the lead engineer and project manager for this project. The project consisted of development of alternative designs for two holes at the Fox Hollow Golf Club in St. Michael, MN that experience frequent flooding. For the alternatives Mr. Cruey lead a project team that performed the necessary hydraulic modeling to show that there would be no impact to the adjacent Floodway along the Crow River. As a result of this project a No-Rise Certificate was prepared.

JR Industrial CLOMR in Killdeer, ND (2013). Mr. Cruey was the lead floodplain manager, modeler, and project manager for the preparation of a conditional letter of map revision (CLOMR) application for a development in North

Dakota. The development was within the 100-year floodplain of Spring Creek near Killdeer, ND. Mr. Cruey prepared a conditional letter of map revision based on fill (CLOMR-F) application.

West Broadway LOMR in Brooklyn Park, MN (2012-2013). Mr. Cruey was the lead engineer, floodplain manager, and project manager for a letter of map revision (LOMR) application along Shingle Creek in Brooklyn Park, MN. Mr. Cruey performed the necessary hydraulic computations in HEC-RAS that showed that there would be no impact to flood elevations associated with lengthening the culvert under West Broadway Ave. Mr. Cruey prepared LOMR application documents and submitted them to FEMA.

Leins LOMR in Aberdeen SD (2012-2013). Mr. Cruey performed hydraulic analysis in HEC-RAS necessary to add additional detailed study area to Foot Creek in Aberdeen, SD. Mr. Cruey prepared necessary documents for a letter of map revision (LOMR) application.

Thief River Falls Dam Break Analysis (2011-2012). Mr. Cruey was the project engineer responsible for the development of an unsteady HEC-RAS model for the Red Lake River in the City of Thief River Falls. The model was used to compare and map dam break scenarios for the probable maximum flood (PMF), 100-year flood, and a sunny day (normal) condition. The client received a report summarizing the results of the analysis and inundation maps showing the flood risk to residences downstream of the dam.

Red Lake River Floodway Determination (2011). Mr. Cruey was the engineer responsible for defining the floodway for the existing detailed HEC-RAS model for the Red Lake River in Pennington County Minnesota. The floodway study was performed in accordance to FEMA and Minnesota state standards for the development of an updated DFIRM database for the community.

San Francisco Bay 100 Year Flood Delineation (2010-2011). Mr. Cruey was a project engineer for a flood plain delineation study in the San Francisco Bay. Mr. Cruey generated the wave run up associated with 100-year still water elevations in the San Francisco Bay. The study was in accordance to FEMA Coastal Standards for the re-delineation of the base flood elevation in Solano, Marin, Napa, and Contra Costa Counties. He developed a script to compile and analyze flood water elevations associated with initial wave conditions and develop input files for the wave run up model Wave Height Analysis for Flood Insurance Studies (WHAFIS).

CVSC Analysis and Floodplain Analysis (2010-2011). Mr. Cruey was the engineer responsible for the generation of HEC-RAS and FLO-2d Hydraulic models for the Coachella Valley Watershed District in order to assess the functionality of the existing levee system along the Coachella Valley Storm Water Channel. Developed hydraulic models and used output to assess flood risks associated with levee overtopping and failure. Mr. Cruey developed a FLO-2d model with recent LiDar survey data and breakout hydrographs from the RAS model. Results were used to map the flood inundation.

Water Quality Studies and BMP Assessments

City of Eagan, Lake Management Plans for Thomas and Blackhawk Lakes (2012). Mr. Cruey developed a suite of best management practices that would improve water quality in several lakes throughout the City of Eagan. This project led to the City's 5-year CIP plan.

City of Eagan, Lake Management Plans Neighborhood Lakes (2013-2014). Mr. Cruey developed a suite of best management practices that would improve water quality in several lakes throughout the City of Eagan. This project led to the City's 5-year CIP plan.

Anne River TMDL (2012). Mr. Cruey developed a suite of BMPs to treat hot spot areas throughout the subwatershed for the implementation plan of this TMDL.

Lower Sauk River BMP Plans (2011). Mr. Cruey was the engineer responsible for the development of a P8 model for the cities of Rockville, Cold Spring, and St. Joseph Minnesota. The model was used to assess existing total suspended sediment and total phosphorus loads and to develop a Best Management Plan for each of the cities. Various projects and cost estimates were suggested to the cities in high pollutant loading areas to reduce the impact to the Sauk River overall water quality.

Clear Lake Diagnostic Study (2011). Mr. Cruey was the project engineer responsible for the development of a P8 model for the Rice Watershed District during a diagnostic study on Clear Lake near Forrest Lake, MN. The model was

based on existing conditions hydrology and the most up to date pond, topographic, and climate information. Mr. Cruey calibrated the model to measured water quality data. Results were used to prepare a best set of management practices within the watershed to reduce pollutant loading into the lake.

Eden Valley Pollutant Load Assessment (2011). Mr. Cruey was the engineer responsible for the development of a P8 model for the city of Eden Valley, MN for the Sauk River Watershed District. The purpose of this model was to estimate annual pollutant loading within the watershed to make a set of recommendations for best management practices. A results summary was presented with figures and a technical memorandum.

Bald Eagle Lake Implementation Plan (2011). Mr. Cruey was a project engineer and technical assistant in the development of an implementation plan for Bald Eagle Lake, MN. Developed best set of BMPs and a hydrologic and water quality assessment.

NDEP Pollutant Load Reduction Model (2009-2011). Mr. Cruey was a part of the development of South Lake Tahoe's Pollutant Load Reduction Model (PLRM) for the South Lake Tahoe Utilities District. His role was primarily as a field engineer for data collection and he provided external QA/QC on the model documentation and functionality. Mr. Cruey compared outputs for the model with outputs from SWMM5 to QA/QC model.

Tahoe BMP Database (2009-2011). Mr. Cruey was a part of the development of South Lake Tahoe's BMP database for the South Lake Tahoe Utilities District. His role was primarily as a field engineer for data collection and he provided external QA/QC on the database documentation and functionality.

Tahoe STPUD Comprehensive Facility Wide Erosion Control Project (2008-2011). Mr. Cruey collected and analyzed data for the determination of areas within the Tahoe basin were directly connected for the development of localized comprehensive erosion control models for the South Lake Tahoe Utilities District. Mr. Cruey performed field collection tasks, model development, and report QA/QC.

Hydrologic and Hydraulic Engineering

Moccasin Creek Sedimentation Channel Design (2013). Mr. Cruey developed an HEC-RAS model of Moccasin Creek in Aberdeen, SD in order to determine a channel design that would carry velocities high enough to flush out sediment coming into the system from upstream agricultural practices and urban runoff.

Six Mile Creek H&H Modeling (2013). Mr. Cruey was the lead modeler for a comprehensive hydrologic and hydraulic model in EPA-SWMM5 of the six-mile Creek portion of the Minnehaha Creek watershed.

Aberdeen I&I Study (2012). Mr. Cruey was the lead modeler for an inflow and infiltration model designed for the City of Aberdeen, SD. Mr. Cruey used XP-SWMM to model the sanitary system. The model was calibrated to data collected at various lift stations throughout the modeling domain.

Glen Creek H&H Model and Sit Design (2011). Mr. Cruey developed an HEC-RAS model of Glen Creek in Plymouth, MN. The objective of the model was to model existing and post construction hydraulics through the system. Mr. Cruey used the model to develop a design channel that was stable under the various flow conditions of the area.

Dry Lake Solar (2011). Mr. Cruey was the engineer responsible for the development of a hydrologic model and hydrology report for Westwood Professionals. The study was done to support the current and proposed conditions hydrology for the Dry Lake Solar II project in Arizona.

Ocotillo Wind Farm (2011). Mr. Cruey was the engineer responsible for the development hydrologic input parameters for a two-dimensional FLO-2D model for the Ocotillo Wind Farm project in Southern California.

Elm River Intake Design (2011). Mr. Cruey developed an HEC-RAS model to assess velocities and shear stresses for pre and post project conditions near the water intake at the Aberdeen South Dakota Water Treatment Plant. The information was used to address sedimentation issues near the WTPs intake facility.

Pajaro River and Salsipuedes Creek Hydraulic Model Update (2009-2010). Mr. Cruey was the project engineer responsible for updating an HEC-RAS model for the United States Army Corps of Engineers (USACE) San Francisco District with new geometry to reflect up-to-date survey data.

Sedimentation Engineering Design and Studies

Wes Herman Pond Design (2011-2013). Mr. Cruey was the lead engineer and project manager for a project where he designed a series of pond/sediment collection basins to solve a sedimentation and erosion issue due to an unstable ravine for a client through the Scott County Soil and Water Conservation District, Minnesota. The deliverable for the client was a set of construction design sheets, engineering cost estimates, and sediment trap efficiencies for the design.

Elm River Intake Design (2011-2012). Using an HEC-RAS model developed for the site, channel realignment was designed to induce velocities at the face of a filter berm to allow filtration without sediment accumulation at the face of the berm. The purpose of this analysis was to provide a solution to sedimentation issues at the intake.

Sacramento River Sediment Study (2010-2011). Mr. Cruey an engineer responsible for a sediment transport study on the Sacramento River in California. He was on the development team of a HEC-6T sediment transport model for the River and its major tributaries. The model was used to estimate aggradation and degradation over a 10-year period and to evaluate spawning gravels and bank erosion rates within the Sacramento River Flood Control System. Efforts for this project were rewarded with an extended scope of work for other areas along the Sacramento River watershed.

Pajaro River and Salsipuedes Creek Hydraulic Model Update (2009-2010). Mr. Cruey developed a relationship between historic and recent repeat survey information to estimate aggradation and degradation. Mr. Cruey prepared figures and report documents to summarize updates to the model and sensitivity results.

Putah South Canal Sedimentation Study (2007-2011). Mr. Cruey was a lead engineer for sediment budget study on the Putah South Canal for the Solano County Watershed District in California. The goal of this study was to identify sources of sediment erosion, some included highly unstable ravines and creeks, and come up with a set of best management solutions to control the sedimentation.

Monitoring and Data Collection

Elm River Intake Study (2009-2011). Mr. Cruey was the engineer responsible for the collection of bathymetric data for the City of Aberdeen South Dakota's Water Treatment Plant in order to assist in the design of a new water intake system.

Sacramento River Sediment Study (2010-2011). Mr. Cruey collected bottom sediment samples and suspended sediment samples at various locations within the study reach in order to calibrate a sediment transport model.

Pajaro River Velocity Measurements (2009-2011). Mr. Cruey was the project engineer responsible and a project manager for the development of a winter velocity measurement monitoring program on the Pajaro River, Salsipuedes Creek and Corralitos Creek in California. Stream velocities were measured using large scale particle image velocimetry (LSPIV), price AA, and ADCP for the USACE San Francisco District. Mr. Cruey designed a mobile imaging system for measuring velocities utilizing the LSPIV method. Mr. Cruey Analyzed different velocity measurement alternatives and prepared report documents.

Little Shasta River Topographic Survey (2009). Mr. Cruey was the engineer responsible for the collection topographic survey data to be used for the development of a base map. The base map was used to do channel modification and fish passage designs.

Highway 32 Bathymetric Survey (2008). Mr. Cruey was the lead field engineer responsible for the collection of topographic and bathymetric survey data on the Sacramento River at the Highway 32 crossing near Chico California for the Army Corps of Engineers, Sacramento District. Mr. Cruey delivered survey data points, an erosion assessment, and a basemap to the client.

Putah South Canal Sedimentation Study (2007-2011). Mr. Cruey developed monitoring plans, identified sediment sources, and managed field crews. Monitoring efforts were stretched over three years.

Project Management

Mr. Cruvey served as project manager on the following projects:

- South Creek Trout Stream Restoration Project (2016-2017).
- Eagan Project EP-2.01 Iron Enhanced Sand Filter Design (2015-2016).
- Eagan Project GP-1.2 Iron Enhanced Sand Filter Design (2016-2017)
- Eagan Project AP-42 Iron Enhanced Sand Filter Design (2016-2017)
- Eagan Project LP-26.3/Lp-26.5 Iron Enhanced Sand Filter Design (2016-2017)
- Treehouse Foods Iron Enhanced Sand Filter and Flood Mitigation Design (2015-2017)
- Fox Hollow Golf Club No Rise Analysis (2013-2014)
- Hay Creek Trout Habitat and Stream Restoration (2013-2014)
- JR Industrial LOMR in Killdeer, ND (2013-2014)
- Wright County Ditch 10 Plans and Specifications (2013-2014)
- West Broadway LOMR in Plymouth, MN (2012-2014)
- Hillshire Brands Rain Garden and Stormwater Improvements Design (2012-2014)
- Wes Herman Pond Design (2011-2013)

Publications

MacArthur R, Rabidoux A, Shvidchenko A, Anderson L, Cruvey B, Pan J., (2009). Developing science-based strategies to manage water conveyance and control weeds and sediment in irrigation and potable water supply canals. 2009 Proceedings of the California Weed Science Society, Volume 61, papers presented at the 61st Annual Conference, Sacramento, CA, 12-14 January 2009.

Leclerc R., Hall B., Haltas I., Cruvey B., (2009). Hydromodification Analysis of Small, Ungaged Watersheds, a Case Study of Alder Creek, California. Proceedings (CD-ROM) of the 33rd IAHR 2009 Congress "Water Engineering for a Sustainable Environment", ISBN: 978-94-90365-01-1, pgs 6082 – 6089, papers presented August 9 - 14, 2009, Vancouver BC, Canada.

Hall B, Shvidchenko A, Leclerc R, Adams L, Copeland R, Cruvey B., (2010). Comprehensive geomorphic and sedimentation analyses of lower Sacramento River for flood management, erosion mitigation and habitat enhancement design. Joint Federal Interagency Conference 2010 "Hydrology and Sedimentation for a Changing Future: Existing and Emerging Issues". Proceedings (CD-ROM) of the 4thd Federal Interagency Hydrologic Modeling Conference and of the 9th Federal Interagency Sedimentation Conference, Las Vegas, NV, June 27-July 1, 2010.

MacArthur R, Rabidoux A, Shvidchenko A, Hanes T., Cruvey B., and Pan J., (2010). Investigation of sources of turbidity and sediment in Putah South Canal, Solano County, California, USA. 34th IAHR World Congress, Brisbane, Australia (26 June – 1 July 2011).

CHRIS ECKLUND

CAD/GIS Designer

Mr. Ecklund has 19 years of experience as an engineering technician. He is a versatile CAD designer and GIS technician who has applied his skills to a variety of projects requiring detailed drawings and maps. His wide range of experience includes developing site location maps, construction plan sheets, industrial process pipe designs, piping and instrumentation designs, and GIS figures depicting road conditions. He has worked for clients in both the public and private sectors.

Mr. Ecklund has worked as a project inspector for several landfill projects in Minnesota. He has also completed HAZWOPER 40-hour training along with a yearly refresher course.



EDUCATION

AS, Architectural Drafting and Design, Northwest Technical Institute

PROJECT EXPERIENCE

Confidential Client, Canola Processing Facility in Yorkton, SK. Duties included working on general arrangements, 3D Modeling and P & ID drawings. (2012)

MnDOT, Township Signing Program, Wright and Stevens counties, Minnesota. Generated plans for project consisting of plan sheets, along with tabulations and miscellaneous detail sheets. (2012)

Waste Management, Inc. - Elk River Landfill, 2012 Gas Separation Project, Elk River, Minnesota. On-site inspector for construction oversight and monitoring, documentation and reporting for the construction of and modifications to the active gas system in 2011. Duties included overseeing trench excavation, fusing of HDPE piping, installation of a variety of pipe sizes, and pipe quality control testing. Tasks included providing daily field reports and drafting of the final documentation report. (2011)

MPCA, Paynesville Sanitary Landfill Closure, Paynesville, Minnesota. On-site inspector for waste re-location and closure of waste area. Closure consisted of installing liner and buffer soils. Additional duties included maintaining daily reports, coordinating schedules and addressing construction related issues with the contractor. (2011)

Waste Management, SPCC Plans, Minnesota Sites. Generated site location and detailed site map figures. These plans were generated in GIS/CAD formats. (2010)

Waste Management, SWPPP Plans, Minnesota Sites. Generated site location and detailed site map figures. These plans were generated in GIS/CAD formats. (2010)

City of McGrath, Wastewater Treatment Improvements, McGrath, Minnesota. Created construction plans for project consisting of plan/profile sheets along with

AREAS OF EXPERTISE

AutoCAD
GIS
Project Inspector
Landfill Operation and Maintenance

TRAINING/ CERTIFICATIONS

Microstation V8
AutoCAD Civil 3D 2014
CADWorx 2014
Arc GIS/Map 10.2
Microsoft Office Suite

general notes and miscellaneous detail sheets. (2010)

Forest City, Wastewater Treatment Improvements, Forest City, Minnesota. Created construction plans for project consisting of plan/profile sheets along with general notes and miscellaneous detail sheets. (2010)

Olmsted County Department of Public Works, Bypass Area Closure – Kalmar Landfill, Olmsted County, Minnesota. On-site inspector for bypass area closure. Closure consisted of installing liner and buffer soils. Additional duties included maintaining daily reports, coordinating schedules and addressing construction related issues with the contractor. (2009)

Olmsted County Department of Public Works, Demolition Area Closure – Kalmar Landfill, Olmsted County, Minnesota. On-site inspector for demolition area closure. Closure consisted of installing buffer soils and installing leachate extraction well with leachate loadout station. Additional duties included maintaining daily reports, coordinating schedules and addressing construction related issues with the contractor. (2009)

Landfill Operation and Maintenance. Performed monthly landfill gas monitoring, flare monitoring, and leachate monitoring for landfill operation and maintenance. Additional duties include routine and non-routine maintenance on landfill flare.

- Minnesota Pollution Control Agency
- Dakhue Landfill – New Trier, Minnesota
- Oronoco Landfill – Oronoco, Minnesota
- Winona Landfill – Winona, Minnesota
- Albert Lea Landfill – Albert Lea, Minnesota

City of Zimmerman, Lift Station 2 Rehab, Zimmerman, Minnesota. Project inspector for removal of existing lift station and replacement of new lift station. Work also included water main relocation, sewer connections and storm sewer relocation. Additional duties included maintaining daily reports, coordinating schedules and addressing construction related issues with the contractor. (2007)

City of Zimmerman, Maefield Estates 2nd Addition, Zimmerman, Minnesota. Project inspector for plans, technical specifications, drawings and construction services during the installation of lift station, sanitary sewer, water main, storm sewer, and bituminous overlay. Additional duties included maintaining daily reports, observing hydrostatic testing of water main, observing air pressure and mandrel testing of sanitary sewer, coordinating schedules and addressing construction related issues with the contractor. (2006)

City of Zimmerman, Water Treatment Facilities Improvements, Zimmerman, Minnesota. Contributed to the design of the process piping for the 4th Avenue South treatment plant along with generating civil sheets containing proposed grading and site piping information. (2005).

City of Zimmerman, Wellhead Protection Plan, Zimmerman, Minnesota. Created GIS figures and tables needed to document the DWSMA for well No. 3. (2007)

City of Zimmerman, Street Study Plan, Zimmerman, Minnesota. Created GIS figures depicting years constructed, conditions of existing roads. (2007)

City of Elysian, Chestnut's 3rd Addition Utility/Street Improvements, Elysian, Minnesota. Created construction plans for project consisting of plan/profile sheets along with general notes, removal, and miscellaneous detail sheets. (2007)

Canadian National/Duluth Missabe & Iron Range Railway Company, Limited Storm Wastewater Study, Duluth, Minnesota. Generated plans indicating storm and sanitary information, watershed information, and recommended improvements. (2006)

Peerless Chain, Wastewater Treatment System, Winona Minnesota. Contributed to the design of the wastewater treatment system. Created plan sheets showing the layout of equipment and piping, along with sections and P & ID drawings. (2006)

CARL ENZENAUER, PE

Chemical/Process Engineer

Mr. Enzenauer has over nine years of experience with Wenck. Carl has knowledge of chemical process equations, process modeling and simulation software, pollution control, and process design.

EDUCATION

BS, Chemical Engineering, University of Minnesota Duluth

SELECTED EXPERIENCE

Process/mechanical engineering lead for a \$500,000 dehumidifier replacement project at a municipally owned community center pool. Worked with vendors on up front design to specify units and procure accurate quotes. Managed design team to product design drawings for demolition of old equipment and installation of new. Created bidding documents and managed public bidding for installation. Provided field support and QA/QC of installation.

Process engineer / lead technical auditor for Boiler MACT energy assessments for various clients. Performed field visits to view the boilers and steam systems. Identified potential energy re-use and savings opportunities. Provided cost estimates and simple payback for installations. Performed these assessments at agricultural processing facilities, chemical facilities, waste to energy facilities, and manufacturing facilities.

Process engineer / technical auditor for Process Safety Management (PSM) program auditing of ammonia refrigeration systems. Provided third party auditing to fulfill the auditing requirements of the PSM/RMP program for highly hazardous processes. Provided a list of audit findings to the facility for correction. Also performed process hazard analysis' (PHA) on ammonia refrigeration systems and provided a listing of follow up items for the facility to correct.

Process/mechanical lead on a pipeline capacity study to validate maximum carrying capacity of a high pressure natural gas transmission line. Performed pressure drop and capacity calculations to show how a new large user would impact the current line.

Process/mechanical engineering lead for a \$2,000,000 conveyance and sizing/sorting replacement project at a food processing facility. Worked with Wenck designers on conveyor layout and coordinated input from the Client and equipment vendors. Updated process drawings (P&IDs) and coordinated electrical and controls design work for new equipment and re-feeding selected existing equipment.

Process engineering lead for a \$2,000,000 boiler replacement project at a food processing facility. Sized all new piping, valves and instrumentation as well as evaluated existing piping for re-use. Worked closely with project designers on locating flow meters in existing piping for ease of access and proper flow conditions. Coordinated control strategy with the Client to integrate new boiler



AREAS OF EXPERTISE

Industrial Process Design
Process Simulation
Modeling
Process Engineering
Control and Safety Valve
Sizing
Control and
Instrumentation
Specification

REGISTRATION

Professional Engineer: MN

CERTIFICATIONS

HAZWOPER 40-Hour
HAZWOPER 8-Hour
Refreshers

controls into existing facility control system.

Process engineer on a design team for a zero-effluent discharge system at an oilseed facility. Validated line sizing and valve selection as well as performed analysis on safety relief valve scenarios. Worked with client on equipment selection "clean-in-place" system design.

Process engineering lead for a \$14,000,000 steam system expansion at a waste to energy facility. Performed material and energy balances around new and existing process equipment. Evaluated existing equipment and piping for re-use in processing capacity and design conditions. Created piping and instrumentation diagrams (P&IDs) and modified existing P&IDs for new process considerations. Set process design basis for new equipment ancillary to new boiler.

Created a computer simulation of process operations for an iron foundry using the simulational software Flexsim. Interfaced with client to provide a realistic simulation of processing time, raw material usage, human labor interaction, product packaging and on-site transportation. The simulation allowed the client to optimize production schedules and evaluate employee staffing needs.

Surveyed stormwater ponds and pond basins for a single client in city-wide pond inventory through use of GPS survey equipment. Evaluated inlet and outlet pipe conditions as well as noted erosion at said in/outlets. Noted pond vegetation as well as basin vegetation with special consideration for invasive species. Performed sediment survey of ponds for client use in determination of necessary remediation (dredging).

Provided construction oversight on a variety of projects:

- Landfill closure cover liner installation and soils inspections.
- Cattle and swine feedlot/manure collection concrete, structural steel and soils inspections.
- Stream bank restoration soils installation inspection.
- Evaluated grading and set elevations through use of GPS survey equipment

Assembled materials and wrote reports for several large scale industrial wastewater discharge permit applications. Created spreadsheets analyzing discharge water concentrations combined from several process operations. Evaluated options for minimizing discharge concentrations and volumes through water re-use in process operations. Interfaced with the Minnesota Pollution Control Agency to address concerns and provide supplemental information.

Assembled equipment specifications for an oilseeds wastewater treatment facility in Mexico.

Prepared Stormwater Pollution Prevention Plans for several agribusiness clients. Created drawings and modified existing drawings showing stormwater drainage and site layout. Wrote reports and recommended Best Management Practices for client approval.

Assisted on design team for a 2,400 MTPD Canola oil facility in Canada. Sized piping, valves, ductwork, and large fans. Sized and performed analysis of relief piping from pressure safety valves. Managed data in multiple Excel spreadsheets tracking changes to drawings and equipment. Assisted in submittal of pressure piping package to Saskatchewan Boilers Branch for certification. Specified multiple specialty piping components including: Flow meters and transmitters, pressure/ temperature indicators/transmitters, steam traps, and control valves. Worked on-site for several months in an engineering construction assistance capacity with client design team.

ANDREW FEIA

Environmental Scientist

Mr. Feia has over eight years of hydrogeologic site investigation, landfill permitting, and environmental compliance with an emphasis on resolving groundwater and surface water concerns at landfills and contaminated sites. Mr. Feia has extensive experience working with industry and regulatory agencies for a wide variety of landfill sites, including oil and gas drilling wastes from the Bakken Shale Play in western North Dakota, saltwater injection wells, and treatment facilities for drilling wastes. Recent work has also involved him extensively with hydrogeologic site characterization and groundwater monitoring network design at landfills in Minnesota, North Dakota, and South Dakota. Mr. Feia also has extensive capability performing RTK GPS surveying in Minnesota, North Dakota, and Montana.

EDUCATION

BA, Environmental Studies, University of Minnesota Duluth

SELECTED EXPERIENCE

Hydrogeologic Site Investigations

Renewable Resources, LLC, Killdeer, ND. Acting client manager for a specialized oilfield waste processing and recycling site in western North Dakota. Specific consulting services provided to client included a thorough site soil and groundwater investigation, facility management planning and operations updates, site cleanup and remediation oversight, process and crude oil tank air permitting, stormwater design, implementation and management, and building leak detection system design and installation services. Mr. Feia was the principal author of the site's Beneficial Use and Environmental Testing Program for the proposed use of beneficial recycling various oilfield wastes. Other specialized services included providing general environmental compliance assistance, NORM/TENORM management, surveying, and regulatory permitting between the North Dakota Dept. of Health and the North Dakota Industrial Commission.

Norman County Demolition Landfill, Ada, MN. Acting client manager for a landfill contaminant investigation and on-going environmental monitoring. Specific consulting services provided to client included a thorough site boring and groundwater investigation work plan, coordination of annual monitoring requirements, and regulatory negotiation. Additionally, project manager for preparation of a permit renewal application the MPCA.

Northwest Regional Landfill Association, Bison, SD.
Cenex Pipeline

Clay County Landfill, Hawley, MN. Services provided to Clay County included submittal of three separate Phase II/III Hydrogeologic Work Plans and Phase II/III Hydrogeologic Investigation Reports, including the supervision and placement of groundwater monitoring wells to evaluate contamination migration from the landfill footprint. Other tasks included logging well borings, developing/sampling of monitoring wells, hydraulic conductivity (slug) testing, and preparation of field logs.



AREAS OF EXPERTISE

Hydrogeology
Landfill Permitting
Environmental Compliance
Groundwater/Soil
Sampling
Industrial Waste Review
Phase I/II Environmental
Site Assessments
RTK Surveying

TRAINING/ CERTIFICATION

40-Hour HAZWOPER (8-
Hour Refresher)
40-Hour Hazardous
Materials Technician (8-
Hour Refresher)
NRC – Certified Troxler
Nuclear Gauge Operator

Noonan Landfill, LLC, Noonan, ND. Professional services included project supervision of a detailed hydrogeologic site investigation for characterization for landfill expansion. Major responsibilities included drilling program design and coordination, groundwater monitoring well design and placement, and preparation of a hydrogeologic report for site feasibility. More recently, provided technical

Dishon Disposal, Buford, ND. Services provided to Dishon Disposal Landfill have included submittal of separate Hydrogeologic Work Plans and Hydrogeologic Investigation Reports for contaminant migration assessment, including the supervision and placement of groundwater monitoring wells to evaluate flow pathways for remedial correction action implementation. Other tasks included logging well borings, developing/sampling of monitoring wells, hydraulic conductivity (slug) testing, and preparation of field logs.

Polk County Sanitary Landfill, Gently, MN. Services provided to Polk County included submittal of Phase II/III Hydrogeologic Work Plans and Phase II/III Hydrogeologic Investigation Reports. Major project management responsibilities included drilling program design and coordination, groundwater monitoring well placement, and final proposal for a groundwater monitoring network update. Provide technical review and approval for all industrial waste acceptance procedures for the landfill.

Ideal Oilfield Disposal, Arnegard, ND. Professional services included conducting multiple Detailed Hydrogeologic Investigations for new site characterization for proposed Special Waste Landfill facilities. Major responsibilities included interaction with regulatory representatives, drilling program design, soil boring logging, development/sampling of groundwater monitoring wells, preparing field logs, and submittal of final hydrogeologic reports. Specialized services included delineating shallow glacial aquifer proximity to site. Other technical services include annual groundwater reporting and review and updating to facility management plans, such as groundwater monitoring plans.

Secure Energy Services USA, Williston, ND. Professional services included conducting a Detailed Hydrogeologic Investigation for new site characterization for a proposed Special Waste Landfill facility. Major responsibilities included drilling program design, soil boring logging; development/sampling of groundwater monitoring wells, preparing field logs, and submittal of final hydrogeologic report to NDDH. Additional services have included annual monitoring and reporting services for the installed groundwater monitoring network. Recent work included assistance in preparing a permit modification application for acceptance of TENORM waste materials.

Mar-Kit Sanitary Landfill, Hallock, MN. Specialized services included conducting a Phase II/III Hydrogeologic Investigation through direction and supervision of waste borings into facility's existing disposal areas as part of the proposed site expansion. Other responsibilities include installing and developing a groundwater monitoring well, logging soil borings, conducting development of monitoring well, preparing field logs and a Phase II/III Hydrogeologic Report. Additional services have included annual monitoring and reporting services for the installed groundwater monitoring network.

Particular other services have included preparation of an Environmental Assessment Worksheet for the proposed expansion of the facility for MPCA Permit renewal and a hydrogeologic drilling work plan for landfill leachate spray application.

Secure Energy Services USA, Manning, ND. Professional services included project supervision of a limited hydrogeologic site investigation for characterization for ultimate use as proposed Special Waste Landfill facility. Major responsibilities included drilling program design and coordination, groundwater monitoring well placement, and preparation of a hydrogeologic report for site feasibility.

Dakota Disposal, Alexander, ND. Professional services included conducting a Detailed Hydrogeologic Investigation work plan for new site characterization for a proposed Special Waste Landfill facility.

Veolia ES Rolling Hills Landfill, Buffalo, MN. Services provided to Veolia included preparing a Phase I Site Investigation Report and Phase II Hydrogeologic Investigation Work Plan for an industrial waste landfill expansion.

Otter Tail Power Company - Ash Landfill, Fergus Falls, MN. Services provided to Otter Tail include a submittal of a Phase I/II Hydrogeologic Investigation and Phase II/III Hydrogeologic Work Plan to the MPCA for future placement of EMS wells to monitor groundwater quality of the ash landfill. Other services included site supervision of a limited Phase II/III site investigation for ash landfill expansion.

American Crystal Sugar Company, Hillsboro, ND. Services provided to ACSC included the supervision and placement of groundwater monitoring wells on facility property to evaluate potential groundwater impacts prior to land application of mud solids. Other tasks included classifying well borings, conducting water sampling and development of monitoring wells, preparation of field logs in both Field 6 and Dineen Field.

Environmental Monitoring Systems - Groundwater

Various Companies. Active project manager for on-going environmental monitoring system (EMS) evaluation and groundwater reporting for 12 landfills in the upper Midwest. Work includes setting up laboratory analysis and sampling firms, coordination and monitoring of results, and preparation of quarterly and annual monitoring reports required by the various state regulatory agencies (MN, ND, and SD). Routine services also include frequent updates to groundwater monitoring networks based on changes in landfill operations or expansion.

Environmental Compliance

Secure Energy Services USA, Ray, ND. Responsible for field screening of impacted soil using a soil conductivity meter and supervised collection of soil samples for saltwater contamination analyses. Other technical services provided included recommendations for Site Closure and next steps for landfill disposal coordination and pricing.

Marquis Alliance Energy Group, Various Sites, ND and MT. Professional services included conducting a Phase I ESA and Limited Phase II ESA at various sites, directing of soil boring work, sample collection and field-screening of soil and groundwater for the presence of salt and hydrocarbon contamination. Responsible for providing cost estimates for site reclamation at each facility.

Benson Power, LLC, Benson, MN. Served as client manager for Benson Power Biomass Power Plant since 2014 to coordinate facility-specific compliance items. These have included sampling of ash by-product from the combustion of turkey litter and other secondary biomass fuel, as specified in the Case-Specific Beneficial Use Determination (CSBUD UT0007), and updates to the SPCC and SWPPP management plans.

Felton Garage, Felton, MN. Supervised the site EDCAD and closure activities at Petrofund site, including installation of water service line at facility to avoid petroleum- contamination. Other services included drinking-water sample collection, field-screening of soil and groundwater for the presence petroleum contamination, and site restoration activities.

City of Dickinson Landfill, Dickinson, ND. Professional services have included evaluating and updating site operations plans for the Baler Building/Transfer Station and MSW Landfill; including operations, groundwater monitoring, leachate management, yard-waste compost unit, wood waste site, and land treatment area plans.

Aggregate Industries, Grand Forks, ND. Professional services included conducting a Limited Phase II Subsurface Investigation, field oversight of soil boring work, sample collection and field-screening of soil for the presence of volatile organic compounds with a photoionization detector.

Redi Services, LLC, Parshall, ND. Responsible for field screening of impacted soil using a soil conductivity meter and supervised collection of soil samples for saltwater contamination analyses. Other technical services provided including landfill disposal coordination and pricing.

City of Fargo Landfill, Fargo, ND. Professional services included the creation of Active Gas Collection System Operation and Maintenance Plan for landfill gas usability at the landfill. Other services have included updating site operations plans for the yard waste compost unit, wood waste site, and land treatment area, and abandonment of site EMS monitoring wells.

Polk County, MN. Duties provided to Polk County included the installation of water collection apparatuses to monitor surface water as a part of the CSAH 41 DRP in Fertile, MN and water sampling. Surface water sampling was conducted using EPA method 1669 for trace metals.

Other services provided to Polk County include supervising soil remediation and closure activities for a limited UST site investigation at the municipal landfill using field screening methods with a photoionization detector and collection of multiple soil samples.

American Crystal Sugar Company, East Grand Forks, MN. Responsible as Owner's representative during the installation and abandonment of gas monitoring well probes as well as the installation of monitoring wells for mud solids application. Other tasks included classifying well borings and installing monitoring wells to supplement current EMS.

Various Companies. Perform and coordinate routine quarterly methane monitoring sampling for five landfill sites in North Dakota and Minnesota. Other responsibilities include methane monitoring plan evaluation.

RTK Surveying

Attawater Depot, LLC, Bainville, MT. Highly specialized services included river channel cross section survey of the Missouri River and topographical relief survey for the proposed use of the site as a freshwater depot.

5 Stone Developments, Berthold, ND. Professional services included performing RTK topographical survey for over 400 acres of proposed residential development, as well utility line surveys, according to ALTA requirements.

Dishon Disposal, Buford, ND. Services included performing RTK topographical survey for proposed expansion area at existing special waste landfill, as well as aerial marker installations.

City of Dickinson, Dickinson, ND. Services included performing annual survey for both the inert and MSW disposal areas at existing landfill, as well as survey of closed emergency inert disposal landfill.

McKenzie County Landfill, Watford City, ND. Services included performing annual survey for both the inert and MSW disposal areas at existing landfill, as well as aerial marker installations.

Clay County Landfill, Hawley, MN. Services included performing topographical survey for proposed expansion area at existing landfill, as well as aerial marker installations.

Red Lake Watershed District, Northeast MN. Highly specialized services included performing flood plain mapping and surveying of Red Lake River from Thief River Falls, MN to East Grand Forks, MN. This included establishing survey control for over 125 river miles.

City of Fargo Landfill, Fargo, ND. Responsibilities included cross sectional surveying of Cell 17 to determine slope stability prior to engineered liner placement.

American Crystal Sugar Company, Crookston, MN. Services included site GPS surveying to locate permitted top-of-waste elevations for lime landfill and pond dike elevations.

American Crystal Sugar Company, Drayton, ND. Services included a GPS site survey of lime landfill closure area and mud placement area.

American Crystal Sugar Company, Hillsboro, ND. Services included a GPS site survey of lime landfill closure area and mud placement area.

American Crystal Sugar Company, Moorhead, MN. Professional services included a GPS site survey of lime landfill closure area and mud area, and pond survey of both the east game pond for estimated sludge removal and condenser pond for placement of water barrel test locations.

Emergency Response

Various Companies. Emergency response services provided to several clients in MN and ND have included diesel spills, canola oil, and crude oil. General duties have included soil sampling, topographical surveying, product recovery, site cleanup, soil/wetland remediation, and regulatory "site closure" coordination.

JOHN FOX, PG

Hydrogeologist

Mr. Fox has over 30 years of engineering company experience. He has worked for clients on diverse range of geotechnical and environmental projects.

EDUCATION

BS, Geology, University of Minnesota

PROJECT EXPERIENCE

Landmark Environmental, LLC - Cofounder, Vice President. Built a company specializing in brownfield redevelopment. Provided property owners and buyers with cost-effective solutions for contaminated properties. Designed, managed, and conducted investigations and cleanups. Wrote reports and communicated with appropriate: local and state regulatory agencies, laboratories, transportation, and waste disposal facilities. Projects included: Phase I, Phase II, remediation and waste disposal, and industrial facilities demolitions, environmental compliance and permitting assistance (SWPPP, SPCC, NPDES), clandestine drug labs, indoor air, soil vapor, asbestos and hazardous materials inventories. Day to day company operations, strategic planning, HR, marketing, banking, insurance and 401k, safety program, phone system, web site, and network administrator.

Barr Engineering Company – Hydrogeologist. Twofold Geotechnical and Environmental focus. Specialized in field investigations which included: design, management and implementation of investigations, and reporting. Focus on conducting complex: studies, abatements, and construction projects at a diverse range of properties across the United States. Sites including: Industrial and municipal landfills, sewage treatment plants, manufactured gas plants, wood treatment plants, dry cleaners, photo development plants, recycling facilities (scrap yards), foundries, refineries, metal plating operations, rail yards, military, mining operations. amusement rides, wind farms, dams, utilities, highways.

Geotech (Now AET) – Geologist Soils Technician. Field and soils lab testing geotechnical and construction testing including: soil density, excavation observation, worked on drill rigs, ASTM soil classifications, RQD, core and chip logging, down-hole testing, and soil laboratory testing, geologic mapping, engineering studies of settlement, and failures, and environmental investigations.

Publications/Presentations:

45th Annual Geotechnical Conference University of Minnesota (author and presenter) 1997 DESIGN AND CONSTRUCTION OF THE FOUNDATIONS FOR A WORLD CLASS ROLLERCOASTER: "THE WILDTHING" Coauthors: Bjorn Birgisson, Jihshya Lin

TAPPI Environmental Conference Atlanta Georgia 1995. STATISTICS-BASED APPROACH FOR THE EVALUATION OF GROUNDWATER METAL CONCENTRATIONS AT A PAPPER MILL LANDFILL SITE Coauthors: Ching-Gang Peng, Jeff S. Ubl, Jim Jackson, Allen Meadows



AREAS OF EXPERTISE

Brownfield Redevelopment
Contaminated Site
Services
Geotechnical and
Environmental Services

REGISTRATION

Professional Geologist: MN
Asbestos Inspector: MN

Air and Waste Management association 88th Annual Meeting and exhibition San Antonio, Texas June, 18-23 1995
TREATMENT OF CONTAMINATED GROUNDWATER FROM A SUPERFUND SITE USING ELECTROCHEMICAL PRECIPITATION AND GRANULAR ACTIVATED CARBON ABSORPTION Coauthors: Ching-Gang Peng, James Langseth.

CHMM Meeting hazardous materials, Red Lake Band of Ojibwa hazardous materials (two days, 8-hour sessions), Minnesota Association of Housing Code Official's (MAHCO) Spring Training Seminar 2004 and 2006 speaker hazardous materials, Southern Twin Cities Association of REALTORS (STCAR) speaker hazardous materials, Brainerd rental properties and managers July meth labs, Minnesota Department of Health meeting of health officials panel member rules propagation, National Public Radio all things considered clandestine drug labs interview. Also presented at public meetings for remedial design, landfill siting, and depositions and arbitrations.

Other Work Experience:

Caine and Associates Land Surveyors Ham Lake MN (May 1985 to April 1986) Surveyor Boundary and topographic surveys.

Minnesota Department of Natural Resources Mineral Division Hibbing MN (Summer 1984) Geophysical survey Aiken Minnesota, petrographic lab.

EPA Environmental Lab Duluth MN (1983) Biologic sample preparation dioxin study.

TODD FRYZEK

Environmental Engineer

Mr. Fryzek is a Senior Project Manager and Senior Environmental Engineer with more than 25 years of robust, progressive, multi-site experience in delivering comprehensive project leadership, business analysis, and staff supervision and training. Proven record of success in effectively managing environmental compliance and remediation projects for public and private sector clients. Effective Environmental Leader with a record of success in remediating environmental conditions and a reputation for having a deep understanding of how to best address environmental matters, issues, and concerns in diverse domestic and international settings



EDUCATION

BS, Geology/ Mathematics, Iowa State University

MS, Civil/Environmental Engineering, Iowa State University

SELECTED PROJECT EXPERIENCE

Client Team Leader – Foth Infrastructure and Environmental, St Paul, MN

October 2012 – Present. Provide senior client relations with industrial and private clients. Lead project managers and serve as the Project Manager while completing a variety of environmental projects throughout the United States. Examples of projects include technical quality assurance for Xcel Ashland's Superfund Site, various due diligence for client acquisitions, subsurface investigations, compliance audits, and dioxin superfund support.

Sr. Project Manager/ Associate-Short Elliott Hendrickson, St Paul, MN; July

2005 – October 2012. Completed marketing, cost estimates, etc. for multiple clients and projects. Managed all components of the work place including technical supervision and direction, staff mentoring, client communications, etc. on multiple concurrent projects. Successfully completed several high-profile projects including environmental support for the Northstar Commuter Rail, I-35W St Anthony Falls Bridge Collapse and Rebuild, and Lafayette Bridge. Types of projects vary from simple Phase I ESAs, to Phase II investigations, to expert review of proposed and installed remediation systems. Supervised and completed multiple environmental compliance audits and permitting for various facilities throughout the United States and Canada, including working with subcontractors/other consultants.

Sr. Project Manager-Earth Tech, Minneapolis, MN; July 2003 –July 2005.

Managed completion of projects from start to finish. Including ISO 14001, environmental compliance reviews and environmental investigations/remediation for commercial and industrial facilities throughout several states, and preparation of corrective actions. Project Manager and lead engineer for design of landfill final covers, gas and leachate extraction systems, groundwater recovery systems and groundwater and leachate treatment systems.

AREAS OF EXPERTISE

Geologist
Environmental Health
Industrial Hygienics
Remediation Systems
Environmental Compliance
Phase I and II
Investigations & Audits
Environmental Permitting

Sr. Project Manager/Contract Manager – URS Corporation 1991-2003. Salt Lake City, UT; Oct. 2002-May 2003. Managed staff of ten and budgets associated with all components of twelve remedial actions/systems at Hill AFB, Utah. Remediation projects include several pump-and-treat systems, an air sparging line, landfill caps, steam stripping for DNAPL removal, LNAPL removal and several trench collection systems. All projects completed such that they comply with Local, State and National requirements. Negotiated contracts and Delivery Orders while maintaining positive interactions with clients' on-base, staff, and regulatory community. Strong interpersonal skills along with effective communications required to maintain a positive working environment for all staff and with regulatory agencies.

Frankfurt, Germany; Oct. 1999-Sept. 2002. Contract Manager for projects with the U.S. Army in Europe. Managed staff of 20 while successfully completing over 60 Delivery Orders. Projects included environmental and safety audits of large military bases, environmental management systems, expert reviews of proposed and existing remediation systems, compliance reviews in multiple countries and states within those countries, engineering designs and studies; subsurface investigations; asbestos and building surveys; regional evaluations of aquifers, combined with groundwater models, recommendations for additional investigation and proposals for remedial actions. Responsible for client contact and development and for completing all projects in a timely manner with high quality. Projects completed in several countries including Germany, Belgium, the Netherlands, Italy, Croatia, Hungary, Spain, and the United Kingdom.

Minneapolis, MN; Mar. 1991-Sept. 1999. While working in Minneapolis, I was promoted from Staff Geologist to Project Manager. Managed various projects, primarily within private industry throughout the upper Midwest, but also involved in projects in over 15 states. Projects varied from completing simple Phase I ESAs and compliance audits of industrial facilities and permitting. Responsible for interactions with clients, regulators and for mentoring junior staff.

Environmental Health Specialist- Anoka County Env. Services, Anoka, MN; Jan. 1990 – Feb. 1991. Responsible for beginning and implementing Anoka County's groundwater protection program.

Industrial Hygienist - AES, Minneapolis, MN; Oct 1988 - Dec. 1989. Completed analysis of air and bulk samples for the presence of asbestos; asbestos building surveys; oversight during asbestos abatements and air sampling.

Geologist – Terracon, Omaha, NE; Jan 1988-June 1988. Completed environmental drilling investigations, UST removals, LNAPL petroleum removal, remediation system operation, health and safety support, and geotechnical investigations.

Examples of projects completed are included below. Areas include Compliance; Subsurface Investigations; Environmental Engineering; Remedial System Operation and Maintenance; Landfills; Alternative Energy; and Asbestos, Dust and Building Characterization.

Compliance

Environmental Compliance Assessment System (ECAS) Contract Manager- Manage \$2 Million/year ECAS contract with the U.S Army. Under the ECAS program, a team of approximately ten staff completed reviews of military bases to insure compliance with all U.S. and Host Nation requirements. Bases which underwent ECAS assessments include Livorno and Vicenza, Italy; Shinnen, The Netherlands; Chievres, Belgium; Heidelberg, Hanau, Giessen, Wiesbaden, Kaiserslautern, and Darmstadt, Germany.

Final Governing Standards (FGS) Updates- Program Manager for the completion of the updates to the FGS' for Germany, Belgium, and The Netherlands. For the FGS updates 19 compliance protocol areas are used to compare U.S. compliance requirements with those of the Host Nation. The more stringent of the two sets of requirements are applied to military bases in the Host Country. Updates to the FGS were completed on a semi-annual basis. The updates included review of EU and Host Nation regulations.

Team Member Ramstein AB ECAMP- Assessor for the 1999 Ramstein AB ECAMP. Responsible for conducting inspections, evaluating compliance with the German FGS, and preparing findings for an ACCESS-based report. Areas reviewed included Air and Hazardous Materials protocols.

ECAS Software, Germany- Creation of ECAS software for use in compliance audits of U.S. Army facilities throughout

Europe.

Technical support for DRMSI- Wiesbaden, Germany & Okinawa, Japan. Technical support for assistance in hazardous materials/hazardous wastes program. For this program, all components of the hazardous waste stream were to be consolidated in one location to assist in cradle-to-grave tracking of hazardous materials/hazardous waste. Hazardous materials and hazardous waste were to comply with both Japanese and U.S. regulations.

Environmental Review Guide (ERG) Update- Germany, Belgium, the Netherlands and Italy. The updated ERG consists of a document which identifies environmental compliance and construction requirements which must be followed for new construction and renovations.

169/494 Design Build Oversight. Environmental Coordinator serving as lead for MnDOT on all environmental issues on the 169/494 design build project. This includes compliance, erosion control, hazardous materials, hazardous waste, threatened and endangered species, noxious weed control, contaminated soil and groundwater, asbestos, sediment, solid waste, etc.

Compliance Audits, Various Clients – Completed environmental compliance audits for various clients throughout North America. Environmental Compliance audits have been completed in roughly 20 states and 2 Canadian provinces.

Subsurface Investigations and Construction Oversight/Remediation

Northstar Commuter Rail – Minneapolis, Minnesota. Project Manager for Phase I, Phase II and Environmental Construction Oversight for Northstar Commuter Rail Project. Provide all support during the environmental investigation and provided construction oversight support for all environmental sites. Environmental sites identified include sites impacted with heavy metals and petroleum products. Roughly 30,000 yards of environmentally impacted soils were removed from the site during construction activities. Provided support to Mn/DOT in identifying potential locations for soil disposal and provided support in determining the most cost-effective means of dealing with environmental issues on the project.

I-35W Bridge Demolition, Drilling Investigation and Construction Oversight, Minneapolis, Minnesota – Minnesota Department of Transportation. Project Manager for the fast response and support for all environmental issues associated with the demolition and reconstruction of the I-35W Bridge which collapsed into the Mississippi River. Provided 24-hour on-call support for all environmental issues associated with the project. Included in this support were issues associated with storage of pieces of the bridge at “the bridge lay down area”, environmental support for addressing issues with construction through a coal gasification superfund site, and air monitoring for VOCs, SVOCs and other contaminants. Included in the support has been DMR reporting, support in completing MPCA VIC application, NAD documentation preparation, MCES discharge review, NPDES application support, soils disposal support and technical support as-needed for environmental issues.

County Road J Phase I and Phase II ESAs and Construction Oversight

Ramsey and Anoka Counties, Minnesota. For this fast track project, the Phase I and Phase II drilling investigation was completed for a two mile corridor which is in the process of being expanded. Over 30 sites were identified during the Phase I investigation. Eight sites were identified which warranted further investigation. Permission was granted by private owners to drill on seven of the properties. Based on the drilling investigation, one site was identified with petroleum and chlorinated solvent contamination. Two sites were identified with petroleum contamination. Engineering designs were adjusted for the environmental impacts found with a proposed barrier system in one area to prevent petroleum impacted water from migrating to an area to be dewatered while constructing a stormwater pond. In the area with chlorinated solvents, the site was submitted to the MPCA VIC program for “no association letters” and to get MPCA approval for actions during construction, including dewatering and discharge to the sanitary sewer via MCES permit.

Twin Lakes Avenue Dewatering VIC – Brooklyn Center, Minnesota. Project Manager for completion of specifications and permits for construction and dewatering adjacent to the Joslyn Superfund site. Multiple wells were sampled every other day for dioxins, Pentachlorophenol and PAHs. Coordination with MPCA VIC program, MPCA Superfund Program and PRP’s representative was required. Supervised the collection of samples and provided the technical lead for completion of the report. Completed permit application to the MCES for discharge of a portion of the water from the project to the sanitary sewer.

Andover Station North VIC – Andover, Minnesota. Served to provide technical support and critical peer review of the reports for submittal to the MPCA VIC program. “No further action” letters were provided by the MPCA VIC program.

Rubbish Ranch Dump Investigation – Inver Grove Heights, Minnesota. Served as Project Engineer for completion of the report, interpretation of the data and provided recommendations for future actions.

Project Manager MN/DOT environmental subsurface investigation and Remedial Action Plan for Trunk Highway 55 Reroute and Tunnel Excavation. For this project, roughly 8,000 cubic yards of petroleum-impacted soils were removed in association with construction of a highway tunnel. Petroleum-impacted water was rerouted for disposal to the sanitary sewer and was eventually permitted for discharge to the storm sewer.

Site Supervisor, Verification Investigation of Cook Composite and Polymer Chatam, Virginia. Supervised the site investigation of this large chemical manufacturer and prepared the summary report for submittal to the state regulatory agency.

Project Geologist, Former Dupont-Barksdale, Wisconsin Explosives Manufacturing Facility. Completed bedrock geologic and groundwater evaluation of Dupont-Barksdale, Wisconsin former TNT manufacturing facility. At this facility, TNT and TNT derivatives have impacted both soils and groundwater. With the potential of a fault going through friable sandstone at the site, the hydrogeologic evaluation was successfully undertaken.

Project Manager, Remedial Investigation MN/DOT St. Paul Park Truck Station. Under this investigation, inaccurate results completed by a previous consultant were corrected. The revised Remedial Investigation included Rotosonic drilling, bedrock coring of the St. Peter Sandstone and Prairie du Chein Formations, and well installation. Revised site geology and hydrogeology to delineate site conditions.

Project Manager, Flint Ink Phase I through Response Action Plan (RAP). Project Manager for the investigation of this former paint manufacturing facility. This investigation culminated in a response action that included excavation of metals contaminated soils and certification of “no further action” from the state regulatory agency.

Larson 444 Wurzburg, Germany – A soil and groundwater investigation of several Operable Units (OUs) at the Wurzburg Army Airfield was completed for this project. While several different OUs have been investigated, the largest consist of a TCE and PCE contaminated groundwater plume which has migrated over 3 miles offsite and impacted several local drinking water supply wells. Was responsible for identifying the source areas of the TCE and PCE contamination and for delineating the extent of the plume. For this investigation over 20 groundwater monitoring wells were installed, over 40 soil boring were completed and 10 passive soil gas sampling ports were constructed. Other OUs investigated include former USTs associated with WWII aircraft operation, petroleum impacts and LNAPL associated with motorpools, CHC impacts to the subsurface from dry cleaning operations, and former fire burn pits. Supervised staff for all aspects of the project and directed the field crews for the completion of the work. For an area with CHC impacts associated with dry cleaning operations an SVE system was installed for two years.

Field Training Instructor, Various Locations. Trained over 200 military personnel in the methods of subsurface characterization including soil lithology, monitoring well installation, soil and groundwater sampling, and the use of field instruments.

CLAIMS Type 1, 2, 3, and 4's- plus creation of a CLAIMS ACCESS and web-based database; various closed and closing bases, Germany. Managed these multiple award projects with a total contract value of over \$2 million. Under these contracts, over 200 Phase I investigations (Type 1), 120 Phase II investigations (Type 2), 40 Phase III investigations (Type 3), and over 20 expert reviews (Type 4s) of existing remediation systems has been completed. The Phase I investigations consist of a review historical records, and a compliance review combined with a site visit along with interviews to identify potential areas of soil and/or groundwater contamination. The Phase II investigations consist of the advancement of soil borings and temporary piezometers to identify if soil and/or groundwater contamination is present. Phase III investigations are completed to delineate the extent of soil and groundwater contamination while Phase IV investigations consist of expert reviews. For the Phase IV portion of these projects, recommendations, evaluations, groundwater models and interaction with regulatory agencies have

been credited with saving the client over \$45 million.

“URS has done an excellent job completing numerous Delivery Orders on time and within budget for the CLAIMS Program. Multiple projects have been simultaneously completed by URS in an exceptionally professional and efficient manner, which has allowed the U.S. Army to acquire a full understanding of environmental site conditions.

URS’ in-house capabilities have aided the US Army Claims Service in eliminating, greatly reducing, or defining the U.S. Government’s liability at hundreds of closed sites. URS has assisted the Claims Service in reducing ongoing remedial costs by over \$45 million since the inception of the CLAIMS program. URS’ ability to complete expert reviews, which includes evaluations of current site conditions, their understanding of compliance requirements, and their expertise interacting with regulatory agencies has been instrumental in achieving these cost savings. I consider URS to be one of, if not the top environmental services company in Germany.”

— Mr. Craig Walmsley, Senior Engineer, CLAIMS Service

Field Team Leader/Project Geologist, Soil and Groundwater Studies, Various U.S. DOD Installations. Tasks completed during these investigations has included Geoprobe (push) sampling for soil gas surveys and groundwater sampling, soil borings, well installation, hydraulic conductivity (slug) testings, pump testing, soil sampling, surface water sampling and groundwater sampling. Reports written include Workplans, Health and Safety Plans, Quality Assurance Project Plans (QAPP), Remedial Investigations, Feasibility Studies, and RCRA Corrective Action reports. Sites included:

- Nike Missile Stations, NE
- Former Nebraska Ordinance, NE
- KI Sawyer AFB, MI
- Cannon AFB, NM
- Holloman AFB, NM
- Offutt AFB, NE
- Wright-Patterson AFB, OH
- Plattsburg AFB, NY

PA/SI Suspected Contaminated Sites, Various Locations, Germany. Soil and groundwater investigations of sixteen potentially contaminated sites in Germany have been evaluated and fourteen more are in the process of being investigated. Various types of sites are being investigated including POL separators, USTs, ASTs, firing ranges, explosive testing ranges, fire pits, parking areas and railroad yards. Fieldwork varies by site and has included among others, well installation, sampling in grids, soil borings, geophysics, etc.

Project Manager, Phase I and II Investigations, Various Locations, United States. Managed the investigation and complete report writing for hundreds of Phase I compliance audits/historical reviews and Phase II subsurface investigations. The investigations have ranged in size from single industrial sites to corridors through towns and several square block areas within cities. The investigations have included record reviews, compliance audits, air quality evaluations, soil and groundwater investigations, hydrogeologic investigations and report writing. Contaminants investigated have included petroleum products, solvents, polyaromatic hydrocarbons, pesticides and heavy metals. Sites include:

- A four block Industrial Area for the Minneapolis Community Development Corporation
- Corridor studies through Bigfork, St. Peter, and Minneapolis, Minnesota for the Minnesota Department of Transportation (MN/DOT)

- Various sites in Iowa, Nebraska, Wisconsin, Missouri, and Illinois
- Compliance Reviews of several postal facilities throughout the upper Midwest

Environmental Engineering

Various Designs, Vicenza, Italy- Including POL separator design, backflow prevention study, UST soil investigations and replacement designs for 11 USTs. Drinking water evaluation and design of a break point chlorination drinking water treatment system to remove elevated nitrates.

Site Supervisor, Soil and Building Remediation, Weyerhaeuser Facility, Wisconsin. For this remedial action level "B" PPE was required for removal of the PCB impacted soil, water and debris from a crawl space under active and inactive portions of the manufacturing facility.

Recycling Management Plan- Tszar, Hungary and Rjeika, Croatia. Evaluation of types of solid wastes generated on the bases. This evaluation focused on economical solutions which will reduce the amount of solid waste generated on the bases while also keep the bases in compliance with solid waste recycling rules.

I wanted to send you my thanks for providing such excellent support for the U.S. Army. During my stay here with the Corps of Engineers, I have come to know that I was very fortunate to have the opportunity to work with each of you (Todd Fryzek and Ulla Hoppe). I have appreciated the contributions that you have made, the hard work, the dedication and the endless desire to achieve the highest and best standards in the quality of products as well as personal commitment you provide. It has been my personal pleasure to work with you

– Connie Chitwood, Project Manager, USACE Europe District

Livorno Drainage Study, Italy – Surface water drainage study, which evaluates the quantities and quality of, water being discharged from the Depot portion of the base. Recommendations on how to treat and control the quantity of surface water on the base were prepared.

Technical oversight for installation of a dual phase extraction system, Wiesbaden Area 3, Germany- A dual phase extraction system was designed. Technical oversight was then provided during the construction of the system along with quarterly performance reports for review by the client.

Project Manager, Wastewater Treatment Systems, Various Locations. Various wastewater systems were evaluated for several different types of food processing facilities. The evaluations included recommendations on methods to improve on-site wastewater treatment systems prior to discharging water to various local municipal wastewater systems.

Project Engineer, Bioremediation Technical Support. Provided technical support for Anoka County, Minnesota in creating guidelines for bioremediation (landfarming) of petroleum contaminated soils.

Vicenza Sewer Investigation, Italy. Over 7,000 meters of sanitary sewer were evaluated to determine the condition of the piping.

Remedial System Operation and Maintenance (O&M)

Project Manager Park Penta, Superfund Site. As Project Manager responsible for completing the groundwater model for the site, including GIS. All portions of this \$800,000/ year project, including interaction with the regulatory agencies, operation of the free product and 90-million-gallon per year groundwater recovery systems, investigation of DNAPL and LNAPL fractured flow under the site, evaluation of remediation alternatives, and hazardous waste disposal were completed under my direction. Part of the duties as the Project Manager was to identify funding costs for the next fiscal year, prepare justification for the costing and propose innovative ideas which could lead to more efficient and timely remediation of the site. For fiscal year 1999, I was instrumental in achieving over \$2.6 M in cost savings for the client.

Project Engineer, National Car Rental, Nebraska. Installed and maintained dual pump-and-treat systems. This project included wells that were installed to create a capture zone for free-floating product while an adjacent well was installed for removal of product from the top of the water table.

Project Manager for Investigation and Remediation. A leaking fuel line associated with two heating oil above ground storage tanks (ASTs) caused soil and groundwater to be impacted at US Steel, Hibbing, Minnesota. Free product was removed from the vadose zone via vacuum truck. Free product was removed from the water table via passive methods including adsorbent socks.

Brine Cell Testing- Various locations Europe. Evaluation of a treatment technology for low level radioactive waste.

Project Manager, Remedial System Operations and Maintenance, Hill AFB, Utah. Manage O&M operations for twelve systems. OU 1 consists of former landfills, burn pits, fire training areas and miscellaneous disposal sites. Several trench collection systems and sumps have been installed to remove contaminated groundwater and LNAPL from the water table. In addition, the landfill cap and methane extraction system must be maintained. OU 2, a former liquid disposal site has a containment wall, several pumping wells and three different trench collection systems. Groundwater pumped from within the containment wall has DNAPL associated with the water. This contaminated water is treated with a steam stripper prior to discharging the water to the sanitary sewer. Groundwater from groundwater collection trenches located outside of the containment wall is run through an air stripper prior to discharging the water to the sanitary sewer. OU 5 Phase I consists of an aeration curtain which uses blowers to complete in-situ air stripping of CHC contaminated groundwater. OU 5 Phase II, OU 6 on-base, OU 6 off-base, OU 6 Craigdale and OU 8 all consist of conventional pump and treat systems which use wells to collect CHC contaminated groundwater. OU 4 consists of horizontally drilled collection wells which use gravity to remove TCE impacted groundwater. Several caps are also maintained. All routine O&M is completed along with requirements to improve and optimize the existing systems.

Landfills

Project Manager, Landfill Closure, Long Prairie Landfill, Long Prairie, Minnesota. Under the MPCA Closed Landfill Program, Served as the Project Manager for construction oversight during the closure of the Long Prairie Landfill. For the project, a roughly 15-acre landfill was consolidated into a 10 acre area. The revised landfill area was capped with a sand layer, geosynthetic liner, rooting zone and topsoil. A passive gas extraction system was installed into the landfill. The project included preparing the final bid documents, completion of the bidding, construction oversight, and a construction certification report. Areas of wetland were protected, a couple stormwater ponds were constructed and a large portion of the reclaimed land was reseeded with native prairie. Addressed the larger than anticipated quantities of municipal waste which was encountered during the consolidation portion of the project by re-engineering the final design while construction was on-going. The re-engineering helped to maintain the overall costs for the closure while also allowing for the project to be completed in a timely fashion.

Project Manager, Landfill Closure, Woodlake Sanitary Landfill, Minnesota. Project manager for redesign of landfill closure. Redesign includes regarding of cap, installation of a synthetic cover, groundwater collection system, installation of an interceptor trench, and design of on-site treatment ponds for impacted groundwater. Total construction cost for the closure is estimated at \$10,000,000.

Project Manager, Treatment System Design, WDE Landfill, Minnesota. Completed design and supervised construction oversight for an aerated treatment pond. The existing air stripper used to remediate impacted groundwater coming from the landfill was requiring significant O&M costs to maintain the system. The designed treatment pond will significantly reduce the O&M costs for the site, while continuing to keep the site in compliance.

Site Supervisor, Landfill Closure, Flying Cloud Sanitary Landfill, Minnesota. Completed site supervision for waste relocation, landfill final cover, and methane extraction system installation at Flying Cloud Sanitary Landfill. Also completed oversight for quarterly groundwater sampling, yearly maintenance of the landfill cover and methane extraction system, and wrote annual reports for the landfill.

Project Manager for Various Industrial Landfills. Supervised quarterly sampling, completed permit reissuance

applications and quarterly reports, annual reports and permit reapplications for the following landfills in Minnesota:

- Dezurik Industrial Landfill
- Champion-Sartell Industrial Ash Landfill
- MEI Industrial Landfill

Project Engineer/Site Supervisor, Pine Bend Municipal Landfill, Minnesota. Completed construction oversight for the installation of a final cover and cap over a portion of Pine Bend Sanitary Landfill. He has also completed hydrogeologic evaluation of potential leachate removal rates and methods for the landfill; investigated potential causes of landfill fires, and supervised asbestos removal from exposed portions of waste at Pine Bend.

Project Manager for Evaluation of Contaminated Groundwater, Winnebago Municipal Landfill, Iowa. At the end of the investigation of fractured groundwater flow in glacial till, the regulatory agency had agreed to a compliance boundary monitoring system which met the goals of the landfill owners.

Site Supervisor, Installation of Methane Extraction Wells, Woodlake Sanitary Landfill, Minnesota. Supervised the installation of over 40 methane extraction wells and associated piping. At the end of the installation, a construction certification report was submitted and approved.

Project Management, Suspected Dump Site, Minnesota. A subsurface investigation and evaluation of a suspected dump site was completed for MN/DOT in Lakeville, Minnesota. In this investigation, the extent of historical dumping was identified and the extent of impacts to soil and groundwater was determined.

Co-Author "Compost in Landfill Closure Topsoil", Presented in the fall of 1994 at the Madison Solid Waste Conference.

Alternative Energy

Project Manager, Industrial Anaerobic Digesters for Methane Production, Midwest Biogas, Minnesota. Project Manager for the design, financial feasibility study, and various other supports for a start-up which will utilize agricultural wastes on a large scale to produce biogas through anaerobic digestion. The biogas and other by-product streams will be sold for revenue. For the project also completed site visits to several active anaerobic facilities in Sweden, Denmark, and Germany.

Asbestos, Dust and Building Characterizations

Project Manager, Dust Contaminated Building, Minnesota. Project Manager for this critical review and evaluation of a building formerly used by a check printing company. Historical check printing methods had resulted in the contamination of the roughly 200,000 square foot building with lead dust. For this project, the extent of lead contamination was identified. After abatement of the dust critical re-inspections of the building was completed.

Have been involved in all aspects of asbestos investigation and remediation. This has included completing over 100 Asbestos Surveys and O&M Plans for buildings ranging in size from small residential houses to the 24-story U.S. West Building in Minneapolis. Have completed Polarized Light Microscopic (PLM) analysis of bulk (building material) asbestos samples, Phase Contrast Microscope (PCM) analysis of air samples, asbestos abatement oversight, final clearance evaluations and final clearance air sampling.

Team Member, Air Emissions Inventories, Various Military Facilities. Part of a team of 8 who completed air emission inventories for several army installations.

Site Supervisor, Sick Building Syndrome, Minnesota. Completed an evaluation of a building with a reported increase in illnesses (sick building syndrome). The building was evaluated for varying levels of carbon monoxide, carbon dioxide, dust and number of air exchanges to determine if the building was a potential cause for a reported increase in the number of illnesses.

Project Manager United States Postal Service, Northlands District. Completed an Access database for District. For the project, over 300 asbestos surveys were critically reviewed prior to putting information into a database. Recommendations for abatement were given to the USPS based upon the review. Other related projects completed for the district have included peer review of over 50 draft asbestos, lead and O&M reports, presenting training for USPS personnel on asbestos awareness, and supervising asbestos abatement projects.

Field Team Leader, Building Characterization and Demolition Design, Building, 4109 Pirmasens, Germany- This time-critical field investigation included collection of hundreds of samples including XRF field screening, dust wipe samples, dust samples, asbestos samples, and building core samples. The samples were analyzed for heavy metals, PAHs, PCBs, VOCs, SVOCs and other relevant contaminants.

Asbestos Survey, Darmstadt, Germany- Community wide asbestos survey. Roughly 600 buildings surveyed.

Emergency Response Asbestos Support, Baumholder, Germany- Short turn around technical support for Corps of Engineers when building renovation was halted by the local regulatory agency.

Building Characterization, Various Locations, Germany. Characterization of over 80 buildings for potential environmental concerns prior to renovation. Potential contaminants evaluated include Asbestos, Artificial Manmade Fibers, PAHs, PCBs, Heavy Metals, Hydrocarbons, VOCs, and Pesticides.

Field Team Leader, 104th ASG Asbestos Survey and Management Plan. Supervised asbestos building surveys and resurveys of hundreds of buildings at the 414th BSB, 233rd BSB, and 284th BSB, Germany. The data collected during the 8-week survey was used to develop Asbestos Management Plans to assist the BSBs in compliance with Chapter 15 of the German FGS.

Certificates

- AHERA Certified for Asbestos Surveys and Asbestos Management Plans
- HUD Certified for Lead Based Paint Surveys and Management Plans
- ISO 14001 Environmental Management Systems Lead Auditor
- OSHA 40-hour HAZWOPPER training and OSHA 8 hour Site Supervisor training

Other

Research, Potential Catalysts to use with Iron in Reactive Barriers. Completed research on potential catalysts for use in the degradation of halogenated organics using zero valence metals. This research included evaluation of manganese dioxide, bimetals and trimetals with iron and zinc for installation in passive groundwater reactive barriers.

MIKE GRAHAM, PWS

Project Manager

Mr. Graham has over 28 years of experience as a Regulatory Specialist with the U.S. Army Corps of Engineers (USACE) and as a private consultant. He has extensive experience managing controversial and technically challenging projects that require in-depth analysis of federal, state, and local regulations. He has expertise in the field of wetland science, including delineation, restoration and functions/values assessments that were gained through practical experience as well as formal training. He owned and operated his own environmental consulting firm for 12 years before joining Wenck in 2012. Mr. Graham has extensive knowledge of federal and state laws, including the Clean Water Act, National Environmental Policy Act, the Minnesota Wetland Conservation Act as well as wetland regulatory law in the State of Wisconsin.



EDUCATION

BS, Recreation, Parks and Leisure Services; Resource Management Emphasis, Mankato State University - Mankato, MN

SELECTED EXPERIENCE

Great Lakes Gas Transmission Company. Wetland Scientist advising GLGTC regarding wetland compliance during construction of the TCPL-II project. Duties included frequent stints at GLGTC offices in Detroit to participate in team meetings and coordinate tasks between GLGTC and the environmental consulting firm Mr. Graham was a member of.

Confidential Client, Large-Scale Pipeline. Project Manager and Lead Investigator for wetland delineation, waterbody data collection and other biological surveys for a 300-mile large-diameter crude oil pipeline in seven North Dakota Counties. Duties included managing field staff, data QA/QC, managing project schedules and budgets and acting as primary client contact.

Confidential Client, Sandpiper Pipeline. Project Manager and Lead Investigator for wetland delineation, waterbody data collection and other biological surveys for a 300-mile large-diameter crude oil pipeline in North Dakota Counties. Duties included managing field staff, data QA/QC, managing project schedules and budgets and acting as primary client contact.

Minneapolis St. Paul International Airport Dual Track EIS. Mr. Graham was Lead Investigator responsible for wetland and portions of wildlife sections of Alternative Environmental Documents, Draft and Final Environmental Impact Statements. This project involved the evaluation of various environmental considerations for the reconstruction of Minneapolis/St. Paul International Airport at its existing location and at various alternative sites in Dakota County.

Metropolitan Council Environmental Services (MCES) - MSB 69U1 Mississippi River Crossing Project: Permitting Assistance (2012). Presented wetland issues in the pre-permit application regulatory stakeholder meetings for Council. Advised the project team on wetland permitting to complete emergency repairs and

AREAS OF EXPERTISE

Wetland/Waterway
Regulation and Permitting
Wetland Restoration/
Reclamation/Delineation
Environmental Review
Documents (EA/EIS/EAW)

REGISTRATION

Society of Wetlands
Scientists (PWS #365) US
Certified Wetland
Delineator (#1179) MN
OSHA 40-hour HAZWOPER
training

installation of the new forcemains. Technical review of the permit applications such as the USACE Section 10/Section 404 Permit Application.

Metropolitan Council Environmental Services (MCES) - South Saint Paul Forcemain Improvement (SSPFI) project (2012-2014). Mr. Graham completed the annual wetland monitoring and reports for the 2013 and 2014 growing seasons, as required under permits issued by the U.S. Army Corps of Engineers (USACE) to MCES. These reports included assessment of vegetation re-establishment in the floodplain disturbed by the project as well as recommendations for management measures to achieve performance standards.

Regulatory Specialist, USACE, St. Paul District Regulatory Branch. Project Manager for review of various proposed projects under Section 404 Clean Water Act and Section 10 Rivers and Harbors Act. Wrote Public Notices and environmental assessments for projects which required individual Department of Army permits. Projects evaluated for regulatory compliance included lake, river and wetland dredging projects, residential and commercial developments, road and trail construction, etc.

Presentations

Energy and the Environment Conference-Wm. Mitchell College of Law. Panelist on the topic of Frac Sand Mining Impact on Local Government. April 2013

North Dakota Petroleum Council Right of Way Task Force. Presented the topic of right-of-way restoration and reclamation. Provided information on proper revegetation techniques and practices for pipeline construction projects. October 2014

Aggregate & Ready Mix Annual Convention. Presented "Section 404 Assumption Study", a discussion on the potential assumption of Clean Water Act Section 404 authority by the Board of Water and Soil Resources from the U.S. Army Corps of Engineers. November 2016

ROSHAAN GRIEME, PE

Civil Engineer

Mr. Grieme has five years of experience on civil engineering projects, performing a variety of duties including project management, AutoCAD drafting, civil design and plan preparation, construction quantity and cost estimating, construction oversight, and surveying.

For the past four years, Mr. Grieme's primary focus has been on real estate development, providing civil design services for numerous clients in the private sector.

Mr. Grieme also has experience on multiple projects as a Project Inspector, primarily overseeing the construction of roads and parking lots.

EDUCATION

BS, Civil Engineering, University of Minnesota

PROJECT EXPERIENCE

Shakopee City Hall – Shakopee, MN (2016). Mr. Grieme completed civil design (grading, storm sewer, and sanitary sewer), AutoCAD drafting, civil construction plans, technical specifications, and construction administration for the new 17,000 square foot City Hall building in Shakopee, MN. The project includes the construction of a new parking lot and two new stormwater retention ponds and is being constructed in 2016.

Pennington County Justice Center – Thief River Falls, MN (2016). Mr. Grieme completed civil design (grading and storm sewer), AutoCAD drafting, civil construction plans, and technical specifications for the Pennington County Justice Center, a proposed 26,000 square foot expansion of a government building in Thief River Falls, MN.

Hospital Expansion – Mora, MN (2016). Wenck provided civil engineering services for the proposed expansion of a hospital in Mora, MN. The proposed project includes the construction of a new access to the site from State Trunk Highway 65. Constructing the new access will require removing the existing hospital access and constructing two new turn lanes on TH 65. Mr. Grieme completed civil design (grading, sanitary sewer, storm sewer, and watermain), AutoCAD drafting, technical specifications, quantity estimates, civil construction plans, traffic control plans, and provided assistance with City and MnDOT permitting.

Industrial Warehouses – Newport, MN (2016). Wenck provided civil engineering services for a proposed re-development of a 16-acre industrial site in Newport, MN. Mr. Grieme completed civil design (grading, storm sewer, sanitary sewer, and watermain), AutoCAD drafting, and civil construction plans for the project, which will result in the construction of two warehouse buildings (83,000 sq. ft and 144,000 sq. ft), parking lots, and stormwater infiltration basins.



AREAS OF EXPERTISE

Private Development – Site Design
AutoCAD and Civil 3D
Civil Plan Preparation
Construction Oversight
Surveying

REGISTRATION

Professional Engineer – North Dakota

Multi-Family Apartments – Watford City, ND (2015). Wenck provided civil engineering services for a proposed 77-unit apartment building in Watford City, ND. Mr. Grieme completed civil design (grading, storm sewer, sanitary sewer, and watermain), AutoCAD drafting, construction plans, stormwater modeling, a Stormwater Management Plan, and a Stormwater Pollution Prevention Plan. Mr. Grieme coordinated other Wenck tasks, including a Phase I Environmental Site Assessment and a traffic study. He helped guide the client through various permitting/application processes, including re-zoning, re-platting, floodplain documentation, and compliance with Federal Aviation Administration requirements.

Park Ridge Plaza – Williston, ND (2015). Mr. Grieme completed civil design, AutoCAD drafting, and civil construction plans for the proposed reconstruction of Park Ridge Plaza, a commercial development in Williston, ND.

Sky-19 Plaza Center - Bismarck, ND (2015). Wenck provided surveying and civil engineering services for the Sky-10 Plaza Center, a proposed 16,900 square foot commercial building in Bismarck, ND. Mr. Grieme completed civil design (grading, storm sewer, sanitary sewer, and watermain) and prepared construction plans.

North 19th Street – Bismarck, ND (2015). Wenck provided surveying and civil design services for the new extension of North 19th Street in Bismarck, ND. Mr. Grieme completed grading design and design of watermain and sanitary sewer improvements. Mr. Grieme also produced construction plans and quantity estimates. Project construction was completed in 2015.

City of Fort Pierre Street Improvements – Fort Pierre, SD (2015). Wenck provided surveying and civil engineering services for a street improvement project in Fort Pierre, SD. Mr. Grieme provided civil design and assisted with preparing construction plans for the project. The project, which consisted of reconstruction of approximately seven residential blocks, was constructed in 2015.

Hawkeye Village Subdivision – Williston, ND (2015). Wenck provided civil engineering services for the first phase of Hawkeye Village, a 160-acre mixed-use development in Williston, ND. Mr. Grieme completed civil design (roads, sanitary sewer, storm sewer, and watermain), AutoCAD drafting and construction plan preparation.

Five South Downtown Redevelopment – Bismarck, ND (2014-2015). Wenck provided surveying and civil engineering services for the Five South project, a proposed redevelopment of several city blocks in downtown Bismarck, ND. Mr. Grieme completed right-of-way exhibits, road layouts, utility layouts, and road/utility construction cost estimates during the conceptual phase of the project.

Multi-Family Apartments – Hettinger, ND (2014-2015). Wenck provided surveying and civil site design services for a 24-unit apartment complex in Hettinger, ND. Mr. Grieme completed civil design, AutoCAD drafting, and construction plans.

MainStay Suites – Watford City, ND (2014-2015). Mr. Grieme was Project Manager for the civil site design of the MainStay Suites, an 89-unit hotel in Watford City, ND. Mr. Grieme completed civil design (grading, watermain, sanitary sewer, storm sewer), AutoCAD drafting, produced civil construction plans, prepared construction quantity estimates, assisted with a Stormwater Management Plan, and assisted the client with permitting. Mr. Grieme also coordinated several other Wenck tasks, including ALTA survey, subdivision lot split, threatened and endangered species determination, floodplain documentation (LOMR-F), and Stormwater Pollution Prevention Plan (SWPPP). Project construction was completed in 2015.

Street Improvement Districts 194, 195, and 196 – Mandan, ND (2014). Wenck was retained by the City of Mandan to provide civil engineering services for three road rehabilitation/reconstruction projects in 2014: Street Improvement Districts (SIDs) 194, 195, and 196. Mr. Grieme completed surveying, AutoCAD drafting, produced civil plans, and prepared construction quantity and cost estimates. SID 194 and SID 196 did not proceed to construction; SID 195 was constructed in the summer of 2014.

Northern Highlands Luxury Apartments – Minot, ND (2013-2015). Wenck provided civil engineering services for the Northern Highlands Luxury Apartments project, a residential development in Minot, ND featuring two apart-

ment buildings, four townhome-style “villas”, and 239 total residential units. Mr. Grieme operated as the primary point of contact for Wenck during construction, which began in 2013 and was completed in 2015. Mr. Grieme reviewed contractor submittals, participated in regular construction meetings, responded to contractor questions regarding the civil design, occasionally observed and inspected civil construction components, and provided additional construction documentation as needed.

Creekstone Corner Subdivision – Williston, ND (2013-2015). Wenck provided civil site design services for Lots 1-4 of Creekstone Corner Subdivision, part of an industrial district in Williston, ND. A large steel building was constructed on each property and can house a variety of industrial businesses. Mr. Grieme provided civil design, AutoCAD drafting, and produced civil plans for City submittal. Mr. Grieme also served as Project Manager for the design of Lots 1 and 2.

Missouri Ridge Subdivision – Williston, ND (2013). Wenck provided civil site design services for Lots 3R and 4R of Missouri Ridge Subdivision in Williston, ND. A large steel building was constructed on both properties for various industrial uses. Mr. Grieme provided civil design, AutoCAD drafting, and produced civil plans for City submittal.

Meadows at Hawktree Subdivision – Bismarck, ND (2013). Wenck provided civil design services for the Meadows at Hawktree, a 29-lot residential subdivision in Bismarck, ND. Mr. Grieme completed design of roads, trails, sanitary sewer, watermain, storm sewer, and lot grading. Mr. Grieme also completed AutoCAD drafting and construction plans.

Street Improvement District 161 – Mandan, ND (2012-2013). Wenck was retained by the City of Mandan to provide civil engineering for the SID 161 road reconstruction/rehabilitation project. Mr. Grieme edited plan sheets, prepared cost estimates, and served as Project Inspector, overseeing road construction, tracking quantities, and interacting with residents.

Sandy River Drive Grade Raise – Burleigh County, ND (2012). Wenck was retained by Burleigh County to provide civil engineering services for the proposed Sandy River Drive Grade Raise project. Mr. Grieme conducted the tree survey, topographic survey, prepared civil plans, created easement documents, and oversaw hydrogeological drilling. The project never went to construction.

ADAM HAYES, PE

Senior Managing Engineer

Mr. Hayes is an experienced engineer and business leader with broad experience working and over 25 years of experience in environmental investigation, remediation design, vapor intrusion studies, Brownfield consulting, and geotechnical engineering. He has managed multi-disciplinary environmental investigation and remediation projects in the United States, U.S. Virgin Islands and Costa Rica with a wide range of environmental contaminants including petroleum compounds, volatile organic compounds, heavy metals, pesticides, and pentachlorophenol. His experience includes commercial facilities, manufacturing plants, pipelines, petroleum terminals, landfills, airports, and ash disposal sites.



EDUCATION

MBA, Kennesaw State University Coles College of Business

MS, Geophysical Sciences, Georgia Institute of Technology

BS, Civil Engineering, Clemson University

REGISTRATION

Registered Professional Engineer □
(AL, AR, FL, GA, MO, MS, NC, and SC)

NCEES Registration (# 17707)

SELECTED PROJECT EXPERIENCE

Lockheed Martin Aeronautical Systems Company Building B-90, Marietta, Georgia. A release of diesel fuel from a backup generator near a former solid waste disposal area resulted in a co-mingled plume of groundwater impacted with petroleum compounds and chlorinated solvents. Services included the completion of a RCRA Facility Investigation (RFI), which included a long-term monitoring plan across this 40-acre site.

Former Atlanta Journal-Constitution Facility, Atlanta, Georgia. An underground storage tank release at this facility resulted in non-aqueous phase liquid (NAPL) over five feet in thickness beneath the site and remediation attempts by others over a period of 15 years had failed to make any progress. A multi-phase extraction (MPE) remediation system was designed and installed to remediate NAPL and dissolved-phase contamination. The system successfully reduced NAPL thicknesses by over 95 percent within the first 10 months of operation.

Fort Gillem Redevelopment, Forest Park, Georgia. Environmental consulting and Brownfield services were provided for the facility which has been in the BRAC program since 2005. The services included evaluation of ongoing Army remediation activities and development of a Brownfield Corrective Action Plan as part of a planned transfer to the Forest Park/Fort Gillem Local Redevelopment Authority. This very complex Corrective Action Plan required development of remedies to address the requirements of all the project parties including the Army,

AREAS OF EXPERTISE

Brownfields
Redevelopment
Vapor Intrusion
Assessment & Remedial
Design
Phase I and II Due
Diligence Site Assessments
Voluntary Cleanup
Program (VCP) Consulting
Soil & Groundwater
Remediation Engineering
Construction Management
Solid Waste Engineering
Alternative Energy
Solutions
Compliance &
Sustainability Consulting

PROFESSIONAL MEMBERSHIPS

Georgia Brownfields
Association Committee
Member
Georgia Environmental
Conference (GEC) Steering
Committee Member
Chi Epsilon National Civil
Engineering Honor Society
Beta Gamma Sigma
Business Honor Society

GEPD, U.S. EPA, and interested prospective purchasers.

Kroger Co. Atlanta Distribution Facility, Forest Park, Georgia. In 2013 the Kroger Co. was searching for a home for their new Atlanta Distribution Center to service the southeast market. The Gillem Logistics Center at the Former Fort Gillem Army was a prime candidate but the property had to overcome concerns regarding environmental liability associated with the former Army activities. A comprehensive investigation plan was developed which required significant coordination between representatives of the Army, the Georgia EPD and the U.S. EPA and A Prospective Purchaser Corrective Action Plan was prepared and approved to provide limitation of liability protection under the Georgia Brownfield Act. A rapid investigation program was performed within a very short window of time and included over 200 direct push soil borings, 40 groundwater monitoring wells, and analysis of over 350 soil samples for a full list of potential chemicals of concern

Paper Mill Black Liquor Sludge Stabilization and Waste Characterization. Mr. Hayes supported black liquor sludge stabilization and waste characterization for the closure of a failed black liquor pond that required disposal of approximately 4,300 yd³ of sludge. He developed a stabilization plan using a combination of fly ash and Portland cement. Mr. Hayes performed a comprehensive waste characterization evaluation, including field and bench scale testing, to evaluate the potential impacts to the industrial landfill accepting the waste. This successful characterization and assessment resulted in savings to the client of approximately \$3 million.

Bovoni Landfill and Anquilla Landfill, St. Thomas and St. Croix, U.S. Virgin Islands. Mr. Hayes developed groundwater and surface water monitoring plans for the Bovoni Landfill and Anquilla Landfill in St. Thomas and St. Croix, U.S. Virgin Islands, in response to a consent order with U.S. EPA Region 2. He initiated and provided senior engineering oversight for quarterly groundwater and surface water monitoring at these facilities and completed evaluation of technical data to assist with overall long-term closure plan.

Paper Mill Industrial Landfill Evaluation, South Georgia Facility. Mr. Hayes performed an industrial landfill evaluation for a facility in South Georgia. Routine detection monitoring indicated elevated concentrations of arsenic in groundwater downgradient from this facility. Mr. Hayes performed a source demonstration report and identified the placement of boiler ash as the source of the arsenic. He delineated the extent of impacted groundwater and prepared an assessment of corrective measures (ACM) report in accordance with GEPD Solid Waste Management rules. The ACM included an evaluation of the potential corrective measures and the technical justification for corrective action via monitored natural attenuation.

Columbus Fuel Depot, Columbus, Georgia. An underground storage tank release at this active municipal fuel depot resulted in non-aqueous phase liquid (NAPL) over one foot in thickness beneath the site. The impacted area extended to within 50 feet of a perennial water body. A multi-phase extraction (MPE) remediation system with air sparging was designed and installed to remediate NAPL and dissolved-phase contamination. The system successfully reduced NAPL thicknesses by over 75 percent within the first 6 months of operation.

Lockheed Martin Aeronautics Company, Marietta, Georgia. Storm water regulation changes required the preparation of an updated storm water pollution prevention plan (SWPPP) for this 900-acre facility. The SWPPP included the evaluation of numerous structures, storage yards, and manufacturing processes, and required the development of appropriate best management practices (BMPs). This SWPPP included the development of a Geographic Information System (GIS) database and storm drain stenciling of 888 storm water inlet structures across the property.

Former Wood Manufacturing Facility, Union City, Georgia. A site investigation performed around a former pentachlorophenol (PCP) wood treatment drip tank identified soil and groundwater impacts at this former facility. A prospective purchaser corrective action plan (PPCAP) for the Georgia Brownfield Program was prepared. The PPCAP preparation required substantial coordination with the Georgia Environmental Protection Division (GEPD) due to the complexities of the property transfer, because of a prior bankruptcy filing. Remediation activities were performed to bring the site into compliance with applicable risk reduction standards. The remediation activities required detailed evaluation and classification of waste streams to minimize overall project costs. The activities successfully prevented listing of the property on the hazardous site inventory (HSI), and a final compliance status report (CSR) was submitted to GEPD.

Georgia Environmental Protection Division Orphan Sites, Various Locations, Georgia. Mr. Hayes provided engineering design and program management services for "orphan" service station facilities in Georgia as a contractor for the GEPD trust fund. The activities included site assessment and development of a CAP. Active remediation including multi-phase extraction (MPE), soil vapor extraction (SVE), and air sparging (AS) systems were designed and installed at multiple sites. The work was completed under agreement with stringent pay-for-performance and schedule requirements.

Ponce Park South-Atlanta Beltline, Atlanta, Georgia. The subject property included approximately 4.5 acres located within the Historic Old 4th Ward adjacent to the Atlanta Beltline multi-use project which had been impacted with a variety of substances including petroleum products, chlorinated solvents, pesticides, and PCBs. A rapid site investigation plan was developed and implemented, and meetings were held with GEPD representatives to develop an acceptable Brownfield CAP which incorporated prior and new site investigation information. The CAP was accepted and GEPD quickly issued prospective purchaser limitation of liability to satisfy the planned closing date.

Resins Manufacturing Facility, South Carolina. A transfer pipe failure resulted in a release of methanol at this active resins manufacturing facility. Soil and groundwater were impacted with methanol concentrations as high as 600,000 mg/L. Bench scale pilot testing of an enhanced natural attenuation remediation approach indicated that large volumes of methane were being generated through the degradation of methanol in the subsurface. A vapor recovery system was designed and installed to mitigate methane concentrations at the plant.

CDC Building 107, DeKalb County, Georgia. Construction activities for this multi-story building and parking deck encountered incinerator ash which had been disposed on the property over 50 years ago. A rapid site investigation plan was developed and implemented to identify the extent of the ash materials and to perform waste characterization determinations. The project required several mobilizations as new pockets of ash were discovered. The materials were fully delineated, characterized, and removed from the site without causing any delays to the project.

Emory University Hospital, Atlanta, Georgia. Construction activities encountered two abandoned, unregistered underground storage tanks (USTs). A rapid site investigation plan was implemented and meetings were held with GEPD representatives to develop an acceptable in-place closure plan. The CAP was accepted and GEPD quickly issued "no further action" status so that construction activities could proceed without delay.

Aeropuerto Internacional Juan Santamaria (AIJS), San Jose, Costa Rica. A three-week investigation was performed to document existing contaminant levels in shallow soils, sediments, surface water, and groundwater at the AIJS airport. The investigation included the collection of 225 samples around the general airport area, fuel facilities, the hanger area, a maintenance building, and a former landfill. Laboratory analyses were performed to evaluate the concentrations of total petroleum hydrocarbons, volatile organic compounds, semi-volatile organics, organochlorine pesticides, organophosphorus pesticides, polychlorinated biphenyls, herbicides, and metals. Preliminary remediation alternations, including site and institutional controls, excavation and disposal, phytoremediation, stabilization, bioventing, soil vapor extraction, chemical fixation, and enhanced bioremediation, were developed for the facility.

Vadose Zone Soil Gas Assessment - Southeast Retail Service Station Facilities. Vadose zone soil vapor and geotechnical data, along with site-specific facility information, was compiled into an Oracle database. The database included field data and collection method information from 48 retail gasoline service station facilities located across 7 states. Qualitative and quantitative analyses of hydrocarbon and oxygen behavior profiles were performed for each site. The empirical results were compared to the generalized soil gas profile behavior predictions of the Johnson-Ettinger risk-based corrective action soil gas computer model and presented at the University of Massachusetts at Amherst.

Private School Site, North Georgia Location. A formerly unpermitted landfill was encountered as the result of development activities for this facility. Remediation activities were performed to remove all waste and unsuitable materials from the site. Confirmation soil, groundwater, and surface water sampling and testing were performed to evaluate the potential impacts from the landfill. Extensive soil vapor sampling was performed and a permanent gas monitoring system was designed for the proposed structures.

Presentations

Vapor Intrusion: Mitigation Variables, Best Practices and Innovative Technologies. Presented to the Georgia Brownfield Association Annual Seminar. April 20, 2016.

Fort Gillem Redevelopment Update. Presented to the Air & Waste Management Association (AWMA)/Association of Women Environmental Professionals (AWEP) Joint Meeting. January 29, 2016.

Fort Gillem – A Unique Brownfield Redevelopment Opportunity. Presented to the Georgia Brownfield Association Annual Seminar. April 21, 2015.

Due Diligence for Property Acquisitions and Building Demolition. Presented to the University System of Georgia Environmental and Occupational Safety Workshop. July 10, 2013.

Due Diligence for Site Development. Presented to American Institute of Architects (AIA). Atlanta, Georgia. July 2012.

Reading & Understanding Geotechnical Reports/ Understanding the Difference Between Phase I & II ESAs. Presented to the University of Georgia – Office of University Architects. Athens, Georgia. November 2011.

Underground Storage Tanks: Regulations, Assessments and Corrective Measures. Environmental Institute Course Conducting Environmental Evaluations: Assessments & Audits. September 2001.

Vadose Zone Soil Gas Data Collection and Analysis. Presented at the 15th Annual International Conference on Contaminated Soils & Water. University of Massachusetts Amherst. October 1999

Speciated Biogenic Emissions Inventory for the Baton Rouge, Louisiana Area, Louisiana Department of Environmental Quality, 1993.

Spatial Analysis of Ozone and Ozone Precursors During the August 9-11, 1992 Ozone Episode of the Southern Oxidants Study Atlanta Intensive, International Conference on Regional Photochemical Measurement & Modeling Studies, Air & Waste Management Association, San Diego, CA, November 1993.

Motor Vehicle Activity Factor Determination through Fuel Consumption Analysis: Atlanta, Georgia, Transactions of the Air & Waste Management Association, VIP-27, 215, 1992. Presented to Air & Waste Management Association, Raleigh, NC, 1992.

Alternative Methods for Evaluating Vehicle Miles Travelled, U.S. Environmental Protection Agency, 1992.

STEVE HEGLAND, PE

Staff Engineer

Mr. Hegland has over six years of civil engineering design, analysis, and construction experience. He has experience on diverse projects including stormwater routing, civil site construction, and solid waste construction. Mr. Hegland's experience ranges from project layout to plan and specification preparation to construction oversight. He has work experience in both the private and public sectors and has worked for clients in multiple states.

EDUCATION

BS, Civil Engineering, North Dakota State University - Fargo, ND

SELECTED EXPERIENCE

Gas Utilization/Recovery

Republic Services, Inc.

Pine Bend Landfill. Responsible for design and project management of the 2015 gas system modifications. Duties included project planning, project design, construction staking and record documentation of gas system alignment as well as directing the construction observation of the lateral vacuum and well installation.

Pine Bend Landfill. Responsible for directing the construction observation of the 2014 gas system extension. Duties included construction staking and record documentation of gas system alignment as well as construction observation of the header and lateral installation.

Pine Bend Landfill. Responsible for construction observation and monitoring, documentation and reporting of the 2013 MSW cell construction. Duties included observation of the soil stripping and stockpiling, geosynthetic clay liner placement, geomembrane placement, clay placement, drainage system installation, leachate forcemain installation, and gas system modification. Performed nuclear gauge testing, sample collection and prepared the final documentation report. The project involved both virgin composite liner as well as a GCL composite liner over existing unlined waste to maximize the site footprint capacity.

Pine Bend Landfill. Responsible for construction observation of the 2013 gas system extension. Duties included construction staking and record documentation of gas system alignment as well as construction observation of the header and lateral installation.

Pine Bend Landfill. Prepared solid waste permit for renewal in 2013. Was responsible for preparation of all reports included in permitting document.

Pine Bend Landfill. Responsible for observation and data collection for geoprobe monitoring around the perimeter of the facility. Directed geoprobe drillers and performed gas monitoring with multiple gas meter and recorded results. Prepared report detailing work performed and results achieved.



AREAS OF EXPERTISE

Construction Observation & Documentation
Construction Plans and Technical Specifications
Solid Waste Landfills
Civil Engineering
AutoCAD

TRAINING

AutoCADD
HydroCAD
40 Hour OSHA Hazardous Waste Operations and Emergency Response (November 2010)
Nuclear Gauge Safety and Use (June 2010)

REGISTRATION

P.E., Minnesota, #52243

Waste Management, Inc.

Elk River Landfill. Responsible for construction observation and monitoring, documentation and reporting on an 8-acre MSW cell construction. Duties included observation of clay barrier layer placement, geomembrane installation, leachate piping systems, gas piping system, granular drainage layer placement, electrical controls and access road construction. Performed all nuclear gauge density testing, sample collection, and assisted with final documentation report. Because the project was completed late in the construction season, the project resulted in the submittal of the full construction documentation report on the day following the completion of construction in order to allow waste the client to begin placement of waste for liner frost protection as soon as possible.

Elk River Landfill. Assisted with the preparation of a solid waste permit modification for expansion of the facility in 2012. Tasks included preparation of the Operation and Maintenance plan as well as the Construction Quality Assurance Plan and Technical Specifications.

Elk River Landfill. Responsible for construction observation and monitoring, documentation and reporting of perimeter berm and access road construction in 2011-2012. Duties included observation of geotextile-reinforced controlled fill placement, leachate forcemain installation, stormwater pipe installation, and gas system extension. Performed nuclear gauge testing, sample collection and preparation of the final documentation report. Also assisted in construction plan preparation and bidding assistance. The project involved the placement of portions of reinforced 2:1 slopes in order to optimize site access.

Elk River Landfill. Assisted with the field data management and annual report compilation in 2012. Assisted with drafting the Annual Operating Report as well as completion of the required MPCA forms and checklists.

Northern States Power Company DBA Xcel Energy

Red Wing Ash Disposal Facility. Assisted with the project design and bidding documents related to a 2014 cell construction. The project consisted of an approximately three-acre cell construction with a synthetic liner system including clay, gcl and a geomembrane liner with both primary and secondary containment. Coordinated with regulatory agency and assisted with construction observation and coordinated construction issues. Was responsible for setting up testing protocol to be completed on the project and coordinated with contractor and laboratories to ensure all testing requirements were met. Was responsible for coordinating contractor schedule, hours, safety protocol and questions with owner and track contractors billing requests.

Red Wing Ash Disposal Facility. Responsible for construction observation for an ash cell closure project in 2013. Was responsible for coordinating and documenting all geosynthetic and soil testing programs. Project included geosynthetic cover with site access road incorporated into design with stormwater management.

Shamrock Landfill, Inc.

Shamrock Industrial Landfill. Assisted with the project design and bidding documents related to a 2015 cell construction. The project consisted of an approximately five-acre cell construction with a synthetic liner system including clay, GCL and a geomembrane liner. Coordinated with regulatory agency and assisted with construction observation and coordinated construction issues. Utilized AutoCad software to confirm grading plans, verification tables and complete project takeoffs.

Shamrock Industrial Landfill. Assisted with the preparation of project design and bidding documents for leachate line extension into a sanitary district interceptor. Assisted with the preparation of bidding documents for construction activities to include installation of approx. 2,500 LF of piping. Also assisted with coordination with regulatory agencies to obtain all necessary permits for project.

American Crystal Sugar Company

Hillsboro, North Dakota Facility. Responsible for construction observation of a 5-acre partial closure of a lime landfill. Duties included observation of lime grading, compacted cover layer, rooting zone placement, turf establishment, and directing surface control placement. Also, coordinated contract schedule and obstacles between contractor and owner. Performed soil density tests, soil sample collection, and wrote final construction documentation report.

East Grand Forks, Minnesota Facility. Responsible for construction observation of a river discharge system modification project. Duties included directing forcemain installation, piping modification made to the river discharge system, and flume removal. Completed final construction documentation report after project conclusion.

Drayton, North Dakota Facility. Responsible for observing soil boring and sampling of an existing beet soils stockpile as part of a feasibility study for remediation options. Identified soil layers encountered and collected samples for laboratory analysis. Completed final documentation summarizing laboratory results.

Hillsboro, North Dakota Facility. Responsible for construction oversight of a 6-acre mud pond construction. Duties included directing clay liner placement, geonet installation, drainage layer installation, forcemain installation and lift station construction. Performed soil density test, soil sample collection, sediment collection, forcemain pressure testing, and pump start up. Completed final construction documentation report after project was completed.

Hillsboro, North Dakota Facility. Responsible for construction oversight of a 9-acre closure of an inert waste landfill. Duties included observation of lime spall waste relocation, waste grading, cover material placement, turf restoration, and access road construction. Performed soil density testing, soil sample collection and completed construction documentation report after project completion.

Crookston, Minnesota Facility. Responsible for construction oversight of a 26-acre pond cover construction as part of an H₂S reduction agreement. Duties included direction of slope preparation, anchor installation, and cover construction. Performed anchor tension testing with contractor and inspected cover seam construction. Completed construction documentation report after project completion.

Hillsboro, North Dakota Facility. Responsible for construction observation of a 3-acre lime landfill cell construction. Directed contractor during subgrade preparation, drainage layer placement, geotextile installation, and initial lift placement. Completed the final construction documentation report after project completion.

Hillsboro, North Dakota Facility. Assisted with the preparation of plans and specifications of a 3-acre partial closure of a lime landfill. The design included grade preparation, cover material selection and placement, and surface water control features. Completed soil samples as part of cover material feasibility analysis for the project.

East Grand Forks, Minnesota. Assisted with the preparation of plans and specifications of a river discharge line modifications project. The design required coordination with railroad company to bore forcemain pipe under tracks. Also required analysis of system to identify any possible stormwater infiltration locations. A mud line was removed from the system and installed adjacent to the piping to prevent contamination of the system in the case of a pipe leak.

All Three Minnesota Facilities. Responsible for performing leak testing on water treatment ponds at all three facilities. Included installing and monitoring equipment in the field as well as downloading data on a routine basis and troubleshooting equipment malfunctions in the field.

Private Client - Storm Lake, Iowa. Responsible for assisting with BMP development for compliance with municipal stormwater quality ordinance. Duties included the development several BMP's for the facility to manage bacteria and other components of urban runoff. Several available technologies were included in the BMP development to assess their loading reduction. Along with each BMP, a cost benefit comparison was presented. Figures were created to depicting BMP plan and itemized cost estimate table was created to accompany report.

Willmar Utilities - Stormwater Analysis of Coal Storage Expansion. Assisted with feasibility study to determine the effects the expansion of the coal storage site would have on stormwater. Duties included development of stormwater runoff calculations as well as volume calculation of existing and proposed conditions. A preliminary cost estimate was also prepared for the proposed expansion infrastructure.

Minnehaha Creek Watershed District - Permit Reviews. Assists permit engineer with working with MCWD staff and permit applicants to develop site designs that satisfy MCWD rule requirements. Performs primary technical review of rate control and water quality treatment detention facilities, infiltration Best Management Practice implementation, hydrologic structure design, and erosion and sediment control measures required in developing areas.

Minnehaha Creek Watershed District - 2015 Park Reconstruction. Responsible for construction observation on a stormwater treatment system incorporated into a city park reconstruction. Project included all testing coordination related to all soil and utility testing. Project consisted of an underground stormwater treatment system being retrofit below and existing park. Project was sponsored by multiple government agencies and project included coordinating construction activities with multiple project managers.

Minnehaha Creek Watershed District - 2015 Stormwater Diversion. Performed construction observation during stormwater diversion construction. Project area had the potential to encounter contaminated soils during construction so soil screening, identification and monitoring was performed during construction. Responsible with all soil monitoring testing. Was also responsible for coordinating material testing during construction.

City of Delano - 2013 Street Feasibility Study. Assisted with feasibility study to outline potential costs and construction options for the 2013 street reconstruction project. Duties included developing detailed cost analysis, performing field measurements to verify input data and attending a City workshop session to field questions and concerns from citizens.

City of Rockford - 2016 Downtown Improvements Project. Completed project design including all AutoCad Drafting utilizing the AutoCAD Civil 3D Program. Project includes utility relocation, curb and gutter realignment, and removal and replacement of sidewalk for a 4 block stretch of downtown Rockford. Responsible for creating project manual and confirming all project quantities and specifications. Responsible for coordinating with private utilities for major relocations of infrastructure.

City of Corcoran - 2014 Private Development. Provided construction observation on behalf of the City during a private development construction. Was responsible for ensuring all construction requirements were met and all necessary material testing was performed. Construction included installation of all public utilities, roadways, and trail construction. Responsible for coordinating construction issues with contractor and city and ensuring all resident concerns were addressed.

2014 Lift Station Construction. Provided construction observation on the lift station construction. Responsible for construction observation of sanitary sewer piping through environmentally sensitive locations. Was responsible for verifying construction was completed in accordance with project plans and specifications. Responsible for coordinating construction issues with residents and ensuring concerns were addressed.

City of Plymouth - Street Reconstruction. Responsible for construction observation of street reconstruction project. Project included pavement reconstruction as well as replacing the stormwater and water supply force main. Responsible for verifying installation with project plans and specifications. Also responsible for coordination of construction procedures with residents and addressing resident concerns.

Channel Restoration. Responsible for construction observation during a channel restoration project to restore channel to original conditions and protect it from future erosion. Observed sheet pile installation and coordinated with contractor to ensure installation was completed as required.

BRAD HELLAND, MS, PE

Site Investigation and Remediation

Mr. Helland is a professional engineer with over 25 years of experience solving environmental problems at dozens of sites across the US and abroad. He manages projects, conducts site characterization and feasibility studies, supports regulatory compliance and litigation efforts, and performs hazardous waste remediation and spill response operations. He has worked on several complex sediment sites including Portland Harbor, the Lower Duwamish Waterway, Harbor Island, and the Seattle Waterfront. He has an extensive understanding of remediating contaminated sites through work with the Washington Department of Ecology, US EPA, Raytheon and the US Navy, and consulting firms. He has managed multidisciplinary site assessments, feasibility studies, remediation designs and specifications, cost estimates, construction management, and post-construction monitoring activities on a variety of sites, including sediment sites. He has worked on two carbon-amended capping pilot projects in Puget Sound, managing contracts, developing experimental design and sampling schemes, and conducting construction oversight. Mr. Helland was Washington State Department of Ecology's Technical Lead for a variety of sites, where he worked with EPA, responsible parties, and other stakeholders to conduct remediation activities. He provided oversight and managed contractors to ensure risk assessment and other technical elements were compliant. He provided technical review and direction on RI, FS, and EECA work, and on several MTCA, CERCLA, and RCRA remedial actions.



AREAS OF EXPERTISE

Contaminated Sediment Management
 Site Investigations and Feasibility Studies
 Data Validation, Management, and SAP/QAPP
 Technology Evaluation and Pilot Testing
 Engineering Evaluation
 Costs Analysis (EECA)
 Hazardous Waste Removal Operations
 Subcontractor Selection and Oversight

EDUCATION

BS, Chemistry, University of Iowa - Iowa City, IA

MS, Environmental Engineering, University of Iowa - Iowa City, IA

PROJECT EXPERIENCE

Contaminated Site Investigation and Remediation

Sediment Investigations. Confidential Clients. On two occasions for different clients in support of a prospective property acquisition that included contaminated sediment, led the consulting team providing rapid response to client needs, including developing and implementing a sediment sampling and analysis plan for dioxin and other hazardous substances, meeting with regulatory agencies and elected officials, and formulating potential sediment remediation alternatives. Team accomplished activities that can often take more than a year in less than two months.

Former Region 10 EPA Administrator John Iani had this to say about the project:

Brad's team was tasked with some very difficult sediment analyses. The timing for the project was very limited and the complicated work needed to be accomplished quickly, but within very strict government environmental parameters. Further, the work performed by Brad's team and their sub-contractors was the basis for a petition to state government policy makers. The abbreviated time frames and complex analysis was quite challenging. They accomplished the required tasks efficiently and without any logistical difficulty and pulled their management and analytical team together quickly and delivered an excellent product.

PROFESSIONAL MEMBERSHIPS

ASCE

REGISTRATION

Professional Engineer: MN (pending), WA #39967

Lower Duwamish Waterway CERCLA Sediment Site RI/FS. As the Washington State Department of Ecology's Technical Lead and Site Manager for this joint Federal-State managed cleanup, oversaw the work for the State. Worked with EPA and the PLP/PRP group, the Lower Duwamish Waterway Group (Boeing, Seattle, King County, and Port of Seattle), to complete a Remedial Investigation and Feasibility Study for the 441-acre site. Integrated State (Model Toxics Control Act [MTCA], Sediment Management Standards [SMS]) and Federal (CERCLA, RCRA, TSCA) requirements on a 5.5-mile reach of the Duwamish River adjacent to other cleanup sites, tribal fisheries, and residential areas. Provided oversight and managed contractors to ensure risk assessment and other elements of the RI/FS were MTCA/SMS compliant. Provided technical review and direction on the RI, FS, and several MTCA, CERCLA, and RCRA remedial actions. Reviewed the source control work and conducted a MTCA Disproportionate Cost Analysis in collaboration with PLPs, which showed the efficacy of capping and natural recovery. Team was recognized twice for outstanding performance (Commitment to Excellent Service, Ecology Agency Award, 2006; Team Performance Award, Toxics Cleanup Program, 2004).

Pier 48 Sediment Investigation. Confidential Client. Elliott Bay, Seattle, WA. Supported the investigation of contaminated sediments as part of a due diligence process to redevelop Pier 48, a prime location on Seattle's waterfront. Authored the sampling and analysis plan and managed the field work, which required collecting sediment grab and core samples in open water and underneath the pier.

Demonstration and Validation of Reactive Amendments at DoD Contaminated Sediment Sites. US Navy. Bremerton, WA. Managed the prime contract to demonstrate delivery, stability and effectiveness of in situ treatment materials that can remediate contaminated sediment sites at reduced costs with faster recovery time compared to dredging and thick isolation capping. Provided construction oversight and project management duties at this successful demonstration of carbon-amended capping material at this CERCLA site.

Year 10 Post-Construction Monitoring and Cap Repair. WA Dept. of Natural Resources. Commencement Bay Middle Waterway Area C, Tacoma, WA. The remedial action for Area C removed, backfilled, and capped contaminated intertidal sediment near the head of the waterway in 2004. Led the team conducting Year 10 post-construction monitoring to assess performance of the remedial action, ensure long-term performance objectives are on track, and make repairs to the cap. Washington DNR required the work to be expedited and submitted to EPA in approximately one month, and team completed all work and delivered the final report on schedule within the allowed budget.

Custom Plywood Interim Action. Anacortes, WA. As part of a MTCA Interim Action, conducted a condensed human health risk assessment and designed a pilot study for thin layer capping with reactive amendment to remediate dioxins in sediment. Remedial actions for the intertidal portion of the Site included removal of 25,000 cy of contaminated sediments, thin layer capping of areas where eel grass is present, and habitat enhancements/restoration.

Northlake Shipyard Interim Action. Seattle, WA. Supported a MTCA interim action in Lake Union. The removal action consisted of dredging 8,000 cubic yards of sand blast grit impacted sediments near active dry docks. The project involved sediment data analysis, and preparing all permitting (JARPA, BE, and SEPA) and design documents, including detailed plans and specifications.

Boeing Commercial Aircraft Sediment Remedial Investigation and MTCA Interim Action. Everett, WA. Served as the Technical Lead for contaminated sediment characterization and management in support of a MTCA cleanup order involving freshwater sediments. Provided extensive technical support to the Ecology PM for the MTCA site, design review and construction oversight for interim action in a freshwater creek, and technical assistance in characterizing contamination in wetlands and other areas of the site. Conducted technical review of sediment RI documents, including source removal actions, sampling plans, and data reports. Represented the Ecology Toxics Cleanup Program during formal and informal dispute resolution meetings.

MICHELLE HOSFIELD

Senior Environmental Scientist/Associate

Ms. Hosfield has eighteen years of professional experience in the environmental field and has worked with several types of clients including homeowners, developers, real estate agents, corporations, mortgage specialists, and contractors. Ms. Hosfield has worked on a wide variety of projects from Phase I Environmental Site Assessments and pre-demolition surveys and oversight, to active remediation projects and grant writing.

EDUCATION

BS, Environmental Science, Minor in Chemistry, University of Wisconsin, River Falls

PROJECT EXPERIENCE

Phase I and II Environmental Site Assessments

Prepared Phase I Environmental Site Assessments (ESA) according to ASTM Standard E1527-05 and the upcoming All Appropriate Inquiries (AAI) rule for various property types including residential, commercial, industrial, agricultural, and cell tower sites.

Prepared and managed Phase II Environmental Site Assessments based on the findings of recognized environmental conditions found in the Phase I assessments. Project sites have been in Arkansas, Florida, Georgia, Indiana, Illinois, Idaho, Kentucky, Minnesota, Nebraska, Ohio, Oklahoma, Texas, and Wisconsin. Investigation activities include field work preparation and scheduling, drilling, soil and groundwater sampling, monitoring well installation, soil gas investigations, and sewer assessments. The reports not only include the methodology, results, and recommendations, but cost estimates to remediate the site according to the plans of the client.

Brownfield Investigations and Remediation Sites

Managed brownfield studies working with the Minnesota Pollution Control Agency (MPCA) Petroleum Brownfields Program and the MPCA Voluntary Investigation and Cleanup (VIC) Program. Prepared Development Response Action Plans and Construction Contingency plans for MPCA review and approval.

Former Oasis Market, Blaine, Minnesota. Project Manager responsible for day-to-day project activities, managing the budget, prepared proposals and final reports, and oversight of field activities. The former Oasis Market site was redeveloped with a three-tenant retail building. The site was an active leaking underground storage tank site throughout the 1990s. Our tasks included updating a Phase I ESA, performing a pre-demolition survey, and removing five USTs, underground piping, and seven dispensers prior to development. Re-development activities included writing a Development Response Action Plan/Construction Contingency Plan (DRAP/CCP) and to enroll the site in the MPCA Brownfields Program. Over the next three months, Wenck implemented the DRAP/CCP and designed a passive



AREAS OF EXPERTISE

Phase I and II Site Assessments
Brownfield Redevelopment Coordination and Implementation
UST/AST Storage Tank Investigations
Petrofund Reimbursement Assistance
Dry Cleaner Reimbursement Assistance
Vapor Intrusion Assessments
Redevelopment Grant Assistance
Asbestos Surveys and Abatement Oversight
Hazardous Material Assessments
Lead Risk Assessments/ Inspections
Emergency Response and Remediation Services

CERTIFICATIONS

OSHA 40-hour Hazardous Waste Operations and Emergency Response
Certified MDH Asbestos Inspector AI9036
Certified MDH Site Supervisor AS9036
Certified MDH Lead Risk Assessor LR3200
Incident Command 100, 200, 320
E-Rail Safe

vapor mitigation system that was installed below the building slab. Utility corridors also required a vapor barrier. Coordination was crucial with our client, the City of Blaine, Coon Creek Watershed District, and the Metropolitan Council. A DRAP/CCP Implementation report was issued to the MPCA for review and approval. The client received a completion letter from the MPCA for the remediation work that was performed at the site.

Westridge Hills Development, Delano, Minnesota. Project Manager responsible for the fieldwork and reporting of a soil investigation of buried dumps that contained asbestos and debris. Defined the magnitude and extent of a 10,000-cubic-yard dump site and prepared an Emissions Control Plan and Development Response Action Plan/Construction Contingency Plan that was approved by the MPCA Voluntary Investigation and Cleanup (VIC) program and Petroleum Remediation program. Prepared an Implementation Report with findings to receive a "No Further Action" letter from the MPCA.

Hopkins Cold Storage, Hopkins, Minnesota. The Hopkins Cold Storage project required a short timeframe for investigation and reporting. The property is occupied with a 60-year old cold storage building that will require abatement and remediation. Wenck secured investigation grant funds through the Hennepin County COA and within a three-week timeframe, Wenck completed a Phase I ESA, a Phase II ESA Work Plan, a Phase II ESA with the installation of monitoring wells and a Response Action Plan to be submitted to the MPCA for review and approval. In conjunction with the investigation activities, the owner of the property applied for the Fall round of grant funding through the Metropolitan Council TBRA and the Hennepin County ERF for asbestos abatement and additional investigation funds.

Karibu Deli, St. Paul, Minnesota. The Karibu Deli redevelopment site was occupied since the late 1800s with single-family residences and two separate filling stations. The property was purchased by the City of St. Paul and the gasoline station was removed along with the dispensers and underground tanks. The property remained vacant for quite some time. A private purchaser bought the property and partnered with the African Development Center to redevelop the site with a deli and coffee shop. Wenck conducted a Phase I ESA, a Limited Site Investigation (LSI) in conjunction with a Geotechnical Investigation, prepared a Response Action Plan and provided construction oversight. The MN Department of Commerce – Petrofund was able to provide reimbursement for up to 90% of the cost of the LSI. Grant funding was awarded for the cleanup activities through MN DEED and the Ramsey County ERF. Construction of the site building is in the final stages.

Oklahoma City Crossroads Project, Oklahoma. Coordinated and directed drilling personal for soil and groundwater investigations performed on a former scrap yard site. This project was a part of a business risk assessment. Field testing included geotechnical borings, surficial soil sampling, investigation of the former maintenance building, investigation of a scrap yard, a sanitary sewer drainage investigation, installation and development of monitoring wells, and report preparation. Cost estimates for future remediation costs were also provided to the client prior to the purchase of the property.

Storage Tank Investigations

Managed underground and aboveground storage tank investigation/corrective action design projects, including Limited Site Investigations and Remedial Investigations for numerous sites in northern Minnesota and in the Twin Cities Metro area.

Oversight of monitoring well installation, development, and sampling according to Minnesota Department of Health and MPCA regulations. Assisted clients with the Minnesota Department of Commerce - Petrofund reimbursement applications.

Asbestos and Hazardous Materials

Certified Asbestos Inspector and Supervisor for the past seven years. Conducted asbestos, lead, mercury, PCBs, CFCs, radon and other hazardous materials inspections and assessments for numerous buildings and residential homes throughout MN and WI. All inspections and assessments were conducted in a manner that was consistent with the applicable State and Federal rules, including, MN Rules 4620 (MDNR), EPAs AHERA Regulations, 40 CFR 61

(NESHAP), and NR447 (WDNR). Sampling experiences include both using an XRF analyzer for direct read results and collecting bulk samples for laboratory analyses.

Prepared Emission Control Plans for the MPCA VIC program for soils that were impacted with asbestos-containing materials.

Coordinated the abatement and oversight for the removal of asbestos from several structures throughout Minnesota as a certified asbestos site supervisor.

Minnehaha Creek Watershed District, Hopkins, Minnesota. Conducted pre-demolition surveys on two apartment complexes, an office building, and two residential structures. Inspections included the sampling of suspect asbestos-containing materials, inventory of hazardous materials, and sampling of suspect lead-based paint. Reports included the inventory of materials, estimated amounts, and estimated costs for removal.

Former Friedrich Farmstead, Otsego, Minnesota. A pre-demolition survey was conducted on a 100-year old farmhouse and twelve outbuildings. Several asbestos-containing materials were identified along with peeling lead-based paint that required stabilization before demolition. From the survey, demolition specifications were developed and submitted to qualified contractors for the demolition of the buildings.

Hennepin County Environmental Services. Pre-demolition surveys were conducted for six commercial properties along CSAH 81 in Crystal, Minnesota. The surveys included a hazardous materials assessment and identification of underground storage tanks, hydraulic hoists, water supply wells, and oil/water separators. Oversight and subsequent testing was provided for the removal of underground storage tanks and hydraulic hoists. The project included the management of a government contract.

Former Abbott Northwestern Hospital, Minneapolis, Minnesota. Prepared asbestos abatement specifications and bidding documents for the removal of identified asbestos-containing materials and hazardous materials at the former Abbott Northwestern Hospital. Plans for the building include restoration of the original hospital wing and existing structure into affordable housing. Part of the project included obtaining grant monies for the removal of asbestos-containing materials and lead-based paint.

Lead Risk Assessments

Conducted over 30 lead risk assessments, lead inspections, and clearances for the City of Bloomington Housing and Redevelopment Authority. The risk assessments were performed on single-family residences applying for federal home improvement loans. The projects included coordination and communication with the homeowner, contractors, and City of Bloomington personnel.

Storm Water Pollution Prevention Plans

Prepared Storm Water Pollution Prevention Plans for several clients according to the April 5, 2015 MPCA General Permit. Plans included assisting clients with identifying Best Management Practices and Benchmark Monitoring Locations. Storm water plans have been prepared for clients such as CHS Inc., Anderson Windows, Randy's Sanitation, various scrap metal clients, and Waste Management.

Spill Prevention, Control, and Countermeasure Plans

Experience in preparing Spill Prevention, Control, and Countermeasure Plans for various clients throughout the State of Minnesota. Plans are prepared in accordance to Title 40, Code of Federal Regulations, Part 112, and the applicable requirements of the Minnesota Pollution Control Agency under requirements of Minnesota Statute 115E.

Soils and Bituminous Laboratory

Managed and trained laboratory staff on construction materials testing.

Conducted laboratory testing in accordance with ASTM and MnDOT standards on soils, concrete, and bituminous mixtures. Tests include grain size analysis, standard and modified proctors, sieve hydrometers, organic materials, aggregate soundness testing, fireproofing, soil consolidation testing, soil unconfined compressive strength tests, bituminous density testing.

Classified geotechnical and environmental soil borings according to the United Soils Classification System (USCS). Prepared soil boring logs using Gint software and site diagrams using AutoCad.

JOHN G. HUNTINGTON, PHD

Analytical Chemistry & Contamination Expert

Mr. Huntington uses his research experience to provide expertise to clients in petroleum, fuels, and coal process contamination issues. He's conducted numerous forensic investigations of sites and served as expert witness for industry and environmental chemistry fields. His work has included developing protocols and performing experimental research in coal and petroleum coke gasification. He has developed models of catalytic cracking and coking that allowed prediction of impacts of feedstock changes and operating design changes, assisting in the redesign of the riser which resulted in multimillion dollar gasoline production improvements. Mr. Huntington holds a patent for a process to economically purify terephthalic acid made from coal to fiber-grade quality.

His work includes developing complex and unique analytical methods in order to report to clients on final accuracy, precision and usability of data for use in project decisions. He can troubleshoot analytical findings as required and consult on corrective actions and overall project scenarios for data quality.

EDUCATION

BA, Chemistry, University of Utah

Ph.D., Physical Organic Chemistry, University of Oregon; Isotope Effects on Peroxyester Thermal Decomposition and Photoelectron Spectroscopy of Cyclobutanes

Postdoctoral Research, Plasma Chemistry and Gas-Phase Ionic Reaction Kinetics, Colorado State University

Postdoctoral Research, Chemistry of Coal, SRI International

PROJECT EXPERIENCE

Over 8 years as Technical Director or Quality Assurance (QA) Manager of client's analytical laboratories, develops numerous trace analytical methods for organic and inorganic contamination. Manages QA and Quality Control (QC) functions of own and client laboratories, including creating accurate and productive Standard Operating Procedures and Corrective Action programs. Plans and directs the technical systems for 5 laboratories in one network. Efforts led to productivity and quality improvements at all locations allowing company to succeed in highly competitive market and also resulted in complaints being reduced by 90% during a 9-year period represented.

Reviews complex and unique analytical methods and report to clients on final accuracy, precision and usability of data for use in project decisions. Troubleshoots analytical findings as required and consult on corrective actions and overall project scenarios for data quality. Expertise includes some of the following: dioxins and other congener-specific analyses, unique matrices, samples highly contaminated with non-routine organic compounds; methods utilizing gas chromatography (GC), GC mass spectroscopy (GCMS), high performance liquid chromatography (HPLC), HPLC-FIMS, Inductively Coupled Plasma (ICP) and ICPMS. Ensures data quality us-



AREAS OF EXPERTISE

Environmental Chemistry
Forensic Investigations
Quality Assurance/Quality Control
Process Designer
Laboratory Management
Database Consulting

PROFESSIONAL MEMBERSHIPS

ASCE

REGISTRATION

Professional Engineer: MN
(pending), WA #39967

ing peer quality control board, quality control sample procedures and computerized QC tracking systems.

In private industry as project Manager for chemistry and IT projects, designs novel oil desulphurization processes and produced patented chemical processes. Investigates contaminant sources in several commercial products, including computer components, chemical products, monomers for synthetic fabric production, and cleaning agents. Consultant for trace level analysis of air samples to detect sources of contamination in public and private buildings. Analyzes point source factors to identify and resolved source of leaks for client refinery resulting in resolution of regulatory issues.

Integrates scientific expertise with studies in linguistics and communication to enrich analytical and expert witness consulting practice and form long term client base and consistent referrals. Trains and provides guidance for developing employees using these skills.

DATABASE DEVELOPMENT AND STATISTICAL ANALYSIS

Combines data evaluation and validation studies with statistical analyses as part of complex project remediation strategies. As clients, federal, state and local regulators all have their own unique database structures, becomes well versed and generates expertise in numerous structures to offer wide range of database consulting services. This includes adapting, 'translating between', programming and managing systems for clients.

Develops new database and electronic deliverable products to facilitate QA system productivity and accuracy in laboratories and other technical companies, including automation systems for data review and quality assurance tasks, heads and directs team that produces an advanced web-based laboratory information management system (LIMS) that allows network of laboratories to operate as a unit.

Assesses client and current industry criteria to design project-specific programs and create unique websites to facilitate product marketing.

PROJECT MANAGEMENT

Started company with \$50,000 of personal investment and developed a profitable and well-respected operation focused on non-standard environmental work. Annual billings went from less than \$300,000 per year during the first year to over \$1,000,000. Served as technical director, financial manager, and president.

Discerned professional capabilities of personnel during hiring process, trained and interacted directly with personnel, resulting in an incredible team of employees and owners that accomplish tasks not considered possible, succeeding on projects despite financial limitations associated with undercapitalization. Developed many special analytical systems for unusual client needs. Crafted a successful sale of the laboratory including a position as Technical Director of that organization to ensure success of venture.

PATENTS: U.S. Patent 4,375,553 - "A Method for Recycle Oxidation of Carbonaceous Materials and BCA Purification." J.G. Huntington, J.R. Graham, 1983. During this period at least 10 other patent applications were not pursued when the companies involved decided to retain the information as trade secrets.

KELLY JAWORSKI

Geologist

Ms. Jaworski has four years of experience on diverse projects including Phase I and Phase II ESA's. She has assisted and implemented remedial investigation activities, including work plan preparation, site safety planning, on-site contractor oversight, construction excavation observation and generation of final reports. She has also assisted on petroleum release site investigations, underground storage tank-removals, groundwater monitoring and reporting, and soil/groundwater remediation to the satisfaction of developers and their lenders.

EDUCATION

BS, Geology, University of Wisconsin-River Falls

PROJECT EXPERIENCE

Downtown East – Minneapolis, MN. Served as a project scientist for multiple sites on the Downtown East project in Minneapolis, Minnesota. Project work included oversight on a large remediation project consisting of two city blocks. Remedial actions included soil screening, soil excavation oversight and confirmation sample collection on each block.

Scott County – Shakopee & Belle Plain, MN. Project work included oversight for remedial efforts during former storage tank removals. Remedial actions included soil screening, soil excavation oversight and confirmation sample collection. Separate excavation reports for each site were prepared for the client and the Minnesota Pollution Control Agency detailing excavation and requesting regulatory spill closure. Both sites were granted closure by the MPCA.

The Gav – Minneapolis, MN. Served as project scientist at The Gav and was responsible for oversight on remediation project from building demolition until final excavation was complete. Remedial actions included soil screening, soil excavation oversight and vapor barrier installation oversight and indoor air sampling as well as assisting with permitting, report writing and communicating with regulatory agencies. The site received a No Further Action letter from the MPCA following the submittal of a Response Action Plan Implementation Report.



AREAS OF EXPERTISE

Phase I ESA's
Phase II ESA's
Remedial Investigation
Petroleum Release Site Investigations
Compiling lab data for analysis

TRAINING/ CERTIFICATIONS

40-hour OSHA Hazardous Waste Operations & Emergency Response
State of Minnesota
Asbestos Inspector

SUZANNE JOHNSON, CHHM

Senior Environmental Project Manager

Ms. Johnson has 21 years of experience on diverse projects including soil and groundwater investigation, and corrective action design and implementation. She has worked with both public and private industry in over 30 states including Minnesota, Michigan, North Dakota, California, Ohio, and New York. Specialties include assessment and remedial investigation; remediation systems design; environmental compliance; gas-to-energy recovery systems compliance; CUP permitting; and water quality.

EDUCATION

BS, Biology/Environmental Science & BA, Journalism, Creighton University - Omaha, NE

PROJECT EXPERIENCE

Site Assessment and Remediation

Ms. Johnson manages environmental site assessment projects to identify environmental concerns and items of environmental note, including investigations of environmental concerns to assess for presence of impacts to the soil, groundwater, and/or soil-gas vapors to define the magnitude and extent of the impacts. She develops and implements plans for remediation of soil, water and/or soil-gas contaminants, and interacts with appropriate governmental agencies in achieving regulatory closure and assurances. In addition, Ms. Johnson develops cost estimates and scopes of work, hires and manages field personnel and subcontractors and manages project budgets to ensure projects are completed on-time and within budget.

Environmental Compliance

Partners with companies and facilities in a broad range of industries to establish tailored environmental compliance programs to achieve and maintain environmental compliance. Responsibilities in environmental compliance program development encompass permitting, reporting, issue resolution, and tracking; as well as training and auditing programs.

Experienced in the development and management of permits, licenses and plans to satisfy current regulatory requirements including:

- RCRA hazardous waste management;
- NPDES stormwater and wastewater permitting;
- Stormwater Pollution Prevention Plans (SWPPPs);
- Spill Prevention, Control & Countermeasure (SPCC) Plans;
- Aboveground & underground storage tank registration and compliance;
- SARA Title III Tier 2 reporting; and
- Emergency Response Plans.

Develops and conducts environmental compliance training programs for various



AREAS OF EXPERTISE

Site Assessment and Remediation
Environmental Compliance
Special Projects & Third-Party Review

CERTIFICATION/ TRAINING

Certified Hazardous Materials Manager
OSHA Hazardous Waste Operations and Emergency Response, 29 CFR 1910.120

PROFESSIONAL MEMBERSHIPS

Association of Hazardous Materials Professionals
North Star Chapter – 2015 President
Minnesota Commercial Real Estate Women
Minnesota Groundwater Association

audiences including both company-wide programs and individual site operations.

Other Key Skills

Active in professional groups and conferences, reaching out to current and potential clients on a regular basis.

Experienced as a liaison between clients, facility operations, company management, and regulatory agencies; applying technical expertise to solve environmental issues, driving resolution, implementing reoccurrence preventions measures, and achieving regulatory assurances.

Extensive experience developing and managing budgets and scopes of work involving outside contractors as well as internal personnel.

Acquisition due diligence, management of environmental site assessments and remediation projects as well as development/brownfield redevelopment projects.

Working knowledge of environmental compliance rules and regulations in over 30 states. Routinely monitoring federal and state regulatory activity and changes to keep clients informed of potential regulatory impacts.

Field Work and Reporting

Conducted due diligence investigations on property types ranging from farmland to manufacturing facilities to bulk fuel storage facilities. The investigations included identification of a variety of environmental hazards including hazardous materials and petroleum impacted soils and groundwater, PCBs, USTs, and other regulatory concerns.

Worked with and directed contractors including well drillers, tank excavators, and environmental drilling contractors. Collected soil, groundwater, soil-gas vapor, and media samples for laboratory analysis. Measured and recorded on-site activities. Developed site maps and plans. Analyzed data and completed final reports for submittal to regulatory agencies.

Research and Marketing

Conducted research for environmental due diligence projects. Assisted marketing effort by developing project summaries and assisting with compilation and completion of bids for a range of environmental consulting projects.

HAGEN KACZMAREK

Environmental Scientist

Mr. Kaczmarek is originally from the Wisconsin Rapids area and prides himself in working with small and rural communities. He provides spatial analysis to multiple sectors at Wenck with over four years of experience in GIS. In addition to GIS experience, he works with the water resources group on hydrology/hydraulic modeling and stream restoration projects. He holds degrees in Geography and Political Science from the University of Wisconsin – Whitewater and a Stream Restoration Science and Engineering post baccalaureate certificate from the University of Minnesota.



EDUCATION

MS, Forest Hydrology and Watershed Management, University of Minnesota-Twin Cities

Post Baccalaureate Certificate, Stream Restoration Science and Engineering, University of Minnesota-Twin Cities

BS, Physical Geography and Political Science, University of Wisconsin-Whitewater

PROJECT EXPERIENCE

Water Resources

Dakota County Parks–Lebanon Hills (2017). Phosphorus loading to lakes, wetlands, streams and stormwater ponds was assessed to determine if improvements can be made. GIS was utilized to delineate subwatershed boundaries by examining topographic and storm sewer information. Curve numbers were developed from landuse and soil layers in GIS. The data was then inputted into P8 where loading rates to the lakes were calculated. The next phase of the project will involve placing hypothetical best management practices in the subwatershed to reduce the amount of phosphorus loading to lakes.

Elm Creek Watershed Management Organization–Rush Creek Subwatershed Assessment (2017). The Rush Creek subwatershed flows through agricultural and rural suburban communities west of Minneapolis. Several GIS analyses help assess the watershed including soil loss model, predicted tile drained areas, and ACPF (Agricultural Conservation Planning Framework) modeling. The subwatershed was hydrologically conditioned to accurately delineate catchment boundaries and determine placement of agricultural best management practices. Preliminary results show high soil erosion values in the upper reaches that can be managed with water and sediment control basins and grassed waterways.

City of Eagan–Wandering Walk and Patrick Eagan Park Trail Feasibility Study (2017). Conceptual trail designs were created and provided to the City for public outreach. Grading impacts were also assessed to determine the appropriate trail: natural hiking trails, 2:1 side slope grading, and 3:1 side slope grading. Conceptual costs were also submitted to the City to aid in determining which projects should go to design. In total, 25 figures were submitted for public comment. The project was completed on-time and on budget.

AREAS OF EXPERTISE

ArcGIS 3D
ArcGIS Spatial Analyst
ArcGIS Mobile
ArcGIS Online
PostgreSQL
PostGIS
Microsoft SQL Server
Trimble GEO XT
Trimble R-10
YSI Multi Parameter Sonde
Water Resources
Management
Stream Restoration

North Fork Crow River – Agricultural Conservation Planning Framework (ACPF) (2017). This project uses the Agricultural Conservation Planning Framework (ACPF) developed by the Agricultural Research Station in Ames Iowa. The ACPF model utilizes topographic, soils, and landcover to determine suitable locations for field best management practices in County Ditch 5, County Ditch 37, and County Ditch 36 systems. GIS is heavily utilized to create a hydrologically correct digital elevation model (DEM) and process the tools. The outputs from the model provide many options to conservation planners to engage with willing land owners to implement practices.

South Fork Crow River – Watershed Restoration and Protection Strategy (WRAPS) (2016). Utilized GIS to determine key strategic planning areas within the South Fork Crow River. Such layers include – universal soil loss equation (USLE), drainage probability, and the restorable wetlands index. Layers were stacked, and management strategies were determined on the proximity to lake of biological significant, concentration of feedlots, areas of high soil erosion, restorable wetlands adjacent to desirable wildlife habitat, and proximity to impaired waters. Over 240 strategies were identified in the 40 subwatersheds. Individual report cards were created for each subwatershed and submitted to the Crow River Organization of Water to help with aiding individual implantation projects.

Coon Creek Watershed District – ATLAS 14 Model Update (2016). The Coon Creek Watershed District updated flood elevations that take into account: new infrastructure, critical assets (storm water BMPs), updated elevation models derived from LiDAR, and surveyed channel information. To supplement surveyed cross-sections, HEC-GeoRAS was used to import cross-sections into XPSWMM. Flood elevations were modeled using XPSWMM through and data was stored/manipulated in a personal geodatabase. This link allowed for a dynamic that allowed for the model to be developed in GIS and synced with external modeling software. Once the flood modeling was completed in XPSWMM, data was exported back to the database where 2D modeling of the flood inundation took place. A tool was developed to project the floodplain based onto the LiDAR derived DEM to create a fast, repeatable process of delineation process. The data was submitted to the watershed district and municipalities within for review of modeling results.

Clearwater River Watershed District – Fertilizer Application Study (2016). Processed nutrient application rates and nutrient soil testing data from farming cooperatives in the Clearwater River Watershed District in Central Minnesota. Soil sample locations were aggregated to field scale where the concentration in the soil was compared to the recommended application rates. The change in fertilizer use resulted in a 50% reduction in fertilizer across the watershed and fertilizer application was reduced by approximately 75% in areas adjacent to perennial streams.

Clearwater River Watershed District – Sediment Source Assessment (2016). Analyzed topographic data to determine sediment sources in uplands in the Lake Betsy subwatershed in the Clearwater River Watershed District. The analysis utilized the universal soil loss equation to estimate the annual soil loss from rill and inter-rill erosion. The values were paired with a sediment delivery ration to determine the net amount of soil reaching the Clearwater River. The stream power index (SPI) was also used to find concentrated flow paths. The analysis resulted in outlining 45 locations to implement best management practices which include – grassed waterways, water and sediment control basins (WASCOBs), contour filter strips, and perennial stream buffers. This information was outlined in a report for future implementation projects.

Middle Fork Crow River Watershed District – Integrated Water Quality Analysis (2016). This project was two-fold to find sources of sediment from stream bank erosion and analyze the exiting stormwater systems in the cities of Spicer and New London. The BMPs calculations from P8 and HydroCAD were compared to construction costs and rated on the amount of pollutants removed relative to cost. BMPs were ranked and shared a composite score with area treated (catchment area) and willingness of landowner (1-not willing, 5-district owned) to find the top ten implantation projects within each City. The top projects were submitted to the Middle Fork Crow River Watershed District where they will partner with landowners and the cities to implement the respective projects.

Rock River, Lower Big Sioux, and Little Sioux Total Maximum Daily Loads (TMDL) (2015). Quantified soil erosion values for upland areas in the Rock, Lower Big Sioux, and Little Sioux watersheds. Identified areas of high erosion potential along reaches impaired for total suspended solids and bacteria to develop a best management practice implementation strategy.

Minnehaha Creek Watershed District Meadowbrook Golf Course Reconstruction (2015). Determined flood volumes on Meadowbrook Golf Course following flooding in early June 2014. Three datasets were used to determine volumes at XP-SWMM modeling results of ten- and one-hundred-year flood intervals, along with approved FEMA elevations. The reconstruction will remove parts of the floodplain south of Meadowbrook. Existing and proposed conditions were evaluated to determine whether storage would increase, decrease or remain

the same. Currently, the design is undergoing minor revisions to maximize the amount of flood volume storage following construction.

City of Eden Prairie (2014-2017). Actively manages GIS data collection for existing pond bathymetry and depth to refusal (as-built) to determine rates of sedimentation. In addition to collecting pond bathymetry, stormwater structures are surveyed to determine the dead pool storage and emergency overflow elevation. This information is brought into GIS to determine the volume of sediment incurred in the ponds life or between dredging projects. The information from GIS is import into P8 and HydroCAD models to determine loading rates, sedimentation rates, and assess the functionality of the stormwater management practice. The finalized data provided to the City helps prioritize BMP placement/maintenance and updates a master asset management database.

Other

Municipal GIS. Create, update and manage data for the Cities of Corcoran, Dayton, and Delano using ArcGIS Online and Desktop. Integrate and convert existing CAD drawings into GIS.

Fargo-Moorhead EIS. Identified changes in flood inundation based on diversion structures surrounding the Cities of Fargo, ND and Moorhead Minnesota. Two diversion alignments were assessed, and the results were reported in the Draft EIS. Additionally, floodplain forests and wetlands were to identify within the project corridor to determine if mitigation of key riparian habitat was needed.

City of Eden Prairie, Environmental Technician. Assisted the Environmental Coordinator with fulfilling requirements under the Small MS4 General Permit through inventorying stormwater wetlands and structural BMPs. Quality assurance of existing Access records and SDE feature classes for MPCA compliance.

University of Minnesota, Research Assistant. Developed laboratory section that focuses on integrating water resources and GIS. Calculated and evaluated Stream Power Index and the Universal Soil Loss Equation values to determine susceptibility for gully and rill erosion in agricultural reaches.

Jefferson County Highway Department, GIS Intern. Created workflow and trained highway superintendents and staff on Trimble GPS. Synthesized accident data that aided in proper signage of hazardous intersections. Rated and inventoried culverts on county highways using Trimble GPS for DOT compliance and hydrologic analysis.

ETHAN KETELSEN, EIT

Project Engineer/Field Technician

A graduate of North Dakota State University, Mr. Ketelsen joined Wenck as a civil engineer (EIT). Ethan has performed construction observation and documentation on a variety of projects and has experience with permitting, construction plans and specifications, technical writing and reporting. His construction observation experience includes coordination with numerous contractors and various material testing.

EDUCATION

BS, Civil Engineering, North Dakota State University

PROJECT EXPERIENCE

Construction Observation and Documentation

Waste Management, MN. Performed observation and documentation of Cell 19 east berm construction activities at Elk River Landfill. Tasks included collecting samples of general fill and clay for lab testing, density testing of the general fill material, taking construction photographs and completing daily field reports.

Waste Management, MN. Performed observation and documentation of the replacement of the concrete tipping floor in Building C at the Maple Grove Transfer Station. Tasks included collecting cylinders of the concrete, performing slump and air entrained content testing, taking construction photographs and completing daily field reports.

American Crystal Sugar Company- Crookston Facility, MN and Hillsboro Facility, ND. Performed observation and documentation of multiple mud pond cleanings. Tasks included documenting truck counts, performing placement thickness measurements, taking construction photographs, and writing a documentation memo.

American Crystal Sugar Company- Hillsboro Facility, ND. Performed observation and documentation of a pond dike repair project. Tasks included surveying, performing density testing, taking construction photographs, and writing a documentation memo.

Southern Minnesota Beet Sugar Cooperative, MN. Performed observation and documentation of the construction of two new beet piling slabs: south of Belgrade, MN and southeast of Clontarf, MN. Tasks included reviewing and approving material submittals, surveying, collecting samples of general fill, Class 5 material, and clay for lab testing, performing density testing, inspection of piping, gate valve and concrete manhole installation, observation of in-ground scale construction, collection of thin-walled Shelby tubes for permeability testing, taking construction photographs, and writing a documentation report.

Southern Minnesota Beet Sugar Cooperative, MN. Performed observation and



AREAS OF EXPERTISE

Construction Observation and Documentation
Project Plans and Specifications
Bid Tabulation and Review
Solid Waste Permitting

REGISTRATION

E.I.T. Certified,
Fundamentals of Engineering

TRAINING & CERTIFICATIONS

Troxler Nuclear Density Gauge Certified (August 2014, Refresher March 2017)
40-Hour HAZWOPER Trained (March 2015, Refresher February 2018)
Design of Construction Stormwater Pollution Prevention Plans (May 2016)

documentation of multiple phases of industrial water piping and outlet structure installation activities. Tasks included density testing of pipe backfill, surveying existing piping, collection of concrete cylinders, performing slump and air entrained content testing, taking construction photographs, and putting together documentation.

Minnesota Pollution Control Agency, MN. Performed observation and documentation of a leachate system improvements project at the Cook County Landfill near Grand Marais. Tasks included field fitting of piping, geotextile, riprap, and excavations, performing pipe air pressure testing, examination of erosion control blanket and seeding, reviewing and approving quantities, completing daily field reports, taking construction photographs, and putting together documentation.

Minnesota Pollution Control Agency, MN. Performed observation and documentation of a gas piping investigation and repair project at the Louisville Landfill near Shakopee. Tasks included making field decisions regarding access points, documentation of pipe televising, vacuum testing of extrusion welded liner, examination of erosion control blanket and seeding, reviewing and approving quantities, completing daily field reports, taking construction photographs, and putting together documentation.

Grand Rapids Public Utilities Commission, MN. Performed observation and documentation of a leachate system improvements project at the GRPUC Sludge Landfill near Grand Rapids. Tasks included field fitting of piping, performing pipe air pressure testing, examination of manholes and 20,000 gallon UST, reviewing and approving quantities for change orders, taking construction photographs, and putting together documentation.

Reuter Walton Commercial, LLC, MN. Performed well modifications and vapor barrier installation in Minneapolis. Tasks included estimating quantities, relocating PVC wells, and installing vapor barrier inside a new commercial building.

Waste Connections, MN. Performed observation and documentation of a gravel pit reclamation near Rosemount. Tasks included density testing, taking construction photographs, and putting together documentation.

Meridian Behavioral Health, MN. Performed observation and documentation of an AST and sewer installation near Rochester. Tasks included coordination between multiple contractors, concrete slump and air entrained testing of the tank piers, taking construction photographs, and putting together documentation.

Republic Services, MN. Perform ongoing operation and maintenance activities for the dual extraction system at Pine Bend Landfill in Inver Grove Heights. Tasks include running the dual extraction system, collecting monthly pump readings, collecting monthly flare readings, collecting weekly gas readings at methane monitoring points, collecting quarterly leachate samples, cleaning existing pumps and installation of new pumps, and periodic surveying.

Vonco II Industrial Waste Landfill, MN. Performed observation and documentation of a gas system installation and partial final closure project. Tasks included gas well drilling logs, surveying, synthetic liner documentation, documenting piping and tank installation, taking construction photographs, and writing documentation reports.

Nuverra, ND. Performed observation and documentation of a clay-cap partial final closure project, including observation of waste relocation, clay barrier placement, rooting zone and topsoils. Tasks included collecting and shipping source soil samples, performing density testing, collecting thin-walled Shelby tubes for permeability testing, taking construction photos, and writing documentation reports.

PATRICK KINNEY

Sr. Industrial Hygienist

Mr. Kinney has 18 years of experience on diverse projects including construction, manufacturing, retail and government sectors. Specialties include exposure assessments for hazardous substances, biological and physical agents, OSHA compliance, indoor air quality and mold/moisture control.

EDUCATION

MPH, Major in Environmental Health, Industrial Hygiene Emphasis, University of Minnesota

BS, Geology, Utah State University - Logan, Utah

SELECTED EXPERIENCE

Sr. Industrial Hygienist - Wenck

- Conducted Process Safety Management (PSM)/Risk Management Program (RMP) three-year audits for a large food manufacturing corporation.
- Developed comprehensive industrial hygiene exposure evaluation program for large manufacturing company. The program included tools for new chemical screening and ongoing evaluations.
- Conducted comprehensive hydrogen sulfide (H₂S) evaluation for wastewater treatment facility and developed safety recommendations for Immediately Dangerous to Life and Health (IDLH) concentrations.
- Provided exposure assessments for a wide variety of occupational exposures including noise, biological agents (mold and endotoxins), welding fumes, metal working fluids, and particulates.
- Conducted written health and safety program reviews for confined space entry, A Workplace Accident and Injury Reduction (AWAIR) Program and respiratory protection.
- Conducted health and safety training including confined space, Employee Right to Know and safety orientation.
- Completed ventilation hood assessments and applications for Minnesota Pollution Control Agency (MPCA) permits.

Sr. Industrial Hygienist - Target Corp.

- Managed corporate hearing conservation program with over 14,000 team members.
- Performed noise evaluations across distribution network, provided recommendations to leadership, and drove changes to improve program implementation.
- Evaluated mold and indoor air quality issues remotely working in collaboration with facilities team and consultants. Developed remediation scope of work, reviewed proposals and hired contractors for abatement.



AREAS OF EXPERTISE

Exposure Evaluation
 OSHA Compliance
 Noise Assessment /
 Hearing Conservation
 Indoor Air Quality/Mold/
 Moisture Control
 Construction Health and
 Safety
 Ventilation Evaluation

PROFESSIONAL MEMBERSHIPS

American Industrial
 Hygiene Association Upper
 Midwest Section
 American Conference of
 Governmental Industrial
 Hygienists

CERTIFICATION/ TRAINING

Certified Industrial
 Hygienist (CIH) #CP9712
 OSHA Training Institute
 Courses:
 Respiratory Protection
 Fall Protection
 Trenching & Excavation
 Confined Space Entry
 Scaffold Systems
 Accident Investigation
 Industrial Noise

Industrial Hygienist- Minnesota OSHA Enforcement

- Performed over two hundred health and safety compliance inspections for a wide variety of manufacturing facilities, construction sites, and government facilities.
- Evaluated facilities for health and safety hazards during walk around inspections.
- Assessed hazards for risk including the probability and severity of injury or illness.
- Communicated OSHA requirements and best practice information to a diverse group of company representatives including corporate management, plant managers, safety coordinators and union stewards.
- Assessed written health and safety programs for compliance with OSHA standards and overall effectiveness.
- Assisted employers with safety and health hazard abatement by providing best practice information for eliminating or reducing exposure.
- Skilled at analyzing requirements for issues including but not limited to personal protective equipment, respiratory protection, hearing conservation, hazardous waste operations, confined spaces, right to know, and blood borne pathogens.
- Proficient at recognizing, evaluating, and providing guidance to control exposures to airborne contaminants and harmful physical agents.
- Chosen by OSHA management to assist medium sized construction company with a detailed evaluation of airborne exposures. The evaluation took place over three months. Reported findings and recommendations for engineering controls to OSHA and company management.
- Authored detailed industrial hygiene monitoring and compliance inspection reports.
- Performed presentations on safety and health topics to a variety of audiences.
- Trained new hires and was a mentor to ensure thorough understanding of OSHA policies, inspection procedures and industrial hygiene best practices.
- Wrote asbestos directive which provides enforcement guidance to MNOSHA.

Project Manager- Environmental Property Audits

- Provided a full range of services for indoor air quality (IAQ) management including initial consultation, inspection, testing and reporting.
- Completed inspections related to mold, asbestos, lead, Phase I environmental site assessments, and demolition.
- Wrote environmental inspection, testing, and remediation reports.
- Developed and implemented respiratory protection program.
- Provided oversight of environmental remediation contractors including bidding, scheduling, progress meetings, monitoring of productivity and review of work performance.
- Conducted AHERA six month and third year inspections for several MN school districts.

BEN KRAMKA, EIT

Geological Engineer

Mr. Kramka joined Wenck as part of the real estate transaction group as a geological engineer. Ben primarily focuses on subsurface investigation where delineation and pathway evaluation is necessary. Mr. Kramka has performed a wide variety of fieldwork activities including: geologic mapping, core logging and RQD measurements, geologic development drilling, surface water sampling and stream gauging, elevation surveys, soil and groundwater sampling, monitoring well installation, Underground Storage Tank (UST) removal observation, verification of soil remediation sampling, soil compaction/quality assurance testing, groundwater and sub-surface modelling, and various other remedial studies. He brings the ability to solve engineering problems, and to think critically about risks and hazards present beneath the ground surface.

EDUCATION

BS, Geological Engineering, Minor: Mining Engineering, Michigan Technological University - Houghton, MI

PROJECT EXPERIENCE

Release and Pathway Evaluation

Natural Gas Compressor Station. Assisted in delineation and evaluation of a historical natural gas release, previously remediated using soil vapor extraction methods. Performed groundwater sampling and analysis, and modelled groundwater flow to evaluate potential migration and degradation of contamination near the site. Worked closely under the Project Manager to assess client needs, and work towards No Further Action (NFA) designation from the State of Michigan.

Jet Fuel Pipeline Release Evaluation. Performed remedial field investigation studies to evaluate potential for a fuel release during removal of an offshore-to-land pipeline. Surveyed surface elevations of the property and helped create a conceptual site model involving geologic cross-sections and groundwater contours, to determine environmental risks prior to sale of the property.

Former Wood Treatment Facility. Generated a sampling grid and determined random sampling locations by following Michigan Department of Environmental Quality statistical sampling guidelines for soil remediation. Prepared a model using AutoCAD software to illustrate sampling locations, relative to current and historical features, and incorporating groundwater flow directions. Performed on-site field investigation and groundwater sampling.

Manufactured Gas Plant (MGP) Sites. Evaluated environmental risks, remediation techniques, and contaminant migration. Determined the feasibility of several remediation systems, analyzed the natural biologic decay of the contaminants, and assessed the potential health hazards related to drinking water and surface water.



AREAS OF EXPERTISE

Real Estate Due Diligence
Phase I Environmental Site Assessments
Phase II Environmental Site Assessments
Brownfield Remediation
Sub-Surface Investigation
On-Site Field Work
Hydrogeology
Excavation Oversight/Observation
Geotechnical Considerations
Technical Reporting
Subsurface Modeling

CERTIFICATIONS/ TRAINING

Engineer-In-Training (E.I.T., MI and MN)
40-Hour Hazwoper

Real Estate and Due Diligence

Phase I Environmental Site Assessments. Conducted due diligence investigations on various properties ranging from farmland, to gasoline service stations. Investigation activities included property walkovers, historical records review, interviewing past, present and future owners, analyzing surveys and maps for potential risks, and preparing detailed reports.

Phase II ESAs. Directed soil investigation using direct push methods with a Geoprobe, hand auger sampling, and hollow stem auger drilling with split spoon sampling techniques at a variety of sites to assess previous contamination concerns. Performed groundwater sampling from temporary and permanent wells and helped install at numerous properties ranging from drycleaners to former landfill sites. Provided report preparation and determined future steps to mitigate environmental hazards identified during sub-surface investigation.

Remediation and Brownfield Development

Industrial PCB Contaminated Site. Worked on a Michigan state funded project to remediate and redevelop a site into a local area sports complex. Analyzed previous soil investigation activities, produced a site excavation design and remediation plan, calculated an engineer's estimate, and prepared bid specifications to hire a contractor for the cleanup. Created supporting drawings and plans for the project using ArcGIS.

Former Metal Stamping Property. Assisted with defining contamination extent at a property impacted with solvents, extending well into the low permeability clay subsurface. Performed soil and groundwater sampling, prepared technical memos to facilitate continued action, and assisted in determining remediation locations. Assisted with performing a feasibility study for potential remediation techniques, and preparing a cleanup plan.

STEPHANIE KUPHAL

Air Quality Engineer

Ms. Kuphal is a chemical engineer with 22 years of experience in air quality permitting and air dispersion modeling. Ms. Kuphal developed the approach of modeling multiple pollutants within a single dispersion modeling run for the MWWTP Air Toxics Review. The approach is used by MPCA in their Air Emissions Risk Analysis spreadsheet. Ms. Kuphal also specializes in air dispersion modeling to support human health risk assessments.

Ms. Kuphal has recent air quality industry experience with surface coating, recreational vehicle manufacturing, taconite mining, solid waste landfills, municipal wastewater treatment plants, vegetable oil extraction plants, municipal waste incinerators, and the oil and gas industry. Stephanie has worked with air quality regulations including PSD, Title V, a variety of state programs, New Source Performance Standards, and National Emission Standards for Hazardous Air Pollutants. Ms. Kuphal also has experience with TRI reporting and Risk Management Plan preparation.



AREAS OF EXPERTISE

Air Quality Permitting and Assessments
Air Permit Compliance
Air Emissions Inventory
Energy Utility Industry

EDUCATION

BS, Chemical Engineering, Iowa State University

SELECTED PROJECT EXPERIENCE

CHS Oilseed Processing, Fairmont, Mankato, and Hallock, Minnesota and Creston, Iowa. Managed air quality work for the four CHS Oilseed plants, including air permit amendment applications for Title V renewals, new construction, and equipment replacements at the soybean oil extraction plants. The projects include PSD applicability determinations, review of state and federal requirements for proposed projects, draft permit review, air dispersion modeling, insignificant modification documentation, control equipment notifications, and stack test extensions. CHS Fairmont work included assisting on the facility's initial PSD permit application, and a later PSD project to increase extraction capacity. Ms. Kuphal has also assisted with the air quality review of an environmental audit for the Creston site.

Northland Aluminum Products, Minnesota. Provided on-going air permit assistance for fifteen years including air permit application preparation, draft permit review, emission inventory preparation, preparation and review of MACT compliance submittals. Stephanie has also completed air dispersion modeling for the site, and provides on-going reminders of upcoming air permitting submittals required.

Metropolitan Council Environmental Services, Minnesota. Completed air dispersion modeling for proposed generators at the Metropolitan Wastewater Treatment Plant. Also completed air toxics and criteria pollutant air dispersion modeling for the Solids project including the new Fluidized Bed Reactors at the MWWTP. Developed an approach to include multiple air toxics in single air dispersion modeling run for the Solids project that has been adopted as the "Q/Chi" approach by MPCA.

Pope/Douglas Solid Waste Commission, Minnesota. Completed air dispersion modeling to support refined human health risk assessments for the construction of a third municipal solid waste combustor. The modeling included direct estimates of deposition within the EPA's AERMOD model.

Polaris, Iowa. Stephanie has prepared Title V renewal applications, a construction permit application, and a Title V amendment application for the Spirit Lake site. The facility has surface coating, engine testing, and space heating equipment.

Tech Ord, South Dakota. Stephanie prepared air dispersion modeling using the AERMOD and OBODM models to estimate concentrations and deposition rates from on-site treatment of energetic wastes. Air dispersion modeling results were used in Wenck's Human Health Risk Assessment for the facility.

Western Lake Superior Sanitary District, Minnesota. Stephanie prepared an application for replacement of boilers, and construction of digester gas boilers at the WLSSD facility. The application also allowed operation of a temporary flare during construction activities. Stephanie also prepared and presented an air permit compliance training session for WLSSD staff. The training session included a description of air permit compliance requirements for the site.

Waste Management, Michigan. Stephanie has prepared air emission reports for the Dafter Landfill, K&W Landfill, and Menominee Landfill for several years. Stephanie also assists with identifying annual NMOC emissions for the site's MSW New Source Performance Standard (NSPS) report.

Spectro Alloys, Minnesota. Stephanie has prepared Toxic Release Inventory (TRI) reports, Pollution Prevention Plans, and Pollution Prevention Plan Progress Reports for the Spectro Alloys facility for several years. The reports have described air emissions from the site, as well as solid and hazardous wastes sent off-site for disposal.

TOM LANGER

Project Biologist

Mr. Langer has over six years of experience as an aquatic ecologist working on deep lake, shallow lake, coastal wetland, inland wetland, river, and stream ecosystems of the Upper Midwest. He has served as a project manager and project biologist on a variety of ecological monitoring, ecosystem health assessments, and environmental- community stressor modeling.

EDUCATION

MS, Conservation Biology, Central Michigan University, Mount Pleasant, MI

BS, Environmental Science (AOE: Biology), University of St. Thomas, St. Paul, MN

SELECTED EXPERIENCE

Wetland / Waterbody / Water Quality Experience

Minnehaha Creek Watershed District Environmental Grade Ecosystem Assessment, Twin Cities, Minnesota (2015 – current). Mr. Langer is a project biologist conducting biological sampling and tasked with developing an ecosystem framework to determine the health of lake, stream, wetland and upland habitats. Major responsibilities include the sampling biotic communities, habitat conditions, health indices review/development, ecological breakpoint assessments, communicating project tasks and results to various audiences. The project goal is assist the district focus management efforts to achieve desired levels of ecosystem services within the watershed.

Site Specific Standard Application of Minnesota River: A Food Web and Contaminant Assessment, Eagan, Minnesota (2015 – Current). Mr. Langer serves as a project biologist assisting with ecosystem monitoring and modeling project within the lower Minnesota River. Project objectives was to assess and model incorporation and bioaccumulation of Selenium in an aquatic food web. Primary duties consisted of water quality monitoring, routine fish surveying and tissue sampling, developing a trophic transfer model, and draft a site-specific application that reviewed the findings of the ecological assessment.

Shingle Creek and West Mississippi Routine Stream Monitoring, Twin Cities, Minnesota (2015 - Current). Mr. Langer serves as a biologist assisting the Shingle Creek Watershed Management Commission (WMC) and West Mississippi WMC routine monitoring programs. Responsibilities include routine monitoring of flow and water quality at various main stem stream sites in Shingle Creek, and several outfall sites in West Mississippi watershed.

Shingle Creek Routine Lake Monitoring, Twin Cities, Minnesota (2015 - Current). Mr. Langer serves as a biologist assisting the Shingle Creek Watershed Management Commission (WMC) routine monitoring programs. Responsibilities include routine monitoring of water quality and temperature profiles at various lakes within Shingle Creek. In addition to water quality monitoring, lake vegetation surveys have also been conducted as part of the lake health assessment.



AREAS OF EXPERTISE

Aquatic Ecology and Biology
 Aquatic Invasive Species
 Environment-Community Dynamics
 Wetland and Lake Management
 Biological Monitoring
 Fisheries Biology
 Wetland/Waterbody Delineations
 Biological Statistics and Modeling
 Scientific Research and Design

CERTIFICATION

HAZWOPER 40 Hour Certification

MN Wetland Delineator In-Training Cert. #5207
 University of Minnesota, MN

Bassett Creek Metropolitan Council Watershed Outlet Monitoring Program (WOMP) (2016 - Current). Mr. Langer serves as a project technician conducting monitoring and data collection for the Bassett Creek WOMP station, including: routine water quality sample collection, storm composite sample collection, and continuous conductivity and flow monitoring equipment maintenance and data management.

Lower Big Sioux, Little Sioux and Rock River Watershed TMDLs (2015-2016). Mr. Langer was a project technician assisting with analyzing nutrient and E. coli related point-source and non-point source loading. Tom was tasked with developing bacteria, turbidity, and nutrient total maximum daily loads for the watersheds. Responsibilities include water quality data analysis, pollutant source assessment, and water quality modeling.

Minnehaha Creek Watershed District Mud Lake Subwatershed Assessment (2016). Mr. Langer was a project scientist assisting with develop a P8 urban catchment model to assess watershed loading and develop best management practices to reduce nutrient loading into Mud Lake, St. Bonifacius, MN.

Responsibilities include watershed delineations, storm water pond assessments, modeling, calibrating models to nutrient loads, best management practice assessment and report drafting.

City of Plymouth, Pike Lake Subwatershed Assessment (2016- 2017). Mr. Langer was a project scientist assisting with develop a P8 urban catchment model to assess watershed loading and develop best management practices to reduce nutrient loading into Pike Lake, Plymouth, MN. Watershed assessment was conducted for the area of loading being contributed from with the city limits of Plymouth. Responsibilities include watershed delineations, storm water pond assessments, modeling, best management practice assessment and report drafting.

Biological / Water Quality Experience – Fisheries Focused

Twin Lake Carp Management 319 Project, Robbinsdale MN (2015 – Current). Mr. Langer serves as the lead biologist for assessing the influence of common carp on the Twin Lake chain of lakes. Project goals are to determine population densities and track seasonal migration patterns to understand the current carp population. Outcomes of this project are to reduce carp populations and maintain low densities over many years to mitigate the negative water quality impacts carp have on the lakes.

Capital Region Watershed District Routine Fish Monitoring, Minnesota (2015 -2017). Mr. Langer has served as a project manager and project biologist on routine fish sampling on lakes within the district. Efforts include supervising and leading species sampling events, taxonomic expert, data analysis and reporting. The fish community monitoring efforts are part of a larger overall effort to track water quality trends within each lake and determine the appropriate management activities to improve water quality and the health of aquatic communities.

Vermillion River Ecosystem Assessment, Dakota County, Minnesota (2015 -2017). Mr. Langer is an aquatic biologist assisting an ecosystem assessment of the Vermillion River and its tributaries. His primary duties include the sampling of the fish community in multiple reaches of the river system and lead statistically rigorous assessments of both biotic and abiotic datasets. Outcomes of which are to relate observed communities to different stressors driving differences fish communities, IBI scores and to direct continued monitoring and restoration efforts on the river system.

Biological / Water Quality Experience – Vegetation Focused

Lake McCarrons AIS Management Plan (2017). Mr. Langer served as a project manager in developing an AIS management plan that CRWD will implement to manage AIS. The plan provides a novel framework and criteria-based approach to direct management decisions and outlines the appropriate management action.

Pine County Aquatic Vegetation Management Plan, Pine City, MN (2016 – 2017). Mr. Langer served as a project manager assisting the County with developing an aquatic vegetation management plan for four county lakes. The plan focused on providing the county with a framework to evaluate primary drivers governing the vegetation community and provided the county with a sampling design to determine the effectiveness of AIS treatments.

Point Intercept, AIS delineation and Emergent Vegetation Surveys, Minnesota (2015 - Current). Mr. Langer served as a project manager conducting vegetation surveys and delineating AIS and emergent stands of vegetation for numerous lake associations. These projects have provided figures, summary memos and health assessments of

the aquatic vegetation community.

Wetland Delineation Experience

Sandpiper Pipeline Wetland and Waterbody Surveys, North Dakota (2015-2016). Mr. Langer serves as a project biologist assisting with wetland delineation and waterbody surveys across the North Dakota reach of the Enbridge Sandpiper Pipeline. Surveying includes taxonomic identification of wetland and upland plant species and soil characteristic classification. Wetland and waterbody survey follows the 1987 US Army Corps guidance.

Routine Wetland and Water Body Investigation, Minnesota (2015 – Current). Mr. Langer is a certified wetland delineator in training (University of Minnesota, 2015) conducting regular wetland and waterbody related investigations. Primary duties vary depending on the scope of project needs but regularly include wetland/ waterbody delineations and an understanding of hydrology and surface water flows.

Laurentian Great Lakes Research

Great Lakes coastal wetland monitoring, Michigan (2012 – 2015). Mr. Langer served as a wetland technician and lab manager for the Institute for Great Lakes Research on an Environmental Protection Agency funded project. Project objective was to monitor/exam Laurentian Great Lakes coastal wetland health via macroinvertebrate and fish Indices of Biotic Integrity (IBIs). Cited publication below.

Independent research (2012- 2014). Mr. Langer served as an independent researcher examining patterns and mechanisms structuring biodiversity of both fish and macroinvertebrate communities throughout the Laurentian Great Lakes basin. Cited publication below.

Undergraduate Mentor (2015). Mr. Langer served as a volunteer public outreach activities and undergraduate research mentor. Project examined the patterns of nitrogen and phosphorus across Great Lake coastal wetlands.

Wetland and nearshore habitat linkages (2012 – 2014). Mr. Langer served as a research technician for Central Michigan University on a project funded by the U.S. Fish and Wildlife Service examining energy flow between wetland and offshore habitats via fish communities using stable isotope and otolith microchemistry techniques.

Undergraduate Research Experience

Shallow lake ecological assessment, Minnesota (2009 – 2012). Mr. Langer served as a research assistant/crew leader for the Minnesota Department of Natural Resources and University of St. Thomas on a study assessing internal and watershed influences on ecosystem characteristics of 144 shallow lakes dispersed across Minnesota.

Shallow lake carbon sequestration assessment, Minnesota (2009 – 2012). Mr. Langer served as a research assistant for the University of St. Thomas on a project funded by the National Science Foundation examining how carbon burial rates differ between shallow lakes in turbid versus clear regimes.

Independent research - Regional and lake-specific differences in carbon sources for fish in Minnesota shallow lakes, Minnesota (2009 – 2012). Mr. Langer served as an independent researcher assessing influences of watershed and landscape characteristics on ^{13}C and ^{15}N isotopic signatures of fathead minnows in 64 shallow Minnesota lakes. Cited publication below.

Peer Reviewed Publications

T. Langer, M. Cooper, L. Reisinger, A. Reisinger, D. Uzarski. 2017. Water fluctuation on α - and β - diversity of coastal wetland fish communities. Submitted.

T. Langer, B. Murry, K. Pangle, D. Uzarski. 2016. Species turnover drives β -diversity patterns across multiple spatial and temporal scales in Great Lake coastal wetland communities. *Hydrobiologia* 777: 55-66.

T. Langer, K. Zimmer, B. Herwig, M. Hanson, J.B. Cotner, W. Hobbs, and G. Small. $\delta^{15}\text{N}$ of Detritivores Track Anthropogenic Landscape Alterations in Shallow Minnesota Lakes. In prep.

Project Publications

T. Langer, D. Uzarski. Implementing Great Lakes Coastal Wetland Monitoring. Sept 2014. Drummond Island Digest: pg 18.

Scientific Presentations

L. Moore, T. Langer, D. Schuberg, D. Uzarski. 2014. Spatial trends in nitrogen and phosphorous concentrations in Michigan's Great Lake coastal wetlands. Poster. Institute for Great Lakes Research 3rd Annual Symposium, MI.

T. Langer, M. Cooper, D. Uzarski. 2014. Influence of water fluctuation on Beta diversity of Saginaw Bay's coastal wetland fish communities. Poster. Institute for Great Lakes Research 3rd Annual Symposium, MI.

T. Langer, K. Pangle, B. Murry, D. Uzarski. 2014. Beta Diversity, Spatiotemporal Structuring and Mechanisms Shaping Great Lake Coastal Wetland Fish and Macroinvertebrate Communities. 57th International Conference on Great Lakes Research, Hamilton, Ontario.

T. Langer, K. Pangle, B. Murry, D. Uzarski. 2014. Beta Diversity, Spatiotemporal Structuring and Mechanisms Shaping Great Lake Coastal Wetland Fish and Macroinvertebrate Communities. 1st Annual Joint Aquatic Sciences Meeting, Portland, Oregon.

T. Langer, K. Pangle, B. Murry, D. Uzarski. 2014. Beta Diversity and the Spatiotemporal Structuring of Great Lake Coastal Wetland Fish and Macroinvertebrate Assemblages. Poster. Institute for Great Lakes Research 2nd Annual Symposium, MI.

T. Langer, K. Pangle, B. Murry, D. Uzarski. 2014. Beta Diversity and the Spatiotemporal Structuring of Great Lake Coastal Wetland Fish and Macroinvertebrate Assemblages. Annual Michigan Chapter of the American Fisheries Society, Holland, MI.

T. Langer. Dealing with large community datasets and use of beta diversity calculations and multivariate ordination techniques. 2013. Invited lecturer to graduate level Bioinformatics course at Central Michigan University.

T. Langer, K. Pangle, B. Murry, D. Uzarski. 2013. Spatiotemporal influences, diversity patterns and mechanisms structuring Great Lakes coastal wetland fish assemblages. Poster. Institute for Great Lakes Research 1st Symposium, MI.

T. Langer, K. Zimmer, B. Herwig, M. Hanson, J. Cotner, W. Hobbs, G. Small. 2012. $\delta^{15}\text{N}$ of Detritivores track nitrogen inputs from agricultural land into shallow Minnesota lakes. Poster. 97th Ecological Society of America Conference, OR.

T. Langer, A. Gittens, K. Zimmer, B. Herwig, M. Hanson. 2010. $\delta^{13}\text{C}$ values indicate regional and lake-specific differences in carbon sources for fathead minnows, *Pimephales promelas*, and black bullheads, *Ameiurus melas*, in Minnesota shallow lakes. Poster. 71st Midwest Fish and Wildlife Conference, MN.

A. Gittens, T. Langer, K. Zimmer, B. Herwig, M. Hanson. 2010. Allometric patterns of $\delta^{15}\text{N}$ in fathead minnow, black bullhead, and common carp in Minnesota shallow lakes. Poster. 71st Midwest Fish and Wildlife Conference, MN.

DAN LARSON

Senior Geologist

Mr. Larson has over 21 years of experience in the environmental consulting field as a geologist and project manager. His areas of specialty include: Phase I and II Environmental Site Assessments, site remediation, Brownfield redevelopment projects, underground storage tank investigations and third party review.

EDUCATION

BS, Geology, University of Minnesota - Minneapolis, MN

PROJECT EXPERIENCE

Phase I Environmental Site Assessments

Has conducted many environmental audits for property transfers including historical record searches, regulatory agency interviews, evaluation of impacts from nearby contamination sites and on-site inspections.

Phase II Investigations

Dan has managed and implemented Phase II and remedial investigation activities including work plan preparation, on-site contractor oversight and generation of final reports. His work on Phase II Investigations and/or remediation projects involved assisting clients in meeting their project goals, including regulatory closure for release sites.

Site Remediation

Dan has managed or been on the design team of several remediation projects with various remedial alternatives including soil vapor extraction, chemical injection, excavation, and free-product recovery. Mr. Larson has extensive hands-on involvement with such systems, including construction oversight, system start up, operation and maintenance.

Brownfield Redevelopment Projects

Prepares investigation work plans and Response Action Plans (RAP) for clients enrolled in the MPCA VIC and/or Petroleum Brownfield programs. Provides response action oversight during development and prepares Implementation Reports and interacts with MPCA to procure the appropriate assurance letter(s).

Underground Storage Tank Projects

Manages petroleum release site investigations and cleanups. UST-related experience includes working with state regulatory agencies to determine compliance and closure requirements, significant on-site investigation experience, data analyses and interpretation, corrective action design, and remediation.

Third Party Review

Dan has assisted clients with third party review of environmental site assessment



AREAS OF EXPERTISE

Site Remediation
Phase I Environmental Site Assessments
Phase II Investigations
Brownfield Redevelopment Projects
Underground Storage Tank Projects
Third Party Review

REGISTRATION

Professional Geologist,
Minnesota, #30591
Asbestos Inspector:
Minnesota

PROFESSIONAL MEMBERSHIPS

Minnesota Groundwater Association (MGA)

reports and field activities, including providing consultation services in support of litigation.

Other

Dan has experience with investigations and/or cleanup of asbestos, lead, radon, pesticides, PCBs, VOCs, heavy metals, petroleum, and EMF.

JOANNA LARSON, PE

QA/QC

Ms. Larson has over 34 years of civil engineering experience including 30 years of experience in the design, permitting and construction quality assurance of solid waste facilities. She has worked with public and private industries as well as government and regulatory agencies in Minnesota, South Dakota, North Dakota, and Iowa. Her specialties include landfill permitting and design, senior design review, and construction management and quality assurance. Ms. Larson has considerable experience in overall landfill operations, landfill development plans, maximizing airspace, phasing and sequencing and preparation of landfill financial analysis, feasibility studies and facility planning.



EDUCATION

MS, Civil Engineering, University of Minnesota

BS, Civil Engineering, South Dakota State University

PROJECT EXPERIENCE

Landfill Permitting, Design, and Operations

City of Fargo, North Dakota - City of Fargo Landfill – Facility Plan. Project engineer for the preparation of a Long-Term Planning Facility Plan for the City of Fargo solid waste needs. The plan identified options to extend the life of the existing landfill, review of adjacent property as well as other rural properties for potential landfill development, and evaluation of alternative waste management methods. The report concluded with a financial analysis for each alternative identified that included capital costs, operational costs and construction sequencing costs. The results of the financial analysis were then condensed into a cost/ton for easy reference and comparison for City use.

Northern States Power Company (DBA Xcel Energy) - Wilmarth and Red Wing RDF Ash Disposal Facility –Landfill Permitting. Project manager for the permit expansion of an RDF ash disposal facility that successfully requested significant variances from the MPCA Rules with respect to property setback distances and collaboratively negotiated with adjacent County landfill for a shared stormwater management pond. Once approved the project will provide Xcel Energy with approximately 10+ years of additional site life. As part of routine annual landfill operations, airspace calculations, fill progression phasing, and environmental review has been performed at both sites. Most recently, permit applications have been approved for metal recovery operations at both sites that require detailed excavation and fill plans for in-place ash excavation and metal recovery over a 10-year period.

Northern States Power Company (DBA Xcel Energy) - Red Wing RDF Ash Disposal Facility –Landfill Permitting. Project manager for the permit expansion of an RDF ash disposal facility that successfully requested significant variances from the MPCA Rules with respect to property setback distances, in addition to alternate liner sections that provide Xcel Energy with flexibility in liner design and

AREAS OF EXPERTISE

Landfill Design, Permitting,
& Operations
Construction Management
and Quality Assurance
Surface Water
Management Design
Senior Design Review

REGISTRATION

Professional Engineer: MN

the ability to capture additional airspace on proposed footprint. The project was approved less than 180 days from submission with minimal comments.

Waste Management - Elk River Landfill – Permit Support. Project manager of the continuous projects at the landfill, which involves the design and permitting of landfill expansion options, cell construction events and landfill closure scenarios. Tied into the operations of the landfill is the permitting of leachate recirculation to treat and dispose of landfill leachate, saving the landfill the cost of hauling leachate, POTW treatment costs and liability of transferring leachate from the facility. Permit support for the landfill also involves negotiations with the MPCA on leachate recirculation systems and MPCA negotiations and response to comments on various permit documents, annual reporting, and general operations support. The most recent permitting activities resulted in a 5 million cubic yard capacity increase or approximately an additional 10 years of site life.

Waste Management - Burnsville Sanitary Landfill – Permit and Operations Support. Project manager for the continuous projects at the landfill, which involves the design and permitting of landfill expansion options, gas system installations, cell permitting and construction events. Together with permit and operations support to the landfill is the multi-directional negotiations with local government entities and integration of wetland and floodplain challenges at the site. The most recent minor permit modification for a revision to base grade elevation and grade was approved with no comment from the MPCA.

Waste Management - Central Disposal Systems Landfill – Permit Support. Project manager for the permit support for the landfill. The continuous project involves the oversight of the environmental monitoring installation and reporting, leachate recirculation system and leachate spray irrigation system data collection and support, preparation of annually required IDNR financial assurance and permit documents, IDNR negotiations and response to comments on various permit documents, semi-annual reporting, and general operations support. Expansion permitting efforts resulted in a 160-acre phased development plan, leachate storage ponds, and surface water management that gained an additional 35 million cubic yards of airspace volume for the client.

Most recently, preparation of a thorough, effective permit amendment request to an existing document resulted in the landfill gaining permission from the IDNR to treat an additional 8 million gallons of leachate on-site through spray irrigation, saving the landfill significant leachate treatment costs. The landfill has a variety of activities taking place and the client benefits from an organized and detailed oversight of the activities.

Clay County Landfill - Clay County, MN – Leachate Recirculation. Design engineer for development of a leachate recirculation permit application to dispose of landfill leachate into the waste mass. The project involves negotiations with the Minnesota Pollution Control Agency to develop an acceptable permit application and operations plan for the facility. Recirculation of landfill leachate enables the landfill to save the cost of hauling the leachate for treatment at an off-site disposal facility as well as enabling the facility to handle the landfill leachate on-site.

City of Billings, MT Landfill Gas to Energy Project - Landfill Gas Condensate Recirculation. Design engineer for development of a landfill gas condensate recirculation permit application to dispose of landfill gas condensate into the waste mass. The project involves negotiations with the Montana Department of Environmental Quality to develop an acceptable permit application and operations plan for the facility. Recirculation of landfill gas condensate will enable the landfill gas plant operator to save the cost of hauling the gas condensate for treatment at an off-site disposal facility as well as enabling the facility to handle the gas condensate on-site.

Northern States Power Company (DBA Xcel Energy) - Red Wing RDF Ash Disposal Facility –Landfill Permitting. Project manager for the permit expansion of an RDF ash disposal facility that successfully requested significant variances from the MPCA Rules with respect to property setback distances, granular drainage layer material criteria, and an alternative liner design. The most recent permitting activities, reviewed by several regulatory agencies with minimal comment, resulted in a one million cubic yard capacity increase, or a site life extension of approximately 20 years.

American Crystal Sugar Company - Crookston, Moorhead, and East Grand Forks, Minnesota – Landfill Permitting. Project engineer for the industrial solid waste permitting at the American Crystal Sugar facilities in

Crookston, Moorhead, and East Grand Forks, Minnesota. The facilities had never been required to be permitted with the Solid Waste Rules. This project brought them into compliance with MPCA requirements. Recent efforts included extensive, cooperative effort to bring all of the MN factories into compliance with State odor and H₂S regulations by use of extensive management changes and capital projects to control H₂S generation and mitigate its impacts.

Allied Waste - Pine Bend Landfill – Landfill Expansion Permitting. Design engineer for the expansion of the BFI Pine Bend Landfill. The design involved 3:1 terraced sideslopes and overfill of previously closed areas with a current active gas extraction system. The permit expansion will enable the client to gain substantial airspace volume at the landfill since they were able to fill a valley between two current waste fill areas.

Grand Rapids Public Utilities Commission - Sludge Landfill Facility – Landfill Expansion Permitting. Project engineer for the permit renewal and expansion of the City of Grand Rapids Sludge Landfill in Grand Rapids, MN. The expansion design involved a 16-acre phased development plan that gained an additional 1.3 million cy of airspace volume. The permit renewal also requested the use of a geosynthetic clay liner be used in lieu of a 2-foot thick compacted clay layer which saved the client excavation and stockpile costs.

Waste Management - Elk River Landfill – Landfill Design. Design engineer for development of demolition/ construction debris cell over previously closed MSW areas at the Elk River Landfill for Waste Management of Minnesota. This enabled the client to gain much needed demolition landfill capacity in order to avoid having to place demolition waste in MSW cells.

Waste Management - Anoka Regional Sanitary Landfill – Landfill Closure Design. Project manager for active gas system design and construction at the Anoka Regional Sanitary landfill for Waste Management of Minnesota. The project also involved the construction quality assurance for an approximate 40-acre composite lined landfill closure.

City of Fargo, North Dakota - City of Fargo Landfill – Active Gas System Design and Gas Utilization. Project engineer for active gas system installation at the City of Fargo, North Dakota Landfill. The project included landfill gas collection and drying for gas utilization at a nearby industrial facility, approximately 1 ½ miles away. The landfill gas is now used at the industrial facility which reduces their costs for fuel and enables the City of Fargo to obtain revenue from the gas produced at the landfill.

City of Fargo, North Dakota - City of Fargo Landfill – Landfill Expansion Permit Modification. Project engineer for preparation of a request for permit modification to laterally expand an existing landfill. The project involved the design and permitting of a lined area with leachate collection over previously unlined waste disposal area as well as the permitting of an alternative landfill cover system enabling the client to eliminate the use of geosynthetics in the cover system.

Waste Management - Sun Prairie Landfill – Final Closure Design and Construction. Project manager for final closure design and construction of the Anoka Regional Sanitary Landfill and the Sun Prairie Sanitary Landfill for Waste Management of Minnesota. The project involved the installation of a clay cap over an unlined MSW landfill and the installation of a slurry wall to prevent the migration of leachate contamination to nearby properties.

Olmsted County, Minnesota - Kalmar Landfill – Landfill Permitting. Design engineer for the permitting of a MSW bypass landfill, a demolition landfill and a double-composite lined ash landfill located on one site. The project was the first landfill to be permitted with the current MPCA rules for MSW and MSW Combustor Ash landfills.

American Crystal Sugar Company - Hillsboro and Drayton, North Dakota – Landfill Permitting. Project engineer for permitting and agency negotiations for waste lime and ash disposal at the American Crystal Sugar facilities in Drayton and Hillsboro, North Dakota.

Oak Grove Sanitary Landfill – Landfill Closure. Project manager for the final closure design at the Oak Grove Sanitary Landfill Superfund site. The project involved the negotiations with the U.S. EPA for an alternative landfill final cover design.

Mine Reclamation

LAC Minerals, LLC - Lead, South Dakota – Pond Conversion. Project manager for the conversion a liquid storage pond to a sludge decant pond at the Richmond Hill facility. The project involved the development of construction plans and technical specifications to convert a double lined treatment pond to a sludge decant pond with the addition of aggregate to raise the pond floor, installation of a drain pipe to the adjacent storage pond by boring through the separation dike, and re-lining the sludge pond with new geomembrane and drainage net materials.

LAC Minerals, LLC - Lead, South Dakota – Pond Re-lining. Project manager for the re-lining of an approximate three-acre leach pad liquid storage pond. The original design involved re-lining of only the primary geomembrane of an existing double lined facility. Upon exposure of the existing primary geomembrane, it was jointly determined with the client that a complete replacement of the double liner and leak detection would be required because of the poor condition of the secondary liner, thereby saving the client from potential future regulatory compliance violations.

Homestake Gold Mine - Lead, South Dakota – Demolition Landfill Permitting. Project engineer for the permitting of a lined demolition material facility to accommodate the material from the process and mining building demolition at the Homestake Gold Mine in Lead, South Dakota. The project was accomplished on the fast track to enable the phased and planned sequencing of the demolition activities to remain on schedule.

Homestake Gold Mine - Lead, South Dakota – Demolition Landfill Closure Construction. Project engineer for the preparation of the closure construction plans and specifications of a lined demolition material facility that was used to accommodate the material from the process and mining building demolition at the Homestake Gold Mine in Lead, South Dakota. The project required significant modifications from the permitted closure as waste flows during demolitions activities were considerably less than anticipated.

Construction Management and Quality Assurance

Waste Management – Elk River Landfill. Project manager for the development of construction plans and technical specifications and construction management of the construction of an approximate eight-acre MSW landfill cell. The construction documentation report for the project, completed late in October, was approved the day following construction allowing waste placement in the cell to begin to get the frost protection layer in place prior to December 31.

Waste Management – Elk River Landfill. Project manager for the development of construction plans and technical specifications and construction management of the construction of an approximate 20-acre MSW closure and gas system improvements at the Elk River Landfill. Construction of the closure didn't begin until September and involved the construction of closure on 3:1 terraced slopes with geomembrane and geonet placement. The project, completed late in November, resulted in reduced leachate generation and improved gas collection at the landfill.

Waste Management – Elk River Landfill. Project manager for the development of construction plans and technical specifications and construction management of the construction of an approximate 10-acre demolition debris disposal area (Cell DC-5A) at the Elk River Landfill. Construction of the cell didn't begin until late September and involved the rapid construction of a one-foot clay liner, HDPE, and one-foot granular drainage layer placement with variable late season weather fluctuations. The project was completed in late November and received immediate approval from the MPCA to begin waste placement for frost protection.

Waste Management – Elk River Landfill. Project manager for the development of construction plans and technical specifications and construction management of the construction of final closure of a demolition debris disposal area (Cell DC-3) at the Elk River Landfill. The demolition disposal area had been "piggy-backed" over a closed MSW disposal area with 3:1 sideslopes and tie-ins to the existing MSW closure which were not well defined from previous construction efforts. The project involved considerable flexibility and coordination with the construction contractor to enable the complete closure of the remaining open areas.

Olmsted County, Minnesota - Kalmar Landfill – Construction Quality Assurance. Project manager for the development of construction plans and technical specifications and construction management of the construction of a several composite lined MSW cells, closures of the ash area with a clay barrier layer, and closures of the MSW area as well as double-composite lined ash disposal cells. The projects involved the successful request for approval of a temporary cover system to be installed in an area of the MSW closure that will potentially be overfilled with a future expansion and quick turnaround on the documentation of the cell construction so that waste could immediately be placed in the cells.

Waste Management - Central Disposal Systems Landfill – Construction Plans and Specifications. Project manager for the development of plans and specifications and construction management of the construction for a composite-lined cell and composite-lined leachate storage ponds and forcemain construction at the Central Disposal Systems Landfill in Lake Mills, Iowa. The design involved the sequencing of the cell construction concurrently with the installation of an active gas system designed and constructed by others as well as sequencing the leachate management at the site while the cell was active before the leachate ponds were constructed.

Olmsted County, Minnesota - Kalmar Landfill – Landfill Construction Quality Assurance. Project manager for the 1990, 1992, 1995, 2003, 2005, 2007, and 2008 construction of MSW bypass cells, demolition cells, and a double-composite lined ash cells as well as progressive landfill closures. The projects involve the development of plans and specifications for construction projects done concurrently at the site. The projects involved the completion of the construction documentation reports immediately after construction so that the client could start placing waste.

Senior Design Review

Senior Review. Performed senior review of numerous construction documents including contract documents, technical specifications, construction plans, and construction quality assurance documents. The benefits to the clients are reduced construction change orders, addendums and reduced permitting design comments on permit packages.

Water Supply

City of Minnetonka, Minnesota - Underground Water Reservoir Design. Project manager for the design and construction oversight for an underground water reservoir located near very popular shopping and commercial area. The project also involved working with the City and park design consultants for the development of a neighborhood park over the top of the reservoir.

Underground Water Reservoir Design. Project engineer for the design of an underground water reservoir and pumping station to replace existing water supply reservoirs. The location was in a residential district and the project involved the successful negotiation and approval of the surrounding citizens.

Water Quality Improvement

Minnehaha Creek Watershed District - Twin Lakes Improvement Project. Project engineer for the Chain of Lakes water quality improvement project. The project involved the coordination of several governmental agencies including the Corps of Engineers, the MPCA, and the DNR. The project also involved working jointly with the Minneapolis Park and Recreation Board and the City of Minneapolis as well as neighborhood associations.

Metropolitan Airports Commission - Comprehensive Water Management Plans. Design engineer for the development of water management plans for the outlying reliever airports. The projects involved the integration of not only surface water management at the airports but also the management of products used and stored on-site and their potential impact to the environment.

Western Mesabi Mine Planning Board - Canisteo Mine Pit Outflow Comparative Feasibility Analysis of Wind Power and Pit Pumping Option. The purpose of this study is to evaluate the feasibility of a pumped conveyance system to manage the Canisteo Mine Pit Outflow through the installation and use of a wind turbine and pumping system. The concept of using a wind turbine is both to provide power to the pump and produce electricity, the sale

of which could offset ongoing operations and maintenance costs.

Western Mesabi Mine Planning Board - Canisteo Mine Pit Outflow Siphon Design and Construction Plans and Specifications. Project engineer for the development of technical specifications and construction drawings for a large diameter siphon capable of transferring 18 cfs from the Canisteo Pit to Trout Lake. The siphon was over a mile in length which was routed through several different properties, wetland areas and areas where there was minimal easement property. The benefit of utilizing a siphon for the conveyance method was to eliminate the cost of pumping the water.

SHAWN LOUWAGIE, PE

Project Engineer

Mr. Louwagie has previous residential construction experience followed by seven years of experience in municipal utility design, street design, project management, street rehabilitation, construction inspection, erosion and sediment control, surveying, and construction staking. Shawn currently serves as the City Engineer for a municipality with a population of 6,000, and works closely with staff to meet project objectives and provide successful outcomes. He has led multiple infrastructure projects which have impacted the general public and local industry.

EDUCATION

BS, Civil Engineering, North Dakota State University

BS, Construction Management, MSU – Moorhead

PROJECT EXPERIENCE

Client Service Manager

- Serves as City Engineer for a community located in Wright County, MN with a population of 6,000.
- Performs City Engineer day-to-day activities and coordinates and manages projects for which the City Staff self-performs.
- Prepares and presents engineering designs and reports to the City Council, Planning Commission, and Water and Power Commission.
- Represents the City in meetings with outside developers and other public entities.

Project Manager/Design Engineer

- Led the design of municipal infrastructure and private projects for new construction and rehabilitation.
- Has prepared project scopes and coordinated workload and tasks for multiple projects.
- Has led public meetings and distributed ongoing communications with residents affected by projects.
- Represented the owner/client in meetings with contractors and developers on multiple projects.
- Develop feasibility reports with cost estimates and assessment roles
- Design and develop plan sets and project specifications for a variety of municipal projects
- Provide construction oversight and inspection for variety of municipal projects
- Conducted storm water/erosion control inspections and developed reports for the Capital Region Watershed District
- Material testing frequency and techniques
- Review project submittals and payment requests
- Project closeout and development of record plans
- Construction staking and surveying techniques, ability to operate surveying equipment
- Contractor management, scheduling, dispute resolution and quality control



AREAS OF EXPERTISE

Municipal Infrastructure and Street Design
 Infrastructure Planning and Maintenance
 Project Development and Management
 Project Oversight and Construction Management
 Surveying and Construction Staking
 AutoCAD

REGISTRATION

Professional Engineer: MN

Railroad Avenue Extension – 2017, Estimated Cost: \$1.2 M.

This project involves the extension of public utilities and the reconstruction of an existing gravel road to an urban street section within the City of Delano. The street extension will provide an additional minor collector route and access point to Downtown Delano. Coordination with the Army Corp of Engineers and the MPCA Public Works program is required for the street extension. Shawn led the project design and coordination, and was heavily involved in producing easement and Right-of-Way acquisition documents used in property negotiations between the City and property owners.

2016 Infrastructure Improvements Project – 2016 thru 2017, Construction Cost: \$5 M.

This project spanned multiple years and involved the reconstruction of approximately three miles of City streets in Delano, MN. Sanitary sewer, watermain, and storm sewer utility replacement was also included in the project which included both residential areas and four blocks in Downtown Delano. Constant coordination was required with the residents and business owners to limit the construction impacts to quality of life and business costs. A portion of the construction costs were assessed to the residents, with the remainder of the costs paid through City Bonds.

Delano Schools Watermain Relocation – 2016, Construction Cost: \$350 K.

This project involved the relocation of watermains traveling to and from the Water Treatment Plant in Delano to allow the development of an Intermediate School building. Construction occurred concurrently with site improvements to the School site, and involved coordination with the Schools contractors and design team to provide hook-ups and avoid utility conflicts. Watermain cut-overs had to be planned to ensure that the City water tower contained sufficient water for public use. This project was designed and managed by Wenck, and final costs were assessed back to the School District.

Delano Floodwall and Riverfront Improvements – 2015, Construction Cost: \$1 M.

This project involved the construction of an 8' deep concrete footing along the Crow River in Delano, MN. A removable floodwall system could then be bolted down to the top of the concrete footing through the means of steel plates embedded in the concrete. Additionally, river bank stabilization, a community gathering space, and concrete pavement approaches on either side of a bridge were included in the project. Provided lead project design, coordinated the public bidding process, contract administration, as well as construction oversight.

Dayton 2015 Street Improvements – 2015, Construction Cost: \$2.6 M.

This project involved street reclamation, mill and overlay, culvert replacement, and gravel road improvements. Streets involved are both rural collectors, and residential streets. Excess material generated from the reclamation activities will be used to maintain and redefine the gravel roads determined from prior evaluations. Shawn drafted a feasibility report, designed, estimated, and bid the project, for which the City of Dayton received bids in the amount of \$2.1 million. Additional work was later added to the contract.

Corcoran SE District Sewer and Water – 2014, Construction Cost: \$1.8 M.

This project involved installing an 18" gravity sewer through a wetland, a sanitary sewer lift station, sanitary sewer force main, and water main. Shawn conducted project oversight for multiple crews working concurrently. Coordination with the MCES was required as the city force main was connected into a Metropolitan Council force main. Other duties included contractor pay request review, construction staking, and resident correspondence.

Dayton Overlay Project – 2014, Construction Cost: \$735 K.

The City of Dayton overlaid three miles of city streets in 2014. This involved the milling of existing bituminous curb, selective street patching, crack spraying, and the bituminous overlay to include new bituminous curb. Project tasks included identifying streets to be included in the project, assist in developing a pavement management plan, develop the project plans and specifications, project oversight, contractor coordination, and project closeout.

Delano Safe Routes to School Trail – 2014, Construction Cost: \$200 K.

Wenck assisted the City of Delano in applying and receiving a federal grant through the Safe Routes to School program and constructed approximately 2,000 lineal feet of eight-foot-wide bituminous trail and 300 feet of concrete walk. The trail is a mixed-use bicycle trail connecting the neighboring community to the school campus. The project included mass site grading, fence removal and replacement, site restoration. By receiving federal funding, this proj-

ect followed the DCP process which requires design, inspection, testing and project documentation done to MnDOT Standards. Shawn designed the trail project, developed the project manual, worked with MN/DOT for project approval, coordinated project testing, conducted the project oversight, and reviewed pay requests.

Southwest Christian High School, Phase II – 2014, Construction Cost: \$1 M.

Southwest Christian High School project, located in Chaska MN, involved the construction of tennis courts, a parking lot, and the installation of storm sewer. Six tennis courts were constructed to include light fixtures, landscaping, and irrigation. Extensive site grading was needed as well as the construction of retaining walls. This was a private project, funded by Southwest Christian High School.

Shawn provided Project Superintendent duties which included managing the day to day operations on the construction site, schedule subcontractors and testing agents, resolve contractor disputes, performed construction staking, quality control and construction inspection.

Delano Infrastructure Improvements Project – 2013 thru 2014, Construction Cost: \$5.2 M.

This project consisted of the reconstruction of approximately three miles of city streets. The reconstruct focused mainly on the replacement and improvement of the storm sewer system, with some sanitary sewer and water main replacement. Most of the streets were reconstructed, with the remainder being reclaimed or overlaid. This project also included concrete sidewalk replacement, driveway replacement, soccer field construction, park grading, parking lot reconstruction, and alley paving.

Shawn provided construction oversight and project management. This involved working closely with the contractors and city staff on everyday activities, on site design changes and decisions, scheduling testing services, reviewing contract documents and payment applications. Shawn also assisted in the overall project design, cost estimate, plans and specification development, as well as project closeout.

Winona County Landfill Leachate Load-out Project – 2013, Construction Cost: \$285 K.

This project involved the installation and connection of piping for a landfill leachate load-out system. A leachate tanker loading pad was also constructed. Shawn's responsibilities included project oversight, construction staking, contractor quantity review, and contractor dispute resolution.

MARLON MACKOWICK, PE

Principal/Project Engineer

Mr. Mackowick is a civil engineer with 14 years of consulting experience where he has focused on renewable energy projects, solid waste engineering, stormwater and construction oversight & documentation. Mr. Mackowick also has expertise in HydroCAD, HELP, Intergraph Microstation PC and AutoCADD systems. He has training in AutoCADD and Civil 3D. He has worked for both private and public sector clients and worked on projects in North Dakota, Minnesota, South Dakota, Wyoming, Michigan, Idaho, Texas and Montana.

EDUCATION

BS, Civil Engineering, North Dakota State University

Additional Courses in AutoCAD

Training in Liner Integrity Survey (Electrical Leak Location)

PROJECT EXPERIENCE

Renewable Energy/Landfill Gas Utilization

Montana Dakota Utilities Co. – City of Billings, Montana. Project Manager responsible for managing feasibility study, permitting to implement a gas-to-energy project and construction of system. Duties included preparing a feasibility study that evaluated landfill gas quantity, utilization options, preliminary design, capital costs and operational and maintenance costs. Additionally pump tests were performed on gas wells to confirm landfill gas quality and quantity in the feasibility report. Duties associated with permitting included preparing air permit modifying solid waste permit which included preparation of system design report to clean the gas to natural gas pipeline quality, operation and maintenance plan and methane monitoring plan. Duties for construction involved preparation of the plans and specifications, design of gas system, bidding assistance, attendance at construction meetings, submittal reviews, final report writing.

Clay County Minnesota Landfill. Project Engineer responsible for upgrading the existing passive gas vent system to an active gas collection system to burn the gas off in an enclosed flare. Duties for this project involved preparation of the plans and specifications, design of enclosed flare and blower, bidding assistance, attendance at weekly construction meetings, submittal reviews, final report writing.

Solid Waste Permitting, Design, Operating

Polk County Landfill, MN. Project manager and project engineer at this site for over ten years. Work includes permitting landfill lateral expansions, development of plans and specifications and construction management and oversight for both cell and closure construction, stormwater design, EAW preparation, preparation of annual reports and evaluation of leachate treatment for the Polk County landfill's MSW, ash, and demolition debris disposal areas. With the three separate disposal areas and variety of activities taking place, the client benefits from an organized and detailed oversight of landfill engineering and operational activities. Also, have completed a tipping fee analysis for the landfill.



AREAS OF EXPERTISE

Construction Management Services
Landfill Engineering
Active Gas Collection System
ET Covers
Stormwater Design and Modeling
Drafting and Design

REGISTRATION

Professional Engineer: MN, ND

Polk County Regional, MN. Project manager for \$14 million of capital projects to provide construction of two new transfer stations in Crookston, MN and Park Rapids, MN and building addition to the Polk County Resource Recovery Facility in Fosston, MN and adding on and renovating a transfer station in Bemidji, MN. Work includes permitting and development of plans and specifications and construction management and oversight and management of state grant.

City of Dickinson Landfill, ND. Project manager at this site for over six years. Work includes permitting of MSW and inert landfill, preparation of the Master Plan for all solid waste operations and development of plans and specifications and construction management and oversight for cell construction for the City of Dickinson. Permitting involved preparing final grades, stormwater management, geotechnical evaluation, hydrogeologic evaluation and preparation of operation, closure, post closure plans. Master Plan involved breaking down current waste flows, projecting future waste flows based on population growth, expected landfill life, waste stream diversion, potential landfill expansions and solid waste operations and tipping fee evaluations.

Nuverra Environmental Solutions – Ideal Landfill, ND. Project Engineer for permitting of a 40-acre landfill expansion, preparation of cell construction and cell closure plans and specifications for Nuverra Environmental Solutions. Permitting involved expanding the landfill laterally approximately 40 acres and vertically expanding the landfill to maximize capacity for the facility.

Clay County Landfill, MN. Project manager and project engineer at this site for over 10 years. Work includes permitting, development of plans and specifications and construction management and oversight for both cell and closure construction, EAW preparation, preparation of annual reports, evaluation of leachate treatment and gas management alternatives, and groundwater remediation projects. One groundwater remediation project consisted of excavating and relocating over 400,000 cubic yards of MSW to a lined cell.

Mar-Kit Landfill, MN. Project manager and project engineer at this public landfill site for over 10 years. Work includes permitting, development of plans and specifications and construction management and oversight for both cell and closure construction. Recent permitting work includes permitting an alternative final cover system (Closure-Turf™) that relies on synthetics for the entire system rather than soil and synthetic liner.

City of Fargo Landfill, ND. Project Engineer for permitting, preparation of cell construction and cell closure plans and specifications for the City of Fargo Landfill. Permitting involved expanding the landfill vertically over lined and un-lined areas which included leachate collection system over the un-lined area.

Anheuser-Busch – Clay County Minnesota Landfill. Engineer responsible for preparing a feasibility study that evaluate landfill gas quantity, utilization options, capital costs and operational and maintenance costs. Duties for this project involved preparing a feasibility report that summarized landfill gas generation, preliminary active gas collection system design, preparing capital and operational and maintenance cost and estimating net power utilization. Additionally performed pump tests on gas wells to determine landfill gas quality and quantity.

City of Sheridan, Wyoming Landfill. Project Engineer responsible for implementing an active gas collection system on the perimeter of the landfill to control landfill gas migration. Duties for this project involved preparation of the plans and specifications, design of landfill gas skid, bidding assistance, attendance at construction meetings, submittal reviews, final report writing.

Solid Waste Disposal Evaluations

Red River Valley and Lakes Region. Project Engineer responsible for preparing a feasibility study on a regional basis in northwestern Minnesota and Western North Dakota to evaluate alternate waste disposal options on a regional base. Duties for this project involved evaluating alternate waste disposal options, evaluating current waste flows and waste disposal fees, developing capital costs and operational and maintenance costs for selected technologies and evaluate economic impact to each entity.

Stormwater

Pelican River Watershed District, Minnesota. District Engineer responsible for reviewing of stormwater permits

for construction/ development within the Pelican River Watershed District. Review applications to determine if proposed project will meet the watershed district rules for stormwater management, water quality and erosion control. Ottertail Power Company – Hoot Lake Plant, Fergus Falls, MN. Project Engineer responsible for performing and calculating a water balance test on an existing lined sedimentation/coal pile runoff pond. Based on the outcome of the test then evaluated options to reconstruct the current pond to meet regulations and then prepared construction plans and specifications for the selected option.

Variety of Sites in North Dakota and Minnesota. As Project Manager or Engineer, Mr. Mackowick has designed, modeled, prepared plans and erosion control plans for stormwater management for solid waste landfills and civil site development projects. Duties for this work includes design, sizing of pipes, structures, ponds and ditches, modeling, water quality calculations, preparation of report and preparation of plans.

ET Cover Evaluations

East Mission Flats Repository and Big Creek Repository – Idaho. Project Engineer responsible for evaluating an Evapo-Transpiration cover for the repository utilizing Vadose/W program. Duties for this project involved collecting climatic data, geotechnical data, modeling soil profile with Vadose/W, evaluate model results and prepare final report summarizing model results.

XCEL Riverside Generating Plant – Minnesota. Project Engineer responsible for evaluating an Evapo-Transpiration cover for an ash landfill utilizing Vadose/W program. Duties for this project involved collecting climatic data, geotechnical data, modeling soil profile with Vadose/W, evaluate model results and prepare final report summarizing model results.

Construction Oversight

Variety of Sites. As Field Engineer, Mr. Mackowick provided construction management services including quality assurance and quality control, testing, field engineering and preparation of construction documentation reports for cell construction and closure, waste relocation, pond reconstruction and active gas collection system installation.

JEFF MADEJCZYK

Environmental Scientist/Aquatic Ecologist

Mr. Madejczyk has worked as an environmental scientist on a wide variety of projects over a 16-year period. His background and education are in fisheries biology and aquatic ecology where he has conducted research on fish and invertebrate communities in lakes, streams and rivers. He serves as both a client manager and project manager for a variety of National Environmental Policy Act (NEPA) environmental review projects including Environmental Assessments (EA), Environmental Assessment Worksheet (EAW) and Environmental Impact Statement (EIS) projects dealing with potential impacts of proposed industrial, utility, commercial and residential developments.

Mr. Madejczyk has also served as both a project manager and a project scientist on a variety of ecological monitoring, TMDL, and environmental permitting efforts, including fish and macroinvertebrate monitoring, endangered species analysis, wetland permitting and mitigation projects, ecological assessments, utility corridor studies, storm water permitting, contaminated sediment investigations and permitting, zoning and conditional use permitting, and construction permitting activities. Additionally, he has a variety of water resource and water quality project experience including field leadership, data analysis, modeling and reporting from lake, stream, treatment wetland and ocean outfall studies.

EDUCATION

MS, Fisheries Biology, Iowa State University

BS, Ecology, Winona State University

PROJECT EXPERIENCE

Aquatic Ecology

Vermillion River Stream Fish Community Monitoring. Client manager and lead scientist for stream fish community monitoring in the Vermillion River watershed since 2009. The Vermillion River contains sections that are designated as both warmwater and coldwater streams which influence the type of fish community present. Annual stream monitoring is conducted by means of electrofishing within coldwater and warmwater reaches within the watershed, using both backpack and barge style electrofishing units. All fish community data was analyzed using index of biotic integrity (IBI) calculations for both warmwater and coldwater communities. Biological monitoring data has been gathered is used to support watershed wide effort to develop a Watershed Restoration and Protection Study (WRAPS) plan that includes specific implementation goals, strategies and projects that target improving water quality, aquatic habitat and fish communities in the streams and creeks of the Vermillion River Watershed. The monitoring data is now being used to identify Capital Improvement Projects within the watershed, such as stream channel restorations, that will improve aquatic habitat and water quality within the Vermillion River.



AREAS OF EXPERTISE

Aquatic Ecology/Fisheries
Biology
Stream Assessments
Environmental Review
Environmental Permitting
Water Quality
Storm Water
Sediment Investigations

Lincoln-Pipestone Rural Water Topeka shiner Incidental Take Permit Study. Served as the project manager and lead biologist for a study that investigated the potential impacts of public water supply wellfield operations on the endangered fish the Topeka shiner. The goal of the project was to acquire a permit from the US Fish and Wildlife Service to allow for increased water use at the wellfield. The study included conducting biological surveys for Topeka shiners in streams, assessing available Topeka shiner habitat within streams, determining potential well field impacts on Topeka shiner populations, and developing mitigation options to create and/or protect shiner habitat. The habitat conservation plan and permit application were reviewed and approved by the US Fish and Wildlife Service. This is the first approved habitat conservation plan and first issued incidental take permit for the Topeka shiner in the United States. The construction of new pool habitat for Topeka shiners to fulfill the mitigation requirements of the permit was completed December of 2008. Monitoring for Topeka shiners in the constructed habitat was conducted in the summer of 2009, with several Topeka shiners observed using the new habitat during the first year after construction. The project received a Grand Award for the American Council of Engineering Companies (ACEC) for Minnesota in 2011.

Capital Region Watershed Fish Monitoring Study. Project manager and lead biologist assisting the Capitol Region Watershed District in conducting fish community monitoring for lakes within the district. Monitoring included summertime field efforts using trap and gill nets to assess fish populations throughout each lake. Sampling methods followed Minnesota DNR protocols and the results were compared to past monitoring efforts to examine fish community trends within the lake. The fish community monitoring efforts are part of a larger overall effort to track water quality trends within each lake and determine the appropriate management activities to improve water quality and the health of aquatic communities.

Minnehaha Creek Watershed Lake IBI Study. In 2015 the Minnesota Department of Natural Resources developed a fish-based Index of Biotic Integrity (IBI) for a variety of lakes in Minnesota. Previously IBI assessment tools have generally been developed mainly for stream fish communities. The DNR Lake IBI is a new fisheries management tool that is being used to move from managing game & sport fish in Minnesota Lakes to assessing overall fish community health of the lake. In 2015 served as one of the lead biologists to assist the Minnehaha Creek Watershed District with conducting Lake IBI fish monitoring. The monitoring includes a combination of four sample gears (gill nets, trap nets, seine nets, & near-shore electrofishing) to ensure the overall fish community within the basin is assessed.

Gleason Lake Management Plan, Curly Leaf Pondweed Control, and Biotic Sampling. Project manager and lead biologist assisting the Minnehaha Creek Watershed District in attempts to control the curly leaf pondweed infestation in Gleason Lake through whole lake herbicide applications. As part of the lake management strategy, the biotic responses of the fish and invertebrate communities to the vegetation management are being examined through calculation index of biotic integrity scores for the lake. Responsibilities include fish community sampling, invertebrate community sampling, vegetation surveys, environmental permitting and herbicide field oversight.

Shingle and Bass Creeks Biotic and Dissolved Oxygen Total Maximum Daily Load Study. Served as the lead field biologist for the Shingle Creek biotic and dissolved oxygen TMDL study. Research activities include conducting macroinvertebrate sampling to calculate a stream IBI score and conducting fish surveys for the purpose of calculating a stream IBI score. Additional field studies included continuous dissolved oxygen surveys, water quality synoptic surveys, time-of-travel dye studies. Also served as the lead biologist for the Rosgen Level III/IV stream geomorphology and aquatic habitat investigations that were conducted on Shingle and Bass Creeks as part of the study. The information was used to identify the causes of low dissolved oxygen within the stream and the hydrological, water quality and habitat-based stressors on the aquatic community in the creeks.

Environmental Review (EAW, EA, EIS) Projects

Fargo-Moorhead Flood Control Project. The Army Corps of Engineers is proposing to develop and construct a large flood control and diversion project that would include levees and a canal to protect the communities of Fargo, ND and Moorhead, MN from flooding of the Red River. The overall flood control project will include a control structure to manage and divert flood waters. The construction of the control structure on the Red River requires a permit from the Minnesota DNR, which in turn triggered the preparation of an Environmental Impact Statement.

The main ecological concern over the project was the operation of the control structure during times when fish migrations for sensitive keystone species, such as lake sturgeon, walleye and channel catfish, was occurring within the Red River. Worked with biologists from the DNR to assess information about the operation of the flood control project compared to fish community and migration patterns within the Red River to assess potential impacts of the project and develop mitigation and monitoring plans within the EIS.

Advanced Rolling Hills Landfill. Served as the client and project manager for an Environmental Impact statement (EIS) to assess the potential environmental impacts of constructing a new municipal solid waste (MSW)/industrial landfill adjacent to an existing active industrial landfill and closed MSW landfill near Buffalo, MN. The Final EIS included the assessment of potential environmental impacts to wetlands, traffic, proximity to structures, and socioeconomics. Participated in several public meetings and public hearings as part of the EIS process. The final EIS was completed in November 2014.

Essar Steel High Voltage Transmission Line Environmental Impact Statement. Served as the project manager for an environmental impact statement assessing the potential impacts of 37 miles of new 230 kV high voltage transmission lines (HVTL). The purpose of the proposed new HVTL was to supply power to the proposed Essar Steel Taconite Mine and Steel Processing Plant located north of Nashwauk, MN. There were four proposed new transmission lines as part of the Route Permit Application that needed to be considered and analyzed within the EIS. The Public Utility Commission rules for transmission line routing require that the EIS include at least one alternative route for each proposed new transmission line. The Final EIS included the assessment of potential environmental impacts to stream crossing, forested lands, public health and safety, wetlands, and proximity to structures. Participated in several public meetings and public hearings as part of the EIS process. The final EIS was completed in June of 2010 and the Route Permit was issued to the applicants in August of 2010.

Noble Flat Hill Windpark and Transmission Line Environmental Impact Statement. Served as the project manager for an environmental impact statement assessing the potential impacts for a proposed 200-megawatt windpark and the associated 230 kilovolt high voltage transmission line. This was the first environmental impact statement assessing potential impacts of a windpark in the State of Minnesota. Wenck worked directly with the Minnesota Department of Commerce and the Developer throughout the entire environmental review process including EIS scoping, completing the draft EIS, attending public meetings, addressing public comments, preparing the Final EIS and participating in the public hearing. Potential environmental issues associated with the proposed project addressed within the EIS included noise, visual impacts, property values, roads and transportation, human health, sensitive habitats, water quality and endangered species.

Keetac Taconite Mine Environmental Impact Statement. Served as the biological sciences coordinator for the environmental impact statement assessing the proposed Keetac Taconite mine expansion project. As the biological sciences coordinator served as the lead researcher, drafter and reviewed for chapters of the EIS related to fish communities, wildlife communities, recreation fisheries, threatened and endangered species, wildlife travel corridors and woody biomass use.

Minnesota Steel Environmental Impact Statement. Project scientist tasked with researching and assessing the impacts of the Minnesota Steel Direct Reduction Steel Plant on the ecological communities (fish and invertebrates) of lakes and streams within the project impact area. Examined the potential for a loss of or impact to critical habitat requirements for fish and macroinvertebrate communities in lakes and streams within the project area of impact. Assessed the potential impacts to water quality in downstream receiving water from proposed mining and dewatering activities associated with the proposed project. The final EIS determined that impacts to the fish and invertebrate communities would be minor due to a lack of significant water level or water quality fluctuations in the area waterbodies.

Sappi Fine Paper Environmental Assessment Worksheet (EAW). Served as the lead drafter and project scientist preparing an EAW to address the potential impacts of the expansion of Sappi Fine Paper's Cloquet Paper Mill. The project included the construction of a new world class Kraft paper machine which would more than double the existing paper mills production. Major issues associated with the project that were addressed in the EAW include water consumption, traffic, storm water, fugitive dust and air emissions and permitting.

88th Army Reserve Unit Environmental Assessment Worksheet. Project scientist and the lead drafter of an EAW investigating the potential environmental impacts for the construction of a new Army Reserve Center and the relocation of the effected Army Reserve Units to the proposed new center in Ellsworth, Wisconsin.

Minnesota Department of Transportation – Trunk Highway 71 expansion. Project scientist on the EAW for the expansion of Trunk Highway 71 from two to four lanes along a six-mile stretch of highway in Beltrami and Hubbard Counties. Assisted with wetland delineations and investigated areas of potential wetland along US Highway 71 expansion corridor in Bemidji, MN. Mapped wetland boundaries using GPS. Incorporated findings of the wetland investigations into EAW.

TMDL and Water Quality Studies

Jessie Lake Nutrient TMDL Project. Served as a project scientist on the Jessie Lake Nutrient TMDL Project for the Itasca County SWCD. Assisted with all aspects of the TMDL development for Jessie Lake including water quality modeling, internal load estimation, ecological community investigation, TMDL report generation and implementation plan development. Project responsibilities include water quality data analysis, total phosphorus lake modeling, internal phosphorus load estimation, watershed load modeling and report generation.

Burandt Lake Management Plan. Developed management activities with the Carver County Water Management Organization to investigate and improve water quality in Burandt Lake in Waconia, MN. Field studies include water quality, vegetation and sediment investigations. Sediment and water quality data was used to design and conduct a whole-lake alum treatment to control the internal phosphorus load of the lake and improve lake water quality and clarity. Capital improvements within the watershed include rain garden design and construction to control watershed runoff. Assisted the County with all phases of the lake management study.

Clearwater River Chain of Lakes Nutrient TMDL Project. Served as a project scientist on two separate Lake Nutrient TMDL Projects for the Clearwater River Watershed District, one addressing six lakes and one addressing five lakes. For each project served assisted with water quality modeling, internal load estimation, TMDL report generation and implementation plan development for the lake nutrient TMDL projects. Project responsibilities include water quality data analysis, total phosphorus lake modeling, internal phosphorus load estimation, watershed load modeling and report generation.

Comfort Lake Forest Lake Watershed District Lake Management Plans. Project scientist that assisted with water quality, internal load and ecological community analysis for the lake management plans generated for six lakes in the Comfort Lake Forest Lake Watershed District. Served as a field biologist to collected sediment cores for internal load phosphorus release laboratory studies. Conducted internal phosphorus load modeling analysis based on results of laboratory studies. Conducted a review of the ecological communities in the lakes from DNR data to determine the impact of the fish and aquatic plant community on the lake water quality.

Rice Creek Chain of Lakes Nutrient TMDL Study. Served as a project scientist and field biologist on the nutrient TMDL study for a chain of five lakes in the Rice Creek watershed. Served as a field biologist to collect water quality samples, sediment cores for internal phosphorus load release studies in the laboratory, conduct lake aquatic plant surveys and collect lake zooplankton samples. Assisted with lake water quality and internal load modeling for the TMDL study. Conduct a review of the ecological community data for the lake to determine the potential impact of the fish and aquatic plant community on the lake water quality.

Stream and Wetland Restoration

Shingle and Bass Creek Phase II Stream Assessment. Served as the field coordinator and project scientist on Phase II stream assessment of Shingle and Bass Creeks, which combined a modified rapid bio-assessment protocol with Rosgen Level III stream assessments to collect and analyze a variety of biologic and geomorphologic data for various stream segments with the goal of developing stream management objectives

Shell Rock River Watershed District Chain of Lakes Sediment Investigation. Served as the project manager and lead scientist for an investigative study which included measuring current sediment depths in five lakes in the City of Albert Lea to estimate total sediment volume and compare to historical estimates. Based on the estimated sediment depths and volumes a conceptual dredging and lake bottom contour plans were developed. Chemical analysis of sediment core samples was also investigated to determine limitations and permitting issues with the disposal of dredged sediment.

City of Charlotte Stream Reach Restoration. Project scientist on a study which combined Rosgen channel health field assessments with GIS analysis examining watershed land use and development trends to identify the best stream reaches to focus the expenditures of restoration funds and efforts.

Broward County. Geographic Information Systems (GIS) lead on a study to determine the feasibility of converting a land parcel in Broward County into a functional, multipurpose treatment wetland park.

Miami-Dade Parks and Recreation Department. Project scientist on the Deering Glade Rehydration Feasibility Study performed to identify alternatives for delivering supplemental surface waters to an historic coastal wetland.

Environmental Permitting Projects

Carver County Storm Water Permit Review. Serves as technical reviewer for development projects requesting storm water permits for Carver County. Reviews permit applications and project designs for compliance with the County volume management, volume control and water quality rules and goals. Additionally, performs field inspections of constructed projects to determine compliance with final approved permit.

Navitas Energy Windfarm Permitting Project. Currently serving as the assistant project manager for a Wind Farm surveying and permitting project. Wenck is assisting the client to determine wind turbine sites by investigation issues such as compliance with wetland avoidance and mitigation rules, cultural resource surveys and analysis, ecologically sensitive resource consultations with the Iowa DNR. Additionally Wenck is providing field surveying services of the wind turbine, transmission line and access road locations, drafted a storm water pollution prevention plan for the site construction, and acquiring the final site construction plan from the Army Corps of Engineers.

Rockies Express Natural Gas Pipeline Project. Served as a contract biologist during portions of a natural gas pipeline routing, permitting and pre-construction project. Project activities included pipeline routing analysis targeted at avoiding environmentally sensitive areas, identification of wetland areas and wetland communities in project corridor, identification of threatened or endangered species in the project corridor, developing survey plans and avoidance tactics for sensitive communities and threatened or endangered species, and coordinating consultations with state and federal agencies to discuss potential impacts to sensitive species or habitats in the project corridor.

Round Lake Contaminated Sediment Investigation: Twin Cities Army Ammunition Plant (TCAAP). Served as a representative to the US Army as a project scientist assisting a technical working group comprised on stakeholders from the US EPA, US Fish and Wildlife Service, Minnesota Pollution Control Agency examining the sediment contamination in Round Lake from previous industrial activities at TCAAP. Prepared technical memo's examining the heavy metals contamination in Round Lake sediments, designed a sample plan to further delineate the extent of the contamination, developed a conceptual model of fate and transport of heavy metals in Round Lake, investigated different contaminated sediment remedial actions such as dredging, capping and natural recovery and conducted a literature review to investigate the mechanism of toxicity and biological risk due to heavy metals associated with lake drawdowns required to manage the lake as a waterfowl refuge.

PAMELA KIEL MASSARO, PE

Water Resources Engineer

Ms. Massaro's work experience with Wenck has primarily focused on water resource engineering, construction management, and GIS analysis. She has experience with storm water and sanitary sewer collection systems, hydrologic, hydraulic & water quality modeling completing steady and unsteady state analysis for TMDL evaluations, industrial & construction storm water management plans, NPDES permitting, Combined Sewer Overflow Long-Term Control Plans, WWTP expansion, FEMA flood insurance studies, and watershed modeling. Ms. Massaro has worked on 63 impairment studies (20 bacteria, 15 turbidity, 19 low dissolved oxygen, 1 chloride and 8 nutrient/ eutrophication) in four states between 1997-2012. As of November 2017, she and her team have provided over 1,756 certified erosion and sediment control inspections for installation of green stormwater infrastructure BMPs, sanitary sewer and flood protection projects.

EDUCATION

BS, Geological Environmental Engineering; minor in Geology, University of Minnesota

Engineering Management, University of Wisconsin, Madison

Modeling Water Quality in Aquatic Environments, University of Minnesota

PROJECT EXPERIENCE

Rare Earth Resources, LLC: Bonanza Mine, OR (2016-17)

Prepared the Stormwater Pollution Control Plan (SWPCP) in conformance with the standards and practices set forth in the State of Oregon Department of Environmental Quality (DEQ) for the proposed Bonanza Mine located in the Cornucopia Mining District near the City of Halfway, in Baker County, Oregon. Successfully obtained the 1200-Z permit for client to commence operations ahead of schedule. This SWPCP is for the facility's operations Sector G (Metal Mining, Ore Mining and Dressing) during earth-disturbing activities prior to active mining, active mining operations, inactive mining, periods of temporary inactivity, and while the facility is undergoing reclamation.

Prepared the Preliminary Engineering Report/Facility Plan (PER) and the Water Pollution Control Facility (WPCF) Individual Permit Application for the proposed operations which included a self-contained processing plant (screening and sandscrew sleds) in conformance with the standards and practices set forth in the State of Oregon DEQ. The WPCF permit was issued January 12, 2018, and is required for wastewater disposal activities pursuant to provisions of Oregon Revised Statutes 468B.050.

Waste Connections, NE: Construction Quality Assurance J Bar J Landfill (Aug 2017 - Oct 2017)

Certifying Engineer for the 4.2-acre Cell 11/12 construction project at the MSW (Municipal Solid Waste) disposal facility, located approximately 15 miles southwest



AREAS OF EXPERTISE

Project Management
Water Resources Management
Stormwater Management
Hydrologic/Hydraulic/
Water Quality Modeling
GIS: ArcMap 10.5.1

REGISTRATION

Professional Engineer, WY, CO, OR, MN, WI & NE
University of Minnesota
Erosion/Sediment Control
Certified in Design of SWPPP (Oct. 2008 to 2018) & Construction Site Management (Nov. 2008 to 2018)

TRAINING

BASINS/HSPF Training, Saint Paul, MN, 2010
Project Manager Boot Camp Training, PSMJ 10/11, 2002 & 2/12-13/2014
BASINS Training, University of Wisconsin, Madison
Beginner SWAT Training, Texas A&M University
Advanced SWAT Training, Texas A&M University
Water Quality Credit Trading Conference

of Ogallala, NE. The newly constructed cell included a composite liner system (30-mil PVC liner and geosynthetic clay liner), leachate collection system, sand drainage layer, and soil protection layer. Ms. Massaro provided construction observation and documentation during construction, and supported on-site staff to ensure that the project was constructed following the CQA Plan. Ms. Massaro certified the construction documentation report, which included field and laboratory soils testing results, PVC geomembrane field records and destructive test results, grade documentation, leachate collection system details, coarse aggregate tests, construction photographs, and construction record drawings for the cell construction subgrade and protective soil layers.

Tri-Districts, CO: River Bluffs Fatal Flaw Analysis (Oct 2017 – Dec 2017)

Project Manager for a fast-track environmental/engineering fatal flaw analysis on a 150-acre site that East Larimer County (ELCO) Water District and North Weld County Water District (North Weld) were considering purchasing for raw water conveyance and storage. Wenck completed the desktop analysis, with limited pedestrian surveys, to identify and evaluate potential environmental and engineering components that could be encountered prior to that purchase occurring. Wenck submitted the draft tech memo in 4-weeks after the contract was signed, so decisions could be made before closing on the property and easements. The Wenck team completed:

- a Phase I Environmental Site Assessment (ESA),
- the evaluation for the presence of Threatened and Endangered (T&E) species,
- Class I (desktop review) for historic, cultural, or archaeological resources,
- off-site wetland determination, and
- a feasibility level reconnaissance related to reservoir supply and delivery infrastructure.

Town of Windsor, CO: Kyger Reservoir Pump Station Project (Oct 2015-Apr 2017). Project Manager for the design, permitting, and preparation of plans and specifications for construction of a river intake/outlet structure, pump controls building, piping, valve vaults and wet wells associated with the Kyger Reservoir Pump Station Project. Ms. Massaro and Ms. Reed completed the necessary engineering hydraulic analysis resulting in issuance of a certificate of no rise for the proposed structures located in the floodway of the Cache la Poudre River. The certification process followed guidance by the Federal Emergency Management Agency (FEMA) under the National Flood Insurance Program (NFIP). The no-rise analysis used the standard step-backwater computer model HEC-RAS used to develop the 100-year floodway shown on the FIRM. In September 2016, Ms. Massaro took over the construction services role from Chris Muller and completed the remaining submittal reviews and limited construction assistance working as an extension of Town staff.

Black Hawk/Central City Sanitation District, CO

Project Manager for team project providing construction observation and owner rep services for the installation of sanitary sewer during variety of projects within the District Boundary.

- Prosser Street, Central City, CO (2016-2017)
- Gregory Street, Black Hawk, CO (Sept 2016-present)
- Monarch Casino, Black Hawk, CO (Sept 2016-present)

City of Greeley, CO: Poudre Ponds Scour Protection Project (2015-Present). Project Manager for the design, permitting, and preparation of plans and specifications for construction of erosion protection measures at the partially reclaimed northwest-most mining cell, also known as the Poudre Ponds Water Storage Facility and Recreational Fishery (Poudre Ponds). The erosion protection measures are necessary to protect the Poudre River Trail (a City of Greeley recreational trail between the Cache la Poudre River and Poudre Ponds) and the integrity of the Poudre Ponds during flood stage flows of the Cache la Poudre River. The project design entails the construction of a grouted riprap inflow point in the shape of a trapezoidal spillway to allow flood stage flow from the Cache la

Poudre River into the pool storage of the Poudre Ponds cell. With subsequent receding of flood stage flows in the river, any water captured beyond the facility's existing water rights, will be returned to the Cache la Poudre River via an existing pump station in Poudre Ponds. Construction is anticipated to start and be completed during the spring and summer of 2019. Wenck completed the necessary engineering hydraulic analysis resulting in issuance of a certificate of no rise for the proposed structures located in the floodway.

Dorsey & Whitney, MN: Confidential Industrial Client. Application for an Aquatic Life Ambient Water Quality Criteria for Selenium in the Lower Minnesota River (2014-present). Wenck completed the scientific study to prepare an application for an Aquatic Life Ambient Water Quality Criteria for Selenium in the Lower Minnesota River. The application was submitted to the MPCA and MCES in December 2015 on behalf of an industrial client. The proposed site-specific standard for selenium is a fish tissue-based standard. The application is presently being reviewed by the MPCA.

Wenck completed the field work to collect samples upstream of the discharge to characterize background conditions, near the discharge and downstream of the estimated river-outfall mixing zone to ensure that selenium concentrations are homogenous throughout the water column. The data collection included:

- Four separate fish sampling events (one in 2012, three in 2015, one in 2016, five in 2017)
- Water quality samples (2015, 2016, and 2017)
- Sediment samples (2015)
- Phytoplankton samples (2015)

Kimley Horn, MN: 2014-15 TCAAP Redevelopment for Ramsey County. Wenck was a subcontractor to KimleyHorn for the redevelopment of TCAAP for Ramsey County. Ms. Massaro served as the Project Manager for Wenck (Apr. 2014 – Dec. 2015) leading the remeandering of Rice Creek, site stormwater planning and management, surveying & plating and geotechnical services. Ms. Massaro, Mr. Marsh and Mr. Claridge prepared the Comprehensive Stormwater Management Plan (CSMP) to outline how the Water Quality Treatment and Peak Stormwater Runoff Control requirements of Rice Creek Watershed District (RCWD) Rules for the Twin Cities Army Ammunition Plant (TCAAP) redevelopment will be met using a regional stormwater approach. The CSMP sets the framework for RCWD permit applications for projects into the future. Developers will be required to comply with RCWD Board Approved CSMP for each respective project proposed.

Meander

Ramsey County proposed to relocate and reintroduce meanders within a portion of Rice Creek, affecting approximately 925 feet of existing channel. Wenck staff completed the design and prepared the construction documents. The pre-construction meeting was held on November 2, 2015. The primary purpose of the project is to facilitate the reconstruction of the intersection at County Road (CR) H, I-35W northbound (NB) on-ramp, proposed I-35W NB exit ramp, and the proposed Rice Creek Commons (former TCAAP site) access roads, into a five-legged double-lane roundabout. The realignment of the creek provided a unique opportunity for creek enhancements. While designing the meander, consideration was given to the historic meandering course of the old creek channel based on historic aerial photo review. Although the historic meanders could not be replicated, the new creek channel will restore some fluvial morphology of the creek to pre-TCAAP conditions. Rice Creek is listed by the Minnesota Pollution Control Agency as an impaired stream for aquatic macroinvertebrate/fish bioassessments, and is considered an important ecological corridor through the region. Wildlife habitat provisions are designed by Wenck and included in construction plans for the new creek channel which will sustain and enhance the regional wildlife corridor. The stream stabilization techniques incorporate woody matter and bio-engineering techniques to improve the ecology along the corridor.

Stormwater Management

Wenck completed work for Ramsey County on the Redevelopment of the Rice Creek Commons (formerly Twin Cities Army Ammunition Plant) in Arden Hills, MN. Wenck completed the Comprehensive Stormwater Management Plan (CSMP) and it was approved on September 23, 2015 by the Rice Creek Watershed District (RCWD) Board. The CSMP is the first of its kind approved by RCWD, and is yet another example of Wenck providing an exceptional outcome for their client. As allowed for under RCWD Rule C.5 (f), the CSMP was prepared as an alternative means to meet the requirements of Rule C.6 (Water Quality Treatment) and Rule C.7 (Peak Stormwater Runoff Control) for redevelopment of the Site, which will be done in various stages, using a regional stormwater system. The development of the CSMP is intended to streamline regulatory permit approvals saving the RCWD and developer time and money as development is proposed. This alone should make the land more attractive and valuable. The plan for Rice Creek Commons creates open green space, centralized stormwater management features that creates community around protection of our natural resources and provides a forum for continued education of water management and sustainable development

By planning for development of Rice Creek Commons using a “campus” approach, the regulatory requirements can be “leveled” so that future applicants within different geographic regions of the project area aren’t faced with more challenges in meeting the requirements. Regional treatment also allows for more efficient treatment and maintenance, and helps ensure that the entire site meets RCWD requirements, from first to last development.

It is anticipated that the Site will be developed on an outlot by outlot basis. Some outlots will be required to construct infiltration devices and/or stormwater ponds. All outlots, as they are developed, will be required to construct some method of pre-treatment or grit removal (e.g., flow through device, vegetated swale, vegetated filter strip, SAFL Baffle, off-line deep sump catch basins, The Preserver™, etc.). Ramsey County will hire a contractor to build 11 of the stormwater ponds, that when the site is fully developed will reduce total phosphorus by 64% to Rice Creek and 60% to Round Lake.

Metropolitan Council Environmental Services (MCES), MN Wetland Monitoring & Reporting. Pigs Eye Peninsula for Contract C (MCES project number 802714). Project Manager for the annual monitoring for the 2013, 2014, 2015, and 2017 growing seasons (Year 1, 2, 3, and 5), as required under 2006-03912-TJF (Permit) issued by the U.S. Army Corps of Engineers (USACE) to Metropolitan Council Environmental Services (MCES). The Permit was issued for a MCES project, site located in part of Dakota and Ramsey counties, to complete the work necessary to construct sanitary sewer forcemains along the Pigs Eye Peninsula into the MCES Metropolitan Wastewater Treatment Plant (MWWTP).

The restored wetland corridor is approximately 1.3 miles in length and is located south of the MCES MWWTP. The dual 30-inch wastewater forcemains were installed through floodplain forest wetland within a cleared corridor that is 200 feet wide for 0.3 miles and 135 feet wide for 1.0 mile. Vegetative restoration of the cleared corridor was carried out in 2012 by Prairie Restorations as well as management of invasive/weedy species. Wenck staff collected field data to complete this annual monitoring report. Ms Massaro prepared the scope and budget in response to Council Work Order request for the Council project manager, Rex Huttes. Ms Massaro prepared payment claims for indirect cost rate engineering service contracts and project progress reports.

Anoka County, MN. 2014-15 Design, Engineering & Project Management Consulting Services. Rice Creek West Regional Trail / Manomin. Rice Creek Bank Stabilization & Trail Reconstruction. Project Manager for the 2015 construction project that consisted of stabilizing the north Rice Creek bank, raising the finished elevation of the trail, widening the trail to 10-foot width and diverting flow through the bridge deck drains off of the trail. The stabilization consisted of a large boulder wall, using 3-foot to 4-foot diameter, granite boulders. The boulder wall was designed with the base of the wall keyed into the streambank to provide the required channel roughness, give it a more natural appearance and provide some better biotic habitat. Wenck provided observation through key milestones during the process including, erosion control installation, removal of the existing retaining wall, installation of the new retaining wall, establishing subgrade to set concrete forms, casting of the concrete curb, establishing subgrade for the new bituminous trail, paving of the new bituminous trail, installation of the new fence, installation of the new drain gutters, and site cleanup and restoration. Ms. Massaro was responsible for overall project delivery, project

management, budget control and invoicing, preparation of the Construction SWPPP, temporary and permanent stabilization documents to comply with permits, obtaining the permits and approvals from federal (USACE), state (MNDNR), county (Hwy Dept) and local agencies (City of Fridley) as well as Rice Creek Watershed District.

Metropolitan Airport Commission, MN: 2014 Anoka County-Blaine Airport (ANE). Project Manager for an \$113,400 contract for engineering and remediation construction services on a MAC-Owned Property adjacent to the Former Larson Auto Salvage Facility Blaine, Minnesota. The work included site excavation and disposal of miscellaneous debris on a small parcel of land within the Anoka County-Blaine Airport property. Ms. Massaro prepared the Construction SWPPP and obtained the Rice Creek Watershed District Permit. She oversaw the preparation of the site plans, contingency plan and final documentation report. Ms. Massaro kept the MAC informed, managed the budget (finishing the Work on time and on budget), as well as oversaw on-site staff trained to identify, sample and manage special wastes, hazardous materials, and asbestos-containing materials requiring segregation and treatment.

Willmar Municipal Utilities, MN: Stormwater (2012). Conducted a site visit to WMU's existing coal yard and proposed expansion areas to better understand WMU's proposed yard expansion concept. Ms. Massaro prepared a concept storm water management plan for the expansion. Ms. Massaro prepared a planning level estimate of probable construction costs for WMU that included Storm Water Pollution Prevention Plan (SWPPP) updates and WMU's National Pollutant Discharge Elimination System (NPDES) wastewater permit updates. The site had coal pile runoff subject to a categorical discharge standard in NPDES permit.

Gopher Resource, MN. 2012 Facility Improvements. Project Manager for 2012 facility improvements (engineer's estimate of construction cost ~\$4.7 million). This fast-tracked project involved the completion of alternative analysis, stormwater, sanitary sewer, pavement, traffic and electrical engineering design, preparation of engineering plans and specifications for construction. Ms. Massaro was designated as the Coordinating Professional for Civil, Environmental, Geotechnical, and Architectural services. The piece de resistance of the multi-disciplinary design consisted of an industrial stormwater collection system and stormwater distribution system that collects all storm water runoff (from three facilities) for rain events up to the 100-year 24-hour design storm (6 inches). The stormwater runoff is collected in a lined (80-mil HDPE geomembrane) stormwater pond and used at the Gopher Resource facility to supplement existing process water use. Collecting stormwater for facility use will eliminate stormwater runoff events (less than the 100-year 24-hour design storm) and subsequently reduce Gopher Resource use of groundwater for process water. Other benefits include the reduction of environmental liability by not discharging stormwater, which MPCA requires quarterly sampling and public publication of analytical results the agencies web site. This project also includes pavement improvements associated with completing the construction of the new facility entrance that addresses public safety issues on Yankee Doodle Road required by the City of Eagan and Dakota County.

ISD #719, MN. Prior Lake High School Addition. (2013-2014). Certified Stormwater, Erosion and Sediment Control Inspections Services. Ms. Massaro was the project manager for the project where 29 inspections and reports were issued to S.M. Hentges, and the Bossardt staff, between October 2013 and September 2014. Ms. Kathryn Miller was the primary site inspector.

Standard Contracting, Inc., MN (2015) Certified Stormwater, Erosion and Sediment Control Inspections Services. Wenck (either Ms. Massaro directly or staff working under her supervision) conducted 84 active construction site visits over 6-months to record inspections and reporting as required by the SWPP plan. Since Wenck staff were working for the site developer, we worked with site-superintendents to deploy cost-effective methods to maintain compliance. Wenck staff was on call to complete inspections within 24-hours of 0.1 inch rainfall. All inspection reports are completed and on the complianceGo database - <http://wp.compliancego.com/>

Capitol Region Watershed District (CRWD), MN. Central Corridor Light Rail Transit (CCLRT) Infiltration Trench Function Verification. The final CCLRT design incorporated two BMPs (infiltration and filtration) to meet the District Rule C, which requires management of stormwater by (1) providing rate control, (2) reducing the volume of runoff, and (3) improving water quality. The CCLRT BMP systems designed to satisfy District Rules are subsurface infiltration trench systems and permeable pavers. The District and Wenck worked collaboratively to verify function of the

infiltration trench systems before construction was complete. When construction is completed, 73 infiltration trench systems will be constructed west of Highway 280 and east of Marion Street.

Project Manager for the field assessments conducted between August 24 and October 19, 2011. Eight (8) infiltration trench systems were selected for evaluation. First, the perforated pipes were assessed to confirm leakage into the washed rock below the pipe. Second, the duration of time to fill washed rock below the pipe was assessed. Finally, the permeability of soils (hydraulic conductivity) was assessed using a simple falling head test.

Additional field assessments are being conducted in 2012. It is anticipated that additional field assessments will be conducted to verify function over the long-term operation and maintenance of the CCLRT BMPs (perhaps on 5-year or 10-year intervals).

Sadoff Iron & Metal Company, NE. New Facility Design in Lincoln (2012). Project Manager for a new metal recycling facility. This fast-tracked project involved the completion of alternative analysis, stormwater, sanitary sewer, water, utility coordination, pavement, electrical engineering design, and preparation of engineering plans and specifications for construction. Ms. Massaro was designated as the Coordinating Professional for Civil, Structural, Environmental, Geotechnical, and Architectural services. Stormwater sheet flows over the concrete surface unit it is captured by one of several stormwater catchbasins. Stormwater is then conveyed to the stormwater pond located on the northeastern corner of the property. The stormwater pond and pre-treatment forebay is designed to capture the stormwater runoff generated during a 50-year 24-hour design storm (6.0 inches of rainfall), and to remove total suspended solids. The treated water is pumped to a vegetated filtration/infiltration ditch. Stormwater percolates vertically through a well-blended, homogenous mixture of 70-80% construction sand and 20-30% organic leaf compost. The filtered water is infiltrated on the bottom of the ditch. No off-site discharge is expected for most of the rainfall events that occur during an average rainfall year. Therefore, quarterly sampling is not required. During the event that the stormwater system overflows, sampling is not required because the overflow event is not a representative of a typical frequently occurring runoff event. Other benefits include the reduction of environmental liability by not discharging stormwater, which NDEQ requires quarterly sampling.

Shine Brothers Corporation of Minnesota. 2012 Site Improvements Project, Worthington, MN (2012). Project Manager for stormwater site improvements at an operating metal recycling facility. This site didn't have enough space to add a sufficiently sized pond without reducing the existing operating footprint or acquiring additional adjacent property. Given the space communicated as available for BMPs, the following site improvements were constructed:

- Pavement on high traffic areas to minimize sediment tracking
- Surface water conveyance feature (filtration ditch) to provide a water quality benefit by trapping sediment and filtering stormwater

This project involved the preparation of engineering plans and specifications for construction, and construction administration. The native vegetated filtration ditch consists of a well-blended, homogenous mixture of 70-80% construction sand and 20-30% organic leaf compost. The filtered water is captured by drain tile prior to discharging off site. Filtered stormwater was observed by Site Manager to have improved clarity during a rainfall event immediately once the filtration ditch was constructed.

ADM Milling Company, MN: Atkinson Mill and Nokomis Mill, Minneapolis (2011-2017). Project Manager for updates to the Industrial Stormwater Pollution Prevention Plan (I-SWPPP) for two Mills located in Minneapolis, MN. Services also included on-site I-SWPPP training and quarterly stormwater sampling assistance.

ADM Milling Company, MN: Atkinson Mill and Nokomis Mill, Minneapolis (2014) SWPP Updates. Project Manager for 2014 updates to the Industrial Stormwater Pollution Prevention Plan (I-SWPPP) for two Mills located in Minneapolis, MN.

Lunds Resort Kimball, MN. Ms. Massaro is providing engineering assistance for site improvements including hydrologic and hydraulic calculations and engineering design of rain garden to meet Stearns County stormwater requirements.

City of Corcoran, MN. Ms. Massaro assisted Wenck's municipal engineering team with the review of future sanitary sewer infrastructure. She mapped possible routes in GIS and developed conceptual costs for council consideration.

State of Minnesota - Department of Natural Resources - Division of Parks & Trails. Saint Croix State Park Gully Stabilization (2011-12). Project Manager for project located in St. Croix State Park, four miles east of Hinckley, MN. Responsibilities include completion of alternative analysis, design using bioengineering methods, engineering plans and specifications, and construction contract administration and oversight for reconstructing a gully (approx. 60-foot head cut) forming at the terminus of the Main Park Drive directly behind the historic St. Croix Lodge. Final design manages stormwater in a historic district using a combination of management methods (biofiltration basin, native plants, infiltration trench).

Preferred Sands of Wisconsin- Blair, WI Site (2012). Preferred Sands of Wisconsin operates a site near Blair, Wisconsin (facility). The facility has pits where silica sand is mined, stockpiles for the residuals from the dry and wet plant processes, and stockpiles of excess overburden which needs to be removed to access the silica sand deposit.

Ms. Massaro aided in the analysis of stockpile location concepts focused on the potential impacts of two potential out of pit stockpile locations. Economic efficiency and permitting were assessed to aid a determination of which location was preferable for stockpiling.

Ms. Massaro prepared a Construction Stormwater Pollution Prevention Plan (C-SWPPP) for a project involving the removal of sediment deposits that were transported down-gradient after a significant flooding event resulted in stormwater pond overflows. The C-SWPPP acted as the one document prepared to streamline approvals. The C-SWPPP met the Trempealeau County Department of Land Management (DLM) requirements, the grading/excavation permit application requirements, the Wisconsin Department of Natural Resources requirements, and included the Water Resources Application for Project Permits (WRAPP) Stormwater Notice of Intent (NOI).

Ms. Massaro served for project manager for Water Resources Engineering Design assistance for internal grading recommendations and stormwater improvements.

Lac qui Parle - Yellow Bank Watershed District (LQPYBWD), MN. Multiple Impairment Total Maximum Daily Load (TMDL) (2011-2012). The TMDL report was approved by US EPA on May 8, 2013, and MPCA on June 20, 2013.

Ms. Massaro completed the LQPYBWD TMDL report addressing the 19 impairments on eight reaches of the Lac qui Parle River and three reaches of the Yellow Bank River. Eleven of the impairments are for bacteria, seven impairments are for turbidity and one impairment is for low dissolved oxygen. Bacteria and turbidity impairments are based on load duration curve-based TMDL equations. The TMDL makes links to various NPDES permit programs including discharges of wastewater, stormwater from industrial, MS4, and construction sites. The computational framework, or model, chosen for determining the DO TMDL was the River and Stream Water Quality Model (QUAL2K). QUAL2K is a public domain model and is widely used and supported by the EPA for TMDL development.

The LQPYBWD is in west central Minnesota, on the southwest side of the Minnesota River. Portions of the watersheds are in South Dakota and Minnesota. The watersheds have a drainage area of approximately 1,538 square miles in western Minnesota (824 square miles) and eastern South Dakota (714 square miles). The states of South Dakota and Minnesota apply different water quality standards to reaches of the same streams that lie in each state. The final TMDLs do not make allocations for the South Dakota portion of the basin; they merely reflect the assumption that Minnesota sources are entitled to only a portion of the loading capacity for their use because of the effect of flow contributions from South Dakota. The TMDL was approved by the MPCA and the US EPA in 2013.

Ms. Massaro completed 3rd party review of the EPA consultant's hydraulic and water quality model (QUAL-2K). Reviewed data collection efforts spanning back to 1987 to prepare flow and dissolved oxygen concentration

duration curves to evaluate critical period. Completed a 2-day data collection effort including multiple dye studies, longitudinal survey (dissolved oxygen, temperature and conductivity) and stream flow gauging. Assisted with presenting a reasonable case for delisting the dissolved oxygen impaired reach to the MPCA using impairment thresholds laid out in the assessment guidance manual for the 2010 assessment cycle. Developed a detailed modeling approach for MPCA approval to use existing data to complete TMDL reporting for the dissolved oxygen impairment. Completed senior modeling role on project team reviewing and guiding development, calibration and verification of steady-state hydraulic and water quality model (QUAL-2K) for dissolved oxygen impairment.

Alliance Steel Service Company, MN 2010 Site Improvements. Ms. Massaro completed engineering plans and permitting for stormwater site improvements, including site paving, stormwater infrastructure improvements and repairs to a turning fluid collection system. Some improvements addressed items raised during a County stormwater inspection.

Alliance Steel Service Company, MN 2011 Site Improvements. Ms. Massaro coordinated a multi-disciplinary team of structural and geotechnical engineers, surveyors and scientists to prepare engineering plans and technical specification for construction of a steel canopy building covering operational railroad spurs and turning fluid collection system. The maximum roof height of the proposed structure was 54-feet above the existing ground surface and the minimum roof height was 48-feet above the existing ground surface (along 31st Ave North.) Permitting included meeting of Xcel Energy, Canadian Pacific Railroad, and City of Minneapolis requirements. The project was not built due to the Owner's decision.

Alliance Steel Service Company, MN 2012 Site Improvements. Ms. Massaro coordinated a multi-disciplinary team of architects, geotechnical engineers, and environmental scientist during the preparation of engineering plans and specifications for stormwater site improvements. The design upgrades the Site's Storm Water Best Management Practices (BMPs) to reduce total suspended solids and control runoff rates. The system retains the 2-year 12-hour design storm (2.31 inches rainfall). These improvements are intended to comply with the MPCA industrial stormwater permit requirements, in addition to City of Minneapolis Chapter 54 stormwater Management Requirements.

Calico Solar Project, CA. Water Resources Engineer providing hydrologic modeling support necessary for construction permitting of the Calico Solar Project in San Bernardino County, California. The proposed project will be 4,613-acre solar generating facility built on an active alluvial fan in the Mojave Desert. Based on existing conditions at the site, Wenck analyzed the hydrology and hydraulics of the project watershed, and reviewed the impact of the proposed site development. This work was completed by Joel Toso, Vanchiswaraiyer Ramanathan and Ms. Massaro working in conjunction with Westwood Professional Services for Mortenson Construction. The design discharges and associated volumes of storm water, debris and sediment for the 100-year, 24-hour storm event were analyzed using the County of San Bernardino Drainage Manual (as well as the standard FEMA approved programs, HEC_RAS and FLO-2D completed by other Wenck team members.)

Metropolitan Airport Commission, MN: SPCC Updates

- 2010 Update: Three of the Reliever Airports (FCM, LVN & STP). Updated facility diagrams for SPCC plan updates.
- 2014-15 Update: Six of the Reliever Airports (STP, MIC, LVN, FCM, ANE & 21D). Updated SPCC plans and mapping updates.

Metropolitan Council Environmental Services (MCES), MN. Hopkins Improvement project (2012-13) Contract A and B. Ms. Massaro was project manager for the Wenck team providing Voluntary Investigation and Cleanup (VIC) Program and Petroleum Brownfields (PB) Program assistance prior to and during Construction. Wenck prepared a Site Contingency Plan and Site Safety and Health Plan for the Project, meeting the requirements of 29 CFR 1910.120. The Wenck team provided as needed inspection and sampling and prepared a documentation report.

Metropolitan Council Environmental Services (MCES), MN. Fridley (2014-2017). Ms. Massaro and Mr. Jeff

Ellerd are providing Voluntary Investigation and Cleanup (VIC) Program and Petroleum Brownfields (PB) Program assistance prior to Construction bidding. Wenck prepared a Site Contingency Plan and Site Safety and Health Plan for the Project, meeting the requirements of 29 CFR 1910.120. The Wenck team is presently providing as needed inspection and sampling.

Metropolitan Council Environmental Services (MCES), MN. Mississippi River Forcemain Repairs: Permitting Assistance (2012-2014). Ms. Massaro aided MCES and Brown & Caldwell to complete necessary steps to acquire the required environmental documents and permits to first complete emergency repairs and second install a permanent repair consisting of additional forcemains in the floodway crossing the Mississippi River. Permitting assistance included agency pre-permit application communications, planning for construction dewatering, floodway construction emergency response, and preparation of the Construction SWPPP, temporary and permanent stabilization documents to comply with federal, state, county and local agencies as well as Coon Creek Watershed District Rules and MPCA's Construction Stormwater Permit. Wenck also completed as needed design document (plans and specs) review to meet permit requirements, as-requested SWPPP inspections, and prepared SWPPP revisions after a MPCA inspection.

Metropolitan Council Environmental Services (MCES), MN. Seneca WWTP: Air Permitting Assistance (2012). Ms. Massaro is project manager for a Maximum Achievable Control Technology (MACT) standards engineering stack test conducted on the multiple hearth incinerators at the Seneca WWTP.

Metropolitan Council Environmental Services (MCES), MN. South Saint Paul Forcemain Improvement (SSPFI) project (2010). Wenck completed a seepage analysis for the existing 48-inch sanitary forcemain and the installation of two 42-inch sanitary forcemains within an existing Mississippi River levee located in St. Paul, Minnesota just north of the Wakota Bridge. The seepage analysis evaluates the predicted seepage flow patterns within the levee to determine 1) if any potential detrimental seepage patterns could develop and 2) the magnitude of the exit gradients are on the downstream (land-side) toe of the levee. The seepage modeling was completed by Paul Eickenberg using SEEP/W 2007 by Geo-Slope International. Typical design criteria from four US Army Corps of Engineering Manuals (EM 1110-2-1901 Seepage Analysis and Control for Dams, EM 1110-2-1913 Design and Construction of Levees, EM 1110-2-2902 Conduits, Culverts, and Pipes, and ETL 1110-2-569 Design Guidance for Levee Underseepage) were incorporated in the analysis. Wenck also completed an uplift/buoyancy analysis on the forcemains. Ms. Massaro was the project manager for this project.

Metropolitan Council Environmental Services (MCES), MN. Empire Wetland Banking Assistance. Ms. Massaro assisted MCES execute a State conservation easement over a reduced portion of an approved bank plan site to facilitate the deposit of MN BWSR Wetland Bank Credits from the Empire Wetland site located north of the Empire Wastewater Treatment Plant in Farmington, Minnesota. Wenck determined the location and acreage of the New Wetland Credits (NWC) and Public Value Credits (PVC) proposed for deposit, facilitated Wetland Conservation Act (WCA) Technical Evaluation Panel (TEP) meetings until issuance of a certificate of compliance. A portion of the credits are already committed as part of the City of Rosemount approved wetland replacement plan, while another portion are needed immediately for U.S. Army Corps of Engineers CWA Section 404 permit issued for MCES's South Saint Paul Forcemain Improvement (SSPFI) project.

Metropolitan Council Environmental Services (MCES), MN. South Saint Paul Forcemain Improvement (SSPFI) project (2009-2012). Ms. Massaro successfully aided MCES and Howard R. Green Company complete necessary steps to acquire the necessary environmental documents and permits to install a forcemain in the floodway through wetlands and crossing the Mississippi River. Permitting assistance included planning for construction dewatering, floodway construction emergency response, compensatory wetland mitigation, engineering hydraulic analysis resulting in issuance of a certificate of no rise for a proposed floodway structure. Completed review and comment of project SWPPP, plans and technical specifications to comply agreements made with federal, state, county and local agencies as well as Ramsey Washington Metro Watershed District Rules and MPCA's Construction Stormwater Permit. Wenck was instrumental in MCES's receipt of U.S. Army Corps of Engineers initial and final proffered CWA Section 404 permit and approved jurisdictional determination using MN BWSR Wetland Bank Credits, and MN WCA LGU no net loss determination exemption for utilities.

- 2011-2012: Completed 48 inspections (between August 2011 to August 2012) for 1 active construction site.

Metropolitan Council Environmental Services (MCES), MN. South Saint Paul Forcemain Improvement (SSPFI) project (2009-2010). Completed 3rd party review of environmental permitting completed and provided MCES with a status update. Completed wetland mitigation support tasks associated with the U.S. Army Corps of Engineers Compensatory Wetland Mitigation Plan submittal requirement for the Clean Water Act Section 404 permit for the South Saint Paul Forcemain Improvement project. Responsibilities included project management and coordination of surveying and wetland delineation efforts completed by Wenck Staff and final reporting coordinated with other sub consultants.

Ms. Massaro and Mr. Shoemaker completed the necessary engineering hydraulic analysis resulting in issuance of a certificate of no rise for the proposed air release valve south of the Pigs Eye Wastewater Treatment Plant located in the floodway of the Mississippi River. The certification process followed guidance by the Federal Emergency Management Agency (FEMA) under the National Flood Insurance Program (NFIP). The no-rise analysis used the standard step-backwater computer model HEC-RAS used to develop the 100-year floodway shown on the FIRM. Wenck completed the analysis using the 2004 CLOMR HEC-RAS and 2002 HEC-2 model files from the Minnesota DNR (MnDNR).

Metropolitan Council Environmental Services (MCES), MN. Completed review, comment and revision of MCES technical specifications to comply the MPCA construction stormwater permit issued August 2008 with Wenck Staff (Dave Parenteau and Heather Libby).

Shingle Creek Watershed Management Commission, MN (Dissolved Oxygen) (2011). The TMDL report was approved by US EPA on November 4, 2011.

Senior Modeler on project team in-charge of development, calibration and verification of a steady-state hydraulic and water quality model (QUAL-2K) to model the dissolved oxygen impairment. Team member providing input on the indices of biotic integrity as part of an identification and assessment of stressors on aquatic populations and communities. The QUAL-2K model includes explicit modeling of surface and groundwater hydrology, hydraulics and constituent routing. Ms. Massaro responsibilities included development of TMDL scenario modeling using the calibrated QUAL-2K models to meet the 5-mg/L DO standard.

Minnesota Pollution Control Agency, MN: Lower Crow River (North Fork): Jewitts Creek and Grove Creek - TMDL (Dissolved Oxygen) (2012). The TMDL report was approved by US EPA on August 20, 2013.

Senior Modeler on project team reviewing and guiding development, calibration and verification of steady-state hydraulic and water quality model (QUAL-2K). Responsible for modeling analysis used to identify cause of dissolved oxygen impairment and develop the TMDLs for the Jewitts Creek and Grove Creek tributaries of the North Fork Crow River Watershed in Minnesota.

Metro Metals, MN Underground Stormwater System. (Jun 2008 – Jan 2009) Ms. Massaro completed engineering plans and specifications, permitting, and construction contract administration and oversight for an ACEC 2009 Honor Award site design to improve stormwater management at the facility. Ms. Massaro was the Certifying Engineer for project. The stormwater management plan developed by Wenck will collect and convey stormwater runoff to an underground storage system filled with tire shreds. The tire shreds are sufficient for stormwater management purposes due to their relatively high void space, but they also provide sufficient strength for material storage on the ground surface above the tire shreds. The system also provides water quality treatment to an area that has previously not been treated. The underground stormwater pond included installation of a 60-mil High Density Polyethylene (HDPE) geomembrane on top of the grading layer for the pond's liner system. The project included Response Action Plan and Construction Contingency Plan (RAP/CCP) Implementation Report, necessary due to the known presence of impacts from former wood treating operations at the Site.

Metropolitan Airport Commission, MN: Water Management Mapping Updates. Conducting site visits, review of engineering plans and studies necessary to update the detailed surface water management (drainage) maps for each of the reliever airports. The updated plans keep the MAC in compliance with the NPDES General Storm Water

Permit for Industrial Activity.

- 2009 Update: Five of the Reliever Airports (21D, FCM, LVN, MIC & STP)
- 2014 Update: Two of the Reliever Airports (LVN & FCM)
- 2013 Update: One of the Reliever Airports (MIC)
- 2015 Update: Six of the Reliever Airports (STP, MIC, LVN, FCM, ANE & 21D)

Chippewa River, MN Turbidity TMDL Study (2014). Engineer on project team involved in developing an SWAT model of the Chippewa River to assess nonpoint source pollution from the river basin. Responsibilities included developing and calibrating the SWAT model to include: surface and groundwater hydrology, weather, soil water percolation, crop growth, evapotranspiration, agricultural management, urban and rural management, sedimentation, and water and constituent routing.

City of Aberdeen, ND Inflow & Infiltration Collection System Study (2009-2011). Engineer on project team that developed an XP-SWMM model of the trunk collection system model from the main lift station to the WWTP for the City of Aberdeen. The XP-SWMM model uses Extran blocks to simulate hydraulics. The model is being used for analysis of the City of Aberdeen's system Inflow/Infiltration (I/I) reduction plan. Additional responsibilities included reviewing record drawings to create the existing interceptor model attributes, assisting with the development of the 2009 and 2011 data collection plan, lumped sub basin models and alternative analysis.

Confidential Project, MN Environmental Review and Permitting. Air Emissions Risk Analysis (AERA). Water Resources Engineer on project team providing environmental assistance to obtain environmental permits and approvals necessary to proceed with construction of a Confidential Project. Ms. Massaro's responsibilities included providing watershed hydrologic and hydraulic input for lake-specific analysis used in air permitting, and air emission risk analysis modeling.

Pope/Douglas Solid Waste Management, MN. Air Emissions Risk Analysis (AERA). Water Resources Engineer on project team providing environmental assistance to increase the capacity of municipal waste combustor facility in Alexandria. Ms. Massaro's responsibilities included providing watershed hydrologic and hydraulic input for lake-specific analysis used in air permitting, and air emission risk analysis modeling.

Capitol Region Watershed District (CRWD), MN. Certified Stormwater, Erosion and Sediment Control Inspections Services. Wenck (either Ms. Massaro directly or staff working under her supervision) has conducted 1,796 active construction site visits for the Capitol Region Watershed District, since 2010.

2010: Completed 29 inspections over 2-months for 14 active construction sites.

2011: Completed 90 inspections, between July to December, for 10 active construction sites.

2012: Completed 67 inspections, between June to September, for 13 active construction sites.

2013: Completed 185 inspections, between April to December, for 36 active construction sites.

2014: Completed 210 inspections, between June to December, for 25 active construction sites

2015: Completed 324 inspections, between March to December, for 16 active construction sites

2016: Completed 358 inspections, between March to December, for 30 active construction sites

2017: Completed 366 inspections, between January to December, for 28 active construction sites

2018: Completed 21 inspections, between January to January 12, for 13 active construction sites

Capitol Region Watershed District (CRWD), MN. Villa Park Wetland Management Plan. Project Manager of hydrogeology, biology, ecology, wetland science, and engineering disciplines evaluating existing monitoring data

and future management options for the Villa Park Wetland System in Roseville. Ms. Massaro developed, and calibrated a unit area load model to estimate watershed loads for the response model (BATHTUB). The models were used to evaluate relative phosphorus reductions for proposed alternatives to develop cost benefit summaries. Her project responsibilities include water budget and phosphorus budget data analysis, characterization of nutrient fluxes, and coordination and consolidated synthesis of multi-disciplinary conclusions and future management recommendations with cost estimates.

Capitol Region Watershed District (CRWD), MN. Cleveland and Randolph Area Groundwater Study. Project Engineer for groundwater study in the Cleveland-Randolph Area of the City of St. Paul. The study area's property owners have routinely experienced high groundwater resulting in reports of constant running sump pumps, property damage, and infrastructure (streets & utility) damage. Her study responsibilities include gathering existing information, GIS mapping, field data analysis. She will also assist the Watershed District identify areas where infiltration is not recommended, and special provisions in the Watershed Rules might apply, and develop management options for existing conditions and/or future development.

Department of Natural Resources, MN. Keetac Expansion Project Environmental Impact Statement (EIS). Team member assisting with project kick off and coordination of staff review and analysis pertaining to the Water Resources sections of the EIS (direct surface water quality, hydrology, hydrogeology, wastewater, and surface water physical effects). Project responsibilities include preliminary review of data analysis, assumptions and methodology completed by Proposer, weekly progress reports, regular involvement centered around hydrologic studies to develop the facility water budget and watershed yield model in the EIS. Responsible for analyzing the inter-basin transfer portion of the final EIS.

Shingle Creek Watershed Management Commission, MN. Conducted field training for Patrick Henry High School students in attendance for a summer session class called "A Political and Environmental Study of Shingle Creek." Taught students general concepts of conducting stream assessment field survey techniques for flow gauging, cross section and velocity measurements, pebble counts, sediment analysis, habitat assessment using Stream Visual Assessment Protocols, water quality sampling and lab work. Presented in-classroom training of general concepts of hydrology, hydraulics and water quality.

Middle St. Croix Watershed Management Organization (MSCWMO), MN. Afton / Lakeland Gulley Stabilization. Project Manager for erosion stabilization project in Afton and Lakeland, MN for the MSCWMO. Responsibilities include facilitation of stakeholder meetings, characterization of erodibility of bed/bank material, design of rock drop structure based on in-channel shear stress calculations, completion of engineering plans and specifications and construction contract administration and oversight.

Metropolitan Airport Commission, MN: 2007-2009 Construction Oversight. St. Paul Downtown Airport - Perimeter Floodwall Improvements Project

- Review of construction plans to identify potential environmental concerns, and attendance at pre-construction meetings for different phases/components of the construction to emphasize the environmental concerns
- Review of daily progress reports
- Attendance at scheduled construction progress meetings
- Conduct weekly site visits, independent of the Construction Contract, to review the measures installed by the contractor to stabilize the disturbed slopes and protect the adjacent wetland, including silt fences, erosion control blankets, and temporary plantings
- Conducted 98 inspections, checklist reports and subsequent contractor follow up
- Preparation of Monthly Progress Reports for the City of Saint Paul
- Participation in other meetings where deemed necessary to resolve environmental issues

- Providing preventative and corrective actions were necessary
- Assisting MAC in complying with the City of Saint Paul's Conditional Use Permit and Variance, Zoning File Number 07-043-737, Minnesota's Construction Stormwater General Permit (NPDES/SDS General Permit), contractor's Testing and Disposal Plan for excavation and earthwork activities, Wetland Conservation Act (WCA), and U.S. Army Corps of Engineers – St. Paul District's Wetland Conservation Act Permit.
- Completed annual reporting for MAC to remain in compliance with the Federal Emergency Management Agency (FEMA) permits and approved revision of Flood Insurance Map, Conditional Letter of Map Revision (CLOMR); and LOMR issued to the MAC by MPCA the and U.S. Army Corps of Engineers (COE).
- Provided environmental review of MAC's Flood Fight Manual under development as the Mississippi River flood event emergency response manual for the St. Paul Downtown Airport

Metropolitan Council Environmental Services (MCES), MN. East Bethel Rapid Infiltration Assessment. Worked with GIS Specialist to develop approach using Spatial and 3d Analyst to create surfaces for Surface Elevation and Groundwater Elevation used in preliminary study to evaluate suitability of East Bethel for utilizing groundwater infiltration for the recovery of treated water.

Water Resources Engineering Experience

Lake TMDLs for Rice Creek Watershed District, MN. Member of project team completing shallow lake load assessment and TMDL for George Watch, Marshan, Reshanau, Rice and Baldwin Lakes. Responsibilities included processing XP-SWMM modeling results for use in P8 modeling.

Comfort Lake Forest Lake Watershed District, MN: Watershed and Lake Water Quality Modeling Investigation for the Development of a Watershed Capital Improvement Plan (2007)

Completed modeling analyses for the study using the following models, tools and data: monitoring data, scientific literature, watershed inventories, the XP-SWMM (v9.1) dynamic watershed hydrologic and hydraulic model, water budget, geographical information systems (GIS) analysis and synthesis, a unit area loading model for estimating watershed loads, and a lake response model (BATHTUB) to assess effects of load changes.

Completed a technical review of the District's existing CLFLWSD XP-SWMM model against FEMA standards for floodplain analysis and against other accepted practices.

Completed hydrologic & hydraulic XP-SWMM model calibration to 2003-06 monitoring data, to support the water quality model and propose a list of projects for the Watershed District's Capital Improvement Plan to reduce total phosphorus watershed loading.

Facilitated stakeholder meeting and public open house presenting capital improvement plan to improve water quality.

Capitol Region Watershed District (CRWD), MN. Ms. Massaro aids Mr. Shoemaker as the CRWD's permit engineer and assists the CRWD staff in managing and planning within the watershed. Engineering recommendations are presented to the Board of Managers based on the District's regulatory programs. Responsibilities include primary technical review of rate control and water quality treatment detention facilities, infiltration Best Management Practice implementation, hydrologic structure design, wetland preservation and replacement, and erosion and sediment control measures required in developing areas.

City of Rochester, MN. Completed Hydrologic Modeling for the Silver Lake Shoreline Restoration using GIS and XP-SWMM. Estimated Fecal Coliform and Nutrient loading before and after the installation of 11,000+ linear feet of shoreline buffer.

Shell Rock River Watershed District, MN. The outlet of Albert Lea Lake - a five square-mile shallow lake in Freeborn County - forms the headwaters of the Shell Rock River. One of the management goals for the lake is the

increase in aquatic vegetation through drawdown of the lake; the existing outlet structure is over 80 years old and in need of replacement. Ms. Massaro completing the hydrologic & hydraulic modeling to evaluate the feasibility of accomplishing drawdown with a new outlet structure. She evaluated the influence the new outlet structure would have on the downstream river channel and subsequent effects on the high tailwater in the Shell Rock River. Existing HEC-2 models were converted to HEC-RAS, HEC-HMS, & XP-SWMM and updated with recent surveying, field reconnaissance & monitoring data. Modeling results were used to evaluate low, normal, and high water levels on Albert Lea Lake drawdown scenarios impact on water quality, hydraulics, and aquatic plant management.

City of Delano, MN: Northwest Sewer Interceptor & Watermain. Project Engineer responsible for hydraulic design, oversight of surveying and geotechnical exploration, permitting assistance, completion of construction plans and specifications, and construction management, on behalf of the City of Delano, of a new sanitary sewer interceptor from its existing wastewater treatment plant (WWTP) to provide a flow capacity of up to 6 million gallons per day to serve future growth areas located west and northwest of town. The new sewer interceptor and watermain cost \$3million to construct and is 2.4 miles in length and was constructed under the South Fork of the Crow River and in the FEMA floodway.

City of Delano, MN: Water Treatment Facility. Member of Engineering Team helping the City of Delano construct a new water treatment facility. Responsibilities include preliminary stormwater planning and detailed XP-SWMM modeling, and preliminary geotechnical exploration coordination.

City of Delano, MN: Parkview Construction Inspection. Ms. Massaro inspected the Parkview Development Sewer and Water Construction during the jacking of the steel casings for Sewer and Water under the South Fork of the Crow River and in the FEMA floodway.

DHL Worldwide Express (Dissolved Oxygen), OH. Subcontractor, to Malcolm Pirnie, Inc in 2004 and Gresham Smith & Partners in 2006, for modeling services to update existing dynamic hydraulic and water quality models (XP-SWMM Runoff, Extran, and Transport blocks and USEPA WASP.) WASP5 modeling files updated to current version WASP6. Change in airport ownership, deicer operations and expansion required the original study of storm water contamination caused by deicing chemicals to be revisited to ensure that state dissolved oxygen standard was being met. Modeling approved by Ohio EPA and permit was re-issued in 2004. Ms. Massaro's 2006 efforts included training of Gresham Smith & Partners staff to run models and provide direction of developing methodologies to update the 2004 models.

Central Lakes Regional Sanitary District & Alexandria Lakes Area Sanitary District, MN. Long Prairie Watershed – (Dissolved Oxygen) TMDL. Water Quality Modeling of Potential New Regional WW Treatment Facility. Primary modeler on a project team determining effluent limits for a possible new regional wastewater treatment facility discharging to the upper Long Prairie River in west-central Minnesota. The final TMDL water quality model was used to complete job responsibilities of modeling analysis.

Shingle Creek (44.5 sq. mi), MN: Chloride TMDL (2006). Completed GIS spatial analysis and visualization techniques to aid understanding of the relationships between in-stream chloride concentrations and application of road salt. Using current aerial photographs and existing road line files, new watershed road coverages were created to reflect the width and length of road coverage for each subwatershed. Watershed road coverages coupled with road salt application rates, from various entities with non-uniform reporting practices (the nine cities in the watershed, in addition to Hennepin County, and Mn/DOT), allowed straightforward tabular and graphical chloride load accounting for each subwatershed. The visualization of standardized relative subwatershed loading with respect to the Watershed's sixteen monitoring sites and the respective salt applicators roads succinctly summarizes the data analysis. Subwatershed chloride loads were directly used with subwatershed results from the calibrated XP-SWMM hydrologic & hydraulic model for the watershed. Utilizing GIS, the Wenck team was able to accurately apply daily road salt loads to the watershed with spatial accuracy, increasing the robustness of the final TMDL report.

Minnehaha Creek Watershed District - Stream Assessment (2003), MN.

- Assessment of Minnehaha Creek included geomorphic assessment of stream stability and need for grade control, assessment of habitat quality and macroinvertebrate sampling for evaluation of IBI.
- Ms. Massaro was the primary modeler in 2003 completing a peer review of modeling analysis completed for a Hydrologic and Hydraulic XP-SWMM model against FEMA standards for floodplain analysis. The model was being proposed to FEMA to update the Flood Insurance Rate Maps (FIRMs), Flood Insurance Study (FIS), and supporting information for Minnehaha Creek. Ms. Massaro provided the Watershed District a list of recommendations to improve model efficiency and accuracy.
- Completed GIS mapping of physical inventory of features, conditions and hydraulic infrastructure along Minnehaha Creek in an ArcView GIS Tool for viewing photos and descriptions overlaid on aerial photographic maps. Worked on team to create a Microsoft ACCESS database showing physical features, descriptions and photos. Completed data analysis on physical inventory by river mile to support report writing.
- Performed XP-SWMM modeling analysis of multiple flow management strategies to reduce peak flow rates and stormwater volumes in the creek to reduce hydraulic stress on streambanks.
- Completed historical and existing aerial, land use and public waters mapping for County/Judicial Ditch network

Minnesota Pollution Control Agency, MN: Long Prairie Watershed - TMDL (Dissolved Oxygen). Primary modeler on a project team for a comprehensive study of water quality in the Long Prairie River. Job responsibilities included development, calibration and verification of steady-state hydraulic and water quality model (QUAL-TX). Responsible for data and modeling analysis used to develop the TMDLs for the Long Prairie River Watershed in Minnesota. Primary GIS Data Manager using ArcView to enhance modeling data management, presentation and results analysis.

Pokegama Lake Association, MN: Flooding Analysis. Engineer on project team evaluating causes and solutions for Pokegama Lake Flooding issues. Water Budget data analysis completed to determine the interactions between Pokegama Lake, Cross Lake, and the Snake River during high water years using existing data collected by the Snake River Water Management Board.

Metropolitan Airport Commission, MN: Baytown Township Groundwater Contamination. Completed GIS Data Management for mapping Groundwater containments.

City of Bloomington, MN. Brookside Area Hydrologic and Hydraulic modeling analysis. Engineer on project team that completed XP-SWMM model construction, model calibration to Fall 2003 monitoring data, and modeling analysis for seven alternatives to alleviate flooding in a low area west of Nine Mile Creek, between Upton Road and Brookside Avenue. The alternatives investigated were various pipe improvements, including larger pipes and re-routing pipes (to divert water away from the problem area). Provided GIS support for project, including client deliverables of link and node shapefiles of modeling attributes.

GIS Experience

GIS specialist support for various watershed district projects:

- Minnehaha Creek Watershed District
- Middle St. Croix Watershed Management Organization
- Capitol Region Watershed District
- Prior Lake - Spring Lake Watershed District
- Shingle Creek Watershed Management Commission
- Pelican River Watershed District
- Long Prairie River Watershed District

- Sauk River Watershed District
- Clearwater River Watershed District
- Carver County
- Coon Creek Watershed District
- Dakota County
- Rice Creek Watershed District
- Vermillion River
- Lake Pulaski Watershed
- Anoka County
- Hennepin County
- Washington County
- South Washington WD
- Platte Basin Plan Update (2016)

GIS Phase I, II Support. GIS Support for Wetland Assessment Projects

TECUMSEH Professional. Twin Cities Army Ammunition Plant (TCAAP), Arden Hills, MN.

- GIS mapping of Soil and Water Sampling for annual reports
- Environmental Support Services
- Spatial data analysis of environmental sampling results to aid property transfer. Comparison of analyte to various environmental standards (EPA Region 9 Soil PRGs Industrial, Residential; EPA Region 9 Tap Water; EPA MCL/TT (Groundwater); MPCA Soil Tier 2 SRV Industrial, Residential; MPCA Soil Tier I SLV; MDH HRL/HBV.)
- Special Mapping of Benzo[a]pyrene equivalents for each Environmental Site Assessment Unit.

Calpine, MN. GIS support for Mankato Plant Siting and Permitting.

Nilfisk Advance Machine, MN. Groundwater Investigation and Cleanup Engineer responsible for the development of geology, soil contaminate and groundwater contaminate models using EVS (Environmental Visualization System.) Data analysis was used to better understand the site.

GIS support of the various Water Resources, Solid and Hazardous waste management, and Air Permitting projects in MN, WI, MI, IL, ND, ID, and NY.

Developed figures and summarized spatial analysis for project reports. Located, digitized, and populated shape files for collection system pipes. Written standards for the collection of model building data in shape file format. Trained staff how to collect model building data to populate shape files in the field or in the office using ArcView, MapInfo, custom programmed mapping / database applications, and/or as-built drawings. Performing QA/QC routines on collected data.

Ms. Massaro's work experience also includes:

Completing steady and unsteady state hydrologic, hydraulic, and water quality modeling analysis for Combined Sewer Overflow Long-Term Control Plans, FEMA flood insurance studies, storm water management plans, permit modification support, airport deicing studies, and TMDL evaluations.

Developing, implementing and supporting GIS data collection plans for modeling using both ArcView and MapInfo.

Previous Water Resources Engineering Experience

Buffalo Sewer Authority, Buffalo, NY (Fecal Coliform)

Member of senior modeling team developing the CSO LTCP model for the Buffalo Sewer Authority. Completed the day-to-day modeling tasks, in addition to providing project modeling team leadership; developing, calibrating, and validating BSA's collection system model using Runoff, Transport, and Extran Blocks of the XPSWMM and MS Access/ArcView database system. BSA's combined sewer system has 67 permitted CSOs in a 110 square mile service area providing service to 550,000 people. The model covers a large majority of the system's 258 sewer patrol points scattered throughout the 850 miles of pipe. Providing senior modeling support to the multi-consultant project team as they developed district-specific alternatives to meet state's fecal coliform standards.

City of Akron, OH (Fecal Coliform, Dissolved Oxygen)

Facilities Planning. Water Resources Engineer involved with the modeling component of the Akron 1998 Facilities Plan, a combined sewer system and receiving waters study. Job responsibilities included refinement of the collection system model, development and calibration the receiving water models, analysis of field monitoring data, development of linkage between MapInfo, XP-SWMM and USEPA WASP models, water quality assessment of existing conditions and determination of effects of various system-wide alternatives on Akron's watersheds to meet state's dissolved oxygen and fecal coliform standards. Using MapInfo as part of the Information Management Platform simplified management and presentation of system information and modeling data for the City of Akron, Ohio.

City of Fort Wayne, IN (Fecal Coliform, Dissolved Oxygen). Combined Sewer System and Receiving Waters Study. Engineer on project team involved in developing an XP-SWMM model of the collection system and database for the City of Fort Wayne CSO Project. The model uses Runoff and Extran blocks to simulate hydrology and hydraulics, respectively. Analysis of both single event and continuous stimulation scenarios of the City of Fort Wayne's system were completed. Job responsibilities included Inflow/Infiltration (I/I) model development, model development and calibration. Additional responsibilities included reviewing and updating GIS database with the existing interceptor model attributes from the record drawings, assisting with the development of the detailed sub basin models and linking the collection system model to the receiving water model to understand baseline conditions compared to the state's dissolved oxygen and fecal coliform standards.

City of Cleveland, OH Department of Port Control (Dissolved Oxygen). Environmental Consulting Services. Primary modeler for development, calibration and analysis of hydrologic, hydraulic and water quality models using XP-SWMM and USEPA WASP for the Cleveland Hopkins International Airport (CHIA). Analysis completed in 1999-2000 was required to support NPDES and EIS requirements and for development of an integrated Master Plan for controlling storm water quantity and quality impacts of the drainage-related components of Airport expansion to meet state's dissolved oxygen standards. Additional responsibilities include the development of the data collection plan, management of subcontractors completing flow monitoring, water quality data collection, dye testing, cross-section surveying, and verification of airport storm water drainage.

Airborne Express: Permit Reapplication - Storm Water Planning (Dissolved Oxygen). Primary modeler on a project team for a comprehensive study of storm water contamination caused by deicing chemicals. Job responsibilities included development and calibration of dynamic hydraulic and water quality models (XP-SWMM Runoff and Transport blocks and USEPA WASP). Models were used to:

- Characterize impacts of deicer discharges in storm water effected on two receiving streams
- Develop Best Management Practices for reduction of storm water contamination to meet state dissolved oxygen standards.
- Analyze storm water treatment alternatives

- Develop flow-based discharge permit limits for the constructed wetland treatment systems
- Use of Map Info enabled the project team to enhance modeling data management and presentation. Model was reviewed and accepted by Ohio EPA in 1999. In addition, this project was awarded the Grand Prize in the 2000 Consulting Engineers Council of Ohio Engineering Excellence Awards Competition.

City of Akron, OH. FEMA Flood Insurance Re-Study. Water Resources Engineer involved with the modeling component of a Flood Insurance Re-Study of two ditches tributary to the Cuyahoga River. Job responsibilities included converting the original HEC-2 FIS model to HEC-RAS, updating the model to reflect streambed modifications from as-built drawings, and establishing baseline conditions for various flow regimes.

Consortium of Wastewater Treatment Districts along the Upper Little Miami River, OH. Ohio-EPA TMDL Peer Review. Conducted peer review of Ohio-EPAs QUAL2E modeling approach and analysis used to develop the proposed TMDLs for the Little Miami River Watershed in Ohio.

City of Youngstown, OH. Completed a Peer Review of another consultants Collection System Modeling Approach.

City of Corry, NY. Collection System Modeling. Provided internal senior modeling review and support of collection system model development, calibration and analysis.

Northeast Ohio Regional Sewer District. Parma, OH Reservoir Rehabilitation. Collection of water quality samples under typical operating procedures.

City of Columbus, OH. Overall Engineering Contract – Three Rivers Modeling Task. Project team member responsible for developing year 2000-01 modeling scope of work for wet-weather receiving water modeling. Develop data collection plan. Provide modeling input on developing data analysis programs.

City of Akron, OH. Water Quality Data Collection. Assisted field crew with the maintenance and collection of in-stream water quality data for the 1998 Facilities Planning effort.

City of Cleveland, OH Department of Port Control. Storm Water Management at Cleveland Hopkins. Assisted with collection of shallow soil sample.

GIS Experience while employed at Malcolm Pirnie:

GIS Data Manager. Primary data manager for the Northeast Ohio Model Development Database. Duties included regular updating of ArcView or MapInfo files for use by all GIS and Modeling staff. Database maintenance included the development of directory trees and consistent file naming conventions between various projects.

GIS User Support. Primary GIS contact for the Northeast Ohio office's GIS and modeling users. Job responsibilities included installation and trouble-shooting of ArcView and related programs, and the training of new GIS users. Training incorporated orientation to the standardized file management practices and instruction in ArcView and related programs. Duties also included drafting technical instructions and tip sheets for GIS users.

Collection of Modeling Data. Developed various written standards for the collection of model building data in shape file format. Located, digitized, and populated shape files of collection system pipes, river centerlines, cross-section surveys, and water quality data collection sites.

Responsible for training support staff how to collect model building data to populate shape files in the field or in the office using ArcView, MapInfo, custom programmed mapping / database applications, and/or as-built drawings. Performing QA/QC routines on collected data. Calculated spatial statistics to support modeling analysis.

Report Support. Creating detailed maps for use in reports and proposals.

EDWARD MATTHIESEN, PE

Principal

Mr. Matthiesen has 30 years of extensive experience in water resources and environmental engineering. His water resources experience includes being the District Engineer for three Twin Cities area watershed districts and four Joint Powers Associations, writing municipal comprehensive stormwater plans, outlet structure and storm sewer design, conducting evaporation studies, aquifer analysis, water quality protection plans, developing computer hydrologic and hydraulic models, and design and construction of lift stations. He also has experience in biological sampling techniques, virus isolation in surface runoff, and chemical modeling of leachate.



EDUCATION

MBA, College of St. Thomas, St. Paul, Minnesota

MCE, University of Minnesota, Minneapolis, Minnesota

BA, Biology, Luther College, Decorah, Iowa

PROJECT EXPERIENCE

Stream Restoration and Stream Bank Stabilization

Haber Pasture, Ames, IA. Mr. Matthiesen was the lead designer for the restoration of a degraded creek on the north side of campus that had been used as horse pasture. The project also included storm water ponding and wetland creation to slow and filter water prior to entering the creek.

City of Fort Dodge, IA. Mr. Matthiesen provided senior oversight and construction observation for reconstruction of a massive slope failure on Soldier Creek. The slope failure was approximately 100 feet long and 75 feet high. Mr. Matthiesen provided oversight of design plans and offered expert insight during construction.

Dupont-Pioneer Seed, Johnston, IA. Mr. Matthiesen was the project manager for stabilization of over 2,000 feet of stream bank on the Dupont-Pioneer property. Using bioengineering techniques, Mr. Matthiesen oversaw the preparation of design plans, permitting, bidding, construction and stakeholder involvement for the project.

Lackawanna Watershed. Mr. Matthiesen was the Project Manager for the watershed assessment for the Lackawanna Watershed 2000 Program in northeastern Pennsylvania. This \$52 million program is working towards the restoration of 40 miles of river in an area of abandoned coal mines and numerous sanitary sewer discharges towards cold and warm water fisheries habitat. Mr. Matthiesen was responsible for data collection according to EPA standards, GIS coordination, site-specific design, and coal bank restoration.

Shingle Creek and West Mississippi Watershed Districts. Mr. Matthiesen is serving as Engineer for the Shingle Creek and West Mississippi Watershed Management Commissions. In this role he is providing stream restoration design

AREAS OF EXPERTISE

Water Resources Planning
Hydraulics
Hydrology

MEMBERSHIPS

Water Pollution Control
Federation
American Public Works
Association
Society of American
Military Engineers

REGISTRATION

Professional Engineer: MN,
WI

to Hennepin County for a reach between Noble Ave and Brookdale Park and a second reach near Brooklyn Center City Hall. An earlier project prepared a corridor plan for the entire length of Shingle Creek using GIS and field reconnaissance to complete a concept of what the creek could become.

Lower Minnesota River Watershed District. Mr. Matthiesen is the senior reviewer for the stabilization of a 50 ft escarpment along 1200ft of the Minnesota River in Eden Prairie. The work involves the preparation of a HEC-RAS model to predict erosive flow forces, the installation of two inclinometers and selecting methods for temporary and permanent bank protection.

Minnehaha Creek Watershed District. Mr. Matthiesen served as the Senior Review Engineer for the design and construction of a detention pond as part of the Minnehaha Creek Watershed District's Gleason Lake Improvement Project. This project improved the water quality discharging into Gleason Lake. The project involved pond excavation, outlet construction, bank protection, channel cleanout, and modeling of flood elevation changes. Mr. Matthiesen also designed and installed stream bank monitoring on Minnehaha Creek near the falls.

Brown's Creek Watershed Management Organization. Mr. Matthiesen was the Watershed Engineer for the Brown's Creek Watershed Management Organization. Associated work included an outlet feasibility study for School Section Lake and inspection of flooding at numerous landlocked basins. This work has involved determining an assessment area, writing a feasibility study, and performing an impact analysis. The proposed project involved draining a landlocked lake into a natural stream channel. Issues of concern with the stream channel are maintaining trout habitat, wetland impacts, and downstream flood elevations. The feasibility study and adverse impact study utilized XP-SWMM and HydroCAD modeling.

City of Eau Claire, Wisconsin. Mr. Matthiesen provided channel design alternatives for a trout stream that was receiving high temperature and high velocity runoff from a car dealership parking lot. Mr. Matthiesen coordinated the design team which provided bank protection and water temperature controls by enhancing groundwater infiltration through a series of detention and infiltration ponds.

City of Davenport, Iowa. Mr. Matthiesen was the Project Manager for the City of Davenport, Iowa's Comprehensive Stormwater Management Plan for three creek systems within the City of Davenport. The plan corrects existing flooding problems with stream improvements, individual building protection and city-constructed detention reservoirs. Future flooding problems are prevented by requiring on-site rate control in selected subwatersheds, a stream monitoring program, and construction of additional city-controlled reservoirs.

Coon Creek Watershed District. Mr. Matthiesen has been the District Engineer for the Coon Creek Watershed District for the past 20 years. As part of his District Engineer's responsibilities, Mr. Matthiesen has prepared plans and specifications for the repair and improvement of Sand Creek and Coon Creek. These repairs have included such materials as cable concrete, riprap, vegetation enhancement, gabions, and grouted riprap. He assisted the District in developing the stream bank program that constructs \$50,000 worth of stabilization projects per year using a cost-effective construction procurement.

Prior Lake-Spring Lake Watershed District. Mr. Matthiesen is the District Engineer for the Prior Lake-Spring Lake Watershed District in Scott County, Minnesota. He is currently working with the District on the seven-mile Outlet Channel Improvement Project incorporating bioengineering processes. To date three of eight channel segments have been constructed. Two of the segments received BWSR or PCA funding for construction.

Pike Creek, City of Maple Grove, Minnesota. Mr. Matthiesen was the Project Manager for the Pike Creek Channel Restoration Project in Maple Grove. This quarter mile long project incorporates numerous bioengineering techniques. Mr. Matthiesen was responsible for the channel design using XP-SWMM and the structural integrity of the channel.

Hardwood Creek, Rice Creek Watershed District, Minnesota. Mr. Matthiesen was the Project Manager for the Hardwood Creek/JD-2 Bank Stabilization Project. This project used a design delivery method of doing site field work and design on location and staking the project for the contractor and paying off unit prices that were bid by quotes.

Shingle Creek, Brooklyn Park, Minnesota. Mr. Matthiesen was the Project Manager for the Shingle Creek Phase 1 Stream Restoration Project between Brooklyn Blvd and Hampshire Ave. This project used bioengineering techniques for the stabilization and narrowing of ¼ mile of creek. He is also the Project Manager for Phase 2 between Hampshire Ave. and Candlewood Ave. that will use native material to narrow and stabilize the channel.

Chanhassen, Minnesota. Mr. Matthiesen is the senior designer for the stabilization of Ravine #2 that discharges to the Minnesota River. The concept stage has been completed and proposes using native material for stream stabilization.

Middle St. Croix Watershed, Afton, Minnesota. Mr. Matthiesen is the Project Manager for the Afton Gully Stabilization Project. This project uses rock vanes and native vegetation for the stabilization of 1500ft of channel.

Eden Prairie, Minnesota. Mr. Matthiesen is the Project Manager for the stream stabilization monitoring program on Riley Creek. This project used the Rosgen methodology for stream assessment and installed stream pins and channel chains to monitor steam movement.

Glen Creek, Anoka Conservation District, Fridley, Minnesota. Mr. Matthiesen is the Project Manager for specific stabilization designs and a corridor restoration plan for this ¼ mile deeply incised channel. Techniques range from cedar revetments to grid slope stabilization.

Bois Forte Indian Tribe, Tower, Minnesota. Mr. Matthiesen is the Project Manager for the Nett River channel restoration. This project will re-meander four miles of channel straightened in a 1986 project. The project also includes the construction of a fish passage structure to overcome the 6 ft head difference at the outlet control structure.

Deep Creek Ranch, Choteau, Montana. Mr. Matthiesen was the project engineer for a trout habitat improvement project that included bank stabilization, increased water yield, habitat structures and a higher permanent pool for a lake adjacent to a fishing lodge.

Lambert Creek, Vadnais Lake Area Water Management Organization, Vadnais Heights, Minnesota. Mr. Matthiesen is the lead designer for the innovative approach in using only hand labor and on-site found trees to provide grade control and bank stabilization for 1,660LF of urban channel restoration.

Blackhawk Creek and Duck Creek, Davenport, Iowa. Mr. Matthiesen is the Project Engineer and lead designer in the bank stabilization master planning and site design for 16 miles of channel in a mix of urban and agricultural land uses.

Hay Creek, Winona, Minnesota. Mr. Matthiesen was the lead designer for a design-build trout habit improvement on 7,000 ft of channel in southeast Minnesota for Trout Unlimited. The design was completed as a joint on-site exercise between the Minnesota Department of Natural Resources, Trout Unlimited, Standard Contracting and Wenck. The work resulted in a three-month period from design to completed construction. The management focused on using on-site tree material to the greatest extent possible.

Spring Creek, New Ulm, Minnesota. Mr. Matthiesen is the lead designer of trout habitat improvement and bank stabilization for 11,000 ft of channel in a totally farmed watershed within the Minnesota River basin. Design concepts have been formulated to assist with grant applications.

Clearwater River, Annandale, Minnesota. Mr. Matthiesen is the Project Manager and designer for the stabilization of several thousand feet of the Clearwater River using Minnesota Conservation Corps crews and on-site woody material.

Minneapolis Avenue gully, Minnetrista, Minnesota. Mr. Matthiesen is the Project Engineer for the stabilization of 370 ft of eroded channel for the Minnehaha Creek Watershed District. The work is coordinated between the Minnetrista Public Works Department and the Watershed District and the Minnesota Conservation Corps. As much of the repair of this five percent (5%) sloped channel will be done with found on-site trees and brush supplemented

with rock structures supplied and installed by Public Works.

St. Croix River Gully Repair, St. Croix State Park, Minnesota. Mr. Matthiesen is the senior reviewer for the repair of this 20' deep gully in the Department of Natural Resources State Park. The work entails volume management activities and bank stabilization.

Lake Minnetonka Shoreline Restoration, Minnesota. Mr. Matthiesen is the senior engineering designer for the Minnehaha Creek Watershed Districts bioengineering demonstration and outreach program. The program so far has designed alternative shoreline restoration practices for sites in Tonka Bay, Orono, Mound and Excelsior. The work stresses native vegetation supplemented with physical restoration practices where needed.

Silver Lake Shoreline Restoration, Rochester, Minnesota. Mr. Matthiesen was the Project Engineer for the restoration of 7,500 feet of a previously bare, turf or concrete pillow shoreline. The project put pilot holes through concrete pillows and inserted live stakes and a native buffer was planted to filter polluted water.

Connections at Shingle Creek, Master Plan, Brooklyn Park, Minnesota. Mr. Matthiesen was the Project Engineer for the restoration of Shingle Creek for several thousand feet near Noble Avenue. The restoration incorporated native plantings and natural physical stabilization structures while connecting this residential and commercial area to the creek.

Shingle Creek Restoration between Highway 694 and Bass Lake Road, Brooklyn Center, Minnesota. Mr. Matthiesen is the senior engineering designer for restoration of 3,500 feet of channel incorporating native plant buffer and reusing harvested salvageable trees to provide in-stream habitat. The work is also being coordinated with Great River Greening to enlist the help of volunteers to install native buffer plants.

Plymouth Creek, Plymouth, Minnesota. Mr. Matthiesen is the senior engineering designer for repair of 2,500 feet of highly degraded channel in a mixed residential and industrial area that discharges into a wetland and then into Medicine Lake. One of the project goals is to lessen the significant sediment load leaving the eroded channel banks.

Turtle Creek Bank Stabilization, Redfield, South Dakota. Mr. Matthiesen is the senior reviewer for the stabilization of 600 feet of this 30 ft high failing embankment. The project will install toe protection and slope revegetation.

Unnamed Creek, Iowa State University, Ames Iowa. Mr. Matthiesen was the lead designer for the restoration of a degraded creek on the north side of campus that had been used as horse pasture. The project also included storm water ponding and wetland creation to slow and filter water prior to entering the creek.

Big Creek, Curlew Valley, Almont, North Dakota. Mr. Matthiesen is the lead designer for two bank stabilization projects using bioengineering practices for the North Dakota Forest Service in Morton County. The work will include using as much woody debris as possible for toe protection and live stakes for near bank stabilization. Due to the arid conditions and lack of available compost or top soil in western North Dakota native plants will be used as the primary vegetation material to withstand dry conditions.

Applewood Road Gully Stabilization, Shorewood, Minnesota. Mr. Matthiesen is the Project Manager for the stabilization of 550 ft of channel that lies between a city road and residential properties. The design consists of tree thinning with the Minnesota Conservation Corps and directing a city-supplied contractor for toe and grade protection. The MCC work harvested on-site trees and fashioned them into brush bundles to arrest slope flow.

Minnehaha Creek Shoreline Enhancement, Minnehaha Creek Watershed District, Deephaven, Minnesota. Mr. Matthiesen is the lead engineer for the buffer vegetation improvement project for Reach 14 in Edina, Minnesota upstream of France Avenue. The project is establishing a native plant buffer on 20 properties and installing in-stream habitat.

Hurst Woods Gully Stabilization, Rockford, Minnesota. Mr. Matthiesen is the Project Manager for the stabilization of 600 ft of eroding channel in a residential area that discharges to the Crow River. The work involves

tree thinning, boulder and rock toe installation and grade control.

Shorewood Lane Channel Stabilization, Shorewood, Minnesota. Mr. Matthiesen is the Project Manager for stabilizing 800 ft of an eroding residential channel that discharges into a wetland. The work has been to develop concept plans and cost estimates and assist the City and Minnehaha Creek Watershed District in preparing grant application.

Cedar Lake Farms Wetland Construction, Scott County, Minnesota. Mr. Matthiesen is the Project Manager for the construction of a 0.6-acre wetland near New Prague, Minnesota.

Woods Creek, Plymouth, Minnesota. Mr. Matthiesen was the senior designer and review engineer for 2,000 ft of channel in eastern Plymouth that flows to Medicine Lake. The work incorporated bioengineering practices into the channel and floodplain areas.

Woodcrest Creek, Coon Rapids, Minnesota. Mr. Matthiesen was the Project Manager for the stabilization of 900 ft of channel adjacent to two baseball fields in the Coon Creek Watershed District. The project used vegetated riprap and rock grade control structures.

Unnamed Creek, Pioneer Seed Corporation, Johnston City, Iowa. Mr. Matthiesen is the Project Manager for the stabilization of a creek going through the original Pioneer Seed fields. The channel is degrading due to the watershed changing from an agricultural to urban landscape without runoff management controls. The work is to provide a robust low maintenance channel.

Rum River Bank Stabilization, Sherburne County, Minnesota. Mr. Matthiesen was the Project Manager for a river bank stabilization on a residential property for the Sherburne County Soil and Water Conservation Service. The project used cedar tree revetments and stream barbs.

Rum River Bank Stabilization, Isanti County, Minnesota. Mr. Matthiesen is the Project Manager for the stabilization of 1,100 ft of channel on a farm near Cambridge, Minnesota for Great River Greening. The project will use native plantings, cedar tree revetments and rock stream barbs.

Levee and Dam Construction

Hayward Wisconsin Public Utilities Dam. Mr. Matthiesen was the on-site inspector for the concrete spillway reconstruction. He was responsible for plan interpretation, verifying concrete material quality and installation. The work was completed in winter under low flow conditions so rigorous thermal protection was required for the concrete curing.

Amex Earthen Dam, Salem Missouri. Mr. Matthiesen was responsible for soil borings and material evaluation for an earth lift on this tailings dam in the Ozarks. The work was accomplished in winter to correspond to low runoff conditions in the contributing watershed.

Hibbing Taconite, Earthen Dam Lifts, Hibbing, Minnesota. Mr. Matthiesen was the resident engineer for the construction of 4 ft lifts on 2,000 ft of earthen tailings dams in northern Minnesota. He was responsible for finding and accepting clay, sand and rip rap material at several concurrent construction sites. He assembled a soils laboratory and performed all in situ measurements to verify construction.

Prior Lake-Spring Lake Watershed District, Rock Spillway Dam Overlay. Mr. Matthiesen was the Project Manager for the seven-mile Outlet Channel Improvement Project incorporating bioengineering processes. One component of this work is the replacement of a dual culvert 14 ft head dam outlet into a rock spillway. He is also the Project Manager for the XP-SWMM Lake Calibration Project. He was the designer for the Highway 13 Wetland Outlet Control Structure and designed numerous small improvement projects, including fish barrier structures and floatable control removal projects.

Watershed Engineering and Planning

Prior Lake-Spring Lake Watershed District. Spring Lake Improvement Project. Mr. Matthiesen as District Engineer for the Prior Lake-Spring Lake Watershed District in Scott County, Minnesota was responsible for the overall feasibility study, preliminary design, final design and construction of all of the components including wetland and sedimentation basin design and construction, ferric chloride building and injection design and construction, carp barrier design and construction, operational start up, property owner negotiations and permitting.

Coon Creek Watershed District. Mr. Matthiesen has been the District Engineer for the Coon Creek Watershed District for the past 20 years. During that time, he has evaluated lake chemical treatment projects, written the District's water management plan, managed the regulatory program, designed numerous ditch repair projects, wetland outlet projects, initiated a lake and stream monitoring program, and conducted several TR-20, HEC-1, HEC-2, and XP-SWMM analyses to eliminate flooding and aid in the formulation of the management plan. As part of his District Engineer's responsibilities, Mr. Matthiesen has prepared plans and specifications for the repair and improvement of Sand Creek and Coon Creek.

Shingle Creek and West Mississippi Watershed Commissions. Engineer for the Shingle Creek and West Mississippi Watershed Management Commissions. In this role, he is assisting the Commission with implementation of a comprehensive stormwater management plan. The Commissions have an active water quality management program that assesses the chemical and biological status of the stream systems and lakes. Mr. Matthiesen is active in grant writing and coordination and implementation of projects with member communities. He was Project Manager for the Second Generation Plan and technical advisor to the Chloride TMDL.

Vermillion River Watershed Management Commission. Watershed Engineer for the Vermillion River Watershed Management Commission. He assisted in floodplain management and was the Project Manager for the preparation of the Second Generation Comprehensive Surface Water Management Plan.

Dakota County, Minnesota. Project Manager for the Dakota County Volume Study. This work involves building a calibrated HEC-HMS model. This model was calibrated and then options were run to determine what management strategies could be used to control volume into the Vermillion River.

U.S. Army Corps of Engineers, Hanford Nuclear Facility, Washington. Project Engineer for a management plan to wash trucks carrying nuclear waste. The work included HydroCAD modeling and recommendations of Best Management Practices and design of a wash and storm water collection pond.

Shreveport, Louisiana Water Utility. Project Manager for the City of Shreveport, Louisiana's Cross Lake Comprehensive Watershed Management Plan. Cross Lake is the city's water reservoir and collects surface runoff from a 400 square mile watershed in Texas and Louisiana. The plan elements addressed catastrophic toxic spill and nutrient reduction from nonpoint sources, data analysis, and development of a bayou monitoring program.

Groton, Connecticut Water Utility. Project Engineer for the 60 square mile watershed protection plan for the City of Groton, Connecticut's only reliable source of water. This work involves evaluating and prioritizing pollution potentials, developing Best Management Practices, and establishing a schedule for implementation.

City of Eau Claire, Wisconsin. Project Manager for the City of Eau Claire, Wisconsin's Comprehensive Stormwater Management Plan. This plan provided a framework to correct present flooding problems and to ensure that future flooding problems did not occur. The plan also included design standards, capital improvement projects, investigation of alternative financing, and a maintenance program. A part of the project included controlling a high temperature, high velocity flow into a trout stream. Mr. Matthiesen coordinated the design team which provided bank protection and water temperature controls by enhancing groundwater infiltration through a series of detention and infiltration ponds.

Mobile Area Water and Sewer System, Alabama. Project Engineer for the development of the surface water protection plan for the City of Mobile, Alabama. The first phase of the project was an assessment of potential pollutant sources and their impact on the surface water quality. The second phase is the plan for recommended management practices including proposed legislation to allow for land zoning authority for the watershed outside of the municipal boundary.

CALTRANS BMP Retrofit Program, Los Angeles, California. Mr. Matthiesen was a design engineer and Quality Control reviewer for the California Department of Transportation's BMP Retrofit Pilot Program. This project included infiltration basin, sump catchbasin, and infiltration trench design on the existing freeway system in Los Angeles. The work also included design of a monitoring collection system at each site to evaluate the effectiveness of each BMP.

General Mills Stormwater Pollution Prevention Plans. Mr. Matthiesen served as the Project Manager for the preparation of stormwater pollution prevention plans according to the requirements of the Clean Water Act for all General Mills, Inc., facilities. The project involved evaluating NPDES requirements at 43 sites nationwide, conducting site inspections at 13 locations, and preparing stormwater management, monitoring, and training plans.

Mare Island Naval Shipyard Stormwater Management Plan, Vallejo, California. Mr. Matthiesen served as a Project Engineer for the preparation of the stormwater management plan for the U.S. Navy Mare Island Naval Shipyard nuclear submarine base located in San Pablo Bay, San Francisco. The work involved site inspection, hydrologic analysis, and recommended practices of stormwater treatment and hazardous materials transport and storage.

Gwinnett County, Georgia. Mr. Matthiesen assisted the sanitary sewer district in the preparation and education program of for water quality protection plants for each of their wastewater treatment plants in this outlying Atlanta region.

Homestead Air Force Base, Florida. Mr. Matthiesen was a design engineer for the feasibility study of minimizing salt water intrusion into the base and controlling storm water flows for water quality into Biscayne Bay.

City of New Orleans Sewer and Water Board, Louisiana. Mr. Matthiesen was the project manager in the preparation of QUAL2E and CORMIX models to analyze overflows and bypasses to the Mississippi River from New Orleans wastewater treatment plants to address a court ordered restoration effort.

Olympic Park, Atlanta Georgia. Mr. Matthiesen was the design engineer for the stormwater management plan for the tennis facility for the Atlanta Olympics.

City of San Francisco, California. Mr. Matthiesen assisted the project team in investigating methods to lessen the watershed delivery of giardia and cryptosporidium into the city owned surface water reservoir. The immune-suppressed population was at risk from water borne diseases and disinfection methods to kill these parasites resulted in undesirable disinfection byproducts.

City of Newton New Jersey. Mr. Matthiesen served as the Project Engineer for the 10 square mile watershed protection plan for the Morris Lake Watershed Protection Plan for the City of Newton, New Jersey. Morris Lake is the city's only water source. This work involved evaluating and prioritizing pollution potentials, developing Best Management Practices, and establishing a schedule for implementation.

Subwatershed Assessments in Blaine, Coon Rapids, Fridley, Robbinsdale, Champlin and Eden Prairie, Minnesota. Mr. Matthiesen has and is providing senior review and engineering for BMP subwatershed assessments in many communities to install storm water quality treatment in areas that were built-out prior to current rules requiring pollutant reductions.

North Loop BMP Stormwater Assessment, Minneapolis, Minnesota. Mr. Matthiesen is providing storm water engineering to Great River Greening in attempting to establish a new park with water quality features in the heart of the Minneapolis Warehouse District.

Project Design and Management

Murphy Warehouse, City of Minneapolis. Project Engineer responsible for evaluating BMPs in the stormwater system retrofit of this almost 100% impervious area. The goal of the project is to reduce the stormwater utility fee and improve the quality of runoff from the site.

Minnehaha Creek Watershed District. Senior Review Engineer for the design and construction of a BMPs for the Gleason Lake Improvement Project and City of Mound Innovative BMP project.

City of Bloomington, Minnesota. Project Manager and Designer for the City of Bloomington's Floatable Control

Removal Project. This project was constructed to remove trash from runoff from the Mall of America that discharged into the Minnesota Valley Wildlife Recreation Area. In this work he analyzed several manufactured floatable control treatment devices and, based on cost, developed his own device in coordination with city public works staff.

City of Maple Grove, Minnesota. Project Manager for the Pike Creek Channel Restoration Project in Maple Grove. This quarter mile long project incorporates numerous bioengineering techniques.

Rice Creek Watershed District, Minnesota. Project Manager for the Hardwood Creek/JD-2 Bank Stabilization Project. This project used a design delivery method of doing site field work and design on location and staking the project for the contractor and paying off unit prices that were bid by quotes.

California Department of Transportation, Los Angeles District. Design Engineer and Quality Control reviewer for the California Department of Transportation's BMP Retrofit Pilot Program. This project included infiltration basin, sump catchbasin, and infiltration trench design on the existing freeway system in Los Angeles. The work also included design of a monitoring collection system at each site to evaluate the effectiveness of each BMP.

Central Corridor Light Rail Project, Capitol Region Watershed District, St. Paul, Minnesota. Mr. Matthiesen led the design for the development of the underpavement tree planters. This led to incorporating this approach through the entire rail length between Minneapolis and Downtown St. Paul on both side of University Avenue.

Porous Asphalt Paired Intersection Study, Shingle Creek Watershed Management Commission, Robbinsdale, Minnesota. Mr. Matthiesen is the Project Manager for this EPA funded research project to assess the suitability and performance of pervious pavement to lessen the need for road salt and improvements in water quality.

Green Roof Do-It-Yourself Tray Development, Shingle Creek Watershed Commission. Mr. Matthiesen is the Project Manager for the development of a green roof tray system to be used on existing buildings without the need for additional structural reinforcement nor long term supplementary irrigation. This is an EPA funded research project administered by the PCA.

Central Corridor Light Rail Project Transit Oriented Design, St. Paul, Minnesota. Mr. Matthiesen is providing stormwater BMP design for a shared stacked design planning effort to encourage multiple beneficial uses for combined stormwater practices for redeveloping property along the Central Corridor between Target Field in Minneapolis through downtown St. Paul.

Williams St. Pond, Capital Region Watershed District, St. Paul, Minnesota. Mr. Matthiesen provided design assistance to clean out an existing pond and install a SAFHL baffle and iron enhanced sand filter in Roseville, Minnesota.

Mitchell Village and Boulder Pointe Pond Repairs, Eden Prairie, Minnesota. Mr. Matthiesen is the Project Manager for the pond cleanout and expansion of two stormwater ponds in the Riley Creek watershed.

Xeon Pond, Coon Creek Watershed District, Blaine, Minnesota. Mr. Matthiesen was the Project Manager for the design and construction of a new pond in the Sand Creek watershed in Coon Rapids, Minnesota. The project incorporated a SAFHL baffle screen in a new inlet and a sand filter at the outlet.

Sauk River Watershed District, St. Cloud, Minnesota. Mr. Matthiesen is providing senior review for the repair of County Ditches 15 and 26. He developed the original as-built profile and is assisting in the bid document preparation.

Presentations

Matthiesen, E.A., and MacDonagh, L.P. "Hardwood Creek Expedited Construction Procurement," presented at the River Restoration Centre annual conference in Exeter, England, April 2008.

Matthiesen, E.A., and MacDonagh, L.P. "Pike Creek, A Stream with No Name," presented at the River Restoration Centre annual conference in Exeter, England, April 2008.

Matthiesen, E.A., "Cross Lake: Watershed Issues in North Louisiana," February 22, 1997, presented at Louisiana Environment '97: Tulane Law School, New Orleans, Louisiana.

Matthiesen, E.A., "Wet Detention/Retention Pond Design," presented at a joint Minnesota-Wisconsin conference, "Improving Stormwater Quality," April 25, 1995, Phipps Center, Hudson, Wisconsin.

Matthiesen, E.A., Spector, D. "Development of a City-wide Stream Restoration and Stormwater Plan", presented at the North Dakota Water and Pollution Control Conference, October 2010.

Matthiesen, E.A. "Stormwater Management Using Wet and Dry Detention Facilities", presented at Half Moon Seminars, Fargo, North Dakota, November 2010.

Matthiesen, E.A., "Introduction to Civil Engineering", MME 101 class, "Introduction to the Engineering Profession", lecture at St. Cloud State University, St. Cloud, Minnesota, October 2010 and October 2012.

Matthiesen, E.A., Spector, D., McCoy, R., "Robbinsdale's Porous Asphalt Residential Street to Reduce Deicing Salt", presented at the University of Minnesota's Water Resources Conference, St. Paul, Minnesota, October 2010.

Matthiesen, E.A., Spector, D., "Porous Pavement Paired Intersection Study", presented at the 54th Annual Asphalt Contractors Workshop/MN Quality Initiative Workshop, Brooklyn Center, Minnesota, March 2010.

Matthiesen, E.A., Spector, D., "The Effectiveness of Various Stream Restoration Techniques on Restoring Biological Integrity", presented at the University of Minnesota's Water Resources Conference, St. Paul, Minnesota, October 2008.

Matthiesen, E.A., Spector, D., "Shingle Creek Update", presented at the 5th Annual Road Salt Symposium, St. Cloud, Minnesota, April 2006.

Matthiesen, E.A., Shoemaker, T.E., "City of Eden Prairie, Minnesota Pond Inventory and Maintenance Assessment", to be presented at the Georgia Water Resources Conference, Athens, Georgia, April 2011.

Matthiesen, E.A., Spector, D., "A Stream Restoration Plan for the City of Davenport, Iowa", presented at the Georgia Water Resources Conference, Athens, Georgia, April 2011.

Matthiesen, E.A., "Mollusk Stream Habitat Restoration Details", to be presented at the 23rd Annual Rivers and Streams Technical Committee meeting, North Central Division-American Fisheries Society, Milan, Illinois, March 2011.

Matthiesen, E.A., "Bioengineering Design and Construction Methods", presented at the joint NRCS and North Dakota Forest Service Riparian Restoration Technical Training Class, Bismarck, North Dakota, October 2011.

Matthiesen, E.A., "Robbinsdale Porous Pavement Stormwater Experience" presented at the 5th Annual Low Impact Development Workshop, Dubuque, Iowa, February 2012

Matthiesen, E.A., Jensen, K, "Lambert Creek Stream Restoration by Hand Labor Methods", presented at the Upper Midwest Stream Restoration Symposium, Minneapolis, Minnesota, March 2012.

CHRISTINE MAYO

Environmental Scientist

Ms. Mayo is an environmental scientist with 14 years of consulting experience focusing on environmental compliance, Phase I ESA due diligence, ISO:9001 auditing, industrial hygiene, and soil and groundwater remediation. Ms. Mayo has experience with various areas of environmental compliance including storm water, pollution prevention programs, and spill prevention, control, and countermeasures (SPCC) plan development. She has participated in all aspects of Phase I ESA report research, inspections and report generation at various sites throughout the country. With regards to ISO:9001, she was the internal representative for an ISO:9001 certified office for seven years, and participated in two external audits by SGS. Each audit was extremely well-received and no non-conformances were found. Responsibilities for industrial hygiene and soil/groundwater remediation have included OSHA required personal air sampling and monitoring, water intrusion inspection, asbestos sampling (industrial, manufacturing, residential, commercial), and groundwater, surface water and soil sampling.



EDUCATION

BS, Chemistry, Georgia Southern University

PROFESSIONAL MEMBERSHIPS

Indoor Air Quality Association (IAQA)

PROJECT EXPERIENCE

Environmental Permitting, Planning, and Compliance

PPG Aerospace, SPCC, SWPPP, and State Discharge Permit, Huntsville, Alabama. Project scientist for revision of compliance plans and wastewater indirect discharge at aerospace transparencies facility. Project addressed corporate-specific requirements while incorporating facility changes.

Tandus Flooring, Environmental Compliance Program Support, Georgia. Project scientist for environmental management program support including air permit auditing, asbestos-containing materials removal oversight, SPCC and SWPPP updates, and UST removal documentation at flooring manufacturing facilities.

Recreational Vehicle Manufacturer, SPCC, SWPPP, and State Discharge Permit, Huntsville, Alabama. Project scientist for development of compliance plans and wastewater indirect discharge at new manufacturing facility. Project addressed corporate-specific requirements while incorporating facility changes as construction of the facility progressed.

Aircraft Service International Group, Station SPCCs and SWPPPs, Nationwide. Project scientist for assessment of current spill program and resulting revisions of SPCC plan at stations across the nation. Project included updates and development of new SPCC plans and SWPPPs at airports nationwide. A new template was implemented to incorporate corporate policies and provide for more cost-efficient revisions associated with frequent operational changes.

AREAS OF EXPERTISE

ISO 9001:2008 Auditing
Phase I ESA Due Diligence
Inspections
Industrial Hygiene
Soil and Groundwater
Remediation

HEALTH & SAFETY TRAINING

HAZWOPER 40-Hour
HAZWOPER Refresher
8-Hour
Hazard Communication
(US)
Defensive Driving
Awareness Training
Loss Prevention Systems
(LPS)
Medical Monitoring

CERTIFICATIONS

EPA Model Accreditation
Asbestos in Buildings:
Inspection and
Assessment, 2005
Asbestos in Buildings:
Inspector Refresher, 2006
– 2013
Asbestos in Buildings: Air
Sampling and Analysis
(NIOSH 582 Equivalent),
2009

Delta Air Lines, SPCC Plans and SWPPPs, Nationwide. Project scientist for assessment of current spill program and storm water program for stations. Project included updates and development of new Delta SPCC plans and SWPPPs at corporate locations and airports nationwide. A new template was implemented to incorporate corporate policies and provide for more cost-efficient revisions associated with frequent operational changes.

E.R. Snell, Asphalt Plant SPCC and SWPPP Development, Georgia. Project scientist for SPCC and SWPPP updates at several asphalt plant locations across Georgia.

Decostar Industries, Inc., Waste Management and Compliance Support, Carrollton, Georgia. Project Coordination and oversight of weekly hazardous waste disposal and manifesting. Prepared Annual Hazardous Waste Tracking Fees and report for submittal to regulatory agencies. Assisted with preparation of Toxic Release Inventory (TRI) report for Decostar's Carrollton manufacturing facility.

Environmental Compliance Auditing

Hazardous Waste Facility, RCRA Ambient Air Monitoring Program, Kings County, California. Project scientist responsible for auditing the ambient air monitoring program required by the facility Resource Conservation and Recovery Act (RCRA) Part B permit issued by the California District of Toxic Substances and Control (DTSC). Program involves ambient air monitoring at three fixed and one mobile station near the facility property boundary. Methods include: Aldehydes by TO-11, VOCs by TO-14, Pesticides and PCBs by TO-4, Metals and PM10 by EPA method 40 CFR 50, Appendix J. 24-hr integrated samples are collected every 12 days and a human health risk assessment completed after one year of monitoring data is collected.

Hunton and Williams, Environmental Compliance Audit Program, Nationwide. Co-auditor for ten food manufacturing facilities. The primary objectives of the audit were to assess compliance with federal, state, and local environmental rules/regulations in addition to facility-specific permit conditions. Alignment with corporate requirements was also addressed at each location.

Due Diligence and Real Estate Development Services

Client Confidential, Phase I Environmental Site Assessment, Lincoln, Alabama. Project Assessor for Phase I Environmental Site Assessment (ESA) for large commercial property under sales transaction. Provided assessment of business risk and estimated costs for corrective action when needed.

Client Confidential, Phase I Environmental Site Assessments, Nationwide. Project Assessor for Phase I ESAs for over 50 commercial automotive properties across the US for a Fortune 100 Company. Provided assessment of business risk and estimated costs for corrective action when needed.

Client Confidential, Phase I Environmental Site Assessments, Southeast US. Project Assessor for Phase I ESAs for over 30 residential properties across the southeastern US for a national real estate firm. Provided assessment of business risk and estimated costs for corrective action when needed.

Nationwide Environmental Claims Unit (ECU), Environmental Support, Nationwide. Project Manager for environmental support of Nationwide's corporate environmental claims unit, with respect to all claims of Chinese-manufactured drywall installations. This support included sampling of suspect materials, documentation of material locations for residential properties, and analysis of results.

Site Assessment and Remediation

United States Department of the Army, Fort Gillem Vapor Intrusion Study, Forest Park, Georgia. Field Team Leader for a vapor intrusion study to evaluate if residential and commercial structures surrounding the installation have been impacted by the volatile organic compound (VOC) groundwater plumes related to FTG-01, FTG-07/10, and FTG-09. Responsible for the collection and evaluation of groundwater, soil gas, sub-slab, crawl space, indoor and outdoor air samples at over 100 residential structures. Assisted with data evaluation and reporting for the Army to U.S. Environmental Protection Agency (U.S. EPA) and Georgia Environmental Protection Division (EPD). Assisted with

communicating results, risk assessment and evaluation of the vapor intrusion pathway to the BRAC Environmental Manager, U.S. Army Corps of Engineers, Savannah District Project Manager, BRAC Headquarters personnel, EPD, U.S. EPA, and the study residents.

Former Dry Cleaner Site, Duluth Georgia. Project scientist for a former dry cleaner site located in downtown Duluth. Assisted with entering the site into the Voluntary Remediation Program and oversight of off-site delineation, data evaluation and reporting to EPD.

Client Confidential (PRP Group), Soil and Groundwater Remediation, South Carolina. Provided assistance in soil and groundwater contamination delineation, and follow-up on remedial actions including landfill cap installation and monitoring natural attenuation activities within an NPL Superfund site.

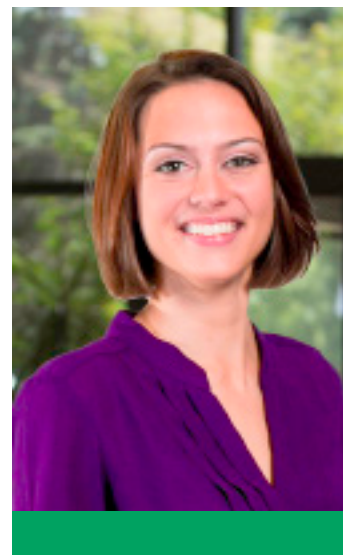
Client Confidential, Voluntary Remediation Program (VRP) Soil Remediation, Georgia. Assisted investigation and removal of PAH-contaminated soil at a residential community in GA. Work was conducted under the VRP which included employee interviews, soil borings, soil excavation and removal, and a groundwater investigation.

Various Clients, Groundwater Remediation, Southeast US. Project coordination for sodium lactate injections for remediation of chlorinated volatile organic compounds (CVOCs) in groundwater at various sites across the Southeast US. Activities included coordination of vendors, contractors, regulatory agencies, and site tenants.

LIBBIE MCCULLEN

Environmental Scientist

Ms. McCullen is an environmental scientist with experience on diverse projects including assisting and conducting soil and groundwater investigations; providing key project support including direct communication with community members, development of educational materials, compilation of data, and report preparation; calculating and compiling data spreadsheets for Emergency Planning and Community Right-to-Know Act (EPCRA) reports and air emission inventories; and assisting with updates to and the preparation, compilation, and distribution of various environmental compliance plans and reports, including Spill Prevention, Control, and Countermeasure (SPCC) plans, Storm Water Pollution Prevention Plans (SWPPP), and Air Monitoring Reports. She has worked with both public and private industry. Responsibilities for soil and groundwater investigations have included OSHA required personal air sampling and monitoring; monitoring well construction oversight; construction excavation observation; and groundwater, surface water, soil vapor, and soil sampling.



AREAS OF EXPERTISE

Soil and Groundwater Investigation

EDUCATION

BS, Chemistry, Southern Polytechnic State University

PROJECT EXPERIENCE

James-Bates-Brannan-Groover-LLP, UST Releases, Atlanta, GA. Supporting automotive dealerships with underground storage tank (UST) closures. Responsibilities include locating soil borings, directing drilling sub-contractors, soil and groundwater sampling, slug testing, surveying, coordinating with the analytical laboratory, comparing results to screening criteria. Assisted with the preparation of proposals, a UST Closure Report, and a Corrective Action Plan (CAP)-Part A Report.

United States Department of the Army, Fort Gillem, Vapor Intrusion Study, Forest Park, GA. The Army is performing a vapor intrusion study for residential and commercial properties located outside the base. Responsibilities included oversight of installation of soil vapor implants, well installation, groundwater sampling, scheduling buildings for sampling, delivering results packets to owners, participating in public meetings, data tabulation and assisting with report preparation for the U.S. Environmental Protection Agency (U.S. EPA) and GA EPD.

City of Duluth, Former Dry Cleaner, Duluth, GA. The project is a property formerly used to operate a dry cleaner. Responsibilities include overseeing drilling subcontractors, soil logging and sampling, well installation, and groundwater sampling, coordination with the laboratory, tabulating results, preparing figures in support of entering the GA EPD Voluntary Remediation Program (VRP).

United States Department of the Army, Fort Gillem, Historical Records Review, Forest Park, GA. Project included performing a limited environmental site assessment for multiple properties located outside the installation boundary. Responsibilities included review the historical aerial photographs, topographic maps, and city street directories for the sites located within 0.5 mile of the installation boundary, and preparation of a limited environmental assessment report.

CERTIFICATION

40 Hour HAZWOPER Training, OSHA

United States Department of the Army, Fort McPherson, Former Crematory Site, Fort McPherson, GA. The Army performed interim removal actions for lead-impacted soil and buried ash/debris in two phases. Phase I: Assisted field team leader and project risk assessor with many tasks relating to database entry, data analysis, tabulation and calculations for dioxin/furan TEQ and report preparation. Phase II: Lead field operations with tasks including determining excavation limits, directing yellow metal operators, XRF screening, soil sampling, using GPS unit and GIS Collector for real-time sample and boundary locations, and coordinating with the analytical laboratory. Assisted project manager and project risk assessor with many tasks relating to report preparation and production

United States Department of the Army, Fort Gillem and Fort McPherson, Administrative and Public Records, Forest Park, GA. Member of team compiling, organizing, and providing gap analysis of all environmental documentation associated with Fort Gillem and Fort McPherson for the Base Realignment and Closure (BRAC) Coordinator, United States Army Corps of Engineers (USACE), and the public for access and review.

Various Clients, SWPPPs, Minnesota. Provided assistance with updating and developing SWPPPs for clients to continue to engage in industrial activity that meets the terms and conditions of the State of Minnesota Industrial Stormwater General Permit MNR050000 (the Permit). Projects included familiarization with client sites and knowledge of the Permit requirements.

Carl Bolander & Sons, Twin Cities Army Ammunition Plant (TCAAP) Field Investigation, Arden Hills, MN. Project included environmental investigations and remedial actions within the 427-acre portion of the former TCAAP Site. Prepared several sections of 26 sites reports, including historical land use, source areas, and previous environmental activities and actions taken at each site.

RYAN MCELRATH, EIT

Geological Engineer

Mr. McElrath has seven years of experience in the oil and gas, environmental, and emergency response industries. He has a proven ability to combine strong management, interpersonal, and field skills to accomplish a wide variety of projects. Mr. McElrath has extensive experience with environmental site investigation, environmental sampling and remediation, technical writing, and client management.

EDUCATION

BS, Geological Engineering, University of Minnesota

PROJECT EXPERIENCE

Environmental Site Characterization

Numerous subsurface site characterization projects that included subcontractor management, soil boring oversight, monitoring well installation, impacted soil delineation, soil and groundwater sampling, soil vapor sampling, and report writing.

Environmental Remediation

Nutrient and Microbe Injections – Various Locations. Developed and implemented in-situ remediation solutions involving the injection of nutrients and naturally occurring microbes to enhance the degradation of petroleum products. These remediation efforts allowed the client to achieve clean-up goals while saving costs by avoiding excavation and material handling and remaining operational during remediation activities.

Multi-Phase Extraction System – Langdon, ND. Worked with the client and the State of North Dakota to develop a multi-phase extraction (MPE) system aimed at the mass removal of petroleum products and chlorinated solvents in the soil vapor and groundwater phase at an existing gas station.

Construction Oversight – Various Locations. Managed the cleanup and remediation of contaminated construction sites by working with developers, project managers, city officials, and construction superintendents and crews. Activities included site characterization, asbestos sampling and removal oversight, tank removal oversight, hazardous waste handling coordination, and document preparation.

Incident Response

Acted as a lead member of emergency response teams on a variety of spills and train derailments, assisting in the cleanup of crude oil, benzene, and ethanol. Industrial Health Services

Served as a licensed Minnesota Asbestos Inspector and X-Ray Fluorescence Analyzer operator while performing Pre-Demolition inspections and industrial health inspections.



AREAS OF EXPERTISE

Site Investigation
Remediation
Incident Response

CERTIFICATIONS

Environmental Engineer in Training
HAZWOPER 40-Hour
HAZWOPER 8-Hour Refreshers
E-Rail Safe
MN Asbestos Inspector
University of Minnesota
Erosion and Stormwater Management Training
Inland Waterways Spill Responder Training

CHRIS MEEHAN, PE, CFM

Resource Group Manager/Principal

Mr. Meehan leads Wenck Water Resource Group Manager and Principal of Water Services for the firm. He is responsible for developing and implementing Corporate Strategic Plan initiatives targeted at sustaining marketplace advantages in the water market. He serves as a direct report to company COO, providing strategic advice on operation, finance and growth initiatives.

- Lead 55 water professionals with the delivery of solutions to clients across the county
- District Engineer for Minnehaha Creek Watershed District, which is the largest watershed district in the state.
- Lead over a team who delivered over 100 projects in 2017 in a wide variety of services from wastewater, water supply, groundwater, water resources and ecological restoration.
- Lead staff in 7 office locations which have continually delivered 10% annual growth under his direction, while improving profitability of group by 25%.
- Provided market analysis for regional and international expansion. Identified growth strategies through strategic hires, joint venture, and startup office.

EDUCATION

MBA University of Minnesota - Minneapolis, Minnesota

MCE, University of Minnesota - Minneapolis, Minnesota

BSCE, University of Minnesota - Minneapolis, Minnesota

REGISTRATION

Professional Engineer, MN

Certified Floodplain Manager (CFM)

PROJECT EXPERIENCE

Mr. Meehan has over 17 years of experience in the fields of watershed planning, water quantity and quality modeling, environmental review, stream restoration design and construction management. Mr. Meehan has served as project manager and project engineer on several multidisciplinary projects. He is also experienced with several numerical models including HEC-HMS, HEC-RAS, XP-SWMM, CORMIX, WaterCAD and HydroCAD. Specific projects demonstrating his range of experience are provided below.

Minnehaha Creek Watershed District 2014 Flood Response. Mr. Meehan served as the project manager for Wenck assisting the Minnehaha Creek Watershed District respond to the June 19, 2014 a rainfall of between 4 and 5 inches. In response to the high water levels and damage associated with the floods Wenck worked collaboratively with MCWD to initiate actions which would limit potential flooding in the watershed. Wenck worked with District staff to assess damages along the creek and identify necessary repairs in time to meet FEMA reporting requirements. This required Wenck staff to assess over 25 miles of streams in the



AREAS OF EXPERTISE

Hydrologic/Hydraulic Modeling
Floodplain Management
Stream Restoration
Design & Construction Management
Stormwater Management
Watershed Planning
Environmental Review

PROFESSIONAL MEMBERSHIPS

Board of Directors and Treasurer (2006-2009), Minnesota Waters
* Executive Board, Minnesota Association of Floodplain Managers (2002-2007), Chair (2006)
*City of Minnetonka Comprehensive Plan Steering Committee (2006-2008) * American Red Cross - CEO Network Events

District and provide cost estimates for the repairs within 60 days.

Cottageville Park, Hopkins MN – Through a collaborative process between the Minnehaha Creek Watershed District and the City of Hopkins Mr. Meehan lead the redevelopment of Cottageville Park in the City of Hopkins. Working together nearly five acres of parkland which now connects to a restored streambank of Minnehaha Creek provides needed parkland in a heavily urbanized area of the City. The park incorporates over 25 acres of regional stormwater treatment under new greenspace which will off-set regulatory requirements for a planned affordable housing project.

Minnehaha Creek Watershed District – District Engineer - As the District Engineer for Minnehaha Creek Watershed District Mr. Meehan is intimately familiar with the District's regulatory program and creating an adaptive management approach to implementation. During his time with the District, Chris has lead multiple capital implementation projects throughout the Minnehaha Creek Greenway, Six Mile Creek Watershed in addition to lead the regulatory program.

Through the District's Balanced Urban Ecology Policy, Chris is intimately familiar with the District's approach to making change in a diverse watershed which results in improvement in the watersheds natural resources as well as cultivating thriving communities.

Meadowbrook Golf Course, Minneapolis Park and Recreation Board – After the floods of 2014 Meadowbrook Golf Course experienced significant damage which lead to the course being closed. Given extensive nature of the damages the Minneapolis Park and Recreation Board collaborated with the Minnehaha Creek Watershed District to evaluate how to make a more flood resilient course. Mr. Meehan led a multi-discipline team which through a collaborative process developed a layout which made it more flood resilient, enhanced natural vegetation, improve water quality. and created a more economically viable course. Through the ability to move soil around on the site the project was able to elevate 12 of the 18 holes above flood levels, added a driving range and addressed neighborhood flooding issues.

Six Mile Creek Watershed Plan, Minnehaha Creek Watershed District – Six Mile Creek subwatershed is one of the priority geographies the watershed is focused on. It is a chain of over 13 lakes, five of which are shallow, that drains into Halsted Bay of Lake Minnetonka. Through the development of the plan, as the District Engineer, Chris has lead or help in developing a comprehensive diagnostic water quality study, internal loading assessment, fish community, aquatic vegetation assessment, corridor green print along with recreational corridors. Through the process the information is be used to develop a multi-jurisdictional plan to restore the watershed.

Red Lake River Floodplain Mapping Project. Served as project manager on a limited hydraulic analysis of two streams in Red Lake County, Minnesota as part of a floodplain mapping project for the Red Lake Watershed District under a contract with FEMA. Using cross section surveys and bridge structure information collected in the field by Wenck, a hydraulic model was prepared using the U.S. Army Corps of Engineers HEC-RAS model for 32 miles of the Red Lake River and 4 miles of the Clearwater River within the city limits of Red Lake Falls to estimate surface water profiles from a 100-year storm event. A floodway encroachment analysis was also performed as part of this project. Modeling results were then used in developing digital floodplain mapping for Red Lake County.

Plymouth Creek, Plymouth, Minnesota. Mr. Meehan was the project manager approximately 8,000 feet of stream and habitat restoration. Included in this restoration project was the remainder of approximately 2,500 feet of channel through a wetland before discharging in to Medicine Lake. The design included rock vanes, riffles, root wads and live stakes.

Pike Creek Channel Restoration Design, Maple Grove, Minnesota. Mr. Meehan served as lead Project Engineer for the \$0.5 million Pike Creek Channel stabilization project. As lead project engineer he completed survey assistance, feasibility design, bid package preparation, and construction oversight.

Prior Lake Outlet Channel Restoration, Minneapolis, Minnesota. As a Project engineer Mr. Meehan has completed hydrologic and hydraulic analysis for scour analysis, in addition to providing design, plan and specifications assistance, and construction management services for several restoration projects along the seven-mile long Prior Lake outlet channel.

SARAH NALVEN

Environmental Scientist

Ms. Nalven is an ecologist and biogeochemist who is skilled in communicating to technical and broad audiences. Ms. Nalven is a strong writer and public speaker, with prior experience as an NPR reporter, teacher, scientific writer, and conference presenter, and now at Wenck as a writer of water management plans, grant applications and technical reports. Ms. Nalven has extensive experience working with others, having spent two summers doing arctic fieldwork on a team of nine and two years collaborating with chemists for her master's research. Ms. Nalven also has a proven ability to manage and analyze "big data" using command-line computer programs and Excel spreadsheets.



EDUCATION

MS, Earth, Ocean & Atmospheric Science, Oregon State University - Corvallis, OR

BA, Biology, Colby College, Waterville, ME

PROJECT EXPERIENCE

Water Resources

Six Mile Marsh Phosphorus Load Investigation. Ms. Nalven investigated phosphorus loading in Six Mile Marsh. The Minnehaha Creek Watershed District was interested in understanding if the Marsh was exporting phosphorus to Six Mile Creek and if so, when and to what extent. Ms. Nalven analyzed data, calculated loads, and authored a technical memo summarizing results of the investigation.

Grant Application for Carp Management to Lessard-Sams Outdoor Heritage Fund. Ms. Nalven drafted a grant application on behalf of the Minnehaha Creek Watershed District for the management of carp in the District's waters. The grant application won \$567,000 for the Watershed District to manage carp through several strategies.

Pelican River Watershed District Management Plan. Ms. Nalven worked closely with the client to iteratively write this ten-year watershed management plan. Ms. Nalven worked to quickly familiarize herself with the Pelican River Watershed District, so that the plan clearly and comprehensively laid out watershed issues, goals, priorities and action items.

City of Dayton Local Water Management Plan. Ms. Nalven created a concise, ten-year local water management plan for the City of Dayton to meet the statutory requirements of the State of Minnesota and plan for the protection and improvement of water resources, while also reflecting the City's priorities.

Olmsted County Reservoir Water Quality Analysis. Ms. Nalven assembled all water quality data for six reservoirs in Olmsted County, detected patterns and drivers of water quality and made monitoring and management recommendations to Olmsted County.

AREAS OF EXPERTISE

Ecology
Biogeochemistry
Water Resources
Geology
Biology
Chemistry
Technical Writing
Grant Writing
Planning
Data Management & Analysis
Data Visualization

Nature Center Sign. Ms. Nalven designed and created a sign for a rain barrel in Eden Prairie's Staring Lake Nature Center. The sign combined clear language and aesthetically pleasing visuals to explain the purpose of rain barrels and why Eden Prairie citizens should use them.

Water Resources Public Outreach. Ms. Nalven has presented to students ranging from ages 6 to 12 years on the topic of water quality and stormwater pollution. For example, in summer of 2017, Ms. Nalven met University of Minnesota Water Camp students at the Mississippi River to talk about stormwater pollution and rain gardens and in fall of 2017, Ms. Nalven led Minneapolis's Olson Middle School sixth graders on a fieldtrip to a stormwater pond with an iron-sand filter.

Permit Reviews. Ms. Nalven reviews permit applications to Shingle Creek and West Mississippi Watershed Management Commissions. This consists of assessing whether new development and redevelopment projects adhere to Commission standards by controlling the rate and volume of stormwater leaving their sites, and by treating stormwater before it discharges into storm sewer or downstream waters.

Water Quality Monitoring. Ms. Nalven conducts routine water quality monitoring for the Shingle Creek and West Mississippi Watershed Districts. This involves visiting up to nine sites twice per month to measure physical parameters with a sonde, taking water samples for chemical analysis, and gauging stream flow. This can also involve troubleshooting equipment, carrying heavy loads, working in extreme heat and cold, and interacting with members of the public to explain the watershed's responsibilities.

Real Estate and Remediation

Site Remediation Annual Report. Ms. Nalven performed data analysis and report writing of the annual remedial feasibility assessment for the Nilfisk Advance Machine Superfund Site. Remediation of this contaminated site has been ongoing since the early 2000s, and Ms. Nalven analyzed and presented data to track remediation progress and remaining contamination.

Phase I Environmental Site Assessments. Ms. Nalven conducts due diligence investigations on property types ranging from farmland to manufacturing facilities. The investigations include identification of a variety of environmental hazards including hazardous materials and petroleum impacted soils and groundwater, asbestos, PCBs, USTs, and other regulatory concerns.

Research

Graduate Research Assistant. Ms. Nalven researched carbon cycling in arctic lakes and streams under the guidance of Dr. Byron Crump at Oregon State University. For this work, Ms. Nalven led two full summers of field campaigns (2014, 2015) in northern Alaska, maintained and analyzed immense datasets with command-line computer coding and Excel spreadsheets, and presented her work at four conferences, including the American Geophysical Union Fall Meeting in San Francisco, CA and the International Symposium on Microbial Ecology in Montreal, Canada. Ms. Nalven submitted and defended her thesis to Oregon State University faculty and published this work in the journal Nature Communications.

Research Assistant. Ms. Nalven served as a research assistant in the lab of Dr. Jerry Melillo at the Marine Biological Laboratory in Woods Hole, MA. She performed lab and data analyses for a 21-year soil warming experiment in Harvard Forest, MA.

Teacher. Ms. Nalven served as a teacher for the Semester in Environmental Science at the Marine Biological Laboratory in Woods Hole, MA. She led field and lab exercises for upper-level college students and oversaw their independent projects.

Honors Thesis. Ms. Nalven completed an Honors Thesis in Biology in the lab of Dr. Catherine Bevier at Colby College in Waterville, ME., Ms. Nalven designed and conducted a study on the protective role of bacteria living on frog skin.

Arthur Vining Davis Foundations Fellowship. Ms. Nalven was a summer fellow in the microbial oceanography lab of Dr. Julie Huber at the Marine Biological Laboratory in Woods Hole, MA. During this fellowship, Ms. Nalven produced the first evidence that microorganisms living in hydrothermal vents use the same signaling molecules as microorganisms in less extreme environments.

Publications

Ward, C.P., Nalven, S.G., Crump, B.C., Kling, G.W., & Cory, R.M. 2017. Photochemical alteration of dissolved organic carbon draining permafrost soils shifts microbial metabolic pathways and stimulates respiration. *Nature Communications*.

Nalven, S.G., Ward, C.P., Cory, R.M., Kling, G.W., Sharpton, T.J., Sullivan, C.M., Crump, B.C. Sunlight stimulates microbial growth by replacing key steps in DOM degradation pathways. In prep.

MARK OLSON

Senior Project Manager/Hydrogeologist

Mr. Olson serves as a senior project manager with over 30 years of consulting experience. His project work encompasses a wide range of environmental project types, including ground water, surface water, storm water, and soil issues. Projects have included industrial facilities; hazardous waste sites; solid waste management facilities; EAW/EIS projects; agri-chemical facilities; property transfers and brown-field work; petroleum investigation and remediation. The focus of much of this work has been defining hydrogeologic conditions and potential contaminant migration and control in soil, groundwater and surface water medium. Mr. Olson's project management responsibilities address permitting; permit compliance activities; RCRA and CERCLA site investigation compliance work; regulatory interaction to negotiate and determine compliance and remedial requirements; work plans, site evaluation reports, cost estimates, monitoring and remedial system design; and interpretation of hydrogeologic conditions and contaminant migration problems and solutions. In addition, he provides resource, technical writing experience and project management skills for a variety of both short and long-term environmental project types.

EDUCATION

BA, Cum Laude in Environmental Studies, Geography and Geology, Gustavus Adolphus College - St. Peter, MN

PROJECT EXPERIENCE

Solid Waste Facilities. Completes landfill siting, evaluation, hydrogeologic investigations, and related permitting activities; designs and implements monitoring programs for groundwater, surface water, landfill gas and leachate compliance; evaluates monitoring results with respect to permit compliance and environmental impact; implements corrective actions to mitigate impacts; evaluates leachate generation control and disposal.

EAW/EIS Preparation. Prepares EAW/EIS documents in accordance with NEPA standards for various mandatory, petitioned, or voluntary environmental review projects that have included solid waste facilities, bulk storage facilities, property development, aggregate mining, and wastewater projects.

Industrial and Hazardous Waste Sites. Investigates waste sites, monofills, and discharges and their impact on human and environmental receptors. Negotiates work plans, clean-up criteria and remedial actions for a variety of industries including manufacturing plants, plating facilities, coal gasification plants, and tanneries.

Agri-chemical Facilities. Experienced with the investigation and remediation of agri-chemical releases to soil, groundwater, surface water and sediments at cooperative facilities and formulation plants.

Industrial Stormwater (NPDES) Permitting. Provided senior project management to dozens of upper Midwest facilities to achieve compliance with NPDES requirements. Efforts have included permit applications, preparation of stormwater pollution prevention plans, establishment of monitoring stations, review of mon-



AREAS OF EXPERTISE

Hydrogeologic Investigations
Solid Waste Facility Permitting and Compliance
EAW/EIS document preparation in accordance with NEPA standards
Hazardous Waste Site Remedial Evaluations
Stormwater Compliance
Ag-Chemical Site Investigations

PROFESSIONAL MEMBERSHIPS

Minnesota Ground Water Association
National Water Well Association

itoring data and potential site modifications that may be needed to achieve compliance with surface water quality goals.

Environmental Site Assessments. Has experience in completing Phase I and II environmental site assessments of properties from open undeveloped land to occupied industrial sites. Evaluates environmental issues and clean-ups for site owners, interested parties and regulatory agencies under voluntary and "Brownfield" programs.

Storage Tank Releases/Regulatory Compliance. Assists clients with regulatory compliance issues, in addition to coordinating the investigation, containment, and remediation of solvent, agri-chemical and petroleum products.

Other Environmental Experience. Has a broad background of varied environmental experience that includes geophysical surveys, toxicity analyses, analytical laboratory experience, waste water discharge monitoring, infiltration/inflow studies of municipal sewer systems, die tracer studies, surface water monitoring programs, and solid waste transfer station permitting assistance.

TONY OLSON

Environmental Specialist/Industrial Hygiene Technician

Mr. Olson has 19 years of experience as an environmental scientist/specialist with experience as a liaison between clients, contractors, and environmental regulatory agencies. He has worked with both public and private sectors in Minnesota, Iowa, North Dakota, South Dakota, and Wisconsin. Mr. Olson's specialties include conducting surveys, assessments, investigations, design, management and oversight for handling of asbestos-containing materials, lead-based paint, regulated/hazardous materials and moisture/mold impacted materials.



EDUCATION

BS, Health Science, Mankato State University, Mankato, MN

PROFESSIONAL MEMBERSHIPS

American Industrial Hygiene Association; Asbestos Analysts Registry Accredited #7760

SELECTED EXPERIENCE

Asbestos Services

- Conducts asbestos surveys, materials assessments, materials quantification, and project documentation. Performs asbestos air monitoring, clearance sampling, and project documentation.

Lead Services

- Conducts Lead surveys. Performs paint chip sampling and XRF testing for lead-based paint. Performs lead air monitoring, clearance sampling, and project documentation.

Hazardous Materials Services

- Conducts hazardous materials surveys, materials inventory, and project documentation.

Industrial Hygiene and Health & Safety Services

- Performs indoor-air quality assessments and industrial hygiene monitoring for employee exposure.

Mold and Indoor Air Quality Services

- Performs mold and bio-aerosol, contact sampling and project documentation.

Emissions Testing Services

- Has experience conducting visual testing to determine the opacity of emissions via EPA's method 9. Conducts stack testing to determine the concentration and/or emission rate of a particular pollutant or group of compounds.

AREAS OF EXPERTISE

Asbestos, Lead, and Hazardous Materials Services
Industrial Hygiene and Health & Safety Services
Mold and Indoor Air Quality Services

REGISTRATIONS

Asbestos Site Supervisor: MN, ND, SD, WI
Asbestos Building Inspector: IA, MN, ND, SD, WI,
Asbestos Project Designer: MN, SD
Minnesota Air Monitoring Professional
NIOSH 582 Asbestos Equivalent Air Sampling
PCM Analyst
OSHA 10 Hour Construction Safety and Health Training Certification
OSHA 40-Hour Hazardous Materials Technical Training
Nitron XRF and Radiation Training
40 Hour Hazwoper Technician

ERIC OSTERDYK, EIT

Water Resources Engineer

Mr. Osterdyk joins Wenck as a Water Resource Engineer focusing on providing water resource engineering services to Wenck clients. Eric has had over a year and a half of experience through the course of six internships. He spent four summers with the U.S. Fish and Wildlife Service as a Resource Management Technician, one summer conducting agricultural runoff research for the University of Wisconsin - Platteville, and one summer with Oshkosh Corporation as an Environmental Engineer Intern.

EDUCATION

BS, Environmental Engineering, University of Wisconsin, Platteville - Platteville, WI

BS, Wildlife Ecology, Research and Management, University of Wisconsin, Stevens Point - Stevens Point, WI

PROJECT EXPERIENCE

Hydrologic, Hydraulic, and Water Quality Computer Modeling

Farney Creek Dam, Washington Co., MN. Mr. Osterdyk served as the water quantity and quality modeling engineer to study the feasibility of removing an earthen dam. The dam outlet pipe was rusted and partially corroded, so it needed to be replaced or the dam removed altogether. Mr. Osterdyk created HydroCAD and P8 models to help evaluate six different options ranging from simple lining of the outlet pipe to dam removal and replacement with a new stream.

Coon Creek Watershed District (CCWD). Mr. Osterdyk worked with Wenck GIS staff to update the existing CCWD HydroCAD model subwatershed maps and integrated the new GIS maps with an XP-SWMM model. The XP-SWMM model allows the CCWD to more accurately predict the high-water elevations due to additional capabilities of XP-SWMM compared to HydroCAD. The XP-SWMM model is a "living" model that is updated as new development is proposed and better information becomes available. Mr. Osterdyk utilized the Coon Creek Watershed Atlas 14 XP-SWMM Model (7.3), FEMA's effective Flood Insurance Rate Map (FIRM), and Anoka County GIS, to determine the 100-year flood elevation for a property in Ham Lake, MN. Mr. Osterdyk performed engineering calculations to determine the feasibility, sizing, and life span of an iron-enhanced sand filter for the Springbrook Nature Center weir retrofit project. The objective of this project was to cost effectively remove dissolved pollutants, mainly phosphorus, from County Ditch 17.

Inver Grove Heights. Helped developed and perform QA/QC on the update to a 1,220-square acre hydrology and hydraulics model using the PCSWMM computer model. The model predicts high water levels, flow rates, and velocities for current and anticipated future land use conditions. The model will be used to identify future routing methods for landlocked basins.



AREAS OF EXPERTISE

Hydrologic and Hydraulic
Computer Modeling
Water Quality Computer
Modeling
Watershed Permitting and
Development Rules
Construction Stormwater
Permit Rules
Stormwater Design
Wetland Restoration and
Permitting
SWPPP and ESC Plan
Design
Wildlife Ecology
ESRI ArcGIS

Laurel Creek, Lennar Corporation. Mr. Osterdyk created a HEC-RAS hydraulic model to confirm the existing base flood elevation (BFE), establish a new BFE, and assist in providing a “No-rise” certificate for a proposed development by Lennar Corporation.

Silver Creek Stabilization, Davenport, IA. Mr. Osterdyk utilized an existing HEC-2 hydrologic model output to assist in creating effective, effective corrected, and proposed conditions HEC-RAS models to provide a “No-rise” certificate as well as velocity and shear stress calculations to aid other Wenck Staff in appropriately stabilizing the stream.

Tandus Stormwater Pond, Calhoun, GA. Mr. Osterdyk assisted in creating an XP-SWMM model and preparing concept designs for two stormwater ponds to alleviate flooding issues at the Tandus Centiva (Tandus) Calhoun Fibers plant.

Watershed Permitting and Development Rules

Capital Region Watershed District (CRWD). Mr. Osterdyk performs the primary technical review of rate control and water quality treatment detention facilities, infiltration Best Management Practice implementation, hydrologic structure design, wetland preservation and replacement, and erosion (BMP) and sediment control measures required in developing areas. He also assisted in developing new watershed rules relating the volume retention and rate control.

Coon Creek Watershed District (CCWD). Mr. Osterdyk performs the primary technical review of rate control and water quality treatment detention facilities, infiltration Best Management Practice (BMP) implementation, hydrologic structure design, wetland preservation and replacement, and erosion and sediment control measures required in developing areas.

Pelican River Watershed District. Mr. Osterdyk performs the primary technical review of rate control and water quality treatment detention facilities, infiltration Best Management Practice (BMP) implementation, hydrologic structure design, wetland preservation and replacement, and erosion and sediment control measures required in developing areas.

Construction Stormwater Permit Rules and Inspections

Capital Region Watershed District (CRWD). Mr. Osterdyk performs erosion and sediment control inspections for active construction projects to verify compliance with Watershed District, Minnesota Pollution Control Agency (MPCA), National Pollutant Discharge Elimination System (NPDES), and Construction Stormwater Permit rules. Mr. Osterdyk communicates with construction site super intendents and CRWD staff to keep active permits in compliance. Mr. Osterdyk is a licensed Construction Site Manger and Stormwater Pollution Prevention Plan designer through the University of Minnesota (U of M).

Coon Creek Watershed District (CCWD). Mr. Osterdyk performs erosion and sediment control inspections for active construction projects to verify compliance with Watershed District, Minnesota Pollution Control Agency (MPCA), National Pollutant Discharge Elimination System (NPDES), and Construction Stormwater Permit rules. Mr. Osterdyk communicates with construction site super intendents and CCWD staff to keep active permits in compliance. Mr. Osterdyk is a licensed Construction Site Manger and Stormwater Pollution Prevention Plan designer through the University of Minnesota (U of M).

Metropolitan Airports Commission (MAC). Mr. Osterdyk performs erosion and sediment control inspections at the 6 reliever airports (St. Paul, Crystal, Flying Cloud, AirLake, Anoka-Blaine, and Lake Elmo) in the Twin Cities area. These inspections entail visual observation and photo documentation of stormwater management at construction projects on MAC property and adjacent properties that may affect MAC property, as well as observation of the current state of MAC stormwater infrastructure for recommendations of repairs and/or enhancements.

Gopher Resource. Mr. Osterdyk performs stormwater structure assessments to evaluate the state of the stormwater system to identify current and potential maintenance concerns.

Stormwater Design

Becker Park, City of Crystal, MN. Mr. Osterdyk conducted a feasibility study and created a concept plan to treat stormwater at Becker Park in Crystal, MN. The study used P8 and HydroCAD modeling to identify a cost effective stormwater control measure that diverts low flow from the trunk sewer line into an underground infiltration trench. To goal of the infiltration trench is to reduce flow, total suspended solids (TSS) and total phosphorus (TP), from the trunk sewer line before discharging downstream to impaired Upper Twin Lake. The concept plan provided the city with six different underground infiltration system options and outlined overall cost, volume retained by each system, the footprint of each system, and cost per cubic foot of storage within each system.

Green Stormwater Infrastructure. Mr. Osterdyk conducted a study to develop a goal and strategy to implement green stormwater infrastructure (GSI) on airports owned by the Metropolitan Airports Commission (MAC). The study included performing a baseline assessment of the GSI at the Minneapolis-St. Paul (MSP) and six other reliever airports in the twin cities areas using ESRI ArcMap and the MIDS calculator. The MAC property was then benchmarked against three other airports with similar characteristics. Mr. Osterdyk helped to establish a goal, design a standard to meet that goal, and finally create concept designs to show the economic feasibility of meeting this new standard.

Wetland Restoration and Permitting

Root Wetland Restoration. Mr. Osterdyk performed existing and proposed conditions HydroCAD modeling to assist in a wetland restoration project in Meeker County to show the effect of the restoration on flood elevation, peak discharge, and volume stored.

Rathburn Wetland Restoration. Mr. Osterdyk performed existing and proposed conditions HydroCAD modeling to assist in a wetland restoration project in Hennepin County to show the effect of the restoration on flood elevation, peak discharge, and volume stored.

Previous Experience

2-D Hydraulic Modeling, Senior Design Project. Mr. Osterdyk's senior design project was to create a 2-Dimension Hydraulic model in HEC-RAS to provide a concept plan to resize infrastructure, alleviate flooding on adjacent agricultural land, and prevent overtopping of a road in the Sugar River drainage in Green County, WI.

Environmental Engineer Intern, Oshkosh Corporation, Oshkosh, WI. Mr. Osterdyk served as the environmental engineering intern at Oshkosh Corporation from May of 2016 to September 2016 where he tracked VOC emissions and compliance with Title V air permit by coordinating data exchange with vendors, entering data into comprehensive spreadsheet, and uploading to online reporting database. Additionally, he was part of the "Reduction of Waste to Landfill" and "Energy Reduction" strategic initiative teams, as well as helped manage stormwater permit.

Research Assistant, UW-Platteville Pioneer Farm, Platteville WI. Mr. Osterdyk served as a research assistant at the UW-Platteville Pioneer Farm from May of 2015 to December 2016, where he remotely observed and operated runoff stations in Arkansas and Wisconsin, analyzed data using Microsoft Excel, and wrote official runoff reports. He also tested weirs and flumes in hydraulics lab to create stage vs. discharge rating curves.

U.S. Fish and Wildlife Service – St. Croix Wetland Management District (WMD) Internship. Mr. Osterdyk served as a Resource Management Technician for the St. Croix WMD for two summers from May 2013 through August 2013 as well as June 2014 through August 2014, where he led a group of interns and youth conservation corps. (YCC) students to complete projects such as grassland bird surveys, waterfowl brood counts, waterfowl banding, invasive species mapping, harvesting lupine seeds, and fencing. Additionally, he assisted with delineating wetlands and made sure contractor built spillway to proper specifications as well as designed, edited, and created numerous GIS maps related to wetlands and habitat mapping.

J. JOSEPH OTTE

Principal

Mr. Otte has extensive experience in assessment and redevelopment of properties affected by contamination. As the former supervisor of the State of Minnesota's award-winning Voluntary Cleanup Program (VCP), Mr. Otte has been sought after by developers for his expertise and practical approach to the issues created at the intersection of health risk, financial risk and regulatory liability.

EDUCATION

MBC, Business Communication, University of St. Thomas

BA, Geology, College of St. Thomas

SELECTED PROJECT EXPERIENCE

Redevelopment Projects

Twin City Army Ammunition Plant (TCAAP). Project manager of the wholesale cleanup of remaining infrastructure and soil impacts on the former Government-Owned, Contractor-Operated (GOCO) ammunition plant in Arden Hills, Minnesota. The NPL-listed site is the largest Superfund site in Minnesota. Wenck teamed with Carl Bolander & Sons on a \$23.6 million, lump-sum cleanup project guaranteeing the client a Certificate of Completion, and modifications to the existing Land Use Controls. The Certificate of Completion for the 427-acre redevelopment site was issued in July 2016. The No Further Action letter for the adjoining 108-acre Ramsey County Regional Trail Corridor (a project add) was issued in 2017.

TCF Bank Stadium™. Served as project manager for a complicated redevelopment project involving an NCP-compliant investigation and cleanup of an historic creosoting operation to make way for the construction of a \$288 million collegiate football stadium. Project operations involved infrastructure redevelopment, roadway improvements, dewatering for tunnel construction, grain elevator demolition, soil balance and implementation of a construction contingency plan spanning a dozen VIC Program sites.

Department of Trade and Economic Development (DTED) and Metropolitan Council. Cleanup grant money of \$3.8 million dollars was awarded to the Minneapolis Community Development Agency (MCDA) on behalf of the developer, Wenck's client. The project entailed redevelopment of three city blocks in the historic St. Anthony Falls district of Northeast Minneapolis, creating residential and mixed-use commercial space on a property formerly occupied by a car dealership and other commercial businesses. The project was also awarded the first Brownfield Revolving Cleanup Loan Fund in EPA Region V (and only the sixth awarded nationwide) in the amount of approximately \$800,000.

Redevelopment Project in Downtown Minneapolis. The redevelopment involved the investigation of a state Superfund site with an active groundwater



AREAS OF EXPERTISE

Corporate Due Diligence
Phase I and Phase II Site Assessments
Voluntary Cleanup Program (VCP) sites
Brownfield redevelopment
Remediation

remediation system. The project involved decommissioning an active facility with large quantities of hazardous waste, a hazardous building materials survey of an aging facility, additional investigation of the site, development of necessary cost estimates for cleanup and assistance in applying for grant funding.

Expert Testimony. Provided expert testimony related to a release of solvents and a case involving cleanup cost recovery. In this case, the issue of whether the remedy was “reasonable and necessary” was a key driver in the litigation. Knowledge of the NCP and the regulatory framework for response actions was critical in the preparation of the report and the deposition activities.

Cleanup with Cost Recovery. Provided assistance with cleanup and cost recovery in a transaction in Oklahoma where the primary driver was debris in soil left behind by a former tenant. While concentrations of pollutants were present, the presence of solid waste in the shallow soil horizon necessitated cleanup based on the proposed construction. Because the media was not usable, it required disposal at a permitted facility. Removal costs were consistent with the cost estimate provided at the time of the completion of the Phase I ESA. Efforts to recover costs were successful, though required litigation.

Sediment Sampling and Ecological Risk Assessment. Supported client in defending regulatory action under Superfund by overseeing sediment data collection, preparing ecological assessment work plans and producing an Ecological Risk Assessment.

Implemented Vapor Mitigation Systems. Managed multiple projects involving assessment and mitigation of vapor intrusion under Minnesota’s rapidly changing regulatory framework governing vapor intrusion/vapor encroachment risk.

Redevelopment Project in Downtown St. Paul. Approximately \$425,000 in grant funding was awarded to this “sustainable urban neighborhood” project. The project site historically contained a former Standard Oil facility, as well as a small Manufactured Gas Plant operation.

Redevelopment Project in Downtown Stillwater, Minnesota. The project involved the removal of very high levels of PAH-impacted soil. Wenck was instrumental in obtaining grants of over \$750,000 dollars in cleanup funding.

Developed Response Action Plan (RAP). Provided a Response Action Plan for an old foundry dump in a ravine on a St. Cloud farmstead using a \$35,000 RAP development grant from DTED. Completed cleanup construction to regulatory satisfaction.

Obtained Off-Site Source determination. No-Association determination and tank site closure determination for a one-half block residential townhome redevelopment in the City of Bloomington on the site of a former auto service station. These determinations were necessary to secure funding from HUD.

JOEY OTTE

Environmental Scientist, HAZMAT Technician

Joey has more than 4 years of experience as an Environmental Scientist and HAZMAT Technician at Wenck assisting with various emergency response and rail support projects. He has worked with clients to redevelop and meet benchmarks for improved real estate viability through extensive data collection and analysis. He has worked on and gained experience with Phase I Environmental Site Assessments, Phase II Limited Site Assessments, Excavation Oversight and Remediation projects and various spill and response projects. Joey specializes in emergency response as well as environmental investigation, follow up, and regulatory closure.

EDUCATION

BS, Sustainability Studies, College of Continuing Education, University of Minnesota - Twin Cities

PROJECT EXPERIENCE

- Works with Emergency Response Services, dealing with inventory/stocking in vehicles, office relocation, fabrication, etc.
- Emergency Response Services, train derailments, pipeline work, chemical spill response, certified in Industrial Firefighting, certified in boom deployment, Incident Command implementation
- Industrial remediation, heavy metals dust remediation, mercury abatement, vac truck operations, leachate system management
- Responsible for soil and water sampling, surveying duties, asbestos abatement oversight, and remediation oversight at Twin Cities Army Ammunition Plant (TCAAP)
- Execute data entry in excel and writing/editing plans and specs, reporting, as well as other documents for TCAAP
- Monitoring and vapor well installment, decommission, and sampling, as well as SVE system maintenance and upkeep for various sites around the Twin Cities
- Execute data entry in excel and writing/editing plans and specs as well as other documents for American Crystal Sugar projects



AREAS OF EXPERTISE

Phase I and 2 ESAs
Real Estate Analysis
Environmental Investigation
Soils Classification
Equipment Maintenance
Incident Command System
Surveying
Water/Soil/Soil Vapor/Air Sampling

CERTIFICATIONS

40 Hour HAZWOPER
Asbestos Inspector Certified (MN)
Red Wing CAER Boom School Certified
Dubuque CAER Ice School Certified
Railcar Specialist Certified
SERTC 24-Hour HAZMAT Emergency Response and Railroad Derailment Scenario
Confined Space Certified
Industrial Firefighter Certified

DAVE PARENTEAU

Principal/Director of Risk Management

Mr. Parenteau has significant long term strategic planning experience performing options analyses, permitting, design, construction, O & M activities for individual and phased infrastructure projects, primarily in the solid waste field. Projects have involved expansion permitting, cell construction, closure, active gas collection, remedial investigations, and remedial design. His experience ranges from CADD design, field construction oversight and contractor management, project engineering, and project planning and management. In addition, he is the Director of Risk Management, charged with development and implementation of risk management and mitigation strategies for the firm. Mr. Parenteau's experience includes work in Minnesota, Colorado, Iowa, Michigan, Maryland, North Dakota, South Dakota, Texas, Washington, West Virginia, Wyoming, and Taipei Taiwan.



EDUCATION

BCE, University of Minnesota

PSMJ Project Managers Boot Camp, Las Vegas, NV

Short-course on Slope Stability, University of Wisconsin-Madison

Certificate, Mechanical Drafting and Design, Hennepin Technical Institute

AREAS OF EXPERTISE

Long Term Strategic Planning
Risk Management
Landfill Permitting, Design and Construction
Remedial Design
Remediation System O&M
Expert Testimony

PROJECT EXPERIENCE

Canisteo Mine Pit. Project engineer for design and preparation of construction plans for a low head one-mile long siphon for mine pit dewatering.

Homestake Mining Company. Project engineer for closure of soft tailings basin. Involved in the determination of appropriate soils mix and placement procedures to avoid inversion of the cover soils into the waste. Project Engineer for design and construction of demolition debris disposal area related to mine closure and reclamation activities.

Potlatch Paper Sludge Landfill Closure. Project engineer for closure of sludge landfill involving "floating" the cover system above the waste using geotextile reinforcement.

Minnesota Steel, Inc. Project engineer for evaluation of new steel plant layout and related mine infrastructure as part of preparation of Environmental Impact Statement.

Phillips Petroleum. Project engineer during preparation of design and construction documents for multi-phase groundwater and free-product recovery system for large refinery in Texas. Project involved multiple gradient control and free product recovery wells, seep collectors, associated piping and treatment equipment.

REGISTRATION

Professional Engineer: MN (41243), MD (50381), MI (6201064928), TX (125450), WA (54796)

MEMBERSHIPS

American Society of Civil Engineers - Geotechnical Institute

MPCA – Closed Landfill Program – Flying Cloud Landfill. Project manager for multiphase investigation, design alternatives analysis, for options to consolidate the waste and improve the final cover system and gas extraction system at the Flying Cloud Landfill in Eden Prairie. Certifying engineer for construction bid documents, construction oversight and contractor management, as well as construction documentation report for \$15M project, involving relocation of 2 million cubic yards of waste, footprint consolidation from 90 acres to 60 acres, a new gas extraction system, and site restoration. This was a multi-year project adjacent to a residential neighborhood to one side, and the Flying Cloud Airport on the other.

Xcel Energy. A.S. King ADF, Multiple Construction Projects. Project engineer for six-acre Phase VI Cell 1 and two acre Phase V Cell 2 construction projects. Project features include temporary leachate lift station and connection to sanitary sewer, and composite liners with leachate collection systems.

Xcel Energy. Red Wing ADF, Multiple Construction Projects. Project engineer for West Cell Phase 6 & 7 construction totaling five acres, West Cell Phase 5, 6, and 7 closures, and East Cell Phase 1A construction projects. Features included a geosynthetic clay liner as a replacement for the typical clay barrier layer in the Phase 6 & 7 construction projects, new leachate sideslope riser system and force main connection to existing leachate management system in the Cell 1A construction.

Xcel Energy. Wilmarth ADF, Multiple Construction Projects. Project engineer for Cell 3, and 4 construction totaling five acres and two closure projects totaling four acres. Features include separate full cell secondary collection systems and separate lysimeters for the two cell construction projects.

Waste Management Inc. Central Disposal Landfill, Multiple Construction Projects. Project manager/project engineer for six cell construction projects and the construction of the first leachate storage pond/spray irrigation system permitted in the state of Iowa. The various cell construction projects encompass 35 acres of new lined disposal area. Tasks included preparation of bid documents, contract administration, contractor management, and coordination of field oversight activities.

K & W Landfill. Multiple Construction Projects. Project manager/project engineer for Phase II Cell 2, and Phase 3 Cells 1 & 2 construction projects. Provided on site construction oversight during the construction of the six-acre Phase II Cell 2 double composite geosynthetic liner system. Project manager for construction plan development for two six-acre cells in the Phase 3 portion of the site.

Dafter Landfill. Cell D Construction Documents. Project Manager for development construction documents for Cell D West. Construction included approximately six acres of composite liner and a pore drain system to alleviate potential uplift forces and increase the underlying clay's rate of strength gain due to consolidation. Also included temporary leachate collection sump manhole to allow subsequent expansion to the east.

Glen's Landfill. Multiple Construction Projects. Project manager for development of construction documents for the construction of Cell 3 Phases 1, 2, and 3 and Cell 4 Phase 1, totaling 22 acres of new lined disposal area. Cell 3 Phase 3 was a slope fill liner, which allowed subsequent filling over a non-Subtitle D lined area. All projects included a double composite liner system comprised entirely of geosynthetics

McDaniel Landfill. Multiple Construction Projects. Project Engineer for construction of three sidewall liner extension projects. Projects included preparation of bid documents; contract administration and coordination of field oversight activities for three separate clay sidewall liner extension construction projects.

Olmsted County Department of Public Works. Multiple Construction Projects. On-site field engineer for construction of 2.5-acre Ash Cell 2A liner system meeting requirements of Subtitle C. Included on-site soils and geomembrane documentation and testing, contractor management and preparation of certification reports.

Project manager for Ash Cell 3A liner construction (2.5 acres), Bypass Cell 3B liner (3 acres) and Bypass Cell 1B Closure (2 acres) construction projects. Tasks included preparation of bid documents, contract administration, contractor management, and coordination of field oversight activities.

Project engineer for Bypass Cell 4B liner construction (3 acres) and second phase of the Bypass Cell 1B closure which incorporated one acre of permanent closure and one acre of temporary closure to allow for potential expansion without the stranded costs of a composite cover system. Tasks included assistance with preparation of bid documents, contract administration, contractor management, and coordination of field oversight activities.

Mar-Kit Landfill Board. Multiple Construction Projects. On-site field engineer for construction of 3.5-acre Cell 1A/B liner system, lined leachate storage ponds and spray irrigation area. Included on-site soils and geomembrane documentation and testing, contractor management and preparation of certification reports.

Project engineer for Cell 3 liner construction (3.5 acres) that was done teaming with a local contractor and using the design-build project delivery method. Tasks included preparation of plans and specifications, contract administration, contractor management, and coordination of field certification activities.

Xcel Energy. Ash Landfill Permitting. Project engineer for solid waste expansion permits at the A.S. King coal ash disposal facility, and the Red Wing and Wilmarth RDF ash disposal facilities. The horizontal expansion at A.S. King was a CEC award-winning project and provided an additional seven years of site life. The east cell expansion at Red Wing provided additional eight years of site life, and the combined horizontal and vertical expansions at Wilmarth provided 10 years of additional site life.

Waste Management Inc. Central Disposal Landfill. MSW Landfill Expansion Permit. Project engineer for multiple expansions providing approximately 40 million cubic yards of disposal capacity. Includes vertical expansion above an unlined disposal area as well as horizontal expansions totaling 120 acres.

K & W Landfill. MSW Landfill Expansion Permit. Project manager for 30-acre horizontal expansion providing 49 million cubic yards of additional disposal capacity. Project involved double composite liner system comprised entirely of geosynthetic materials.

Dafter Landfill. MSW Landfill Expansion Permit. Project manager for permit modification. This modification allowed the site to construct the last cell in their current permit in a manner that would allow for subsequent cell development and still provide access to the leachate collection sump. The subsequent cell development was conceptually designed and planned to be incorporated into an expansion, but not yet permitted.

Project manager for expansion providing approximately four million cubic yards of additional disposal capacity. Project includes vertical expansion over unlined areas, and cell development and filling sequence that allows enough time for underlying very soft clays to develop enough strength to support the ultimate build-out of the site.

Nan Ya Plastics, Taipei, Taiwan. Industrial Waste Landfill Permit. Geotechnical engineer for proposed industrial waste landfill in a coastal setting. Also performed analysis of settlement, bearing capacity, and slope stability, which included seismic evaluation.

Olmsted County Department of Public Works. Kalmar Landfill Re-permitting. Project engineer for two solid waste re-permitting applications. Site includes MSW combustor ash disposal areas lined with a Subtitle "C" liner system, MSW disposal area lined with composite liner system, and demolition debris disposal area.

Polk County Solid Waste Department. Landfill Re-permitting. Project engineer for permitting of demolition debris disposal area on previously undisturbed portion of existing landfill site.

Mar-Kit Landfill Board. MSW Landfill Re-permitting. Project engineer for solid waste permit re-application.

Design incorporated first final cover system approved in Minnesota with a geocomposite drainage layer, which reduced capital costs due to the high costs of clean sand.

Central Sanitary Landfill. MSW Landfill Re-permitting. Various closure and expansion plans justifying alternative designs under stringent Act 641 Solid Waste Rules. Certification for Cell 3A, including double-composite liner.

Burlington Northern. Waite Park Car Shop Site. Served as Project Engineer prepared plans, specifications, and construction quality assurance plan for the construction and closure of a 2.5-acre, 50,000-cubic-yard composite contaminated soil containment cell at a Superfund site.

Project included composite liner system, leachate collection and detection systems, and composite cover system.

Devils Lake Landfill. Closure of existing landfill incorporating target range and trap shooting range as final use into design of the landfill cap, which included a geosynthetic liner, drainage layer, and cover.

Olmsted County Oronoco Landfill. Project Manager for ongoing 60-acre closure project, which involves evaluation of existing clay final covers and the potential for leachate extraction. Site evaluations of the feasibility for gas-to-energy and on-site treatment of leachate and condensate. The project also includes a 500 CFM active gas extraction system, grade correction of settled areas, and modifications to the surface water management system

Koochiching County Landfill. Project manager for 25-acre closure and active gas system project. Project included on-site waste consolidation, re-use of existing on-site clay cap and installation of new piping network, extraction wells, and blower flare for a gas collection system.

Ironwood Landfill. Project Manager for 13-acre closure project and remediation system modification. The project incorporated consolidation of the waste on site to reduce the footprint and provide grade correction. This project also involved use of a geonet geocomposite as an alternative to a granular drainage layer. The groundwater pumpout well and piping system were re-designed as part of this project.

Watonwan County Landfill. Project manager for 25-acre closure project. The project included on-site waste excavation and relocation and an active gas extraction system using a combination of new gas wells and modified existing deep passive vents. This closure project included the first geonet geocomposite drainage layer ever constructed in the Closed Landfill Program.

Wabasha & Geislers Landfills. Project manager for closure of Wabasha County site involving excavation and site restoration of the Geislers site. The waste was hauled to the Wabasha site as part of grade correction. Due to the site constraints the design incorporated site perimeter roads on the waste mass and involved a portion of the final cover engineered for a 3:1 slope.

Northwoods Landfill. Project engineer for the sites closure. The project incorporated consolidation of the footprint and incorporation of waste from a nearby VIC cleanup site. The project involved an FML cover, surface water management features and passive gas venting.

Houston County Landfill. Project manager for closure of this 8.5-acre site including an all-weather final surface allowing the sawmill that is currently operating on the site to use the waste area as a log storage area.

Expert Testimony

Cathy Olsen, et al. v. Ayres Associates, Inc., et al. & Karen Cossalter, et al. v. Ayres Associates, Inc., et al. Retained as an expert in a wrongful death and professional liability litigation related to an incident at a landfill site where four men succumbed to hydrogen sulfide fumes in a manhole and died as a result. The suit alleged that the engineering firm who prepared the record drawings was negligent.

Village of Hammond WI vs Ayers Associates, Inc. & CNA Insurance

Retained as an expert in a professional liability litigation related to the design, permitting and construction of an infiltration basin system for a waste water treatment plant for the Village of Hammond WI. The suit alleged that the due to the design professional's negligence, that the Village was entitled to damages amounting to approximately twice the design professional's liability insurance limits.

Svoboda Properties LLC, vs Halling Engineering

Retained as an expert in a professional liability litigation related to the design, permitting and construction of a gravel parking surface that was intended to function as a stormwater infiltration system and as a parking/storage lot surface.

CAROLYN PATULLO

Senior Compliance Specialist

Ms. Patullo has more than 10 years of experience providing environmental compliance consulting services to clients in multiple states and provinces throughout the US and Canada. Business sectors include manufacturing, food production, retail and solid waste.

EDUCATION

BS, Civil Engineering, North Dakota State University

SELECTED EXPERIENCE

Fargo Landfill – Fargo, ND

- Prepared Storm Water Pollution Prevention Plan (SWPPP) per North Dakota general industrial storm water permit (NDR05-0000).
- Prepared Spill Prevention Control and Countermeasure Plan (SPCC Plan).
- Assisted in preparing application for Title V air permit.
- Conducted Tier 2 landfill gas sampling and assisted with compliance and report documentation.
- Collected groundwater samples as required by solid waste permit.
- Analyzed and interpreted water quality data, and prepared hydrologic annual and semi-annual reports as required by solid waste permit.
- Provided construction oversight for a cell closure and geosynthetic liner installation during cell construction.

Target Corporation – All US and Canada

- Managed the air permitting, wastewater permitting and biomedical waste permitting programs for all stores, distribution centers and headquarter buildings in 49 states and 10 provinces.
- Managed hazardous waste permitting program for Canada operations.
- Wastewater: Evaluated state and local regulations with focus on photo lab and food operations wastewater sources. Obtained necessary permits; coordinated semi-annual wastewater discharge sampling at over 30 locations, and prepared quarterly, semi-annual and annual wastewater reports.
- Air Quality: Evaluated federal, state and regional regulations; obtained necessary permits and prepared emission inventory reports.
- Biomedical Waste: Evaluated state and regional regulations for U.S. pharmacy operations; determined environmental regulatory obligations, and obtained necessary permits.



AREAS OF EXPERTISE

NPDES permitting
EPCRA – Tier 2 and TRI
SPCC Plans/ASTs
Air Permitting
Environmental Monitoring
Systems

- Oversaw the development of SPCC Plans for distribution centers and headquarter buildings in multiple states.

Arctic Cat – Thief River Falls, MN

- Prepared Storm Water Pollution Prevention Plans (SWPPP) per Minnesota general industrial storm water permit (MNR050000).
- Prepared Spill Prevention Control and Countermeasure Plan (SPCC Plan).
- Assisted with the preparation of the State Disposal System (SDS) permit renewal application.
- Determined wastewater sampling locations and protocol. Developed facility Sampling Plan and Toxic Organic Management Plan as required by facility SDS permit.
- Prepared compliance calendars for two (2) manufacturing facilities.
- Developed Pollution Prevention Plan as required by the State of Minnesota per the MN Toxic Pollution Prevention Act.
- Evaluated hazardous chemicals for applicability to the Chemical Facility Anti-Terrorism Standards and prepared submittal as required by Department of Homeland Security.

Bobcat – North Dakota

- Prepared SWPPPs for several North Dakota manufacturing facilities.
- Prepared SPCC Plans for several North Dakota manufacturing facilities.
- Assisted with the application for a Minor Source Permit to Operate as a result of replacing and adding new emission sources.

LM Wind Power – Grand Forks, ND

- Prepared SWPPP for Grand Forks facility, and prepared No Exposure certifications for multiple temporary facilities in North Dakota.
- Prepared SPCC Plan for Grand Forks facility.
- Prepared Tier 2 and Toxic Release Inventory Reports as required by Emergency Planning Community-Right-To-Know Act (EPCRA).
- Prepared Biennial Waste Report as required by Resource Conservation and Recovery Act (RCRA) for Large Quantity Generators.

American Crystal Sugar Company – Minnesota and North Dakota

- Prepared SPCC Plans for multiple manufacturing facilities.
- Collected groundwater samples and conducted methane monitoring at multiple landfills in North Dakota and Minnesota.
- Analyzed and interpreted water quality data, and prepared hydrologic annual and semi-annual reports as required by solid waste permits.

Other Environmental Compliance

- Prepared Limited Environmental Compliance Assessments (LECA) for multiple clients in North Dakota, Minnesota, South Dakota and Missouri. LECAs were used to identify environmental permitting gaps.

- Provided in-house SPCC and SWPPP training for industrial clients.
- Conducted routine inspections for a construction/architectural materials manufacturing client per SPCC and SWPPP requirements.

HALEY ROBERTS

Project Manager/Chemical Engineer

Ms. Roberts is a chemical engineer with more than eleven years of experience in air quality permitting and compliance. Specifically, she has experience in Title V and construction permit applications and permit amendments, negotiating permit conditions with regulatory agencies, air dispersion modeling using AERMOD, air toxics analyses, health risk assessments, performing Best Available Control Technology (BACT) analyses, preparing emission inventories, and providing compliance assistance with current regulations and permits. Ms. Roberts also has extensive experience with ambient air monitoring and performing QA/QC audits associated with these projects. Additionally, she conducts air quality compliance audits for industrial clients throughout the country.



EDUCATION

BSChE, Chemical Engineering, Georgia Institute of Technology

REGISTRATION

Professional Engineer: Georgia PE035698

SELECTED PROJECT EXPERIENCE

Air Permitting and Compliance

Whiting Oil and Gas Corporation, Permitting & Compliance, Texas. Project Engineer on numerous projects for Whiting. The projects consisted of Texas Permit by Rule applications. Tasks for these applications included compiling emission calculations, including running the software program TANKS 4.0.9d and E&P Tanks, preparing the proper air permit application forms and ensured compliance with all applicable federal and state rules.

Whiting Oil and Gas Corporation, Permitting & Compliance, North Dakota.

Project Manager on numerous projects for Whiting. The projects consisted of permit applications for gas processing plants and compressor stations. Tasks for these applications included compiling emission calculations, including running the software programs TANKS 4.0.9d, E&P Tanks, and GLYCalc, preparing the proper air permit application forms and ensured compliance with all applicable federal rules. Air toxics modeling was also completed when required by North Dakota's Air Toxics Policy.

Whiting Oil and Gas Corporation, Permitting & Compliance, North Dakota, Montana. Project Manager on numerous projects for Whiting. The projects consisted of tribal registration applications. Tasks for these applications included compiling emission calculations, including running the software programs TANKS 4.0.9d and E&P Tanks, preparing the proper air permit application forms and ensured compliance with all applicable federal rules.

AREAS OF EXPERTISE

Air Permitting
Air Quality Compliance
Air Dispersion Modeling
Ambient Air Monitoring
Risk Assessments
Climate Change
QA/QC Audits

PROFESSIONAL MEMBERSHIPS

American Institute of Chemical Engineers
American Chemistry Society
Air & Waste Management Association
Professional Chemistry Fraternity Alpha Chi Sigma – Professional Branch
Society of American Military Engineers

TRAINING

Air Dispersion Modeling Training
PSMJ Project Management Training
Hazard Communication (US)/WHMIS (Canada)
Defensive Driving Awareness Training
HAZWOPER 40-Hour
HAZWOPER Refresher 8-Hour
Medical Monitoring
Respirator Fit Test

Oil and Gas Client, Permitting & Compliance, Modeling, North Dakota. Project Manager on project numerous air permit application for a gas processing and crude handling facility and compressor stations. Tasks for this application included compiling emission calculations, including running the software programs TANKS 4.0.9d and GLYCalc, preparing the proper air permit application forms and ensured compliance with all applicable federal rules. An air toxics analysis required by North Dakota's Air Toxics Policy was also completed for these projects. Refined criteria modeling using AERMOD was also completed for one of the projects.

Confidential Oil and Gas Client, Permitting & Compliance, North Dakota. Wenck prepared a construction permit application for a drill cutting and slop oil processing facility. Processes at the site included combustion, storage tank emissions and other process emissions. The application addressed various federal regulations and North Dakota's Air Toxics Policy and other State rules. Other tasks of this project included direct correspondence with state regulators and also completing the appropriate application forms.

Chemical Waste Management, Inc., Kettleman Hills Facility, Construction Permit Applications for New and/or Modified Emission Units, Kettleman Hills, California. Project manager responsible for preparation of various Authority-to-Construct permit applications for a Title V facility modification. Involved preparing applications and negotiating with the SJVUAPCD to finalize conditions incorporated into the Permits-to-Operate. Projects included conversion of a Class II industrial and Class III municipal solid waste arid landfill into a bioreactor, adding a gas collection system to the Class II/III landfill to control NMOC emissions from the decomposition of Class III MSW, increasing daily tonnage limits, increasing operating schedule, and modifying internal combustion engines permits. Projects have been subject to NSPS, NSR, BACT, and other state and federal air standards. [11/2005-present]

Chemical Waste Management, Inc., Kettleman Hills Facility, Various Air Permitting and Regulatory Support, Kings County, California. Project Engineer for many air permitting actions over a four-year period serving as an air consultant. Prepared Authority to Construct (ATC) permit applications, negotiated with regulatory agencies (primarily but not limited to the San Joaquin Valley Unified Air Pollution Control District), and helped the facility implement and comply with the final Permits to Operate (PTOs). Permitting actions include: conversion of B-19 landfill from Class I/II to Class II/III, conversion of B-19 landfill to a bioreactor, installation of a Gas Collection and Control System on the B-19 landfill, construction of a new 44M cubic yard Class II/III landfill (B-17), expansion of the Class I/II B-18 landfill to add an additional 15.6M cubic yards of airspace, various changes to internal combustion engine permits, etc. Several of these permitting actions involved purchasing and implementing Emission Reduction Credits (ERCs) for NOx and VOC emissions to comply with offset requirements in the San Joaquin Valley airshed.

Chemical Waste Management, Inc., Kettleman Hills Facility, Title V Air Emissions Permit Application, Kings County, California. Project engineer responsible for updating emissions inventory to determine the actual and potential emissions from the active treatment units at the facility. To predict VOC emissions from the active face of the Class I landfills, a diffusion model was developed based upon the US EPA's approved methods for estimating emissions from land treatment operations. A compliance plan was prepared to maximize operational flexibility, while still complying with all state, federal, and Air Quality Management District regulations, including the Off-Site Waste and Recovery Operations NESHAP applicable to the facility. The Title V permit application was updated, revised, and resubmitted to the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD).

Chemical Waste Management, Inc., Kettleman Hills Facility, Miscellaneous Compliance Support, Kings County, California. Provided consulting to help the facility comply with associated requirements with the NSPS WWW for MSW landfills, and annual emissions inventory reporting.

United States Army, Air Program Compliance- Ft. Gillem-Ft. McPherson, Georgia. Provided air program compliance support to Fort McPherson and Fort Gillem. As part of the air compliance support for these two installations, Wenck maintains and updates the synthetic minor air permits for each facility. Wenck is responsible for gathering monthly information required for the Synthetic Minor Title V Permits for Fort Gillem and Fort McPherson. This information includes monthly generator run time logs, fuel usage reports, Stage II Vapor Recovery Daily Inspection Forms for the AAFES stations, VOC Chemical usage, and the natural gas and LPG usage for boilers.

Additionally, Wenck handles all the submittals to Georgia Environmental Protection Division including semi-annual reports for each installation and permit modifications. [2008-2012]

Delta Air Lines, Inc., Air Quality Gap Assessments, Nationwide. Performed environmental air compliance assessment at the Delta Hartsfield-Jackson Atlanta International Airport (ATL) and Salt Lake City, Utah Airport (SLC). As part of the Wenck audit team, performed a week-long site tour to review operations, activities, and layout of ATL and SLC operations. After the audits, Wenck communicated all requirements, findings, and noted strengths and/or deficiencies with site personnel and prepared an assessment report.

Daktronics Inc., Air Permitting and Compliance – Minnesota. Provides ongoing compliance assistance for recordkeeping and reporting activities for the facility. This includes monthly emission calculations of VOCs, HAPs and the NESHAP emission rate, semi-annual NESHAP Subpart M compliance reporting, semi-annual deviations reporting, and the air emissions and air toxics inventory reports.

Georgia Alternative Energy Cooperative, Air Permitting and Compliance – Sycamore, Georgia. Wenck managed the environmental permitting of a 56 MMGal/yr corn-based ethanol plant. Permitting for plant construction and startup included synthetic minor air quality permitting. [2008]

Kraft Pulp and Paper Mill. As part of an air permit application for converting a Kraft Pulp mill to chemical cellulose pulp, performed a Best Available Control Technology analysis given that the modification required a PSD review for ozone. The application was declared complete upon first submittal.

Malt-O-Meal Company, North Carolina. Prepared the initial permit application for the facility as well as the permit application for a subsequent plant expansion. This included the preparation of the application, emissions calculations, and application forms.

PPG Aerospace, Inc., Air Permitting Support- Huntsville, Alabama. Provided to permitting support to the PPG Aerospace's Huntsville, AL facility specializing in the manufacture of transparencies for the aerospace industry. As part of this project, Wenck performed a site visit, assessed changes since the previous permit renewal, and prepared all required permit application forms for the Synthetic Minor Operating Permit (SMOP) renewal application.

Air Dispersion Modeling

Confidential Energy Client. Assisted on a project to perform an ambient air quality analysis for a facility in Minnesota. The primary purpose of the project was to complete a modeling analysis using AERMOD primarily for the 1-hour NO₂ and SO₂ NAAQS standards. This project allowed the client to make future capital improvement planning decisions for the plant. (2012)

Confidential Clients. Assisted with a modeling project for two clients with facilities located next to each other. Modeling was performed for the 1-hour SO₂ and NO₂ NAAQS. Duties included managing data requests for the two companies and coordinating model results to each client. (2012)

Confidential Energy Client, Minnesota. Prepared Computer Dispersion Modeling Protocol for PM_{2.5} (24-hour basis) and SO₂ (1-hour basis). This protocol shall describe the proposed modeling methodology and input data, in accordance with the most current MPCA modeling guidance for Title V air dispersion modeling analyses. Completed a modeling analysis for the SO₂ and PM_{2.5} emission sources and compared the results to the 1-hour SO₂ and 24-hour PM_{2.5} NAAQS. (2013)

Confidential Energy Client, Minnesota. Completed a modeling analysis using AERMOD for NO₂ (1-hour basis) NAAQS standards. The project was to assist the client in making future equipment purchase and operation decisions. (2014)

Ambient Air Monitoring and Risk Assessments

Chemical Waste Management, Inc., Kettleman Hills Facility, RCRA Ambient Air Monitoring Program, Kings County, California. Project manager for an ambient air monitoring program required by the facility RCRA Part B permit issued by the California District of Toxic Substances and Control (DTSC). Program involves ambient air monitoring at three fixed and one mobile station near the facility property boundary. Methods include: Aldehydes by TO-11A, VOCs by TO-14A, Pesticides and PCBs by TO-4A, Metals and PM10 by EPA method 40 CFR 50, Appendix J. 24-hr integrated samples are collected every 12 days. Assisting in the development and implementation of a comprehensive monitoring program including a detailed sampling plan, standard operating procedures, sampling equipment specifications, site personnel training, quality assurance, auditing on-site monitoring station setup, support, laboratory coordination, and periodic agency reporting.

Chemical Waste Management, Inc., Kettleman Hills Facility, Health Risk Assessments, Kings County, California. Managing the preparation of several expansive health risk assessments based on collected ambient air samples and presenting the findings in a final report for agency submittal. Also, manage and assist with annual screening health risk assessments for the facility.

Chemical Waste Management, Inc., Kettleman Hills Facility, PCB Congener Study, Kings County, California. Project manager for this project. Associated with a TSCA landfill expansion and renewal of the facility's TSCA permit, the USEPA required the Kettleman Hills Facility to conduct a study to determine if past and current disposal activities of TSCA designated waste adversely impacted human health and the environment. The project involved designing a plan to sample and analyze ambient air, surficial soil, and vegetation. The resulting data was used to conduct a human health and ecological risk assessment to determine potential exposure and impacts to off-site receptors.

Climate Change

Metropolitan Airports Commission (MAC), Greenhouse Gas Emissions Inventory – MSP Airport, Minneapolis, MN. Member Wenck team that assisted the MAC with preparation of a voluntary GHG emissions inventory for the Minneapolis-St. Paul International Airport (MSP). The project involved quantifying GHG Protocol Scope 1, 2 and various Scope 3 CO2 emissions at and associated with MSP from: MAC-controlled sources (facilities, MAC-operated on-airport vehicles and equipment, etc.), airlines and other tenants, and the general public while at MSP. Annual emissions were calculated for 2005 to establish a baseline year consistent with the Minnesota Next Generation Energy Act of 2007. Emissions were also calculated for 2007 as the most recent full year with data available at MSP. The Wenck report went a step beyond an inventory and calculated the CO2 emissions reductions associated with many of the capital improvement projects completed at MSP over the past few years.

Waste Management, Inc. – Kettleman Hills Facility, GHG Flux Emission Rate Determination, Kettleman Hills, CA. Project manager for this project. The Wenck team, along with its project partners, to perform a GHG emissions study using dynamic flux chambers to measure the six Kyoto Protocol GHGs, and precursors, from the active face of a hazardous waste landfill. The data is used to help Waste Management develop GHG emission rates to quantify their GHG footprint nationwide.

United States Army, GHG Emissions Inventory, Ft. Gillem – Ft. McPherson, GA. Technical lead on the Wenck team that is currently working to complete a GHG emission inventory for the Environmental Office at Fort Gillem, GA. This project is being performed under Executive Order (EO) 13423 – Strengthening Federal Environmental, Energy, and Transportation Management, dated January 24, 2007. EO 13423 sets forth the Federal Agency goals for improving energy efficiency and reducing GHG emissions. Once completed, Fort Gillem will be the third U.S. Army Installation worldwide to have done a GHG study. Fort Gillem, a sub-installation of Fort McPherson, is a very complex site with various army units, tenants, contractors, and retired military utilizing the Garrison daily. For the study, Wenck is focusing on Scope 1 and Scope 2 emissions of all six GHGs.

Wenck, Corporate GHG Emissions Registration and Reporting to The Climate Registry, Nationwide Offices.

Assisted with Wenck's voluntarily committed to measure, independently verify, and publicly report its GHG emissions on an annual basis utilizing The Climate Registry General Reporting Protocol.

Prior to Joining Wenck

Delta Air Lines, Inc., Air Quality Support, Nationwide. Provided general air quality compliance support for Delta's corporate environmental services department. This support included permitting assistance, regulatory applicability research, and policy manual revision. [11/2005 – 12/2006]

Comair, Air Quality Compliance Support, Cincinnati, Ohio. Project engineer to ensure compliance with EPA regulations as well as any applicable state regulations. Prepared emission inventory data for Comair's operations at the Cincinnati/Northern Kentucky International Airport for use by Comair for the facility's annual emission inventory survey. Provided air quality programs needs assessment for Comair's operations nationwide. Conducted regulatory applicability assessments and air emissions data tracking system reviews, providing recommendations. [11/2005 – 11/2007]

Atlantic Southeast Airlines, Inc., Air Quality Compliance Support, Nationwide. Prepared annual Clean Fueled Fleet Program and emission inventory reports for ASA's Atlanta, Georgia, operations. Prepared emissions inventories for commercial air transportation and aircraft maintenance facilities. Provided air quality regulatory compliance support. Performed material property calculations to assess whether new materials to be used in aerospace applications at each facility comply with federal NESHAP regulations and state regulations, and maintenance of the environmental project web site Air Quality Tracking System (AQTS). [02/2006 – 11/2007]

Confidential Retailer, Compliance Support, Atlanta, Georgia, and Nationwide. Project engineer for environmental compliance support including assistance with permits and responses to inspection reports from regulatory agency. Prepared approximately 40 permit applications in throughout California's air districts. [08/2006 – 06/2007]

Coca-Cola Enterprises, Air Compliance, Atlanta, Georgia. Project engineer to ensure compliance with EPA regulations as well as any applicable state regulations. This project includes a study to ensure that specific states have adopted the EPA's standard and that fuel filters can be recycled at the client's facilities. A 1998 EPA letter indicated that properly drained metal fuel filters meet the regulatory definition of scrap metal and therefore, if recycled, are exempt from regulations as a hazardous waste. An additional study was added to determine whether fuel can be added to used oil for recycling in the specific states where they have operations. [11/2005-12/2005]

Coca-Cola Enterprises, Stormwater and Hazardous Waste Program, Nationwide. Provided internal hazardous waste management guidelines and prepared NOR documents for state regulating boards. [05/2006-12/2006]

Lockheed Martin Company, Groundwater Remediation, North Charleston, South Carolina. Worked on data plots and reports for sodium lactate injections for remediation of chlorinated volatile organic compounds (CVOCs) and chromium (VI) in groundwater. [06/2006]

Confidential Industrial Client, Phytoremediation, Salisbury, North Carolina. Project engineer assisting strategic planning on the use of phytoremediation to remediate 1,4-dioxane contamination in the seepage. [2007]

Confidential Industrial Client, Groundwater and Soil Investigation and Remediation, North Carolina, South Carolina, and Canada. Project engineer performing site investigation at various polyester manufacturing plants; assisting on monitoring of key chemical and MNA parameters; assisting MNA data evaluation for site contaminated with 1,4-dioxane, chlorinated solvents and other site-specific contaminants. [2007]

Confidential Industrial Client, GIS and Geodatabase Management, Various Sites in USA and Canada. GIS work

assisting to facilitate the organization and analysis of hydrological and chemical data for industrial sites located in North Carolina, South Carolina and Canada. Assisting in developing custom queries and specialized data analysis program using Microsoft Access to facilitate data evaluation through the database and relates to GIS software (ArcView 3.3, ArcGIS 8.3). Data are compiled, related to spatial data, and analyzed in map and cross-sectional views to identify the extent of pollution and investigate data gaps for future assessment. [2007]

Publications

Roberts, Haley H., and Sherman, Clayton J. Particulate Matter Sampling and NAAQS Update. Article published in the Air Pollution Control Journal, June 2013.

CHARLES ROGERS II, J.D.

Environmental Analyst/Risk Management Counsel

Chad Rogers joined Wenck as part of the real estate transaction group. As a project manager and environmental analyst, he primarily focuses on conducting Phase I Environmental Site Assessments and managing Phase II Environmental Site Assessments. He also has a background working with legal issues and began a role as Wenck's Risk Management Counsel in 2016. He holds a Juris Doctorate from William Mitchell College of Law and a Business Administration Degree from the University of St. Thomas.



EDUCATION

Doctor of Jurisprudence, William Mitchell College of Law – St. Paul, MN

BA, Business Administration, University of St. Thomas – Minneapolis, MN

Admitted to the Bar by the Minnesota State Board of Law Examiners,
October 26, 2012

PROJECT EXPERIENCE

Project Manager/Environmental Analyst

- Managed Phase II Environmental Site Assessments involving well abandonment, soil sampling, groundwater sampling, soil vapor sampling, visual mold inspections, lead-based paint assessments, and indoor radon gas sampling at both residential and commercial properties
- Reviewed and edited Phase II Environmental Site Assessment reports regarding PCB wipe sampling, sub-slab soil vapor sampling, indoor air monitoring, and asbestos-containing materials surveys
- Managed, reviewed, and edited hundreds of Phase I Environmental Site Assessments
- Conducted site reconnaissance at agricultural, commercial, industrial, and institutional properties
- Reviewed and edited tire recycling facility permit applications
- Prepared real estate transaction screens

Risk Management Counsel

- Co-developed and implemented an internal risk strategy
- Reviewed, edited, and negotiated hundreds of client agreements
- Provided counsel to Wenck's project managers and team members
- Established written agreements with Wenck's subcontractors

Legal Assistant & Summer Associate

- Conducted hearing, deposition, trial, and arbitration preparation
- Drafted pleadings and attended a trial and a mediation
- Performed an extensive document review for a divorce case
- Drafted a document retention policy
- Researched securities laws and breaches of fiduciary duties
- Prepared a presentation on FINRA arbitration

AREAS OF EXPERTISE

Real Estate Due Diligence
Phase I Environmental Site Assessments
Phase II Environmental Site Assessments
Grant Assistance
Environmental Law

- Organized fundraisers for John Choi for Ramsey County Attorney
- Drafted and served subpoenas
- Provided counsel to clients under a lawyer's supervision
- Hired and trained new employees

Intake Volunteer

- Conducted preliminary interviews for divorce and custody disputes
- Conducted secondary interviews for immigration and landlord/tenant disputes
- Referred clients to shelters, volunteer lawyers, and government agencies
- Performed conflict checks

Business Law Extern

- Researched wind projects in Ohio, New Mexico, Texas, and Minnesota
- Researched Midwest ISO and the interconnection queue
- Conducted presentations for management
- Drafted and revised Private Placement Memoranda

KIMBERLY SANDERS, EIT

Senior Client Services Manager

Ms. Sanders has over 15 years of experience in civil and environmental project/program management and business development.

EDUCATION

MS, University of Alabama-Birmingham - Birmingham, AL

BCE, The Georgia Institute of Technology - Atlanta, GA

TRAINING/CERTIFICATIONS

Fundamentals of Engineering Exam
(EI No. 11016)

40-Hour OSHA Hazardous Waste Health and Safety Training

8-Hour OSHA Hazardous Waste Health and Safety Supervisor Training

10-Hour OSHA Construction Safety & Health Training

Project Management/Change Management Training

PROJECT EXPERIENCE

Client Service Management

Identified, developed and maintained clients in the state, municipal and commercial market sectors to achieve sales and revenue goals while delivering high quality projects. Coordinated proposal activities and approved content and quality of proposal presentations and submittals for targeted clients. Negotiated concurrence with client on proposed project objectives, scope, quality, project team, schedule, budgets and price. Coordinated regulatory agency contacts needed to obtain permits and approvals required by law, rules and regulations. Initiated/directed/coordinated project activities and assures project team understanding of project objectives, scope, quality, schedules and budget. Provided professional leadership in civil and environmental engineering and sustainability, and participated in professional organizations and activities. Utilized CRM software to manage client relationships. Presented plans, objectives and progress of current and targeted clients to CEO, COO and Business Team leads.

Program/Project Management

Prepared and conducted a work program for unincorporated Fulton County's Environment Division including the development of environmental policies, environmental review of zoning applications / plans, comprehensive planning, management of County environmental projects and environmental education initiatives. Implemented departmental initiatives and represented the County on such matters; provided recommendations on environmental issues and policies. Presented an analysis of the environmental impacts of development with respect to existing environmental conditions to the Fulton County Board of Commissioners at zoning hearings. Managed all aspects of the County's remediation projects including contaminated soil excavation/disposal, groundwater monitoring well installation, contractor oversight and coordination with the Georgia Environmental Protection Division Land Protection Branch. Assigned, monitored and evaluated the work of assigned staff including 5 environmental planners, 4 environmental education



AREAS OF EXPERTISE

Client Service
Management
Business Development
Civil/Environmental
Engineering
Project Management
Environmental Assessment
Remediation
Sustainable
Redevelopment
Community Relations

PROFESSIONAL MEMBERSHIPS

Villages at Carver YMCA
Board
Brighten Academy Charter
School
Georgia Brownfield
Association
Air and Waste
Management Association

coordinators and one administrative professional. Maintained relationships with other County departments, outside agencies, and citizens.

Environmental Engineering

Project tasks included excavation of potentially contaminated soils and chemical sewers, demolition of building structures and foundations, horizontal well abandonment, well extension/lowering, underground storage tank removal, borrow area excavation, hazardous waste management and construction of a RCRA-equivalent cover. Prepared Design Change Notices (DCNs), answered subcontractor Requests for Information (RFIs), reviewed field engineering reports, supervised excavation and demolition subcontractors; coordinated review of Subcontractor submittals, coordinated with other Rocky Mountain Arsenal engineers/departments and Client and Regulatory Agency representatives concerning the design and operations of the project and reviewed survey data packages. Presented project status to the client and Regulatory Agency representatives as required.

Prepared the design for the South Plants Remediation Project (300-acre site) including the excavation of potentially contaminated soils, building demolition, excavation of building foundations, excavation of chemical sewers, abandonment of monitoring wells and placement of a low permeability soil cover over the entire site. The design included field investigations, calculations of excavation and borrow material volumes; calculations of storm water runoff, design of drainage channels, permeability studies for the soil cover, preparation of project specifications in CSI format and the methodology and planning of field activities. Participated in meetings with the Client and Regulatory Agencies throughout the design process.

ROWDY SCHMIDT

Construction Manager

Mr. Schmidt's areas of expertise are construction management and oversight. As a construction manager with Wenck, he has been responsible for managing construction observation and quality control for several municipal projects, including a \$2 million municipal street reconstruction project and a \$250,000 city park project. Mr. Schmidt is experienced reviewing plans and specifications, supervising the completion and accuracy of record plans, reviewing and revising final drawings, reviewing and approving pay requests, and many other tasks related to construction management.



EDUCATION

BA, Construction Management, University of Minnesota

United States Air Force

Minneapolis Drafting School, Certificate of Drafting

PROJECT EXPERIENCE

United States Air Force, Contract Manager

- Inspected and managed over \$8.5 million in projects
- Coordinated and directed pre-construction meetings
- Assured that the record plans were complete and accurate
- Prepared plans and specifications as part of a design team
- Developed, managed and applied a warranty program for all projects on the base

Otto Associates Engineering and Land Surveying, Project Manager

- Reviewed plans and specifications prior to construction and obtained all necessary permits
- Supervised the completion and accuracy of record plans.
- Review and revise final drawings as well as develop quantity spreadsheets and cost estimates
- Reviewed and approved all pay requests
- Managed worker productivity, as well as safety and quality of construction
- Scheduled survey crews for all construction staking
- Assured that all daily/weekly inspection logs were complete and accurate
- Coordinated each phase of construction with developer, contractor and cities

AREAS OF EXPERTISE

Construction Management
Municipal Construction
Oversight
Landfill Construction
Oversight
Erosion/Sediment Control
Oversight

TRAINING

AutoCAD and Eagle Point
MnDOT Certification for
Bituminous Street 1
MnDOT Certification for
Concrete Field 1
MnDOT Certification for
Aggregate Production
Erosion and Stormwater
Management Certification
40 Hour OSHA Hazardous
Waste Operations and
Emergency Response
Nuclear Gauge Safety and
Use
Construction Surveying -
GPS

Wenck, Construction Manager

- Part of the design team and management of quality assurance for a design/build project involving site grading, sewer and water construction, and street construction. (Pine City Clinic)
- Managed the construction observation and quality control for a \$2 million street reconstruction project in Windom, MN. Work included: Concrete pavement, sewer and water installation, and traffic control in assure residents were able to safely drive to and from their residents.
- Prepared site plans and managed the construction staking as well as construction oversight and quality control for a \$250,000 city park for the City of Delano. Work included: Site excavation, Placement of concrete slab and curbs, storms sewer installation, playground assembly, and site restoration.
- Pine Bend Landfill – Responsible for construction oversight and monitoring, documentation and reporting on the installation of a new HDPE Condensate FM. Duties included: daily field reports, construction observation, nuclear density testing and surveying (GPS).
- Mar-Kit Landfill – Responsible for the oversight and reporting of a composite lined landfill cell. Inspected and documented the installation of the base liner system, GCL, granular drainage layer and leachate collection piping.
- Waste Management, Inc., Elk River Landfill – Assisted in construction oversight and monitoring, documentation and reporting on a 20-acre landfill closure construction project. Duties included: overseeing buffer soil placement, HDPE geomembrane and geonet/geocomposite installation, cover soil placement, and various other site improvements. Performed liner installation documentation and daily field reports.
- Shingle Creek Restoration Project – Project managed the construction and quality control for the Restoration of one mile of Shingle Creek. Project included: Clearing and grubbing, Site excavation, bank stabilization, and site restoration and erosion control.
- Waste Management, Inc., Dickinson County Landfill – Responsible for the oversight documentation, and reporting of the installation of a new gas and leachate system. Duties included: construction observation, scheduling, daily field reports, weekly construction meetings, nuclear density testing and surveying (GPS).
- Managed the construction observation, construction surveying and quality control for a \$1.2 million sewer and water utility project in Corcoran, MN. Work included: sanitary sewer and water trunk line installation and street restoration.
- Managed the survey team for a preliminary survey for the design of a \$4 million street and infrastructure improvement project in the City of Delano, MN. Duties include: assuring the completeness and accuracy of the preliminary survey.

TODD SHOEMAKER, PE, CFM

Principal Water Resources Engineer

Mr. Shoemaker has 15 years of experience in water resources and environmental engineering. His water resources experience includes watershed and stormwater management; hydrologic, hydraulic and water quality computer modeling; floodplain management and regulation; wetland restoration and permitting; and streambank stabilization. His environmental engineering experience includes establishing and managing a \$5 million inflow and infiltration program for the City of Dubuque, IA.

EDUCATION

MS, Civil and Environmental Engineering, University of Wisconsin at Madison

BS, Civil Engineering, Environmental Engineering Certificate, University of Wisconsin at Madison

REGISTRATION

Professional Engineer in Minnesota & Iowa
Certified Floodplain Manager (CFM)

Projects

Hydrologic, Hydraulic, and Water Quality Computer Modeling

Farney Creek Dam, Washington Co., MN. Mr. Shoemaker served as project manager and lead engineer to study the feasibility of removing an earthen dam. The dam outlet pipe was rusted and partially corroded, so it needed to be replaced or the dam removed altogether. Mr. Shoemaker evaluated six different options ranging from simple lining of the outlet pipe to dam removal and replacement with a new stream.

City of Fort Dodge, IA. Mr. Shoemaker created HEC-RAS, HydroCAD, P8 and XP-SWMM models for the Soldier Creek, bioretention and Badger Creek projects. HEC-RAS was used for the Soldier Creek project to certify “no-rise” in the 100-year flood elevation. HydroCAD was used for hydraulic design of two bioretention basins. P8 was used to evaluate pollutant removal of two bioretention basins and an expanded wet pond. XP-SWMM was used to evaluate high water levels before and after installation of in-line channel weirs within Badger Creek.

City of Dubuque, IA. Mr. Shoemaker developed a 600-acre hydrology and hydraulics model using XP-SWMM to investigate flooding of a land-locked basin. He used 1D and 2D elements of the model to simulate surface flow into and out of the land-locked basin, which was used to show neighbors the source of flooding and where water went when it overflowed. Mr. Shoemaker evaluated several alternatives to reduce flooding: pumping, gravity flow, filling the low area, and using earthen berms to cut-off contributing flow paths. The recommended solution was a gravity flow system with a backflow preventer.



AREAS OF EXPERTISE

Watershed management,
design and planning
Hydrologic and hydraulic
computer modeling
Floodplain management
and regulation
Stream stabilization and
restoration
Watershed permitting and
development rules
Site design
Wetland restoration and
permitting
Hydrologic monitoring

PROFESSIONAL MEMBERSHIPS

MN Association of
Floodplain Managers
IA Floodplain &
Stormwater Management
Assoc.

Mr. Shoemaker is currently working on a 2D model of the downtown Millwork District. Street flooding has flooded buildings in the last two years, so Mr. Shoemaker is using the 2D capability of XP-SWMM to determine the source of flooding and simulate potential solutions.

City of Davenport, IA. Mr. Shoemaker developed a 65-square mile hydrology and hydraulics model using the EPA SWMM computer model. The model predicts high water levels, flow rates, and velocities for current and anticipated future land use conditions. Mr. Shoemaker worked with Wenck GIS staff to seamlessly merge land-use information from GIS into the SWMM computer model. The model will be used to identify stream reaches with high erosion potential and may serve as an update to the City's Flood Insurance Rate Map produced by FEMA.

Coon Creek Watershed District (CCWD). Mr. Shoemaker worked with Wenck GIS staff to update the existing CCWD HydroCAD model subwatershed maps and integrated the new GIS maps with an XP-SWMM model. The XP-SWMM model allows the CCWD to more accurately predict the high water elevations due to additional capabilities of XP-SWMM compared to HydroCAD. The XP-SWMM model is a "living" model that is updated as new development is proposed and better information becomes available.

Mr. Shoemaker served as the project engineer for the CCWD non-degradation study. Mr. Shoemaker developed a P8 model for the entire watershed for 1988, current, and future conditions. Total suspended solids runoff load reductions were applied to developed areas based on the expected removal efficiency of in-place BMPs required by CCWD rules.

Mr. Shoemaker served as the project engineer for the CCWD watershed assessments in the Sand Creek, Lower Coon Creek, and Glen Creek subwatersheds. He created P8, XP-SWMM, and HydroCAD models to assess existing pollutant loading, flooding, and how proposed stormwater management practices could improve each.

Mr. Shoemaker conducted an infiltration study within the CCWD. Three monitoring sites were chosen to better understand the infiltration capacity of underlying soils. Data obtained from pressure transducers at each site was used to better estimate infiltration rates in the Anoka sand plain.

Pelican River Watershed District (PRWD). Mr. Shoemaker designed a storm water detention pond and outlet structure. The pond design had to incorporate future runoff from the expansion of County Highway 6 and a 22-acre residential development. The pond was designed to PRWD standards for water quality and rate control.

Mr. Shoemaker created an XP-SWMM model to evaluate potential downstream impacts caused by the filling of a wetland. As part of future expansion, the Detroit Lakes airport proposes to fill a portion of a wetland upstream of a lake and the Pelican River. The XP-SWMM model was constructed to determine what impact the filling of the wetland would have on discharge, bounce, and the duration of inundation of the downstream water bodies. The XP-SWMM model predicted little to no impact on downstream water bodies but did indicate flooding on the wetland to be filled due to the decrease in storage.

FEMA Letter of Map Revision (LOMR). Mr. Shoemaker created an XP-SWMM computer model to revise FEMA floodplain boundaries within a large portion of the Lower Rum River watershed. The watershed area consisted of approximately 15 square miles and was previously studied by FEMA as a non-detailed Zone A floodplain. The study numerically defined the floodplain boundary and assigned base flood elevations throughout the watershed.

Mr. Shoemaker delineated subwatershed boundaries; obtained ditch, culvert, and topographic survey information from various sources; created and executed the computer model; and mapped the predicted flood elevations to confirm the model accuracy.

The Lower Rum River Watershed Management Organization, Minnesota Department of Natural Resources, and FEMA each conducted independent reviews of the study to confirm its accuracy. Mr. Shoemaker participated in public information, Planning Commission, and City Council meetings as a part of the review process.

FEMA Conditional Letter of Map Revision (CLOMR). Mr. Shoemaker obtained a CLOMR for a developer who desired to fill within the FEMA-designated floodway. According to FEMA rules, Mr. Shoemaker used the computer model HEC-RAS to evaluate the impact of the proposed fill. The computer model indicated a shift in the 100-year and 500-year floodplain and the 100-year floodway for Moccasin Creek in Aberdeen, SD. This shift allowed for the residential development to occur without FEMA requiring flood insurance for each future homeowner.

Metropolitan Council Environmental Services (MCES). South Saint Paul Forcemain Improvement (SSPFI) Project. Mr. Shoemaker completed the engineering hydraulic analysis resulting in issuance of a No-Rise Certificate for the proposed air release valve south of the Pigs Eye Wastewater Treatment Plant. The certification process followed guidance by the Federal Emergency Management Agency (FEMA) under the National Flood Insurance Program (NFIP). The HEC-RAS models were obtained from MnDNR and modified to reflect the structure modeled as an obstruction.

City of Delano. The City has a history of severe flooding problems due to poor drainage and the effects of the Crow River, which bisects the town. Mr. Shoemaker developed an XP-SWMM computer model covering approximately 600 acres. The model evaluated three conditions: existing agricultural land use, proposed residential development, and improvements to the watershed following residential development. City planners and developers used this model to manage stormwater and future development.

Mr. Shoemaker is currently working on the design of a stormwater pumping station for the City. He is developing an XP-SWMM model for the east side of the city to determine what pump size is required to achieve the project goals.

Prior Lake-Spring Lake Watershed (PLSLWD). Mr. Shoemaker assisted the Project Engineer for the PLSLWD ongoing Outlet Channel Operation and Maintenance Program.

The 2002 Outlet Model Calibration Study used measured data to calibrate the PLSLWD's XP-SWMM model. Future land use characteristics were then applied to the calibrated model to determine future Prior Lake water surface elevations.

The 2002 Panama Avenue Wetland Model used the model developed for the 2002 Outlet Model Calibration Study but refined one sub-watershed to show the effect of a new outlet structure for that sub-watershed. The model showed that water levels in the wetland could be increased to gain flood storage yet maintain wetland hydrology and vegetation.

Watershed clients. Mr. Shoemaker is familiar with a variety of rainfall-runoff computer models. Through his work with watershed districts, Mr. Shoemaker has used and is able to efficiently evaluate output from HydroCAD, XP-SWMM, P8, PondNet, HydraFlow, PondPack, and TR-55 computer models.

Watershed Management Design and Permitting

Pond Inventory and Assessment, City of Eden Prairie, MN. The City of Eden Prairie has over 900 wetlands and ponds in their stormwater management system. Starting in 2009, Wenck began assisting the City in evaluating the effectiveness of these ponds. Mr. Shoemaker originally served as the project manager and developed methodologies for conducting the assessment. The project is now in its fifth phase as we work toward assessing all ponds in the City. Mr. Shoemaker was responsible for organizing as-built information, field inspecting the basins to identify maintenance needs, surveying the basins to collect information for hydraulic and water quality purposes, modeling the drainage system using P8 Urban Catchment Model, and inventorying and reporting of the results. The inventoried basin information is used in a city-wide P8 model where undertreated watersheds can be identified for future projects to reduce watershed total phosphorus loading to lakes and streams.

Timber Creek North Vacuum Dredging, City of Eden Prairie, MN. Mr. Shoemaker served as the project manager

and lead designer for a pond sediment removal project. Wenck previously studied the pond and determined that accumulated sediment should be removed to improve its pollutant removal performance. Wenck also found, however, that the accumulated sediment was contaminated and thus removal and disposal was quite expensive. After researching alternatives, Mr. Shoemaker recommended the use of vacuum dredging, which is not as disruptive or expensive as hydraulic dredging. With vacuum dredging, only non-consolidated sediment can be removed from the bottom of the pond. This method was approximately 1/3 the cost of traditional methods and allowed for quicker permit approvals as well.

Iron-Enhanced Sand Filter, City of Eden Prairie, MN. Mr. Shoemaker served as project manager and lead designer for a 300-foot long iron-enhanced sand filter around the perimeter of this pond. Wenck previously studied this pond and determined that accumulated sediment should be removed to improve its pollutant removal effectiveness. To maximize pollutant removal, Wenck suggested adding an iron-enhanced sand filter and acquired grant funding to aid the City in implementing the filter. Wenck and the City have since monitored filter performance for two years, and data indicates the filter is achieving approximately 85% removal of dissolved phosphorus.

Iron-Enhanced Sand Filter, Capitol Region Watershed District. Mr. Shoemaker served as project manager and lead designer to two different types of iron-enhanced sand filters around the perimeter of Williams Street Pond. The pond is located directly upstream of Lake McCarrons in Roseville, MN, so Mr. Shoemaker worked with the Capitol Region Watershed District to maximize pollutant removal in the pond. Accumulated sediment was dredged from the pond, and then iron-enhanced sand filters were installed on either side of the pond outlet structure. Monitoring data from 2016 indicates approximately 70% removal of dissolved phosphorus.

Haber Pasture, Ames, IA. Mr. Shoemaker served as the project engineer to evaluate and design water quality improvement practices for this portion of the Iowa State University campus. Mr. Shoemaker created a hydrologic and hydraulic computer model to determine flow rates and volumes of runoff directed to the site. He then evaluated infiltration, filtration and extended wet detention practices to improve water quality treatment. Mr. Shoemaker recommended extended wet detention for final design due to existing soils, pollutant removal efficiency, and cost.

City of Eden Prairie Town Center Watershed Assessment. Mr. Shoemaker assisted the City in developing a plan to incorporate green infrastructure into areas where redevelopment is expected to occur. The Southwest Light Rail will have a station near Eden Prairie's Town Center, which the City expects to stimulate redevelopment projects. The watershed assessment determined existing pollutant loading and identified areas where stormwater management practices could be implemented in the future. A mix of tree trenches, infiltration trenches, pervious pavement, stormwater planters, and enhanced sand filters were recommended.

The study was expanded to include the nearby Eden Prairie Center mall. Similarly, Wenck identified numerous stormwater practices that could be implemented with future redevelopment and quantified their benefit on downstream water resources.

City of Eden Prairie Iron-enhanced Sand Filter. Mr. Shoemaker served as the Project Manager for the installation of an iron-enhanced sand filter on an existing stormwater pond. Pond 22-13-B is directly upstream of Staring Lake, so Wenck identified it as a good location for an iron-enhanced sand filter, which has been shown to remove dissolved phosphorus. The filter is approximately 320 feet long and 10 feet wide and treats the first one-half inch of runoff from the watershed. Construction will be complete in fall 2014.

City of Fort Dodge, IA. Mr. Shoemaker led a multi-disciplinary team among multiple jurisdictions and organizations to develop multiple water quality improvement projects. One phase of the project was to install multiple practices (ponds, bioreactors, saturated buffers, and enhanced sand filters) in the Badger Lake watershed to improve water quality in the lake. The other phase of the project was to stabilize a massive slope failure on Soldier Creek, stabilize other parts of Soldier Creek, meander a section of Soldier Creek, and install an infiltration/filtration practice upstream of Soldier Creek. Mr. Shoemaker coordinated field work, hydraulic and water quality modeling,

preparation of design plans, permitting and stakeholder involvement. Construction on Soldier Creek, bioretention basins, and Badger Creek will be complete in 2016.

Washington County, MN Public Works. Mr. Shoemaker assists County engineers in the implementation of stormwater management practices to satisfy the requirements of local cities and watershed districts. Most recently, Mr. Shoemaker designed stormwater practices for CSAH 15 that was slated for turn lane expansion and a mill-and-overlay. Practices included biofiltration swales and surface infiltration trenches.

Capitol Region Watershed District (CRWD). Mr. Shoemaker assisted CRWD staff in evaluating three re-development sites in St. Paul according to current and proposed CRWD standards. Mr. Shoemaker utilized a variety of BMPs (green roof, infiltration, underground storage) to satisfy current CRWD standards. It was determined, however, that the cost of these BMPs was unreasonable relative to the rest of the development. The same three sites were then evaluated according to revised CRWD standards. It was determined that the revised standards could be satisfied at a much more reasonable cost to the developer.

Mr. Shoemaker continues to serve the CRWD as permit engineer. He assisted the District in developing new watershed rules based on the outcomes of the study discussed above. As permit engineer, he assists the CRWD staff in managing and planning within the watershed. Mr. Shoemaker provides recommendations to the Board of Managers based on the District's regulatory programs. He performs the primary technical review of rate control and water quality treatment detention facilities, infiltration Best Management Practice implementation, hydrologic structure design, wetland preservation and replacement, and erosion and sediment control measures required in developing areas.

City of Mound Redevelopment. Mr. Shoemaker assisted MCWD staff in the design of BMPs for re-development projects in the City of Mound. Mr. Shoemaker designed two BMPs to reduce sediment and nutrient loading.

The first BMP was an infiltration trench that receives runoff from a parking lot that previously directed untreated runoff to Langdon Lake. The trench was retrofitted into the site and designed such that all runoff from a 0.75-inch storm would be filtered before discharging to Langdon Lake. The trench was seeded and planted with native vegetation to create an aesthetically pleasing stormwater management BMP. Mr. Shoemaker also provided construction management oversight during project construction.

The second BMP was a parking lot with pervious concrete that reduces the amount of sediment discharging into Lake Minnetonka. The parking lot was previously graveled with undefined boundaries. The project served to reduce sediment loading to the lake and also improve the aesthetics of the park within which it was located. Due to high groundwater, the parking lot was designed with a draitile to ensure drawdown between storm events. It is now the largest pervious concrete parking lot in the State of Minnesota. Mr. Shoemaker also provided construction management oversight during project construction.

Middle St. Croix Watershed Management Organization (MSCWMO). Mr. Shoemaker serves as the permit review engineer for MSCWMO. He assists MSCWMO staff in managing stormwater runoff within the watershed and evaluating proposed developments according to MSCWMO rules. A major focus is to ensure the proposed St. Croix River Bridge project meets or exceeds MSCWMO rules.

Minnehaha Creek Watershed District (MCWD). Mr. Shoemaker assists the MCWD Engineer in managing and planning within the watershed. The District has a drainage area over 180 square miles and several member municipalities. Mr. Shoemaker meets weekly with the District Technician to provide recommendations within the District's regulatory programs. He performs the primary technical review of rate control and water quality treatment detention facilities, infiltration Best Management Practice implementation, hydrologic structure design, wetland preservation and replacement, and erosion and sediment control measures required in developing areas. Mr. Shoemaker also evaluates proposed wetland impacts and application of the Minnesota Wetland Conservation Act.

Coon Creek Watershed District. Mr. Shoemaker assists the Coon Creek Watershed District (CCWD) Engineer in managing and planning within the watershed. The District has a drainage area over 100 square miles and four-member municipalities. He provides recommendations within the District's regulatory programs and performs technical review of rate control and water quality treatment detention facilities, infiltration Best Management Practice implementation, hydrologic structure design, wetland preservation and replacement, and erosion and sediment control measures required in developing areas.

Pelican River Watershed District. Mr. Shoemaker serves as the PRWD permit engineer. He works closely with PRWD staff and applicants to develop site designs that satisfy PRWD rules and applicant needs. He performs primary technical review of rate control and water quality treatment detention facilities, infiltration Best Management Practice implementation, hydrologic structure design, and erosion and sediment control measures required in developing areas.

Mr. Shoemaker presented a 4-hour BMP seminar to developers and engineers working within the PRWD. The presentation focused on alternative stormwater management practices and how these practices could be designed to satisfy PRWD rules.

Mr. Shoemaker continues to serve the PRWD as permit engineer. He is assisting the District in developing new watershed rules, which include an emphasis on volume control (infiltration).

Shingle Creek and West Mississippi Watershed Management Commissions. Mr. Shoemaker also serves in a similar capacity for the Shingle Creek and West Mississippi Watershed Management Commissions (SC-WM WMC). The drainage area of these two watersheds is nearly 100 square miles and includes 10-member municipalities. As with the CCWD, he oversees the SC-WM WMC regulatory programs and provides primary technical review for developing areas. He is responsible for the implementation of the Minnesota Wetland Conservation Act as these watersheds act as the Local Government Unit for several member municipalities.

Stream Stabilization and Bioengineering

City of Ames, IA. Mr. Shoemaker served as project manager and design engineer for a 2,000-foot channel stabilization project. The project involved removing dozens of mature trees, stabilizing the channel toe and banks, and designing a drop structure to dissipate energy. Most of this work occurred on private property, so it was imperative to listen, react and cooperate with landowners.

City of Fort Dodge, IA. Mr. Shoemaker led a multi-disciplinary team to stabilize a massive slope failure on Soldier Creek. The slope failure was approximately 100 feet long and 75 feet high. Mr. Shoemaker coordinated field work, hydraulic and water quality modeling, preparation of design plans, permitting and stakeholder involvement.

Webster County, IA. Mr. Shoemaker led a multi-disciplinary team to stabilize over 3,000 feet of Badger Creek. Mr. Shoemaker determined the eroded creek banks were the main source of sediment to the downstream Badger Lake. Bioengineering solutions using tree removal, bank reshaping, and encapsulated soil lifts were designed to stabilize the banks and improve water quality within Badger Lake. Mr. Shoemaker coordinated field work, hydraulic and water quality modeling, preparation of design plans, permitting and stakeholder involvement.

Dupont-Pioneer Seed, Johnston, IA. Mr. Shoemaker was the engineer of record for stabilization of over 2,000 feet of stream bank on the Dupont-Pioneer property. Using bioengineering techniques, Mr. Shoemaker oversaw the preparation of design plans and permitting for the project.

Highland Ravine. Mr. Shoemaker serves as the Project Manager and lead design engineer for the stabilization of Highland Ravine in St. Paul, MN. When complete, the project will stabilize over 2,000 linear feet of eroded and incised channel using bioengineering techniques. Proposed practices include bioengineering, pipes on steep slopes, a dry pond to slow water and prevent downstream flooding, and selective tree thinning. The project will be constructed in the fall of 2014.

197th Street Ravine. Mr. Shoemaker assisted the Carnelian-Marine-St. Croix Watershed District (CMSCWD) in

developing a stabilization plan for an eroded ravine. The ravine drains to a seepage wetland and then to the St. Croix River, a Wild and Scenic River. The stabilization plan includes a rain garden at the top of the slope to retain and slow runoff and bioengineering techniques to stabilize the existing ravine and install a new pipe within adjacent city right-of-way to carry the majority of runoff. The project will be constructed in the fall of 2014.

Lower Minnesota River Watershed District (LMRWD). Mr. Shoemaker completed HEC-RAS models for the Eden Prairie Bluff Stabilization project. Mr. Shoemaker incorporated newly surveyed river cross-sections into the existing HEC-RAS model to more accurately predict flood elevations and water velocities. This information aided in the design and selection of the recommended option.

Minnehaha Creek Gorge Stabilization. Mr. Shoemaker assisted the MCWD Engineer in developing a conceptual plan for reducing erosion within the gorge and providing stormwater management practices for the Minnesota Veterans Home. Mr. Shoemaker developed a plan to include infiltration practices on the Veterans Home property to reduce runoff rates and volumes before entering the creek below. Mr. Shoemaker also conducted a sediment stability analysis for pre- and post-construction conditions. Mr. Shoemaker used the HEC-RAS computer model to show necessary locations for grade control and erosion protection.

City of Chanhassen Ravine 2 Stabilization. Mr. Shoemaker assisted the City of Chanhassen in the design of a ravine stabilization project. Mr. Shoemaker used bioengineering techniques to stabilize a natural ravine experiencing excessive erosion. Mr. Shoemaker used a combination of riprap drop structures, native plantings, and side slope protection (dead trees) to stabilize the ravine. Mr. Shoemaker used the computer model HEC-RAS to assist in the design requirements.

City of Brooklyn Park Shingle Creek Restoration. Mr. Shoemaker completed plans and specifications for restoration of Shingle Creek in the City of Brooklyn Park. Mr. Shoemaker worked to design a stream restoration project to stabilize eroding streambanks, improve water quality, and enhance habitat and aesthetics. The design modifies the stream from a ditched to a meandered stream reach with a native vegetation buffer stabilizing the stream banks and rock vane riffles providing grade control, reaeration, and new in-stream habitat.

Inflow and Infiltration Reduction

City of Dubuque, IA. Mr. Shoemaker was responsible for establishing and managing a \$5 million inflow and infiltration program for the City of Dubuque, IA. Mr. Shoemaker coordinated a property inspection program, smoke testing, dyed water testing, sanitary sewer televising, pipe priority ranking, and capital improvement projects. Through these efforts, the City was able to reduce their inflow and infiltration (I&I) flow by over 2 million gallons per day.

Mr. Shoemaker was also responsible for the City's compliance with an EPA-directed Consent Decree. He regularly communicated and submitted reports to EPA and Iowa DNR staff.
Wetland Restoration and Design

Nachbar – Huss wetland restoration. Mr. Shoemaker designed and coordinated the review of an 80-acre wetland restoration project in Scott County, Minnesota. He designed approximately 45 acres of new wetland through the breaking of drain tile and construction of a reinforced outlet berm. He created a computer model to simulate existing and proposed hydrologic conditions. The plan provides for the restoration of various wetland types as well as approximately 35 acres of upland buffer. Mr. Shoemaker prepared the permit application, coordinated with local, state and federal agencies for review of the permit, and attended public meetings during the review process.

City of Delano. Mr. Shoemaker guides development in the City to integrate wetland restoration and conservation with development and stormwater management requirements. City ordinance requires that future development consider wetland restoration as part of their overall development.

Tapestry Development. Mr. Shoemaker completed the preliminary design for the restoration of two wetland basins. Both basins had been drained and farmed for decades, so excavation and revegetation plans were developed to create open-water wetlands with a variety of vegetation. Each plan was created to conform to WCA rules for wetland restoration.

Site Design

SCI Recycling. Mr. Shoemaker completed a site design to improve stormwater management at the facility. Currently, runoff collects at a low spot on the site, which renders that area of the storage yard useless. The stormwater management plan developed by Mr. Shoemaker will improve the collection and conveyance of stormwater runoff across the site. It will also provide water quality treatment to an area that has previously not been treated.

Metro Metals. Mr. Shoemaker completed an innovative site design to improve stormwater management at the facility. Currently, runoff collects at two low spots on the site, which renders these areas useless during wet periods. The stormwater management plan developed by Mr. Shoemaker will collect and convey stormwater runoff to an underground storage system filled with tire shreds. The tire shreds are sufficient for stormwater management purposes due to their relatively high void space, but they also provide sufficient strength for material storage on the ground surface above the tire shreds. The system also provides water quality treatment to an area that has previously not been treated.

Doboszanski and Sons, Inc. Mr. Shoemaker completed the site design for a new 30-acre facility in Corcoran, MN. The innovative design combined stormwater facilities and wetland mitigation to preserve usable space on the site. The stormwater facilities were designed for water quality and quantity and included a draitile system to provide additional filtration prior to discharge from the site. Mr. Shoemaker designed a high-quality wetland replacement area as mitigation for wetland impacts. The wetland replacement area consisted of Type 2 and 3 wetland with wetland seed and planted live plugs.

Kaplan Metal Reduction Company. Mr. Shoemaker designed a storm sewer layout, dry pond, and underground storage for a 0.86-acre industrial site in St. Paul. Site limitations required construction of an underground storage area and surface pond to satisfy the City's water quantity standards.

City of Delano. Mr. Shoemaker designed a stormwater management plan for the City's new water treatment plant. The plan was developed to control stormwater runoff to existing runoff rates by using an existing stormwater pond on an adjacent site. The existing pond was not designed to accommodate stormwater from the water treatment plant site, so Mr. Shoemaker prepared calculations showing the necessary pond expansion to meet rate control requirements. He also evaluated and sized storm sewer to adequately convey runoff to the pond.

Minnesota Wetland Conservation Act Agent

City of Delano. Mr. Shoemaker reviews land development applications for compliance with the Minnesota Wetland Conservation Act (WCA). He is responsible for the review and official approval of wetland boundaries and mitigation plans. He regularly cooperates with local, state and federal agencies to review development impacts to wetlands. He provides recommendations to the City Engineer, Planning Commission members, and City Council.

Shingle Creek and West Mississippi Watershed Management Commissions. Mr. Shoemaker is also the WCA Agent for all land development within these two watersheds. With cooperation from local, state and federal agencies, he is responsible for the review and official approval of wetland boundaries and mitigation plans. He provides recommendations to the Watershed Engineer and Watershed Board of Commissioners.

Hydrologic Monitoring

The Green Institute. Mr. Shoemaker assisted the Kestrel Design Group in developing a monitoring system for a green roof at The Green Institute in Minneapolis. Mr. Shoemaker created a hydrologic model to predict the amount of runoff from the green roof. He then designed a plastic barrel with a circular orifice and overflow to catch and record the amount of runoff generated from the green roof.

Shingle Creek Watershed District. Mr. Shoemaker assists the SCWMC in their annual lake and stream monitoring programs. Monitoring activities include installation, maintenance, and operation of approximately 10 automated flow gauging and water quality sampling stations. Lake monitoring includes surface and bottom layer sampling, as well as dissolved oxygen and temperature profile collection at several sites.

He also was the primary sample and data collector in the SCWMC Chloride TMDL study. He is familiar with sampling protocol, conductivity data collection, and operation of monitoring equipment.

City of Bloomington. Mr. Shoemaker installed and operated three storm sewer monitoring sites to evaluate a recurring flood problem. The equipment was installed at strategic sites to evaluate volume and depth of runoff through the storm sewers. It was necessary to install equipment that could determine reverse flows since it was assumed that downstream high water levels caused the flooding of the problem area.

DIANE SHORT

Analytical Chemistry & Contamination Expert

Ms. Short has extensive experience as an analytical laboratory chemist. She has run methods for GC, GC/MS, LCMS, and most inorganic and wet chemistry analyses. She has reviewed, prepared and/or re-written the QA/QC sections of project documents: Quality Assurance Project Plans (QAPP), QA Manuals, Sampling and Analysis Plans (SAP), Standard Operating Procedures (SOP), Laboratory Analytical Plans (LAP), Work Plans, Data Validation/ Data Management Plans, Natural Resource Damage Assessment (NRDA) Plans, Chemical Quality Management Plans and Work Plans, other QA-related documents and reviews ISO 9000, 14001 and ASQC/ANSI documents.

EDUCATION

BA, Chemistry, University of Utah

Ph.D., Physical Organic Chemistry, University of Oregon; Isotope Effects on Peroxyester Thermal Decomposition and Photoelectron Spectroscopy of Cyclobutanes

Postdoctoral Research, Plasma Chemistry and Gas-Phase Ionic Reaction Kinetics, Colorado State University

Postdoctoral Research, Chemistry of Coal, SRI International

PROJECT EXPERIENCE

Established and led an environmental chemistry company for more than 27 years. She has performed extensive data validation for EPA, DOE, DOD, city and state agencies, private parties under CERCLA, RCRA, Emergency Response, Natural Resource Damage. Ms. Short has performed data review of water, soil, sludge, mixed waste (radiochemistry), air, plant, fish, and animal tissue for low, medium and high levels referencing documents from all of the major federal, state and local agencies. Validation is performed using, but not limited to, the following programs and corresponding protocols: CLP Statements of Work and EPA Functional Guidelines for Data Validation - Organic and Inorganic; SW 846 methods and QC, Air Force AF-CEE, Navy CLEAN, HAZWRAP, Department of Defense, Corps of Engineers, Department of Energy and private party Standard Operating Procedures.

As new methods and instrumentation arise, she has developed comprehensive data validation procedures which include all applicable QC from the EPA CLP and regulatory agency guidance, from the QC inherent in the methods, and using the Data Quality Objectives set for the project.

Ms. Short has designed or modified database management systems for the QA/QC function for the several clients including one full state-wide system. She uses the database to track, manage and interpret data for the needs of clients. Ms. Short and her colleague Dr. Huntington have designed and implemented semi-automated QC review and full tracking programs referencing these protocols.



AREAS OF EXPERTISE

Quality Assurance/Quality Control (QA/QC)
ISO 9000 and ISO 14000 Auditing and Consulting
Database Design and Management
Environmental Chemistry and Data Validation/ Data Usability
Statistical Analysis
Litigation and Regulatory Review Support
Public Involvement/ Community Relations Support

Ms. Short also leads training programs for clients in setting data quality objectives, quality assurance and data usability. Her training courses also include change management tools and communication skills. Ms. Short provides technical support for public involvement and community relations programs by recognizing and integrating the emotional concerns of the public into the education process. Her certifications include consulting in the change management process and business coaching.

JORDAN SHUCK

GIS Specialist

Mr. Shuck's work experience with Wenck has primarily focused on GIS support for municipalities, water resources and remediation projects. While at the University of Minnesota-Duluth he graduated with a major in Geography with a strong emphasis in Cartography and GIS. He is the GIS manager at Wenck and has overseen large geospatial projects in during that time. He specializes in ArcGIS mobile, ArcGIS online and spatial and 3d analyst.

EDUCATION

BA, University of Minnesota-Duluth, Duluth, MN

PROJECT EXPERIENCE

City of Delano. GIS support for the Delano Water Treatment Plant.

- Creation of a City-Wide GIS
 - Developed the work flow to create the GIS, software platform, data to be surveyed, collection of data using tablets, geodatabase design, ArcGIS on-line and mobile applications
 - Worked directly with City and Wenck Staff to get all of the necessary public works information surveyed. Created layers for the GIS using publicly available data.
 - Populated the GIS geodatabase with other needed information, i.e. inverts, rings, project name, builds etc.
 - Created an online GIS system for the City and Wenck staff to view, edit and manipulate.
 - Trained city staff to create hyperlinks between sanitary sewer mains and their specific televised videos.
 - Coordinated surveying and training of City Staff/Interns
 - Created mobile application for the city staff to do the inspections and follow through on work order items.
 - Trained and continue to train public works, interns and other office staff on using GIS both in the office and with mobile applications
 - Worked directly with city staff to determine what data they wanted collected as well as what attribute data they wanted to be able to collect while conducting inspections
- GIS support for the Delano Northwest Interceptor
- GIS support for the 20-Year Master Water Plan
- GIS support for the 20-Year Transportation Plan
- GIS support for the Trunk Highway 12 Reconstruction showing Realignment and all utility relocations
- Fire Department Mapbook with addresses for 911 Response



AREAS OF EXPERTISE

ArcGIS Advanced 3.3-10.4
 ArcGIS Online
 ArcGIS Mobile
 AutoCAD 2014
 Collector for ArcGIS
 ArcGIS Spatial Analyst
 ArcGIS 3d Analyst
 ArcSWAT
 Trimble R8 and R10
 GPS Trimble GEO XT

City of Corcoran.

- Creation of a GIS of utility information for Public Works
 - Used existing information from Wenck as-built survey information to get survey quality horizontal and vertical accuracy. Project consisted of sanitary sewer, water system and easements.
 - Populated the GIS geodatabase with other needed information, i.e. inverts, rings, project name, builds etc.
 - Linked the projects to the record plans for each of the projects.
 - Created an online GIS system for the City and Wenck staff to view, edit and manipulate.
 - Added fields in the layers for a work order management system, i.e. maintenance required, last flushed, last televised, last inspected etc.
 - Created mobile application for the city staff to do the inspections and follow through on work order items.
- Parcel Mapping
- Floodplain and National Wetlands Inventory Mapping

City of Dayton.

- Creation of a GIS for Public Works and Planning
 - Developed the work flow to create the GIS, from software platform, to data to be surveyed, collection of data using tables, geodatabase design, ArcGIS online and mobile applications
 - Populated the GIS geodatabase with surveyed utility information as well as zoning, land use, buildable acres, wetlands, LiDAR etc.
 - Created an online GIS system for the City and Wenck staff to view, edit and manipulate.
 - Created mobile application for the city staff to be able to edit data from their tables/smart devices

City of Greenfield.

- GIS analysis and mapping for the Comprehensive 20-Year Land Use Plan
- Growth Impact analysis for Varying Densities Land Use Plan
- Other mapping including Parcel Mapping, Floodplain, Major and Minor Watershed Mapping

City of Eden Prairie Stormwater Pond Inventory. The project included inventorying and assessing stormwater basins that are located on City property, within City right-of-ways or under drainage and utility easements. To date 496 ponds have been evaluated over a five-year period. Assessment included surveying, evaluating maintenance needs, sedimentation issues and pollutant removal performance through field visits. After the data was collected, GIS was used to determine; permanent and flood storage areas and volumes, sediment volumes, pond bathymetry, subwatersheds, as well as landuse, soils and other input data for the modeling. The data collected during field visits was used to create P8 and BATHTUB models to assist the city in evaluating which stormwater basins were critical to city drainage and which basins need to be expanded or cleanout to meet state water quality standards for both volume and pollutant removal.

City of Aberdeen.

- GIS support for Infiltration and Inflow Study
- Converting Autocad drawings of sewer lines, manholes, lift stations, monitoring locations, land use, streets and parcels into a GIS. Converting from a local coordinates system to a State Plane Coordinate System
- Creation of sewersheds and calculating flow estimates based on land use areas in each sewershed

GIS Needs Assessment, Kandiyohi County.

- Research and compile a list of applications other counties in the state utilized GIS
 - Conducted phone interviews of any county that had a GIS department
 - Determined if these applications would be applicable to Kandiyohi County
 - Based on the interviews, research and prior knowledge of the GIS system and GIS needs assessment was created for Kandiyohi County.
 - Created a Feedlot map of Kandiyohi county

Twin Cities Army Ammunition Plant (TCAAP), Arden Hills, MN.

- Created a soil database with tens of thousands of records that compare the soil data to various standards. This database has then been imported to GIS to be able to visually identify the exceedances. This database has now been divided into National Guard owned property and the Ramsey County owned property. The National Guard uses this data to create different land use controls on their property. For the Ramsey County property, it has been an integral tool for the cleanup and remediation of the 427-acre property to residential standards.
- GIS mapping of Soil and Water Sampling for annual reports
- Spatial data analysis of environmental sampling results to aid property transfer
- Use of GPS to find soil sampling locations, on TCAAP site
- Verification of data between databases and GIS data
- GIS mapping of Diesel Range Organics (DRO) for the entire TCAAP site and DRO mapping of each individual Environmental Site Assessment (ESA) Section
- GIS mapping of Benzo [a] Pyrene (BAP) Equivalents for the entire TCAAP site and BAP mapping of each individual ESA Section.

Classified Wetland Pipeline Inventories. GIS Project manager for wetland inventories for two large pipeline corridor projects. Wenck conducted GIS mapping and inventory of a 300- and 350-mile pipeline projects in North Dakota. GIS staff created data dictionaries in Trimble for field staff to collect pertinent data in the field. A daily file geodatabase was created for a seamless import from the field data, and a daily QA/QC was also conducted of the field data collected. At the end of the field season, hundreds of maps were produced to display the delineated wetlands throughout the corridor.

Canadian Pacific Railway Emergency Response.

- Created a GIS Mobile system for Emergency Response incidents such as derailments.
 - Use tablets or smart devices to survey information such as rail car locations, delineation of spill, incident command post spill booms etc. Data is synced in real time to GIS personnel in offices for instant map creation.
- Worked with Canadian Pacific Railway and the Minnesota Regional Railroads Association to produce a National Railroad Resources Map.
 - Coordinated with other large railroads such as BNSF, Union Pacific and Canadian Pacific to ensure that all of their Emergency Response Resources were accounted for and in the correct geospatial location

Environmental Impact Statement – Minnesota DNR –Keetac U.S. Steel and MN Steel Industries.

- Manipulation and mapping of land cover types, vegetation types, DNR Natural Heritage, wetlands, water resources, soils and mined areas.
- Analysis of past and future cumulative wetland impacts based on historical and existing land cover mapping, wetland delineations and past and future land disturbances.
- Analysis of past and future cumulative impacts to threatened and endangered plant species (Botrychium) based on use of DNR Natural Heritage Information System Element Occurrence data to assess 'preferred habitat' for the species of interest.
- Hydrologic (surface water) analyses related to water appropriation and indirect wetland impacts. Quantification of project impacts to various natural resources.
- Developed a file structure from the beginning of the project that would provide logical file organization and, thus, improve the ease of data transfer.

Weston Solutions (EPA-START Hurricane Katrina Relief Effort). Worked directly with the EPA Reconnaissance, Household Hazardous Waste, Emergency Response, NOAA and Coast Guard to develop maps to assist them with their daily efforts in the relief effort. Utilized daily GPS data along with other various layers to create numerous Map-books to assist in the recovery of "open items". Creation of metadata for numerous data layers created while the EPA was working on the relief effort. The metadata created met the Federal Geographic Data Committee standards for the National Spatial Data Infrastructure.

Wastewater Infrastructure Alternatives Analysis.

- Projects include: Diamond Lake, City of Burtrum, City of Larsmont, Central Lakes Region Sanitary District, Pelican

- River Watershed District and the City of McGrath.
- Mapping of all properties within the project boundary.
 - Dividing the project into individual service areas based on topography and geography
 - Linking the septic inspection spreadsheet to GIS to create Compliance Status Maps

Chippewa River - Turbidity TMDL Study. Completed GIS spatial analysis to prepare land use, crop practice, land slope and soil erodibility for the SWAT hydrologic, hydraulic and water quality model for the watershed. Mr. Shuck responsibilities also include preparation of GIS data for public meetings using visualization techniques; and processing of multiple land use coverages (8 difference County Land Use files, National Wetland Inventory (NWI), and the National Agricultural Statistics Service Land Cover) across the 2,000-square mile watershed with spatial accuracy to increase the robustness of the final TMDL report and aid understanding of the relationships between in-stream turbidity.

Capitol Region Watershed District (CRWD). Villa Park Wetland Management Plan – Phosphorus Reduction. Completed GIS analysis by subwatershed using MCES 2005 land use/land cover and 2007 survey information. Subwatershed specific information was used to set the watershed phosphorus loads using unit area loading rates (UALs) in terms of pounds of phosphorus per year (lb/ac/yr). UALs were selected based on literature values that best represented land use (direct storm water runoff) conditions in the watershed. His project responsibilities also included processing of historical bathymetry information.

Comfort Lake Forest Lake Watershed District: Watershed and Lake Water Quality Modeling Investigation for the Development of a Watershed Capital Improvement Plan. Completed GIS analysis by subwatershed using spatial coverages of land use from Washington and Chisago County land use, National Wetland Inventory (NWI), and USGS National Hydrography Dataset (NHD). Subwatershed specific information was used to set the watershed phosphorus loads using unit area loading rates (UALs) in terms of pounds of phosphorus per year (lb/ac/yr). UALs were selected based on literature values that best represented land use (direct storm water runoff) conditions in the watershed. GIS analysis directly linked to modeling analyses for the study using water budget, and a lake response model (BATHTUB) to assess effects of load changes.

Non-degradation Studies.

GIS support for cities of Eden Prairie, Chanhassen and Andover Non-degradation Study

- Determining imperviousness on a subwatershed basis using Spatial Analyst

TMDL Studies. GIS analysis and ArcSWAT modeling for TMDL studies including City of Lakeshore, City of Stillwater, Prior Lake/Spring Lake Watershed District, Clearwater River Watershed District, Rice Creek Watershed District, Crow River Watershed, Elk River Watershed and Buffalo Creek Watershed District.

Prior Lake/Spring Lake Watershed District.

- GIS support for the watersheds TMDL Study
- Easement mapping for the Prior Lake outlet channel

Shingle Creek Watershed Management Commission.

- GIS support for project reviews
- GIS support for Shingle Creek Stream Assessment
- Mapped the centerline migration of Shingle Creek

Minnehaha Creek Watershed District.

- GIS support for Minnehaha Creek Stream Assessment
- Drainage and access easement mapping
- GIS support for Water Resources Management Plan Update
- Assisting in Water Quality Sampling for Minnehaha Creek Watershed District

Minnehaha Creek Watershed District – Lake Shoreline Stabilization Project.

- Modeled the Fetch, Wave Height and Wave Period for Lake Minnetonka using Spatial Analyst and 3D Analyst. Created Shoreline Classifications types of Lake Minnetonka using High Resolution Oblique Imagery. Combined the Fetch, Wave Height, Wave Period and Shoreline Classifications to determine high risk erosion areas.

Soil Erosion Assessment Method. Worked with Water Resources Department to develop a GIS work flow to create a standardized calculation of the Modified Universal Soil Loss for Watersheds. Created a Land Cover file using multiple years of National Agricultural Statistics Service Land Cover and the National Wetland Inventory. Developed a Soil Delivery Potential layer derived from the SSURGO Soils Database by combining Erodibility Factor and Runoff Potential. Combined Land Cover, Slope, Erodibility Factor, Runoff Potential and Soil Delivery Potential to create the Modified Universal Soil Loss. Method was performed for Elk River Watershed, Chippewa River Watershed, Clearwater River Watershed and the Lac Qui Parle Watershed Studies.

Pelican River Watershed District.

- GIS mapping and analysis

Coon Creek Watershed District.

- GIS support for CCWD's Non-degradation Study
 - Determining imperviousness on a subwatershed basis using Spatial Analyst
 - Various mapping and GIS analysis

GIS Specialist support for various watershed district projects.

- West Mississippi River Watershed Management Commission
- Sauk River Watershed District
- Clearwater River Watershed District
- Carver County
- Rice Creek Watershed District
- Comfort Lake/Forest Lake Watershed District
- Capitol Region Watershed District
- Shell Rock River Watershed District

Fibrowatt.

- GIS Analysis to determine an optimum location for a turkey waste to energy location in North Carolina as well as Southeastern United States and South United States.
 - Created a county-based GIS database with 18 separate columns based on different years of turkey/broiler production, number of farms per county and litter generation.
 - Use of GIS Spatial Analyst to determine optimum locations based on transportation
 - Used the maps created from the database and the geographic analysis to determine the prime locations by county.

Confidential Project Environmental Review and Permitting. Air Emissions Risk Analysis (AERA). Completed GIS analysis for project team providing environmental assistance to obtain environmental permits and approvals necessary to proceed with construction of a Confidential Project. Mr. Shuck's responsibilities included DNR lakefinder bathymetry processing to determine lake specific hydraulic characteristics; use of Minnesota DNR Lake Watershed Delineation (Lakeshed) Project and USGS National Hydrography Dataset (NHD) coverages for hydrologic characteristics for used in air permitting, and air emission risk analysis modeling.

Pope/Douglas Solid Waste Management. Air Emissions Risk Analysis (AERA). Completed GIS analysis for project team providing environmental assistance to increase the capacity of municipal waste combustor facility in Alexandria. Mr. Shuck's responsibilities included DNR lake-finder bathymetry processing to determine lake specific

hydraulic characteristics; use of Minnesota DNR Lake Watershed Delineation (Lakeshed) Project and USGS National Hydrography Dataset (NHD) coverages for hydrologic characteristics for used in air permitting, and air emission risk analysis modeling.

Department of Commerce – Environmental Impact Statement.

- Responsibilities included analysis of: wetland impacts, land cover, house locations, wind speed, Minnesota Community Biological Survey and the Natural Heritage Information Systems database.

Metropolitan Council Environmental Services. East Bethel Rapid Infiltration Assessment. Developed and implemented GIS approach using Spatial and 3d Analyst to create surfaces for Surface Elevation, Groundwater Elevation and Depth to Groundwater. Data was used in preliminary study to evaluate suitability of East Bethel for utilizing groundwater infiltration for the recovery of treated water.

Navitas Energy Pomeroy Iowa Wind Farm Environmental Permit. Jordan provided GIS assistance for the 6,500-acre, 43-turbine wind farm in Pomeroy, Iowa. He obtained the available free GIS data for that area including aerial photographs, National Wetland Inventory, USDA Land Cover, Public Land Survey, Public Waters Inventory, FEMA Floodplains and County Soil Surveys. From these layers he was able to conduct house counts, identify possible wetland locations, perform land cover analysis and identify other possible other possible siting issues.

Navitas Energy Pomeroy, Iowa, Wind Farm – Phase I ESA. Jordan provided GIS assistance for the Phase I ESA which included 6,500 acres of agricultural land, and was set up for 43 wind turbines. He obtained historical aerial photographs dating back to 1940 to identify the change in landscape over time. The ESA identified issues during site reconnaissance that allowed the client to identify potential latent liability.

Nilfisk Advance Machine.

- Operation and maintenance of granular activated carbon groundwater treatment system
- Sampling of the monitoring wells and the treatment building (biannual)
- Supervise the replacement of carbon in the carbon vessels
- Assist with the monthly Wastewater Treatment Discharge Monitoring Report

Metropolitan Airport Commission: 2009 Water Management Mapping Update. Five of the Reliever Airports (21D, FCM, LVN, MIC & STP). Conducting site visits, review of engineering plans and studies necessary to update the detailed surface water management (drainage) maps for each of the reliever airports. The updated plans keep the MAC in compliance with the NPDES General Storm Water Permit for Industrial Activity.

LOUIS SIGTERMANS, EIT

Environmental Engineer

Mr. Sigtermans joined Wenck in 2014 and has worked on a variety of projects focusing on industrial wastewater treatment, municipal wastewater management, construction stormwater management, and environmental compliance. He has worked with both municipalities and private industry throughout the state of Minnesota. Specialties include wastewater treatment; process engineering; and stormwater pollution prevention planning.

EDUCATION

MS, Environmental Engineering, University of Minnesota

BS, Biochemistry, University of St. Thomas

PROJECT EXPERIENCE

Industrial/Private Sector Wastewater

Assisted with an engineering evaluation of existing wastewater treatment infrastructure at a sugarbeet processing facility in Minnesota. The evaluation focused on monitoring and analyzing data on several physiochemical and operational parameters. Identified operational and storage bottlenecks, and identified possible capital improvements and operating modifications to improve effluent water quality.

Assisted with the design and permitting of a package wastewater treatment system and treated effluent storage pond for a workforce housing facility in western North Dakota. Responsibilities included assisting in the design of conveyance infrastructure, obtaining regulatory approval, and acquiring building and conditional use permits from the county.

Assisted with an engineering evaluation of existing wastewater treatment infrastructure at a hazardous waste disposal facility in Atlanta, Georgia. The evaluation focused on identifying cooling methods for improving the performance of an aeration tank. After completing the evaluation, assisted with the design of a new cooling tower and heat exchange system, including preparation of specifications and construction drawings.

Provided wastewater permitting and discharge reporting assistance for a metal stamping facility in the Twin Cities. Responsibilities included evaluating flow and sampling data, preparing reports, and corresponding with the local regulatory authority.

Assisted a private client with wastewater permitting for a proposed metal finishing facility in Alabama. Startup of the facility occurred in early 2016. Tasks included communicating with the client and regulatory agencies, comparing sampling data from existing facilities, reviewing local ordinances, preparing permit applications, and reviewing and preparing comments to the draft pretreatment agreement.



AREAS OF EXPERTISE

Wastewater Treatment
Stormwater Management
Construction Oversight &
Documentation

CERTIFICATIONS

Design of Construction
SWPPPs (2017-2020)

Municipal Wastewater

Assisted with improvements to a wastewater treatment system in Lakefield, MN. Options evaluated included upgrades to the existing mechanical treatment system and the construction of off-site stabilization ponds. Responsibilities included assisting with present worth calculations to determine O&M and capital costs of the two options.

Assisted with the design of new treatment structures and modifications to existing equipment for an industrial wastewater treatment system owned and operated by the City of Becker, MN. Responsibilities included assisting with the preparation of construction plans and specifications, construction cost estimating, and assisting client with the bidding process and selection of a contractor.

Assisted with design planning of sanitary sewer extensions for various residential and commercial development sites in the cities of Dayton, Corcoran, and Maple Grove, MN. Designs included forcemain and lift station installations to connect to existing wastewater infrastructure.

Stormwater Management and Pollution Prevention

Mr. Sigtermans is certified in Design of Construction SWPPPs through the University of Minnesota's Erosion and Stormwater Management Certification Program. He has prepared construction SWPPPs for both municipal and private projects including stream bank restorations, greenfield commercial and residential developments, and street reconstruction projects involving installation/re-installation of water and sewer utilities for various municipalities.

MARK STACY, PG

Senior Hydrogeologist

Mr. Stacy is a registered professional geologist and has over 20 years' experience in groundwater development and hydrogeologic investigations. Having completed water supply investigations in Wyoming, Colorado, Utah, Arizona, California, Texas, Idaho, Oregon, and Nevada, he is experienced in all facets of groundwater development. In addition, Mr. Stacy has completed a wide range of hydrogeologic and groundwater studies for many different projects and clients. His professional experience has included studies related to groundwater availability and development, high capacity well siting and design, production well construction and development; aquifer testing and evaluation, wellfield design, source water assessment and protection, water supply master planning, river basin planning, production well evaluation and rehabilitation, construction and mine dewatering, infiltration gallery design, hydrogeologic characterization of abandoned mines, monitoring well installation, water quality and contaminant monitoring and assessment, hydrogeologic baseline characterization for mine permitting, water rights and policy evaluation, groundwater modeling, due diligence, spring surveys, and wastewater disposal.

EDUCATION

MS, Geology/Water Resources, University of Wyoming
BA, Geology, Augustana College

REGISTRATION

Professional Geologist - Wyoming, Idaho, Utah,
Kansas, Minnesota, California
Registered Geologist - Oregon, Missouri

PROJECT EXPERIENCE

Groundwater Supply and Development

In the process of installing 25+ high capacity wells, Mr. Stacy has worked with various public and private clients involved in municipal, irrigation, and industrial projects including:

Shoshone Groundwater Development Level II Project – WY. Completed the hydrogeologic analysis of the area served by the Shoshone Utility Organization and identified 14 potential well sites to target the Quaternary, Nugget, Tensleep, and/or Madison aquifers. Test drilling of 3,435-foot deep Tensleep Well yielded a 400+ gpm well that met the project requirements for supplementary supply. A 27-foot deep alluvial well capable of yielding 80 gpm was also completed.

Belvoir Casper Aquifer Level II – WY. Conducted additional hydrogeologic and geophysical exploration of the Casper Aquifer on the Belvoir Ranch west of Cheyenne to further explore its groundwater development potential. To identify preferred test well drilling locations, teamed with Zonge International to complete both seismic reflection and electrical resistivity surveys of five areas that appeared to have enhanced aquifer permeability based on hydrogeologic mapping. Test well drilling at four sites to depths ranging from 2,042 to 3,178 feet yielded wells capable of producing between 40 and 200 gpm in an area from which previous drilling



AREAS OF EXPERTISE

Groundwater Development
Hydrogeologic Investigations
Geologic Mapping & Analysis
Aerial Photo Interpretation
Well Site Selection
Well Design and Development
Aquifer Testing and Analysis
Wellfield Design
Hydrogeologic Baseline Studies
Dewatering
Environmental Site Contamination
Source Water Assessment And Protection
Infiltration Gallery Design
Wastewater Disposal
Shallow Groundwater Issues

PROFESSIONAL MEMBERSHIPS

National Ground Water Association
Colorado Groundwater Association

had obtained no more than 24 gpm.

Belvoir Ranch Groundwater Grant – WY. Completed a detailed hydrogeologic assessment of the Casper Aquifer along the eastern margin of the Laramie Range. Identified five potential drilling sites to test the productivity of the Casper Aquifer. Test drilling of two of the five sites to depths ranging from 1,130 to 1,348 feet indicated water quality conditions are excellent, and that high capacity wells (700 gpm+) can be completed in this area to obtain water from the Casper Aquifer.

Indian Paintbrush Water Supply Level II – WY. Evaluated the hydrogeologic conditions associated with two existing Indian Paintbrush Water District wells, and completed a well siting study for the purpose of completing a new test well for the district. The district's wells yield approximately 65 gpm, but the production of one of the wells had been declining and the district was in need of an additional high capacity well. Having completed a hydrogeological assessment and lineament analysis, identified seven potential sites for test hole/test well drilling. The complex geologic setting of this area made the successful completion of a high yielding well uncertain. Following test hole drilling, collaborated with Thomas Drilling on the construction and testing of a 365-foot Amsden Formation well for the district. Stepped and constant rate aquifer testing of the well indicated it would sustain a 184 gpm production rate, or approximately three times the target yield.

Hot Springs/Worland Pipe Level II Investigation – WY. Conducted a hydrogeologic assessment of and installed two wells to depths of 1,070 and 1,703 feet to evaluate the productivity and water quality of the Madison Aquifer near Thermopolis. The second Madison Limestone test well was drilled along the crest of Buffalo Creek Monocline, encountered a six-foot cavity, and yielded in excess of 750 gpm of high quality groundwater for the project.

Hydrogeologic Investigations

Mr. Stacy has produced source water protection plans, developed water supply plans, analyzed contaminant hydrogeologic problems, and designed construction dewatering systems including:

Laramie County Aquifer Project – WY. For the Wyoming Water Development Commission and the Laramie County Commissioners, worked with JR Engineering both to develop a groundwater atlas and interactive GIS, and to prepare a framework for management of the county's groundwater resources. As a result of unparalleled growth, Laramie County governmental entities have been faced daily with an increasing number of development decisions involving the county's groundwater resources. This increasing need for water and inability to evaluate impacts of proposed development have spawned concern among county residents, planners, and elected officials over the impact such development will have on the sustainability of the county's groundwater resources and their ability to meet increased demands. This project resulted in the Laramie County Water Atlas.

Platte River Basin Planning Project – WY. For the Wyoming Water Development Commission and in coordination with Trihydro Corporation, Inc., prepared a thorough profile of surface and groundwater use, and assessed groundwater availability throughout the sub basins of the Platte River Basin of southeastern Wyoming. This investigation involved developing estimates of surface and groundwater use for both domestic and municipal users in the basin based on the number of domestic wells and interviews with public water system operators. For the groundwater availability aspect of the project, reviewed relevant geologic and hydrogeologic documents, water rights, high capacity well locations, and water quality conditions; and developed recharge assessments for the various aquifers in each sub basin. This analysis also included a review of the pertinent interstate water agreements and an assessment of their impact upon future groundwater development in the basin.

JEFF STROM

Water Resource Scientist

Mr. Strom has over eight years of consulting work experience in hydrologic modeling, water quality modeling, data processing and analysis, water quality modeling, Geographic Information Systems (GIS) and report writing to support various watershed projects, lake management plans, TMDL projects and implementation plans and WRAPS studies. Since arriving at Wenck, Mr. Strom has worked as the lead water quality and hydrologic modeler and report writer on over a dozen TMDL projects that addressed over a hundred impairments throughout the state of Minnesota. Prior to Wenck, Mr. Strom worked for Carver County Environmental Services collecting flow and water quality data, developing hydrologic rating curves and report writing/development for their county Water Management Plan and TMDL projects. Mr. Strom also worked as a student research assistant at the Large Lakes Observatory at the University of Minnesota Duluth where he conducted field and laboratory experiments to model physical processes and biogeochemical cycles in Lake Superior.

EDUCATION

MS, Water Resource Science, University of Minnesota

BA, Environmental Studies & Geography, Gustavus Adolphus College

PROJECT EXPERIENCE

TMDLs and WRAPS

Vermillion River Watershed TMDLs and WRAPS. Mr. Strom was the lead author and modeler for the Vermillion River Watershed TMDL and Watershed Restoration and Protection Strategy (WRAPS) studies. The TMDL study consisted of two dissolved oxygen impairments, one turbidity impairment, twelve bacteria impairments, and two lake nutrient impairments. TMDL allocations and source assessments were done using a combination of field surveys, modeling, GIS analyses, and load duration curves. Mr. also worked with the MPCA, Vermillion River Watershed Joint Powers (VRWJPO), and other local stakeholders to develop a detailed WRAPS report for the Vermillion River watershed. The WRAPS report summarized past assessment and diagnostic work in the Vermillion River watershed and outlined ways to prioritize restoration and protection strategies to help restore and maintain biological health throughout the watershed.

Snake River Watershed TMDL and WRAPS. Mr. Strom served as the project manager and developed several Generalized Watershed Loading Function (GWLF) models to predict watershed hydrology and pollutant loading to four lakes in the Snake River watershed. Model output was used to predict each lake's hydrologic budget and identify phosphorus loading hotspots throughout the watershed. Mr. Strom also used long-term flow monitoring data to develop flow-duration curves that were used to set E. coli allocations for three impaired reaches throughout the watershed. Mr. Strom authored the TMDL reports as well as the WRAPS report for the Snake River Watershed. The WRAPS report was one of the first of its kind in the state as part of MPCA's "watershed approach" to address Minnesota's 81 "major" (8-digit HUC) watersheds.



AREAS OF EXPERTISE

TMDLs & WRAPS
Water Quality Modeling
BMP Analysis
Limnology
Aqueous Geochemistry
Hydrology

PROFESSIONAL MEMBERSHIPS

North American Lake Management Society (NALMS)

Ann and Fish Lake Excess Nutrient TMDLs. Mr. Strom developed hydraulic and phosphorus watershed models for the Ann and Fish Lake watershed using the NRCS curve number approach and a unit area load GIS model. These models, along with measured sediment phosphorus release, were used to develop flow and nutrient budgets for each lake. Flow balance and nutrient inputs to each lake were modeled using BATHTUB to determine necessary reductions for each lake to meet Minnesota state water quality standards. GIS was then used to map existing land-use practices throughout each watershed and identify potential projects and BMPs to meet target reductions. Mr. Strom was also the primary author of the final TMDL report and implementation plan and presented the results of the models and TMDL allocations to the clients and stakeholders at various technical advisory committee (TAC) and stakeholder meetings.

North Fork Crow Watershed Dissolved Oxygen TMDLs. Mr. Strom led modeling efforts to develop and calibrate QUAL-2K models for five tributaries of the North Fork Crow River. These models were used to characterize hydrology and point-source and non-point source loading during summer low-flow conditions. Results of the modeling suggested stream hydrology, particularly lack of flow, reaeration, flow-through wetlands and over-widened stream channels are major drivers of low DO during summer baseflow conditions. Mr. Strom was also the primary author of the final TMDL report and implementation plan.

North Fork Crow – Lower Crow River Watershed Bacteria and Turbidity TMDLs. Helped develop a fecal coliform total maximum daily load for the lower Crow River watershed. Responsibilities included development of hydrologic flow duration curves and rigorous accounting of fecal coliform sources in the watershed to help understand the linkages between watershed hydrology, seasonal land management practices and bacteria sources throughout the watershed. Mr. Strom was also the primary author of the final TMDL report and implementation plan.

Shingle Creek Dissolved Oxygen TMDL. Mr. Strom helped conduct hydrologic and water quality synoptic surveys to collect data for TMDL development of the Shingle Creek Dissolved Oxygen TMDL. Mr. Strom also led efforts to build, calibrate and validate a steady-state hydraulic/water quality model (QUAL-2K) using hydrologic rating curves and monitoring data from routine monitoring and the synoptic survey sampling events. The calibrated QUAL-2K model was used to diagnose potential sources of dissolved oxygen depletion and the necessary scenarios and load reductions to mitigate violations. Model results suggested stream hydrology, particularly stream channel form, lack of groundwater/baseflow and reaeration, play a large role in the low DO levels observed during low-flow conditions.

Getchel, Stony and Unnamed Stream Turbidity TMDLs. Mr. Strom developed a Soil and Water Assessment Tool (SWAT) model to assess watershed hydrology and non-point source TSS loading for three tributaries (Getchel, Unnamed and Stony) in the upper Sauk River Watershed. Watershed runoff, groundwater flow and TSS pollutant loading were setup and calibrated by comparing model output to flow monitoring data, hydrologic rating curves and water quality modeling data. Final model output was used to identify high-priority areas of upland sediment loss, inputs from in-channel erosion and the fate and transport of this sediment through the channel network.

Chippewa River Turbidity TMDL. Developed a Soil and Water Assessment Tool (SWAT) model for six subwatershed in the Chippewa River Watershed. This model was built and calibrated to predict watershed hydrology/runoff as well as sediment sources (upland vs channel erosion) and the fate and transport of total suspended solids throughout the stream network.

Rice Lake Excess Nutrient TMDL. Mr. Strom helped lead modeling effort to develop a hydrologic and nutrient budget for Rice Lake. Mr. Strom built, calibrated and validated a BATHTUB lake response model to establish the lake's water budget and set a nutrient reduction target and develop the appropriate scenarios and load reductions needed for Rice Lake to meet Minnesota state nutrient standards. Mr. Strom also authored the TMDL report and presented the modeling results and allocations to various stakeholder meetings.

Ann and Emma Lake Excess Nutrient TMDLs. Developed a Generalized Watershed Loading Function (GWLF) model for Ann and Emma Lake watersheds. This model uses a modified version of the National Resources Conservation Services (NRCS) curve number approach to model watershed hydrology and runoff. Mr. Strom utilized flow and water quality monitoring data to calibrate the model's hydrology and pollutant loads. Output from the calibrated model was used to predict each lake's water budget and watershed phosphorus load which helped identify priority areas for best management practice (BMP) implementation. Mr. Strom also co-authored the TMDL report and implementation plan.

BMP Planning and Subwatershed Assessments

Upper Clearwater River Agricultural BMP Assessment. Mr. Strom served as the technical lead on a BMP assessment project to address sediment loading in the Upper Clearwater River Watershed. This study used terrain analysis, the Revised Universal Soil Loss Equation (RUSLE), and the Agricultural Planning Framework (ACPF) tool identify potential locations for upland surface runoff control BMPs. This assessment identified 34 potential agricultural BMPs that would reduce sediment loading to the Clearwater River by 45 tons per year. The final list of potential BMP projects included estimated cost, TSS reductions, and a cost/benefit analysis. This study was completed in late 2016 and the Clearwater River Watershed District is currently working with local farmers to implement several of the BMPs presented in the final report.

Alimagnet and Air Lake Industrial Park Subwatershed Assessments. Mr. Strom was the project lead for the Alimagnet and Air Lake Industrial Park Subwatershed Assessment Projects in the Vermillion River Watershed. These two subwatersheds were identified as high priority subwatersheds in the Vermillion River Watershed TMDL and WRAPS reports. Wenck used watershed modeling tools to identify high pollutant loading areas and potential BMP practices to reduce phosphorus and sediment loading to downstream waterbodies. These assessments identified 64 potential BMP opportunities that would remove over 112 pounds of TP and 50,000 pounds of TSS per year.

City of Mora Subwatershed Assessment. Mr. Strom was the project lead for the City of Mora Subwatershed Assessment Study. This study, funded through a Clean Water Partnership, used P8 and other watershed modeling tools to identify high potential phosphorus and sediment loading areas throughout the City of Mora. Wenck used the modeling results to identify 29 potential retrofit BMP opportunities that would remove 1,100 pounds of phosphorus and 76,000 pounds of sediment per year. The final report included cost estimates for each BMP along with estimated pollutant load reductions and a cost/benefit analysis to help rank and prioritize the list of potential BMPs.

Lake Management Plans and Diagnostic Studies

Okabena Lake Diagnostic Study. Mr. Strom served as the technical lead and primary author of the Okabena Lake Diagnostic Study. Located in the City of Worthington, Okabena Lake is a 776-acre nutrient impaired shallow lake located in Southwest Minnesota. Okabena Lake's watershed covers over 9,500 acres in both urban and rural agricultural areas. The diagnostic study focused on estimating sediment and phosphorus loading to Okabena Lake, and identifying high potential pollutant loading areas. Loading from the City of Worthington was estimated using a watershed P8 model, and rural loading and sources were assessed using a combination of monitoring data and assessments and literature rates. Internal loading from the lake sediments was analyzed by collecting lake sediment cores and measuring phosphorus release under laboratory conditions. Results of this study are currently being used by local stakeholders and the MPCA to develop implementation strategies to restore and improve water quality conditions for Okabena Lake.

Blackhawk and Thomas Lake Management Plan. Mr. Strom helped author the management plan report and led modeling efforts to update the City's PONDNET model to predict watershed hydrology and phosphorus loads to Blackhawk and Thomas Lake. Lake response to flow and phosphorus loads were modeled in BATHTUB to set realistic goals and reductions to improve water quality in each lake. Mr. Strom also assisted in identifying potential BMPs to help meet necessary watershed load reductions.

Water Quality Monitoring

Shingle Creek and West Mississippi Routine Monitoring. Mr. Strom currently oversees and helps manage the Shingle Creek Watershed Management Commission (WMC) and West Mississippi WMC routine monitoring programs. Located in east-central Hennepin County, these watersheds cover over 67 square miles across 10 municipalities. Both commissions routinely monitor flow and water quality at various main stem stream sites in Shingle Creek, and several outfall sites in West Mississippi watershed. Both commissions also conduct macroinvertebrate sampling and wetland and lake monitoring through various volunteer programs and commission funded studies. Mr. Strom's duties include developing annual monitoring plans and budgets, overseeing day to day sampling and fieldwork, data analysis and modeling, annual reporting and presenting final results to the commissions.

Bassett Creek Metropolitan Council Watershed Outlet Monitoring Program (WOMP). Since 2013, Wenck Associates has been contracted by the Bassett Creek Watershed Management Commission (WMC) to operate the Metropolitan Council's WOMP station on Bassett Creek. Mr. Strom currently oversees all monitoring and data collection for the Bassett Creek WOMP station, including: routine water quality sample collection, storm composite sample

collection, and continuous conductivity and flow monitoring equipment maintenance and data management.

Sediment Management

U.S. Minerals (Wisconsin) Industrial Stormwater Sediment Analysis. Mr. Strom led sampling efforts to collect sediment from two stormwater ponds for an industrial client in western Wisconsin. The sediment samples were analyzed for various pollutants required by the Wisconsin DNR to determine proper disposal and management procedures. Mr. Strom authored a technical memorandum summarizing the results of the sediment sampling and data analysis, and helped communicate findings to the client and the Wisconsin DNR. Wenck is currently working with the client to develop a plan to manage sediment in each pond.

Red Cedar River and Lake Menomin Sediment Investigation. – Mr. Strom developed the sample plan and led sampling efforts in response to a tractor-trailer spill containing hazardous material in the Red Cedar River in Menomonee, WI. Mr. Strom assisted with the data analysis of the sediment results to determine the degree of contamination and compare results against Wisconsin DNR. Mr. Strom helped author the report and communicate results of the investigation to the client and Wisconsin DNR.

Round Lake Sediment Investigation. Mr. Strom assisted in a sediment investigation of Round Lake, a shallow lake in Arden Hills, Minnesota that receives industrial discharges from the former Twin Cities Army Ammunition Plant (TCAAP). Mr. Strom assisted in the sediment sampling and data analysis for this project which included developing technical memos that mapped/delineated the extent of heavy metals contamination in Round Lake sediments and developed conceptual models examining the fate and transport of metals within the sediments. Wenck then lead management efforts to develop a sample plan and conduct field sampling efforts to delineate the extent of contamination within the lake. Wenck used the results of the sediment analysis to investigate and develop different remedial actions such as dredging, development of new lake contours, capping contaminated areas with clean sediment, and natural recovery.

Minnehaha Creek Stormwater Basin Sediment Analysis. – Mr. Strom was responsible for collecting sediment samples and determining sediment depth in several stormwater basins in the Minnehaha Creek Watershed in Minneapolis. Mr. Strom used sediment probes and piston coring equipment to collect the sediment samples and determine the amount and depth of accumulated sediment in each pond. Mr. Strom assisted in writing technical memos recommending dredged material disposal volume and appropriate disposal methods.

Sediment Phosphorus release studies. Over the past seven years, Mr. Strom and Wenck has partnered with Dr. William James with the University of Wisconsin-Stout on over 50 lakes and reservoir studies to evaluate sediment chemistry and phosphorus release from lake sediments. Mr. Strom has used these studies to help city, state, and watershed clients identify sources of non-point source loading to lakes and develop TMDLs and sediment management plans to reduce phosphorus loading from sediment to improve water quality.

ERIK SUNDBO

Group Manager - Environmental Construction Services

Mr. Sundbo has over 29 years of experience in Environmental Construction Services, including the inspection, abatement design, and management of regulated materials as they relate to building demolition, renovation, and maintenance.

He has worked on high-profile projects within public & private sectors throughout the lower 48 states, Alaska, Puerto Rico, and the U.S. Virgin Islands. Services also include grant acquisition & administration, environmental management on historic sites, litigation support, and expert testimony.



EDUCATION

BA, Biology, Luther College, Decorah, IA

University of Wisconsin, Lacrosse – MEPD
Candidate

TRAINING

EPA/MDH Inspector, Planner, Supervisor, & Designer
Hazardous Waste Operations (HAZWOPER)
OSHA 10 (AWAIR) and OSHA 40
Niton and Innovex XRF & Radiation Safety Training
EPA – Renovation, Repair, and Painting (RRP)

AREAS OF EXPERTISE

Regulated Material
Management in Buildings
and facilities prior to
Renovation & Demolition

Corrective Action Design,
Bid Administration and
Project Management

Training and Executive
Briefings

SELECTED PROJECT EXPERIENCE

Austin Utilities (MN) – Power Plant Demolition Project – Provided comprehensive Inspection in the Austin Power Plant for the ID of asbestos and regulated materials that are required to be removed prior to demo. Created RFP and provided design assistance for the decommission project. Project fees >\$100K.

Twin Cities Army Ammunition Plant (TCAAP), Arden Hills, MN – Brownfield cleanup project. Provided comprehensive inspection at the main TCAAP complex for asbestos and other regulated material, created abatement design, conducted abatement oversight and air monitoring and clearance testing, and final closeout reporting. Project fees >\$100K.

Arden Hills Army Training Site (AHATS) – Brownfield (MN) - Lead-in-soil testing and evaluation of site impacted by extensive military use. Provided testing and QAQC involving both state and federal agencies. Fees >\$100K.

John Deere Waterloo Works (IA) – Demo Project - Provided a comprehensive inspection of 57 industrial buildings comprising the original John Deere tractor manufacturing plant. Provided abatement design, abatement monitoring and demolition oversight. Fees >\$1M.

Xcel Energy Power Plants (MN), including Riverside, Granite Falls, and Blackdog Plants - Provided inspection and abatement oversight and reporting for

PROFESSIONAL MEMBERSHIPS

Association of Facilities
Engineers (AFE)

the decommission of multiple power plants operated by Xcel Energy. Fees >\$500K.

Confidential Client, Facilities in Minnesota and throughout USA

Midtown Exchange Building Renovation Project, Minneapolis, MN

IDS Center 30-Floor Renovation Project, Minneapolis, MN

Federal Aviation Administration (FAA) Regional Air Traffic Control Center Renovation Project

Metropolitan Airports Commission, MSP Annual Contract and 17-35 Runway Expansion Project

Delta Airlines – MSP Environmental Services

General Services Administration (GSA) – Bishop Henry H. Whipple Federal Building Renovation

General Services Administration (GSA) – Warren E. Burger Federal Court Building Renovation

Department of Veteran Affairs – Fort Snelling and Fort Meade Renovation Projects

US Postal Service – Minneapolis and St. Paul Main Branch Renovation Projects

Georgia Pacific – Nekoosa Mill Renovation Project

University of Minnesota – Campus Wide Environmental Services

University of St. Thomas – Campus Wide Environmental Services

Hennepin County (Minneapolis) Property Services

Ramsey County (St. Paul) Property Services

Ramsey County Court House and City Hall (CHCH) Restoration Project

Wal-Mart Corporation – National Inspections

The Gap Corporation – National Inspections

General Growth Corporation – Nationwide Personnel Training Program

Target Corporation – National Inspections

KATIE SWOR

Environmental Engineer

Ms. Swor has nine years of experience on diverse projects including on-site air permit assessments, air permit compliance, and human health risk assessment. Her graduate school work analyzed the impact of diesel emission reductions on exposures and exposure distributions. Ms. Swor's specialties include air quality engineering, solid waste planning, and human health risk assessment.

EDUCATION

MS, Civil Engineering – Environmental Engineering, Minor in Public Health,
University of Minnesota

BE, Engineering Sciences, Dartmouth College

BA, Engineering Sciences and Russian, Cum Laude, Dartmouth College

PROJECT EXPERIENCE

At Wenck, Ms. Swor has worked on a variety of facility air assessments and permitting projects. She is the human health risk assessor for the 3M Cottage Grove Corporate Incinerator risk assessment and the Prairie Lakes Municipal Solid Waste Authority expansion project. She is familiar with MPCA's Air Emissions Risk Analysis (AERA) process. Ms. Swor works closely with her project teams in areas of air dispersion modeling, emissions calculations, and environmental assessment. Ms. Swor has also been involved in assessing facilities' need for federal or state air permits, including estimating emissions and following regulatory guidance.

Ms. Swor was the data manager and risk assessor for the Fort Gillem Vapor Intrusion Study in Georgia. She evaluated groundwater, soil gas, sub-slab, crawl space, indoor air, and ambient air samples at numerous structures to calculate human health risk values and communicate results to representatives of EPA, Georgia EPD, and the Department of Defense. She also performed risk assessment and report preparation of the Crematory Site at Fort McPherson in Georgia.

As a Research Assistant with the Department of Civil Engineering at the University of Minnesota, Ms. Swor assisted with EPA STAR Grant #RD-83362401: Impact of diesel emission reductions on exposures and exposure distributions: Applications of a geographic exposure model.

Ms. Swor's capabilities include:

- Calculating emissions from a variety of process equipment to support air assessment reports, permit applications, and risk assessments.
- Analyzing and evaluating air, soil, groundwater, and sediment data to estimate risks to human health, including using IRAP-h to implement EPA's Human Health Risk Assessment Protocol (HHRAP).
- Evaluating complex data to support air quality, solid waste assessments and reports.



AREAS OF EXPERTISE

Human Health Risk
Assessment
Air Quality Permitting and
Compliance
Soil, Groundwater, and
Sediment Data Analysis

PROFESSIONAL MEMBERSHIPS

Air & Waste Management
Association (A&WMA)

RYAN THELEN, EIT

Civil Engineer

As an EIT with Wenck, Mr. Thelen has worked across many areas and groups during his 9 years with the company. Mr. Thelen performed construction observation and reporting for multiple types of projects throughout Minnesota and North Dakota including agricultural facilities, landfills, and residential sites and he has communicated and worked with numerous contractors at each job site. In addition, he has experience in permit renewals, surveying, and soil and water sampling activities. Specialties include construction oversight, permitting and engineering, and environmental assessment.

EDUCATION

BS, Civil Engineering, University of Minnesota

PROJECT EXPERIENCE

Construction Observation

Mr. Thelen has observed various phases of residential, commercial, and industrial construction. He utilized GPS for topography and grade checks, inspected pipe and manhole installation, oversaw landfill re-grading and cover activities, inspected landfill liner installation, and inspected multiple residential sites for MPCA erosion control compliance.

Ramsey County Twin Cities Army Ammunition Plant (TCAAP). On-Site Project Manager and Construction Oversight for the 30-month project.

- Asbestos abatement
- Contaminated soil removal activities
 - Soil Testing
 - Headspace Analysis
- Utility removal activities
- Building demolition
- GPS Surveying
- Scheduling and Coordination of Field Staff

Houston County and Winona County Landfills. Performed construction observation and documentation for miscellaneous stormwater and drainage repairs at each site.

Municipal Infrastructure Projects – Construction Oversight/Project Engineer.

Mr. Thelen provided oversight for several municipal infrastructure improvement projects. Responsibilities included:

- Sanitary sewer trunk line installation.
- Street re-construction including full utility replacement.
- Mill and overlay pavement as well as new construction paving oversight.
- Storm sewer improvements and installations.



AREAS OF EXPERTISE

Erosion Control Inspector/
Construction Observer
Surveying
Environmental,
Commercial, Residential
Design
Construction Observation
Soil and Water Sampling

CERTIFICATION/ TRAINING

Microsoft Office products-
Excel, Word
AutoCAD
40-Hour OSHA Hazardous
Waste Operations &
Emergency Response
(HAZWOPER) Training,
2009
Troxler Nuclear Gauge
Training, 2009
Asbestos Inspector
E-Rail Certified

PROFESSIONAL MEMBERSHIPS

American Council of
Engineering Consultants
(ACEC)
National Society of
Professional Engineers
(NSPE)

- Sanitary forcemain installation utilizing HDD and open-cut methods.
- Drainage ditch repair oversight.
- Ensured Quality and Safety processes were being implemented on site.

Design

Residential Design:

- Performed takeoffs for various residential sites
- Preliminary utility and street design for proposed residential development

Commercial Design:

- Commercial site takeoffs
- Layout design for storm water and utilities
- Quality control review

Environmental Design:

- Wetland quality and delineation inspections
- Part of a tree identification survey team on a small residential site

Surveys

Mr. Thelen has performed field work for ALTA/Topographic Surveys. In addition, he operated total station and Trimble GPS devices, performed construction staking, lot surveys and utility, curb, grade and building staking.

Twin Cities Army Ammunition Plant (TCAAP). Arden Hills, MN. Mr. Thelen helped collect ground water samples both on-site and off-site. Thelen assisted with data collection and data entry for the annual operating report compiled each year.

Agricultural Facilities

Moorhead, MN. Mr. Thelen assisted in project management duties for an agricultural production company in the food processing industry. He provided a variety of services related to the improvement of facility operations and maintenance. He designed piping infrastructure, surface impoundments, pumping structures, inert waste landfills, and other improvements such as access roads. He also assisted in needs such as bid preparation and review, permitting, cost estimating, construction oversight, compaction testing, construction surveying, and preparing annual reports. Mr. Thelen also helped the facility complete water balance testing for each of the facility's industrial ponds as required by the facility's NPDES permit.

Traffic Studies

Cottage Grove, MN. Mr. Thelen was responsible for preparing a traffic impact study for a new commercial supercenter. He was responsible for collecting existing traffic conditions including traffic volumes and roadway layouts. Mr. Thelen also prepared a traffic impact study for the proposed development which summarized the results of the traffic analysis.

Air Permitting

Mr. Thelen has assisted with the entry and creation of permit spreadsheets for a large oil company with facilities throughout the U.S.

JOEL TOSO, PHD, PH, PE

Senior Engineer

Mr. Toso is a civil engineer with more than 25 years of experience specialized in water resources engineering and hydraulics. Mr. Toso is a recognized project manager with extensive experience working with federal, state, local and private clients. He has worked on numerous projects that include hydrologic and hydraulic modeling, surface water management plans, best management practice design, dams, reservoirs, spillways, stilling basins, river engineering, stream restoration, bridge crossing analyses and scour investigations, sediment transport, water balance studies, water supply and sanitary sewer design, mine engineering, flood studies, wetland hydrology, marinas and docks, environmental assessments, and cost estimates. In addition to field work, Mr. Toso has taught Applied Hydrology and Hydraulics at the University of Minnesota for more than 18 years.

Mr. Toso is a Certified Project Manager, having met the stringent training, experience and practical examination requirements of the Certification Program, which is recognized by the Project Management Institute (PMI).

EDUCATION

PhD, Hydraulics, University of Minnesota

MS, Civil Engineering and Hydrology, University of Minnesota

BS, Civil Engineering, University of Minnesota

PROJECT EXPERIENCE

Expert Witness

Water Levels Adjacent to a Development in West Bloomfield, MI. Prepared litigation documentation and expert witness service for a case involving lakeshore development. The work included determining whether a development lost developable lots due to road construction activity modifying the water outlet to the lake and raising the local groundwater levels. Services during trial were required.

Minnesota State Attorney General's Office. Worked to defend against a claim by a homeowner that the Department of Transportation damaged property by excessive dewatering adjacent to the property for road construction.

U.S. Attorney's Office Expert Witness for a Wetland Investigation near Mahnomon, MN. Prepared documentation regarding water flow through wetlands and its impact on flooding of an adjacent property. The work included determining the hydrology and the hydraulics of the site and surrounding area.

Stormwater Modeling near Downtown Minneapolis, MN. Provided expert witness services for a case involving storm water damage of a clinic in Minneapolis. The work included preparing a detailed hydrologic model of the watershed and investigating the hydraulics of the flow in pipes and roadways immediately adjacent to the site and testifying to the results.



AREAS OF EXPERTISE

Water Resources
Engineering
Hydraulics
Expert Witness
Surface and Groundwater
Hydrology
Storm Water Management
Wetland Hydrology
Floodplain Management
Open Channel Flow
Well & Lift Station Design
River Engineering
Civil Engineering
Mine Engineering
Permitting

REGISTRATION

Civil Engineer / Minnesota
/ 19950
Professional Hydrologist
- American Institute of
Hydrology

Personal Injury Case Involving a Flume Ride. Provided expert witness services for a personal injury case in Dakota County, MN. The work included determining flow velocities, in travel times within a flume ride and testifying to the results.

Property Flooding in West Central Minnesota. Prepared litigation documentation for a case involving flooding of farm property in west central Minnesota. Investigated the claim that raising a roadway caused flooding and property damage.

Rural Water Supply Pipeline Breaks. Prepared litigation documentation regarding a rural water supply system in northwestern Iowa. The work included determining the cause of numerous pipeline breaks in the system. Hydraulic transient pressures were investigated as the suspected cause.

Snow Pile Modeling for Development in Bloomington, MN. Prepared litigation documentation involving development of a hydrologic model to simulate the snow pile buildup in the Metropolitan Sports Center parking lot in Bloomington, Minnesota. The results were used to settle a court case regarding the condemnation of the property.

General Civil Engineering

Plans and Specifications for \$24M Development in Woodbury, MN. The work for the 12-building site included preparing conceptual plans for permitting and construction plans for the grading, storm water management, utilities, and paving.

Sanitary Sewer System Problem Investigation for the City of Bloomington, MN. Performed a study of a regional sanitary sewer system adjacent to Dakota and Colorado Roads. The purpose was to determine the cause of repeated sanitary sewer backups in the area during intense rain storms. The analysis identified both storm water and sanitary flows were the cause. Alternative solutions were proposed and a detailed design was prepared for the selected solution. The selected alternative avoided costly up-sizing of the pipeline by installing formed inverts in several manholes along the route, reducing the energy losses in the system and increasing the hydraulic capacity.

Site Work Plan Preparation and Specifications for the National Sports Center in Blaine, MN. Plans and specifications included: access roadways, parking lots, grading plans, stormwater management ponds, storm sewer, drain tiles, water mains, retaining walls, picnic shelters, and pedestrian bridges.

Site Development for the Lower St. Anthony Falls Hydroelectric Project, Minneapolis, MN. Prepared plans and specifications for permitting requirements including alternative grading plans, earthwork volumes computations, site drainage, trail and riverfront considerations.

Sanitary Sewer and Utilities for the City of Bloomington, MN. Prepared plans and specifications for the replacement of the sanitary sewer and utilities of 78th Street in an area north of I-494 and west of France Avenue. The design included alternatives with and without a lift station, re-directing flows to better fit the regional conveyance system, pipe and manhole supports in areas with deep peats, and cost estimates of each alternative.

Lift Station Rehabilitation for the City of Bloomington, MN. Prepared plans, specifications, and complete bidding documents for three sanitary sewer lift station renovations including: James Avenue lift station (LS 05) – three pumps and a 12-inch force main; Rich Road (LS11) – two pumps and a 4-inch force main; and Chalet (LS14) – two pumps and a 12-inch force main.

Hydrologic Modeling/Surface Water Management

Stormwater Geysering Problem Investigation for the Mn/DOT I35W Stormwater Tunnel, Minneapolis, MN. Managed and provided technical direction for an investigation of a storm water geyser-effect problem associated with the stormwater tunnel below Interstate 35W in downtown Minneapolis. The tunnel section is 12 to 16-foot in diameter, 120 deep, extending from the Mississippi River approximately 3.5 miles under the freeway into south Minneapolis. Geyser effects were experienced at two 8-diameter dropshafts located approximately 0.75 miles

apart. Water mixed with air bursts 75-feet above the freeway surface during the events and has blown off/damaged various covers and grating over the shafts. The work consisted of designing an instrumentation system to capture the events on video tape and record flow data (pressures, discharge, flow direction and velocity); analyzing data regarding the hydrology and hydraulics of various storms causing the problem; modeling the flow characteristics with a hydraulic transient model (with the University of Minnesota) and exploring various alternative solutions to the problem.

Surface Water Management Plans Various Clients. Managed and provided technical direction for surface water management plans for several municipalities and developments around the Twin Cities Metropolitan area in Minnesota. These plans included: hydrology and hydraulic modeling; channel, pipe, and pond sizing; wetland delineations, water quality considerations; permitting, and cost estimates.

Hydrologic and Hydraulic Modeling for Wood Treating Facility, Salisbury, MD. Designed and analyzed the effects of relocating a stream for a \$10-million site remediation project. The project required flood level analysis including tidal effects; plans and specifications for construction of rock weirs and bioengineered stream bank protection.

Hydraulic Modeling of the Mississippi River for the U.S. Army Corps of Engineers. Conducted a study to determine the flood level impacts of numerous dredge spoil sites along the Mississippi River and Minnesota River for the Channel Maintenance Plan.

Tunnel Study for a Capstone Course at the University of Minnesota. Lead senior undergraduate students in a study of installing various alternative tunnel solutions to surface water flooding in south Minneapolis. The results of the study were used for a capstone project presentation (a graduation requirement for the civil engineering program). The study included: hydrologic modeling to determine tunnel sizing; hydraulic modeling for the tunnel design; dropshaft considerations (air entrainment), outlet design (discharge to the Mississippi River); and construction cost estimates.

Two-Dimensional Flow Modeling for the Metropolitan Council Environmental Services, St. Paul, MN. Provided technical direction for a project to prepare a two-dimensional flow model of the east pre-treatment facility at the Metropolitan Wastewater Treatment Plant. The project identified the cause of sediment buildup in the inflow channel and evaluated alternatives to prevent sediment deposition.

Alternative Water Sources for Irrigation of Parks and Golf Courses Study for the City of Minneapolis, MN. The study looked at surface water and groundwater sources with the goal of sustainability. Prepared plans and specifications for selected combined source options.

Storm Water Modeling for the Hardwood Creek Development in Lino Lakes, MN. Managed the storm water modeling of a 400-acre proposed development. The project required modeling the site with both SCS hydrology and SWMM Runoff hydrology to compare the differences. Modeling results were calibrated to observed flows and water levels. The relatively flat topography and numerous drain tile systems complicated the modeling process.

Tunnel Instrumentation Plan for City of Minneapolis, MN. Prepared an instrumentation plan to collect hydraulic data from the 10th Avenue and Oak Street storm tunnels. Worked with a contractor to implement the plan. Analyzed the data to determine the existing hydraulic capacity of the systems and whether there were any problems (capacity or surging).

Hydraulic Engineering

Hydraulic Analysis of a Flume Ride. The work included predicting flow conditions within the flume using a two dimensional computer model. Flow conditions varied from subcritical to supercritical.

Preparation of Two Hydraulic Design Manuals. Managed the preparation of two hydraulic design manuals for segmental retaining walls, one for installations along channels and one for along shorelines. The manual cover stream flow hydraulics, wave hydraulics, computations of water and ice forces, and related considerations for

segmental retaining wall design. Manuals were distributed throughout the United States and portions of Canada and Australia.

Nine Mile Creek Streambank Protection Method Design in Bloomington, Minnesota. Responsibilities in the \$2.0-million project included: plans and specifications, an environmental assessment worksheet, coordination and cooperation in the City of Bloomington, and construction observation.

South Lake Creek Channel Improvements Design Management in Lakeville, Minnesota. Work involved channel sizing, erosion protection, roadway crossings, and energy dissipation.

Devil's Lake Outlet Channel Options Investigation for the U.S. Army Corps of Engineers in North Dakota. Work involved design and cost analysis of 13 different gravity and pumped outlet options considered for flood control.

Devil's Lake Pumped Outlet Options Investigation for the U.S. Army Corps of Engineers in North Dakota. The project included design alternative pumped outlet options involving multiple pipelines, channels, pump systems, intake and outlet considerations, hydraulic transients, groundwater infiltration/exfiltration and cost estimation.

Water Supply/Wells and Pumps

Water Main Design for the City of New Brighton, MN. Assisted with the design of approximately one-mile section of a large raw water and waste water pipeline for the municipal groundwater treatment system.

Plans and Specifications for Municipal Wells and Pumps. Designed and wrote specifications for municipal wells and pumps for the Cities of Bemidji, Northern Township, and Brooklyn Park, Minnesota.

Plans and Specifications for Municipal Well, Pumps, and Pumphouse for the City of Lakeville, MN. Designed and wrote specifications for a municipal well and pump house for the City's water supply system.

Plans and Specifications for Beach Improvements at Clifton E. French Regional Park in Hennepin County and Baylor Regional Park in Carver County, MN. The projects included a unique system to improve swimming water quality requiring: production well design for discharge into curtained beach areas; water distribution design within the beach areas; and beach curtain design.

Plans and Specifications for a Groundwater Supply System for Four Golf Courses in the City of Minneapolis, MN. Prepared plans and specifications for groundwater supply systems for irrigation of Hiawatha, Wirth, Columbia, and Gross golf courses in Minneapolis, Minnesota.

Plans and Specifications for a Groundwater Supply System for Noerenberg Memorial County Park in Orono, MN. Managed preparation of plans and specifications for Noerenberg Memorial County Park water supply system, including new well, pump system, irrigation system, and water tower modifications/rehabilitation.

Water Distribution System Analysis for the City of Northfield, MN. Managed a study of the water distribution system to determine the low-pressure zones and the impact of adding a hospital complex within the City.

Alternative Water Supply Study for the Joint Water Commission (Cities of Golden Valley, New Hope, Crystal, MN). The work included: discussions with regulatory agencies to determine their requirements; investigation of alternative sources (groundwater and surface water); modeling of the distribution system to determine effects of new alternatives; determining treatment requirements to match City of Minneapolis water supply; screening alternatives and performing a life-cycle cost evaluation of selected alternatives.

Well Field Investigations and Wellhead Protection Studies. Managed investigations for the Cities of Lakeville, Bloomington, and Brooklyn Park, MN.

Sediment Transport Engineering

Hydraulic and Scour Investigations. Managed investigation for more than 200 bridges in Minnesota including

several interstate bridges and large structures over the Mississippi and Minnesota Rivers. Work included survey of the bridges and support structures, hydraulic and scour analysis, evaluation of the results, and report preparation.

Sediment Transport Study for a Power Plant Intake along the Minnesota River in Mankato, MN. Managed and provided technical direction to address a sedimentation problem at the intake of a power plant. Work involved using a two-dimensional flow model to investigate alternatives to address the problems at the intake. The report presented the results, a cost comparison, and recommendations.

Sedimentation Study of the La Crosse River as it enters Lake Neshonoc (a dam reservoir) in West Salem, WI. Computed sedimentation rates and presented alternatives for sediment management and removal.

Remedial Investigation of a Large Industrial Facility in an Estuary of Lake Superior in Duluth, MN. Project included: identifying alternative remediation measures, analyzing the motion of existing estuary sediments under wave action, considering options for clean, placed, cover sediments, and preparing cost estimates and report.

Dam Engineering

Gate Calibration for St. Louis River Hydroelectric Project in Northern Minnesota. Prepared a gate calibration plan that includes five upstream reservoir/dam facilities and four downstream dam and hydroelectric facilities in Minnesota.

Periodic Inspection for Zumbro Lake Dam in Rochester, MN. Conducted periodic investigations of Zumbro Lake Dam, including site surveys, soundings, concrete inspections, general facility review, and reports.

Spillway Stability Analysis for Red Lake Dam in Crookston, MN. Conducted a hydraulic study of the stability of the rock spillway.

Dam Break Analyses and Emergency Action Plans. Prepared for the following facilities: Lock and Dam 1 on the Mississippi River, Granite Falls Dam on the Minnesota River, and Lake Zumbro Dam on the Zumbro River.

Spillway Evaluations and Improvement Projects. At Lake Marie and Riss Lake earth dams in Missouri.

Reservoir Regulation Manuals for the Mississippi River Headwaters. Rewrote and updated documentation for the regulation manuals at Pine, Sandy, Gull Lake reservoirs for the U.S. Army Corps of Engineers.

Outlet Works Design for 18 Square Mile Reservoir for the South Florida Water Management District in Florida. The project included investigation of several outlet, service spillway and auxiliary spillway options. The final design included outlets capable of discharging 800 cfs under 24 feet of head and a design of a combined service and auxiliary spillway with a capacity of 1200 cfs.

Waterfront Engineering

Design for Large Marina in Red Wing, MN. Managed activities to establish a marina on the Mississippi River near Red Wing, Minnesota for Treasure Island Casino. Project included: preparing permit applications to the Corps of Engineers and the Minnesota Department of Natural Resources; hydraulic dredging considerations; anchoring for the marina; plans and specifications for the marina construction; ice/debris barrier design; marina deicing design; and contract administration.

Conceptual Design and Layout for a Proposed Marina. Assisted with conceptual design and layout of the facilities for proposed marinas on the Mississippi River in Clinton, Iowa and in St. Paul, Minnesota.

Design for the Island Station Marina in St. Paul, MN. Prepared the design and permit application for the Island Station Marina near downtown St. Paul. Project included determining flood level impacts and dredging requirements.

Mine Engineering

Stream Relocation Project Eveleth, MN. Managed a project to re-route a stream around a rock stockpile. The project included channel sizing, stream bed protection, and addressing fishery concerns.

Mine Closure Cost Estimation for a Major Mining Facility in Northern Minnesota. Managed a project included: determining all required mineland reclamation activities required by law; computing qualities of earthwork; environmental concerns, landfills, and waste clean-up and disposal; equipment salvage; re-vegetation requirements; demolition; stream, lake, and wetland restoration; utility removal; legal concerns; and land sales.

Mine Re-permitting in Northern Minnesota. Managed a project to prepare re-permitting documents for a taconite mining operation. The work included: preparation of long term operating plan for the tailing basin and plant; description of the design, construction, stability and scheduling of the basin dams; development of a water balance and evaluation of the water quality concerns; identification of environmental monitoring procedures relating to air and water quality; and preparation of the closure scheme.

Wetlands Mitigation Plans for a Northern Minnesota Mine. Assisted with providing hydrologic analysis of wetland mitigation plans on rock stockpiles. These plans were driven by the lack of mitigation locations in the area. Also researched the possibility of using expended tailing basin locations for wetland creation.

Water Quality Permitting Issue for a Northern Minnesota Mine. Assisted Minnesota taconite mining companies with permitting issues including investigated treatment alternatives of tailing basin effluent to meet water quality permit requirements.

Sand Mining Operation for the National Sports Center in Blaine, MN. Managed a project for permitting of a three million cubic yard sand mining operation. Evaluated surface and groundwater impacts of the dewatering process required for mining sand. Estimated groundwater table drawdown for the surrounding area wetlands. Provided information necessary for state water appropriation permit. Designed discharge system to minimize water quality impacts to receiving water course.

Re-permitting for Tailing Basin in Northern Minnesota. Worked extensively with the Northshore Mining tailing basin near Silver Bay for re-permitting purposes. The work included a water balance and flood level computations to determine dam height requirements; preparation of long term operating plan; identifying environmental monitoring procedures; and preparing a closure scheme.

Water Supply for Dredge Operated Sand Mine in Tolagnaro, Madagascar. Assisted with predicting water yield from surface and groundwater sources and devised optimum water management schemes for a proposal dredge-operated mine in Madagascar by a Canadian company. The work included assistance with the environmental impact assessment, coordinating on-site flora and fauna survey, preparing a scope of work; and responding to correspondence from World Bank in Washington, D.C.

Environmental and Waste Management

Remedial Investigation of a Large Industrial Facility with Soil and Water Contamination by Coal Tar Derivatives in Duluth, MN. Project included: mapping contamination, identifying alternative remediation measures, preparing cost estimates and report.

Environmental Assessments for Numerous Projects in the Metro Area. Prepared environmental assessment worksheets, and information for environmental impact statements related to surface water for numerous projects over 20 years in the Twin Cities metropolitan area in Minnesota.

Burnsville Landfill in Burnsville, MN. Assisted with the stormwater management system for the site, sizing pipes and ponds, and designing layout. Worked on the leachate collection system pump out.

Moonlight Rock Landfill in International Falls, MN. Prepared grading plan, computed volumes, stormwater management system for the site, sizing pipes and ponds, and designing layout feasibility study.

Contaminated Site Cleanup in Salisbury, MD. Prepared graded plan for cap of a 300-acre former wood treating facility site. The clean-up plan for the site included containing the contaminants with an existing clay layer 40-feet below grade, a surrounding bentonite slurry wall, and a low permeability cap in selected areas. The grading plan minimized infiltration to reduce groundwater treatment. A water balance was performed to estimate the groundwater flows from the site.

Herbst Landfill in Blaine, MN. Prepared future use plans for a closed demolition landfill. Plans included alternative layouts of recreational fields and associated facilities. Care was required to not affect the cap and maintain the side slopes of the existing landfill.

Storm Water Pollution Prevention Plans (SWPPP). Prepared numerous SWPPPs for various sites including large landfill site reuse areas, commercial areas, and residential developments areas.

Thermal Plume Analysis

Thermal Plume Modeling. Managed projects to model thermal plumes at the Riverside Power Plant in Minneapolis, the High Bridge Power Plant in St. Paul along the Mississippi River, the Wilmarth Plant along the Minnesota River in Mankato, and the Monticello Nuclear Power Plant in Monticello. Assisted the power company with meeting water quality permit conditions related to water temperatures of cooling effluent. Collected temperature data, modeled results and provided alternative measures to meet permit requirements.

Reduction of Intake Water Temperature for a Power Generation Plant on the Mississippi River in Red Wing, MN. Managed and provided technical direction for a design-build project to minimize the intake water temperature variation causing a loss of 240,000 KW-hr per day for a nuclear power generation plant along the Mississippi River. The work involved data collection, two-dimensional flow modeling, and preparation of design alternatives that resulted in increasing the power generation, earning the utility company an excess of \$2 million per year.

Wetlands

Wetland Hydrology Instruction. Taught a course in hydrology for the Corps of Engineers wetland staff. This course was full semester long and was part a series of courses providing wetland regulation staff the training needed for their work.

Use of Wetlands to Alleviate Devils Lake Flooding. Worked of a project involving a GIS based hydrologic investigation to determine the effect of restoring upstream farmed wetlands on the water level of Devils Lake.

Sod Farm Wetland Investigations. Provided extensive investigation of sod farm wetlands (\$200,000+ in fees) to determine methods to delineate wetlands in these relatively flat areas. Work involved analysis of flows through peat soils and prediction of groundwater levels.

Teaching

University of Minnesota. Taught Applied Hydrology and Hydraulics at the University of Minnesota for over 18 years. Taught Water Supply for the Infrastructure Systems Engineering course and assisted in other courses such as Project Management, Computational Hydraulics, Hydraulic Structures, and Refresher Course for Civil Engineers as guest lecturer and instructor for various portions of the courses.

Metropolitan State University. Mr. Toso taught a full quarter course in Hydrology prepared for the wetland regulatory branch of the U.S. Army Corps of Engineers.

Publications

Co-author. "Continuous Synthesis of Runoff from the Kawishiwi River Watershed in Northeastern Minnesota," St. Anthony Falls Hydraulic Laboratory, Project Report No. 222, Presentation made to the Minnesota Department of Natural Resources and U.S. Army Corps of Engineers, 1983.

Senior author. "A Practical Model for Urban Watersheds," Presented at the Symposium of Engineering Hydrology Proceedings, American Society of Civil Engineers, August 1987.

Senior author. "Extreme Pressures in Hydraulic Jump Stilling Basins," Journal of Hydraulic Engineering, Vol. 114, No. 8, August 1988. (This paper was the runner-up for the 1990 Karl Emil Hilgard Hydraulics Prize for the best paper in the Journal of Hydraulic Engineering)

Senior author. "Intake Canal Modifications Improve Power Plant Efficiency," Cold Regions Impact on Civil Works Conference Proceedings, American Society of Civil Engineers 9th International Conference on Cold Regions Engineering, September 1998.

Co-author. "Karnafuli Project: Model Studies of Spillway Damage," Journal of Hydraulic Engineering, Vol. 114, No. 5, May 1988.

Senior author. "Design Considerations for Hydraulic Jump Structures," Proceedings of National Conference on Hydraulic Engineering, American Society of Civil Engineers, August 1987.

Senior author. "Data Acquisition and Analysis of Pressure Fluctuations in Hydraulic Jumps," American Society of Civil Engineers Conference Proceedings, August 1985.

Co-author. "Karnafuli Hydroelectric Project: Hydraulic Model Studies of Spillway Damage," American Society of Civil Engineers Conference Proceedings, August 1985.

Author. "The Magnitude and Extent of Extreme Pressure Fluctuations in the Hydraulic Jump," PhD Thesis, University of Minnesota, December 1985.

JACOB WARD

Field Technician

Mr. Ward has six years of experience in the environmental testing industry working with the DNR, MPCA, MDH and other state agencies. His expertise includes: ground, water, and air quality control sampling. He manages project sites to ensure state and federal regulations are being followed and the team working onsite are compliant with safety protocols.

EDUCATION

BS, Biology, St. Cloud State University - St. Cloud, MN

PROJECT EXPERIENCE

- Conducted Environmental site investigations, assessments, and surveys to sample, measure and analyze air, water, material, and soil.
- Identified, evaluated, and recommended risk and remediation/abatement strategies/designs to ensure compliance with federal, state and local regulations.
- Prepared applicable permit applications, risk assessments and technical documents including proposals, reports and regulatory agency correspondence.
- Designed systems and environmental protection plans including Phase I/II environmental site assessments, asbestos and lead surveys and abatement.
- Supervised contractors for environmental health and safety standards at project worksites.
- Clients included public and private agencies and organizations.
- Supervised asbestos abatement procedures.
- Conducted tests of different samples to identify their safety levels and determine if they are within clearance parameters.
- Monitored compliance and management programs for hazardous threats to the health and safety of the public.
- Monitored and analyzed air emissions from industrial plants.
- Monitored power plants, coal plants, ethanol plants, and other facilities to identify potential design, construction and operation practices that violate safety regulations and laws.
- Monitored production rates and planned rework processes to improve production.



AREAS OF EXPERTISE

Environmental Site Assessment
Water Quality Sampling
Air Quality Sampling
Safety Compliance

CERTIFICATION/ TRAINING

Asbestos Site Supervisor/
Inspector – MDH
OSHA Hazwoper
Lead Risk Assessor - MDH

SHANE WATERMAN

Project Hydrogeologist

Mr. Waterman has twenty years of experience on diverse projects including soil and groundwater investigation, corrective action design and implementation. Mr. Waterman has worked with public and private clients in a variety of roles throughout the country including Minnesota, Wisconsin, North and South Dakota, California, Nebraska, Iowa, Ohio, Indiana, Oregon, Washington and Texas. Mr. Waterman has also worked with the WI, MN and OH Underground Storage Tank Programs.

EDUCATION

MS, Geology, emphasis in Sedimentology/Hydrogeology, Ohio University

BS, Geology, University of Wisconsin - Oshkosh, Wisconsin

SELECTED EXPERIENCE

Remedial Investigation and Cleanup Projects

Twin Cities Army Ammunition Plant (TCAAP), Arden Hill, MN. Remedial Investigation and Response Action Implementation. Technical team lead for the subsurface assessment and risk assessment of the main manufacturing portion (427-acre site) of the larger property known as TCAAP. Project duties included the preparation of the project Quality Assurance Project Plan (QAPP) and investigation methodology. Wenck employed an incremental sampling methodology (ISM) to assess risk of the property upon successful remediation of any contaminated sites within the project boundaries. Project duties also included the preparation of multiple response action plans (RAP) to address numerous contaminated properties within the 427-acre project site.

Confidential Client, St Paul, Former Manufacturing Facility. Remedial Investigation and Response Action Implementation. Project manager for the subsurface assessment of the former manufacturing facility. Site investigation included soil borings, soil gas probes and monitoring wells. Planned and performed soil vapor extraction pilot study to design a full-scale soil vapor extraction system.

Project duties included the design of a soil vapor extraction / air sparge system to address volatile organic compound contamination. System design included nine soil vapor extraction vents, blowers systems, a treatment system utilizing catalytic oxidation treatment, six air sparge wells and a master control system. Provided construction and start-up oversight, and ongoing technical review for system monitoring, operation, and maintenance.

Thomas Lake Center, Dry Cleaner Site, Eagan, Minnesota. Remedial Investigation and Response Action. Project manager for a subsurface investigation of tetrachloroethene (PCE) contamination associated with a dry-cleaner tenant. Responsible for the coordination and management of subcontractors, soil and groundwater sample collection, well installation, data



AREAS OF EXPERTISE

Phase I and II
Environmental Site
Assessments
Brownfields Investigation
and Remediation
Remedial Investigations
Corrective Action Design
Hydrogeologic
Assessments
Hazardous Waste
Emergency Response

CERTIFICATION

Certified Hazardous Waste
Site Worker, OSHA 40-hour
training course
Certified Hazardous
Materials Technician,
OSHA 40-hour training
course
Incident Commander
Training – TTCI
Advanced Tank Car
Training – TTCI

REGISTRATION

Professional Geologist,
Minnesota #42313

management and interpretation, hydrogeologic interpretation and soil-vapor extraction pilot testing, remediation system design, construction oversight and general operations and maintenance oversight. Project responsibilities also included client and regulatory maintenance and compliance with the Minnesota Voluntary Investigation and Cleanup staff.

Nash Finch Distribution Facility, Bellefontaine, Ohio. Phase II Subsurface Investigation. Project hydrogeologist for a subsurface investigation of petroleum-related contamination at the facilities maintenance garage. Responsible for the coordination and management of subcontractors, soil and groundwater sample collection, well installation, data management and interpretation, and hydrogeologic interpretation. Project responsibilities also included client and regulatory maintenance and compliance with all Ohio Department of Commerce Bureau of the State Fire Marshall rules and regulations. Based on the data collected and the interpretation of results Wenck successfully negotiated site closure on a site that had been open for over 10 years.

Leder Bros., Minneapolis, Minnesota. Remedial Investigation and Response Action Planning. Project manager for the subsurface assessment of an existing scrap metal recycling facility. Project responsibilities included designing and implementing an investigation approach and evaluating potential risk to multiple receptors. Responsibilities included subcontractor management, sample collection, data analysis and report preparation.

Bay Side Recycling, Duluth, Minnesota. Multiple-Phase Investigation and Remediation of Hazardous Waste Site. Project manager for multiple remedial investigation actions at the facility. Project responsibilities have included the investigation and assessment of metals and PCB-impacted soils at the facility. Other activities included the investigation and remediation of a shredder fluff stockpile found to contain hazardous levels of TSCA and RCRA wastes. Responsibilities during this phase of the project included the coordination and oversight of the removal and disposal of approximately 11,000 cubic yards of hazardous shredder fluff waste.

University of Minnesota, TCF Bank Stadium Site, Minneapolis, Minnesota. Remedial Investigation and response Action Planning. Project hydrogeologist during the remedial investigation of the proposed football stadium site. The site was formerly used for industrial purposes including a former wood treatment facility and petroleum bulk storage facility. Project included monitor well installation and extensive soil sampling. Responsibilities included initial investigation planning, sample collection, data analysis and report preparation. Other project tasks included providing technical support at client and regulatory meetings.

SCI Recycling Service, Anoka, Minnesota. Multiple-Phase Investigation and Remediation of Petroleum and Hazardous Wastes. Project manager for multiple remedial investigation/remedial actions at the 12.4-acre metal recycling facility. Project responsibilities included the investigation and remediation of RCRA hazardous soils in a former area of the site that was impacted by a large fire. Other activities included the investigation and remediation of a shredder fluff berm found to contain hazardous levels of TSCA and RCRA wastes. Responsibilities during the project included the coordination and oversight of the removal and disposal of approximately 4,900 tons of hazardous shredder fluff waste. In addition, a total of approximately 52,600 tons of lead-impacted soil was stabilized on-site to ensure disposal of the material as non-hazardous solid waste. In all over 71,000 tons of impacted soil was removed from the site during the remedial actions.

The site is currently under the purview of the MPCA Petroleum Brownfield Program. Site activities include significant groundwater investigation and risk assessment.

St. Anthony Gun Club, Ramsey, Minnesota. Multi-Phase Investigation and Remediation. Project hydrogeologist for several soil and groundwater investigations of heavy metal and PAH contamination from past trap and skeet shooting activities. Project responsibilities included designing and implementing an investigation approach and evaluating potential risk to multiple receptors. Project responsibilities also included the design of a remediation strategy, preparation of remediation specifications, contractor bidding, project coordination and management.

University of Minnesota – St. Paul Campus, St. Paul, Minnesota. Stormwater Detention Pond Construction Project. Project hydrogeologist for the investigation and remediation of a former non-permitted dump for construction of a stormwater detention pond. Project activities included the planning, field supervision of construction contractors, sample collection, data analysis and report preparation.

HuntGregory Redevelopment Sites, Minneapolis, Minnesota. Multiple-Phase Investigation and Remediation. Project hydrogeologist for several soil and groundwater investigations of heavy metal and petroleum-related

contamination at multiple sites located throughout the development. Project responsibilities included monitoring well installation and extensive soil sampling. Other responsibilities included waste characterization and disposal coordination, contractor supervision, report preparation, and technical support at client and regulatory meetings.

HuntGregory Block 40 Redevelopment Site, Minneapolis, Minnesota. Groundwater Mitigation System Design and Installation. Project hydrogeologist of a design/build contaminated groundwater trench mitigation system. Project responsibilities included the preparation of a work plan, contractor supervision and coordination, implementation report preparation, and technical support at client and regulatory meetings.

Commercial Redevelopment Site, Stillwater, Minnesota. Multiple-Phase Investigation and Remediation. Project hydrogeologist for multiple subsurface soil investigations of historic fill impacted with heavy metal and petroleum-related constituents. Project responsibilities included extensive soil sampling and waste characterization, disposal coordination, subcontractor management, field supervision of remedial activities, report preparation, and client/regulatory maintenance.

Former Lowertown Depot Redevelopment Site, St. Paul, Minnesota. Multiple-Phase Investigation and Remediation. Project hydrogeologist for several soil investigations of heavy metal and petroleum-related contamination at the site. Project responsibilities included extensive soil sampling and characterization, waste disposal coordination, subcontractor management, field supervision of remedial activities, and report preparation.

Former Bellaire Sanitation Transfer Station Site, Grant Township, Minnesota. Response Action Implementation. Project manager for the remediation of a former non-permitted landfill. Project tasks included waste characterization, disposal coordination, subcontractor management, field supervision of remedial activities, report preparation, and client/regulatory maintenance.

YMCA, Marshall, Minnesota. Remedial Activities. Project hydrogeologist for the remedial cleanup of several former bulk aboveground and underground storage tank leak sites. Project responsibilities included oversight of the excavation activities and landspreading of petroleum-contaminated soil. Project responsibilities also included subcontractor management, monitoring of geothermal well installation activities, report preparation, and client/regulatory maintenance activities.

Brownfields Site, Amery, Wisconsin. Phase II Subsurface Investigation. Project hydrogeologist for a subsurface investigation of petroleum-related contamination at a city-owned property. Responsible for the coordination and management of subcontractors, soil and groundwater sample collection, well installation, data management and interpretation, and hydrogeologic interpretation. Project responsibilities also included client and regulatory maintenance and compliance with all Wisconsin Department of Natural Resources rules and regulations. Based on the data collected and the interpretation of results Wenck successfully negotiated site closure.

Phase I Environmental Assessments

Multiple Clientele (MN, IA, NE, OH, IN, WI, WA, OR and TX). Preparation of Phase I Environmental Site Assessments and Transaction Screens for residential, commercial, and industrial clients. All Phase I Environmental Site Assessments were completed in accordance with the standards of the American Society for Testing and Materials Phase I Environmental Site Assessment Process.

Phase II Environmental Site Assessments

University of Minnesota, Peking Garden Site, Minneapolis Minnesota. Phase II Investigation. Project hydrogeologist for the subsurface investigation of a former industrial site. Project responsibilities included subcontractor coordination and management, data management, slug testing, aquifer testing and interpretation, and report preparation. Other project tasks included working with multiple state programs to obtain numerous liability assurances for the University.

City of Minneapolis-Fire Station No. 14, Minneapolis, Minnesota. Phase II Investigation and Response Action. Project hydrogeologist/manager for the remedial investigation of a former gasoline and service station. Responsible for subcontractor management, supervision of drilling and sampling, well specifications, data management, hydrogeologic interpretation, vapor assessment and report preparation. The site was closed by the MPCA and the city was able to redevelop the site into a fire station.

Plastic Products Facility, West Branch, Iowa. Phase I and Phase II Environmental Site Assessments.

Project hydrogeologist for the initial Phase I Environmental Site Assessment and subsequent subsurface investigation of methylene chloride contamination. Project responsibilities included preliminary hydrogeologic and contaminant investigation of suspect areas identified in the Phase I Environmental Site Assessment. Responsible for subcontractor management, supervision of drilling and sampling, well specifications, data management, hydrogeologic interpretation, and report preparation.

Former Advance Machine, Spring Park, Minnesota. Remedial Investigation. Project hydrogeologist for the subsurface investigation of a dissolved phase TCE contaminant plume at the former machining facility site. Project responsibilities included subcontractor coordination and management, data management, slug testing, aquifer testing and interpretation, geophysical data interpretation, and report preparation.

American Crystal Sugar, Minnesota. Phase II Environmental Site Assessment. Project hydrogeologist of a Phase II Environmental Site Assessment for reconfiguration of the landfill compliance boundaries. Project included the subsurface assessment of dissolved phase heavy metals migration from process waste disposal sites located on the site. Responsible for subcontractor management, field activities, data management, hydrogeologic interpretation, and report preparation.

City of Marshall, Minnesota. Remedial Investigation. Project hydrogeologist for the remedial investigation of a former gasoline and service station. Responsible for subcontractor management, supervision of drilling and sampling, well specifications, data management, hydrogeologic interpretation, and report preparation. The site was closed by the MPCA and the City was able to redevelop the site into a public park.

Former Gas Station Site, Lowry Avenue, Minneapolis, Minnesota. Remedial Investigation. Project hydrogeologist for a remedial investigation of petroleum-related contamination at a former gasoline station. Responsible for the coordination and management of subcontractors, soil and groundwater sample collection, well installation, data management and interpretation, and hydrogeologic interpretation. Project responsibilities also included client and regulatory maintenance and compliance with all Department of Commerce rules and regulations as to maintain maximum reimbursement eligibility for the client.

City of St. Paul, St. Paul, Minnesota-Redevelopment Site. Phase II Environmental Site Assessment. Project geologist for the initial Phase II Environmental Site Assessment of a future public park redevelopment site along the Mississippi River. Project responsibilities included preliminary site screening to evaluate potential human health risks and exposures based on future site scenario. Responsibilities included the development of work plans, subcontractor coordination and management, field activities, data management, investigation report preparation, and construction contingency plan report preparation.

City of Fargo, North Dakota-Fargo Landfill. Phase II Environmental Site Assessment. Project hydrogeologist for a Phase II Environmental Site Assessment of a dissolved volatile organic compound plume in the shallow ground water table. Project included the subsurface assessment of contaminant migration from the old landfill. Responsible for subcontractor management, field activities, data management, hydrogeologic interpretation, and report preparation.

Buckbee Mears, St. Paul, Minnesota. Phase II Environmental Site Assessment. Project hydrogeologist for the Phase II Environmental Site Assessment of a chromium storage tank basin located in the basement of the former manufacturing facility. Project included the installation of hand-augured soil borings and sample collection activities.

Lampert Yards, Northfield, Minnesota. Phase II Environmental Site Assessment. Project hydrogeologist for the Phase II Environmental Site Assessment of a former auto body/service station. Responsible for subcontractor management, field activities, data management, and report preparation.

Confidential Client, Iowa. Phase II Environmental Site Assessment. Project hydrogeologist for the Phase II Environmental Site Assessment activities near a former city dump. Project responsibilities included subcontractor management, supervision of drilling activities, sample collection, chemical data management and interpretation, and report preparation.

Confidential client, Minnesota. Multiple Phase II Environmental Site Assessments. Project hydrogeologist for

multiple Phase II Environmental Site Assessments at the scrap metal recycling facility. Project responsibilities have included numerous environmental assessments based on current and past site activities, and characterization of process waste for disposal purposes. Responsible for subcontractor management, supervision of on-site field activities, data management, hydrogeologic interpretation, report preparation. Project has also required extensive technical and litigation support.

Crown Hydro Site, Minneapolis Minnesota. Phase II Environmental Site Assessment. Project geologist for the initial Phase II Environmental Site Assessment of a hydroelectric site. Project responsibilities included preliminary site screening to evaluate on-site fill conditions. Responsibilities included subcontractor coordination and management, field sampling and characterization activities, data interpretation and management, report preparation, and construction contingency plan report preparation.

Mankato Energy Site, Mankato, Minnesota. Phase II Environmental Site Assessment. Project hydrogeologist for a Phase II Environmental Site Assessment performed to assess the potential impacts of an adjacent former city dump. Project responsibilities included subcontractor management, supervision of drilling activities, sampling collection, chemical data management and analysis, and report preparation.

Hydrogeologic Assessments

Alexander, North Dakota – Proposed Special Waste Landfill Site. Detailed Hydrogeologic Site Evaluation. Project hydrogeologist responsible for performing field-work and data compilation activities associated with the investigation of a 160-acre site in northwestern North Dakota. Specific duties included the oversight of drilling activities, detailed geologic characterization of site soils and bedrock, compilation of results.

Finlayson, Minnesota – Proposed Special Waste Landfill Site. Detailed Hydrogeologic Site Evaluation. Project manager responsible for overseeing all aspects of the project including the fieldwork coordination, oversight of field staff and overall project management activities. Other project duties included detailed ground-water fate and transport modeling. The model results were used to aid in the design of the landfill.

Pratt Homes Development Site, Forest Lake, Minnesota. Hydrogeological Evaluation. Project hydrogeologist responsible for assessing potential basement dewatering scenarios at a future residential redevelopment site. Project activities included the design, implementation and analysis of numerous aquifer tests, report preparation, and client maintenance activities.

MCES – Blue Lake WWTP, Shakopee, Minnesota. Hydrogeological Evaluation and Training. Project hydrogeologist responsible for implementation and analysis of a multiple pumping well test to assess existing and future aquifer dewatering activities at the facility. Other project tasks included document preparation, client maintenance activities and training associated with the operation of the facility groundwater dewatering system.

Water Well Design and Groundwater Appropriation Experience

Watford City, North Dakota – Multi-Tenant Housing Development. Potable Public Water-Supply Well Design. Project hydrogeologist for a 60-person multi-tenant housing development. Project activities included the preparation of the design plans and specifications for a potable public water-supply system.

Emergency Response

Brewster, Minnesota – Crude Soybean Oil Cleanup. Project leader during an incident involving crude soybean oil. Project tasks included the coordination and oversight of the cleanup of approximately 5,000 gallons of soybean oil from a damaged 2.5 million gallon above-ground storage tank.

Guttenberg, Iowa – Train Derailment. Project leader during a multiple car incident involving denatured ethanol. Project tasks included the coordination and oversight of the transfer of approximately 200,000 gallons of denatured ethanol from damaged tank cars to over-the-road transportation. Other activities included performing damage assessments and inspections.

Minnesota City, Minnesota – Train Derailment. Project leader during a multiple car incident involving kosher soybean oil. Project tasks included the coordination and oversight of the transfer of approximately kosher soybean

oil from damaged tank cars to over-the-road transportation.

Dresbach, Minnesota – Train Derailment. Project leader during a multiple car incident involving liquid fertilizer. Project tasks included the coordination and oversight of the transfer of approximately 120,000 gallons of liquid fertilizer from damaged tank cars to over-the-road transportation. Other activities included performing the initial damage assessments and railcar inspections.

New Orleans, Louisiana Emergency Response. Project activities included responding to hazardous spill sites for assessment and cleanup. Other project tasks included monitoring the health and safety of field crews during the collection of bio-hazardous materials, reconnaissance and collection of displaced intact chemical drums and tanks.

Shuttle Recovery Mission, Texas. Data Collection and Health and Safety Monitoring. Project included sample collection, documentation, and health and safety monitoring for field crew. Project activities also included the identification of potential shuttle debris in a reservoir with an average depth of approximately 50 feet utilizing GIS and multi-scanning sonar technologies.

Siting and Permitting

MIN-DAK, South Dakota and Minnesota Sites. Site Evaluation and Permitting. Managed site characterization and permit completion for several beet spoils land application sites located in South Dakota and Minnesota. Project responsibilities included the collection of soil samples at each land-spreading site, data collection and interpretation, and permit completion.

Stormwater Pollution Prevention Planning

Multiple Industrial Clientele (MN, IA, NE). Preparation of numerous Stormwater Pollution Prevention Plans (SWPPPs) for industrial clients. All SWPPPs were prepared in accordance with all state and federal rules and guidelines.

Expert Opinions and Testimony in Litigation

Veolia ES Special Services, Inc. (fka Onyx Special Services, Inc.) vs. Techsol Chemical Company et. al. U.S. District Court, The Southern District of West Virginia at Huntington, November 2007. (tank car spill incident)

Publications

“Permeability in Carboniferous Siliciclastic Units of Southeastern Ohio,” 1997 Geological Society of America Abstracts with Programs (North-Central Section), v.29(4), p. 77.

“Controls on Porosity and Permeability in Carboniferous Siliciclastic Units of Southeastern Ohio,” 1997, Masters Thesis, Ohio University, Athens, Ohio.

MEAGHAN WATSON

Environmental Scientist

Ms. Watson joined Wenck in 2015 and has over five years of experience on diverse projects including environmental permitting and compliance, soil erosion and sedimentation control plans, wetland restoration monitoring reports and Environmental Assessment Worksheets (EAW), as well as threatened and endangered species surveys. In addition, she has completed several certifications.

Ms. Watson is a certified Wetland Delineator in Training in the state of Minnesota and has experience performing wetland delineations in North Dakota, Minnesota, and Wisconsin. She has experience identifying and classifying wetland vegetation and western prairie vegetation. Ms. Watson also has assisted with preparing Wetland Bank Plans and performing subsequent monitoring and reporting in Minnesota. She has experience with annual monitoring on wetland banks and mitigation wetlands.

Ms. Watson has gained experience identifying suitable habitat for Dakota Skipper, a recently listed federally threatened species in Minnesota and North Dakota. She has worked on numerous projects identifying plants and native plant communities in western North Dakota and assessing habitat suitability for hosting Dakota Skipper.

EDUCATION

BS, Environmental Science, University of Minnesota-Twin Cities

SELECTED EXPERIENCE

Environmental Permitting and Compliance

Enbridge Energy Maintenance Projects. Participated in an environmental permitting and compliance team for Enbridge pipeline maintenance projects in Minnesota, North Dakota, Michigan, Wisconsin, Illinois, Missouri, Kansas, and Oklahoma. Held lead roles as a field compliance task manager for project work in Illinois and completed hundreds of permit applications for projects across all states. Gained experience drafting environmental permit applications at the local, state, federal, and tribal levels. Also managed the schedule and execution of different stages of restoration for two complex wetland restoration projects.

Regulatory District Representative at Minnehaha Creek Watershed District. Represented the Watershed District in permitting approval and environmental compliance. Performed site inspections, reviewed small-scale private projects and large-scale public agency project, and met with contractors and planners to aid in continued environmental compliance with district regulations.

CapX2020 Joint Transmission Line Project. Assisted with tree removal and replanting inventory list to comply with permit requirements and completed water appropriation reporting for the Minnesota DNR for the 2014 construction season.



AREAS OF EXPERTISE

Environmental Permitting & Compliance
Wetland Delineation
Plant Identification
Soil Erosion & Sedimentation Control Plans
Wetland Restoration Monitoring Reports and EAWs
Threatened and Endangered Species Surveys
GIS

TRAINING

Certified In-Training Wetland Delineator (#5202)
Erosion and Stormwater Management Construction Installer (expired)
ASTM Phase I
Environmental Site Assessment Certified
Trained in Karner Blue Butterfly Survey and Identification (WI DNR)
40-Hour HAZWOPER Certification

Wetland Conservation Act LGU – City of Dayton, Shingle Creek WMC, West Mississippi WMC. Completed wetland delineation report reviews for properties and proposed project sites in each LGU area. Also participated in Technical Evaluation Panel meetings onsite to review wetland boundaries and types. Completed WCA regulatory forms such as Notice of Application and Notice of Decision forms for multiple and various projects. Additionally, reviewed wetland replacement and banking plans as the LGU for the listed agencies.

Wetland Replacement Plans – Various Clients. Assisted with preparing wetland replacement and wetland banking plans and the supporting concept, scoping, and full application documents required for the Minnesota-USACE Joint Wetland Permit application.

Environmental Review

Halls Island EAW - Minneapolis Park Board. Assisted with writing sections of an environmental assessment for a park creation project on the Mississippi River front on a historically industrial site, including surrounding land use assessment, previous site use, and hazardous waste generation and disposal. Participated in field sampling for soil contamination analysis and geotechnical feasibility.

Mankato Energy Center EAW – Calpine Energy. Assisted with writing sections of an environmental assessment for the expansion of an energy plant in Mankato, including archaeological and historical resources and effects on the natural environment, such as wetlands, soils, groundwater, and rare and unique natural resources.

Westside Generating Station EAW – Rochester Public Utilities. Assisted with writing sections of an environmental assessment for the construction of a new energy plant in Rochester, including impacts to wetlands, soils, groundwater, and geology.

Williston Northeast Truck Reliever Route EA – NDDOT

Assisted the EA team with the preparation of wetlands, wildlife, and other natural resources sections of the Williston EA and in preparing wetland related information for the EA from the NDDOT wetland delineation report.

Four Seasons Mall EAW – Rockhill Management LLC

Gathered background information and research to prepare the majority of the first draft of the Four Seasons EAW. Worked with team members to complete natural resource related portions of the document, within a shortened time frame of delivery to the client.

Methodist Hospital Floodplain Mitigation EAW – Park Nicollet

Responsible for preparing the majority of the first draft of the Methodist Hospital EAW and working with team members to integrate additional wetland and floodplain data from prior LGU studies.

Bemidji Public Schools EAW – Bemidji Public Schools

Assisted with drafting the Bemidji Public Schools EAW and coordinating with project team members to complete the document. Coordinated submittals and document management with the LGU.

Middle Piney Reservoir Rehabilitation EAW – Wyoming Water Development Commission

Drafted a Biological Assessment for the Middle Piney Reservoir project and incorporated this information into related portions of the EAW.

Sundance-Dehn Development EAW – Power Lodge

Assisted in preparing an EAW and establishing sensitive species protection guidelines for a large residential development with mixed single and multi-family homes.

CSAH 4 Redevelopment EAW – Kandiyohi County

Assisted in preparing an EAW for a county road redevelopment project. Focused on water resources and sensitive species, drawing information from the wetland delineation effort.

Dresbach Wastewater Treatment Project – Dresbach Township

Developed background data and drafted EIW for a new sewer infrastructure project in the unsewered community of Dresbach Township. Special focus on sensitive mussel species in the Mississippi River.

Orchards at Cahanes Farm EAW – Croix Capital Group

Assisted in gathering background data and drafting an EAW for a single family residential development in Baytown Township, Minnesota.

Phase I Environmental Site Assessments

Aiple Property Phase I - Stillwater, MN. Assisted Environmental Professional with Phase I historic research, site visit and interviews, and wrote Phase I report for client.

Stream/Wetland Restoration Monitoring

Plymouth Creek Stream Restoration Project – City of Plymouth, Minnesota.

Completed all environmental permitting for stream restoration project including WCA, DNR, Corps, and local watershed permits. Also assisted in vegetation and stabilization planning and long-term maintenance goals.

Northshore Mining Company - Gilmore Creek Stream Restoration, St. Louis County, Minnesota. Assisted in field visits to set up vegetation monitoring quadrats and photo documentation methods for monitoring streambank restoration success. Assisted in writing the 2014 monitoring report for Northshore Mining.

U.S. Steel Wetland Restoration Monitoring reports. Assisted in vegetation data processing and report writing for U.S. Steel wetland restoration in Aitkin County, MN for mining wetland mitigation projects at the Palisade I, II, and III sites.

Enbridge Energy Wetland Restoration Monitoring reports. Assisted in vegetation data processing and report writing for Enbridge Energy wetland restoration in Aitkin County, MN for pipeline wetland mitigation projects at Thompson and Nikolayson sites.

Merriam Junction Sands, LLC - Wetland Restoration Monitoring reports. Assisted in vegetation data processing hydrologic data analysis and report writing for Merriam Junction Sands wetland restoration for an industrial sands project at the Merriam Junction Site in Stillwater, Minnesota.

Wetland Bank Establishment – Multiple Clients. Assisted with preparing the scoping documents, concept plans, and full wetland bank applications following the MN Board of Soil and Water Resources guidance for wetland bank establishment.

Botany and Rare Species

Karner Blue Butterfly Surveys – Enbridge Energy. Surveyed 10 miles of existing pipeline corridor in Wood and Adams County, WI performing Level I and Level II KBB habitat surveys. Utilized Karner blue butterfly identification training obtained from the Wisconsin DNR for Habitat Conservation Partners.

Monarch Butterfly Conservation - University of Minnesota. Managed database of donations for monarch conservation funds; assisted with graduate student research for monarch survivorship and *Ophryocystis elektroscirrha* (OE) parasitic infections; raised, mated, and fed monarch individuals; and cultivated nectar plants. Also assisted with training seminars for Monarchs in the Classroom teacher education program.

Dakota Skipper Habitat Desktop Assessment – Multiple Confidential Oil and Gas Clients. Developed an off-site review of proposed project areas in counties with potential Dakota skipper habitat. This process involves a review of aerial imagery for potential suitable habitat areas and the elimination of areas to survey through analyzing previous disturbance, land use, and vegetative cover.

Dakota Skipper Habitat Surveys – Multiple Confidential Oil and Gas Clients. Performed multiple Dakota skipper habitat surveys throughout western North Dakota. Surveys included parcel meanders for native prairie remnants, plant identification and habitat assessment. Communities were assessed for the cover of native bunchgrasses and the presence of nectar plants necessary to support Dakota skipper. Performed surveys on multiple well pads and access roads and within a proposed pipeline corridor.

Threatened and Endangered Species Determinations - Multiple Confidential Oil and Gas Clients. Assessed

proposed and existing well pads and access roads for the potential to support threatened and endangered species in western North Dakota. Tasks included wetland identification, raptor nest surveys, habitat identification, and plant identification.

Native Prairie Monitoring and Survey – Minnesota DNR. Performed annual plant inventories for several native prairie sites under DNR management. Inventories required setting up pre-established transects and plant identification at each transect. The purpose of each annual survey is to evaluate prairie plant community response to management and to detect broad, plant community changes that may occur over time. Each observed plant species in every other transect plot was identified to provide a highly accurate and extensive amount of data to the DNR for research purposes.

Tree, Shrub, and Noxious Weed Surveys – Proposed Pipeline in Western North Dakota. Assisted with botanical surveys over four miles of pipeline corridor, identifying all trees and shrubs located within the corridor. Noxious weed inventories were also performed. Surveys took place in the Missouri River floodplain near Williston, North Dakota.

Biological Opinion on the Effects to the Dakota Skipper from the Construction and Operation of 15 Oil and Gas Wells on 3 Pads in McKenzie County, North Dakota – Petro Hunt and Continental Resources. Assisted in the research and writing of a biological opinion document under the guidance of the U.S. Fish and Wildlife Service. This document was a four-month project researching and describing the potential impacts to the Dakota skipper population as a result of constructing and operating three well pads for the above clients. Tasks performed included literature reviews of scientific papers, interviewing experts on Dakota skipper, and writing portions of the impact statements included in the document.

Rapid Floristic Quality Assessments – Minnehaha Creek Watershed District. Assisted with wetland vegetation inventories contributing to a watershed-wide assessment of wetland health and function in Minnehaha Creek Watershed District. The project involved a timed meander survey of each wetland plant community identified on site and identification of each plant species observed.

Bald Eagle Point Count Surveys – Palmer’s Creek Wind Farm, Fagen Engineering. Completed bald eagle use surveys prior to the construction of a wind farm consistent with US Fish and Wildlife Eagle Conservation Plan Guidance.

Soils

Soil Science Teaching Assistant, University of Minnesota. Ran the basic soil science lab for undergraduate students for two different professors. Set up lab study stations, administered lab tests and assisted students with questions.

Biological Science Aid, USDA. Participated in field research regarding the impacts of conventional fertilizer application on greenhouse gas emissions. Assisted in soil gas sampling surveys, plant population surveys, and soil profile analyses.

Wetlands

CSAH 4 Road Redevelopment Wetland Delineation – Kandiyohi County

Lead effort to perform a wetland delineation along 8 miles of county road for a road redevelopment project, compiled wetland delineation report, and coordinated submittal to regulatory agencies for approval.

Wetland Review and Drainage Investigation, Multiple Properties. Assisted in both an off- and on-site wetland and drainage investigation for each property. Offsite review included reviewing historical aerial imagery and available information for soils, hydrology, topography, and wetlands. The on-site visits typically include performing a wetland delineation to identify the extent of wetland on the subject property. Have also assisted with performing offsite wetland determinations under the NRCS SOSM (State Offsite Methods).

Wetland/Waterbody Investigations for a Proposed Pipeline in Northern North Dakota (2015-Present).

Assisted with and acted as Crew Lead for wetland delineations, tree, shrub, and noxious weed surveys along a proposed pipeline corridor near Minot, North Dakota. As a Crew Lead, was responsible for communicating with

environmental permitting managers and reporting daily progress. Field crew leaders assisted processing and QA/QC of daily field data.

Cedar Ridge Buffer Investigation – Meridian Behavioral Health. Performed a site visit to the Cedar Ridge behavioral center to assess the quality and function of existing wetland buffers on site in order to comply with Brown's Creek Watershed District regulatory requirements. The buffers were surveyed for undesirable species, disturbance, and vegetation manipulation such as crops or turf grass. Tasks included a random meander survey of vegetation and a visual assessment of bare ground within the wetland buffers.

Williston NE Truck Reliever Route – NDDOT. Assisted with wetland delineation and waterbody inventory for a proposed 14-mile truck bypass route for the City of Williston. Also assisted in drafting the Environmental Assessment document for the Williston NE TRR, as noted above.

GIS

Wetland Delineations - City of Eden Prairie. Created final wetland delineation figures for several delineation projects within the City of Eden Prairie.

Wetland Delineation and Botany Survey for a Proposed Pipeline in Western North Dakota. Post-processed all survey data for Western Expansion surveys, including wetland delineations, tree and shrub surveys, noxious weed inventories, and Dakota skipper habitat surveys. This project also included providing attributes and figures to the client to determine the amount and location of Dakota skipper habitat on site for their permitting purposes.

Phase I Figures – Various Clients. Assisted with creating figures for various Phase I projects.

Meadowbrook Golf Course Improvement Project – Minnehaha Creek Watershed District. Supplied the District with the necessary figures and visual information for USACE and WCA permitting requirements. Worked with District staff to create figures for the proposed wetland impacts associated with realigning a section of Minnehaha Creek for improved flood storage and wildlife habitat.

Water Quality

Saunders Water Quality Sampling - CP Rail

Performed water quality sampling and data gathering for CP Rail.

ADAM ZOBEL

Senior Environmental Project Manager

Mr. Zobel is a Senior Environmental Project Manager within the Real Estate Resources Group at Wenck. He has 14 years of environmental consulting experience assisting clients with transaction-based environmental due diligence, brownfield redevelopment, petroleum and non-petroleum release investigations, and remediation.

EDUCATION

BA, Biology, St. Olaf College

Study abroad program, Lancaster University, 2000

SELECTED PROJECT EXPERIENCE

Mr. Zobel's responsibilities included project management, facilitating and mentoring of entry level staff, and client development and proposals. Areas of expertise included:

- Environmental Due Diligence - Phase I and Phase II Environmental Site Assessments (soil, groundwater and soil vapor), including field experience.
- Development Response Action Planning, Response Action Implementation
- Environmental Budget Opinions.
- Assisting clients with MPCA VIC and Petroleum Brownfield Programs and Superfund Investigation/Remediation.
- Grant assistance, assessment and cleanup grants.
- Limited Site Investigations, Remedial Investigations, and Corrective Action for petroleum and non-petroleum sites.

Phase I Environmental Site Assessments

Prepared environmental site assessments for a wide range of clients, which have included manufacturing and industrial-type facilities, commercial/retail facilities, multifamily dwellings, farmsteads, abandoned/vacant, and undeveloped properties.

Phase II Environmental Site Assessments

Coordinates remedial investigation activities including work plan preparation, implementation and generation of final reports. Manages Phase II projects involved with compliance issues, hazardous waste, dry cleaning facilities, groundwater wells, asbestos, PCBs, lead-based paint and petroleum releases involving groundwater and soil impacts.

Brownfield Redevelopment Projects

Experience with Brownfield redevelopment projects includes Minnesota Pollution Control Agency (MPCA) correspondence, Voluntary investigation and cleanup (VIC) and Petroleum Brownfields Program (PBP) applications, preparing investigation work plans and Response Action Plans (RAPs), providing response action oversight, and implementation reporting. Secured grant funding for various assessment/cleanup projects.

Storage Tank Investigations/Projects

Provided Limited Site Investigations and Remedial Investigations. Experience includes soil borings, test pits and monitoring well installation/sampling, tank excavations, reporting, and Petrofund applications.



AREAS OF EXPERTISE

Environmental Due Diligence
Brownfield Redevelopment
Petroleum and Non-Petroleum Release Investigations and Remediation

CERTIFICATIONS

40 Hour OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER)
MDH Certified Asbestos Inspector No. AI9262
CPR/First Aid Training



Printing:

