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BARR

TECHNICAL PROPOSAL for

Remediation Master Contract

Category C: Closed Landfill Program
Environmental Services

prepared for

Minnesota Pollution Control Agency

Submitted by Barr Engineering Co.
April 2018

contents

separately uploaded attachments

non-public/trade secret data

attachments

1. cover letter

April 11, 2018

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

RE: Remediation Master Contract—Category C: Closed Landfill Program

Dear Ms. Heininger:

Barr is pleased to submit our proposal for Category C: Closed Landfill Program services for the Minnesota Pollution Control Agency's Remediation Master Contract. We accept the Classification Levels and Rates—Schedules 1 and 2 and the Equipment and Supplies List in the MPCA's request for proposals and clarifications in Addendum 1 (dated March 19, 2018).

Our contact information is:

Firm name:	Barr Engineering Co.	**Contact:**	Dan Fetter, Vice President
Address:	4300 MarketPointe Drive Minneapolis, MN 55435	**Address:**	4300 MarketPointe Drive Minneapolis, MN 55435
Telephone:	952-832-2600	**Telephone:**	952-832-2741
Website:	www.barr.com	**Email:**	dfetter@barr.com

firm history and organization structure

Barr's staff of more than 750 provides engineering and environmental services, including permitting and design for hazardous- and solid-waste facilities, contaminated-site assessment and remediation, engineering and design of facilities and systems, materials handling design, air quality permitting, environmental management and compliance assistance, and water resources management. Barr is headquartered in Minneapolis and has offices in Minneapolis, Duluth, and Hibbing, Minnesota; Jefferson City, Missouri; Ann Arbor and Grand Rapids, Michigan; Bismarck, North Dakota; Salt Lake City, Utah; and Calgary, Alberta.

Barr was incorporated in 1966 as an employee-owned company. Barr is divided into four business units: Assessment and Remediation, Engineering and Design, Environmental Management, and Water Resources. Barr's principals in charge are responsible for responding to our clients' needs, building project teams, and executing and managing projects.

For the nearly 50 years, Barr's Assessment and Remediation unit has worked on landfill sites in Minnesota and has decades of strategies gained and lessons learned from these projects.

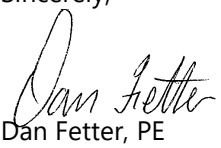
description of overall capabilities

We believe Barr is best suited to assist the MPCA with its Closed Landfill Program, because our:

- **Closed Landfill Program experience allows us to hit the ground running.** Barr is currently in the Closed Landfill Program (CLP), and we are providing ongoing services for the Freeway and Brookston landfills. We have staff qualified in the CLP with teams in place that will provide continuity of service on our existing projects and offer efficient and knowledgeable assistance for your other landfill projects. The MPCA will benefit from Barr's project knowledge and familiarity with your needs and requirements.
- **Large Minnesota-based staff provides localized knowledge and efficient services.** Barr has offices in Minneapolis, Duluth, and Hibbing, with 625 Minnesota-based engineers, scientists, and support specialists. Our staff have broad knowledge and deep experience with our state's regulatory programs and all aspects of our unique Minnesota environment (hydrogeology, wetlands, and climate), allowing the MPCA to avoid steep learning curves associated with out-of-state staff. Our experienced Minnesota-based teams are conveniently located to efficiently serve CLP project locations, allowing significant time and fuel savings for Barr to mobilize staff and equipment.
- **Extensive history with landfills helps solve complex problems.** Landfill projects are—by their nature—large and complex. Barr's landfill experience spans nearly 50 years, and we specialize in solving large and complex problems for our clients. We are experienced in all aspects of landfill projects—from investigation to design and construction to monitoring and remedial system optimization. Selecting Barr will provide the MPCA with access to a wide spectrum of landfill expertise.
- **Specialized expertise with emerging contaminants facilitates successful treatment.** The landfill industry is facing new challenges related to emerging contaminants of concern such as per- and poly-fluoroalkyl substances (PFAS) and 1,4-dioxane. These emerging contaminants can complicate leachate management, groundwater monitoring and remediation, and public outreach for landfill sites. Although these contaminants can be challenging to investigate and remediate, Barr's engineers have up-to-date project experience, including multi-media sampling and analysis, modeling, and water-treatment-system design. Our experience will allow the MPCA to efficiently assess the impacts of evolving requirements as these contaminants require treatment and to determine appropriate technologies for treatment efficiency.

Thank you for the opportunity to propose on this work. If you have any questions regarding our proposal, please feel free contact me at 952-832-2741 or dfetter@barr.com.

Sincerely,



Dan Fetter, PE
Vice President, Principal in Charge

2. qualifications and capabilities

summary of overall company capabilities

Barr integrates engineering and environmental expertise to help clients develop, manage, process, and restore natural resources. Our 750 engineers, scientists, and technical support specialists serve the power, mining, manufacturing, and fuels industries, as well as natural-resources management organizations and municipal, state, and federal agencies. Our clients' projects take us across the Midwest, throughout the Americas, and around the world.

Barr's areas of expertise include permitting and design for hazardous- and solid-waste facilities; groundwater modeling, air quality permitting; environmental management and compliance assistance; water supply and wastewater treatment; water resources management; assessment and remediation of contaminated sites; engineering design; and process and materials-handling design.

Barr's experience with the waste facilities began nearly fifty year ago as the Minnesota Pollution Control Agency (MPCA) was created and its landfill programs emerged. Barr has worked for MPCA and our industrial clients on numerous waste facilities as the industry and regulatory programs have evolved over time.

Through our work nationwide, we've addressed thousands of sites and have completed hundreds of contaminated-site projects, including many involving waste facility design. Our multidisciplinary teams are organized around the unique needs of each specific project.

resumes of key staff

The primary point of contact for Barr's services under Category C: Closed Landfill Program will be **Dan Fetter**, who will respond to project opportunities with MPCA and will assign the best-suited key staff members to each specific project. Resumes of key staff members (those listed in **bold** type in the matrix below) are provided in alphabetical order in Attachment A.

matrix of staff capabilities

Barr proposes to use any of the individuals listed on the table below to complete the tasks described in the request for proposal's scope of work for Category C: Closed Landfill Program. This table is based on the list of Barr staff that are currently approved to under Barr's existing Closed Landfill Program contract. Additional staff have been included for new personnel classifications Engineer 3 and Engineer 4. Personnel classified as Scientist 3 under the Barr's existing Closed Landfill Program contract have been reclassified or removed.

name	job classification	OSHA certification	years w/ firm	education experience	work experience	licenses and certifications	location
Tristan Beaster	Engineer 1	HAZWOPER Construction	4	MS, Environmental Engineering BS, Environmental Science	8 years of experience with onsite investigations of contaminated soil, sediment, and groundwater; construction observation; remedial design; laboratory bench testing; and construction cost estimates	EIT	Duluth
Josh Gefre	Engineer 1	--	0.75	BS, Civil Engineering	nearly 1 year of experience with surveying and road assessment, writing project specifications, and developing construction drawings	--	Minneapolis
Bailey Hadnott	Engineer 1	Construction	1	BS, Environmental Engineering	1 year of experience with environmental compliance, regulatory negotiations, bench testing, and technical analysis for the treatment of water and wastewater	EIT	Minneapolis
Andy Dillon, PE	Engineer 2	--	6	BS, Civil Engineering	6 years of experience with preparing drawing and specification packages for permitting and construction; serving as lead construction observer for multiple large-scale earthwork projects; and using AutoCAD Civil 3D for site design, grading, and quantity and earthwork-balance calculations	PE: MN	Salt Lake City
Matt Padget	Engineer 2	--	11	BS, Civil Engineering	11 years of civil engineering design experience, including stormwater management, sedimentation ponds, design and permitting of liner and final cover systems for industrial landfills, and site grading and layouts	EIT	Minneapolis
Bryan Pitterle	Engineer 2	--	5	BS, Civil Engineering	5 years of experience with site design and planning, grading, 3D modeling, HELP (Hydrologic Evaluation of Landfill Performance) modeling, drafting, and cost estimating for landfills, dams, and mine sites	--	Minneapolis

name	job classification	OSHA certification	years w/ firm	education experience	work experience	licenses and certifications	location
Jim Berkas, PE	Engineer 3	HAZWOPER	3	BS, Civil Engineering	18 years of experience with permitting, design, and construction management for landfill facilities; site assessments; contaminated-site remediation; design of wastewater systems; stormwater modeling and control-system design; design and installation of sub-slab venting systems; and landfill flare and gas monitoring	PE: MN, IA	Minneapolis
Eric Blodgett, PE	Engineer 3	HAZWOPER	5	BCh, Chemical Engineering	12 years of experience with environmental investigation, project management, vapor intrusion assessment and mitigation, and remediation engineering	PE: MN, IA	Minneapolis
Eric Lund, PE	Engineer 3	HAZWOPER	10	BS, Civil Engineering	10 years of experience with project management; Phase I site assessments, Phase II site investigations, and other environmental investigations; and construction oversight and monitoring for remediation projects	PE: MN	Minneapolis
Dan Fetter, PE	Engineer 4	HAZWOPER	28	BS, Civil Engineering	29 years of experience with regulatory analysis, site investigation, remedial design, brownfields redevelopment, cost estimating, hazardous waste management, and remedial action coordination	PE: MN, IA, MI, WI	Minneapolis
Pete Kero, PE	Engineer 4	HAZWOPER	5	MS, Civil/ Environmental Engineering BS, Environmental Engineering	24 years of experience, including developing, protecting, monitoring, investigating, and cleaning up water resources; regulatory negotiations, compliance, and permitting; and design and construction oversight for water-supply and soil/groundwater-treatment projects	PE: MN, MI, WI	Hibbing
Brad Schwie, PE	Engineer 4	HAZWOPER	6	BS, Geological Engineering	20 years of Phase I and Phase II environmental site assessments (ESAs) and remedial investigation, design, and implementation, including soil, groundwater, storm-water, indoor air, and soil-vapor sampling; telemetry installation and maintenance; and coordination of soil and groundwater remediation and vapor intrusion mitigation	PE: MN, IA, NC	Minneapolis

name	job classification	OSHA certification	years w/ firm	education experience	work experience	licenses and certifications	location
Ray Wuolo, PE, PG	Engineer 4	HAZWOPER	29	MS, Geological Engineering BS, Geological Engineering	32 years of experience in characterizing and investigating groundwater flow and groundwater contamination, including hydrogeologic site evaluation, mining hydrogeology, aquifer remediation, environmental chemistry, landfill permitting, and environmental impact statements	PE: MN, ID, MI, MO PG: MN, KS, MO, WY	Minneapolis
Brian Jurek	Field Tech 1	HAZWOPER	10	AAS, Civil Engineering	22 years of experience in designing, managing, inspecting, and conducting surveys on many types of construction and remediation projects	--	Duluth
Lee Ralidak	Field Tech 1	Construction	2	AAS, Industrial Systems Technologies	2 years of experience as a field inspector and design technician specializing in AutoCAD design, general and detailed structural inspections, and tank inspections.	--	Hibbing
Kim Johannessen	Field Technician	HAZWOPER	27	AS, Energy Management	27 years of experience with groundwater, surface water, and soil monitoring; aquifer testing; and observation of monitoring well installation, Geoprobe field activities, and contaminated soil remediation.	Asbestos Inspector MN Erosion/ Sedimentation Control	Minneapolis
Katie Kaylor	Field Technician	HAZWOPER	11	AAS, Civil Engineering	12 years of experience with construction inspection services, safety consultations, sampling activities, GIS mapping, computer-aided design and drafting (CADD), and environmental permitting assistance	MN Erosion/ Sedimentation Control	Duluth
David Melmer	Field Technician	HAZWOPER	30	BS, Biology	32 years of experience with the collection and analysis of biological and water-chemistry samples from lakes, rivers, streams, and stormwater-treatment-facility discharges	--	Minneapolis
Joe Hjerpe	GIS/CADD Specialist	--	3	BS, Civil Engineering	3 years of experience with Civil 3D modeling, design and plan preparation, and construction support for lined-facility projects in Minnesota, Montana, North Dakota, and Wyoming	--	Minneapolis

name	job classification	OSHA certification	years w/ firm	education experience	work experience	licenses and certifications	location
Molly Keinath	GIS/CADD Specialist		4	BS, Biology GIS Certificate	5 years of experience as a GIS analyst and environmental technician, including creating maps and figures; interpreting current and historical aerial photos; analyzing raster and vector data; georeferencing and digitizing new data; automating GIS processes; and processing CAD data to work interchangeably with GIS	--	Duluth
Keith Lehman	GIS/CADD Specialist	--	3	AAS, Engineering CAD Technology	3 years of experience providing drafting and designing services for structural and mechanical systems, including 3D modeling and 2D drawings	--	Hibbing
Rachel Mitcavish	GIS/CADD Specialist	--	1	MS, Geographic Information Science	2 years of experience with spatial analysis, cartography, remote sensing, and GIS services, including figure and map creation, data management, and data quality control	--	Minneapolis
John Juntilla, PG	On-Site Inspector	HAZWOPER	12	BS, Geology	12 years of experience performing fieldwork and managing environmental investigation and remediation projects	PG: MN	Minneapolis
Kevin McGilp	On-Site Inspector	HAZWOPER	17	BA, Geology	22 years of experience performing fieldwork for projects involving soil, sediment, soil-gas, and groundwater investigations, including designing soil investigations, directing soil excavations, operating and maintaining remedial systems, and reporting investigation results	SWPPP Training	Minneapolis
Jon Aspie	Project Manager	HAZWOPER	12	MS, Geology BS, Geology	28 years of experience with environmental site assessments, environmental site investigations, and remedial actions, including management of Phase II investigations and corrective actions	PG: WI	Duluth
Bill Bangsund, PG	Project Manager	--	28	MS, Geological Engineering BS, Geology	32 years of experience in landfill studies, groundwater resources, contamination studies, and vibration analysis	PG: MN	Minneapolis

name	job classification	OSHA certification	years w/ firm	education experience	work experience	licenses and certifications	location
Lynette Carney, PG	Project Manager	HAZWOPER	5	MS, Geology BS, Geology	23 experience working as a geologist and project manager on petroleum and industrial release sites in MN and WI	PG: MN, WI	Duluth
Ryan Erickson, PG	Project Manager	HAZWOPER Construction	10	MS, Geology BA, Geology and Geography	10 years of experience with petroleum-release sites and brownfield redevelopment projects as both a project manager and a field technician	PG: MN Stormwater Pollution Prevention Plans	Duluth
Seth Hueckman, PE	Project Manager	--	10	BCE, Civil Engineering BA, Physical Sciences	10 years of experience on projects involving landfills and solid-waste management facilities, including site design and planning, grading, 3D modeling, drafting, cost estimating, and construction oversight and management	PE: MN, ND	Minneapolis
Sam Johnson	Project Manager	HAZWOPER	9	MS, Natural Resources Science and Management BA, Geology BA, Environmental Studies	12 years of experience in environmental consulting, including project management; remedial system operations; soil, groundwater, and vapor sampling; oversight of soils excavations, subsurface drilling, and monitoring-well installations; and wetland delineations	--	Hibbing
Tonia O'Brien, PG	Project Manager	HAZWOPER	9	BA, Geology	12 years of experience with surface water/groundwater hydrology; water supply; engineering support; environmental due diligence; and environmental investigation, remediation, and redevelopment	PG: MN, CA, WI	Minneapolis
Michael Dupay	QA/QC Officer	HAZWOPER	12	BA, Chemistry BA, Criminal Justice	12 years of experience with the evaluation and creating of standard operating procedures for an analytical laboratory using a laboratory-information-management system and presenting findings for small and large groups	--	Minneapolis

name	job classification	OSHA certification	years w/ firm	education experience	work experience	licenses and certifications	location
Martin Bevis	Scientist 1	HAZWOPER Construction	1	MS, Geological Sciences BA, Geology	3 years of experience with environmental site assessments; on-site investigations of contaminated soil, sediment, groundwater, surface water, and vapor; aquifer tests; construction observation; and preparation of drilling logs, geologic maps, cross-sections, and technical reports	GIT Asbestos Inspector MN NPDES Construction Stormwater	Duluth
Kaitlin Johnson	Scientist 1	HAZWOPER	0	MS, Geology BS, Geological Sciences	Experience with field-data collection; environmental site assessment related to sediment and groundwater contamination; onsite investigations of soil, sediment, groundwater, surface water, and vapor; construction observation; and ArcGIS support and data management	--	Duluth
Michael Powers	Scientist 1	HAZWOPER	3	BS, Forest Resources	4 years of experience with data management and database creation and skills and coursework with GIS, remote sensing, and forest ecology	--	Duluth
Kinnan Stauber	Scientist 1	HAZWOPER	10	BS, Biology	11 years of vegetation assessments, delineations, and hydrology monitoring, including experience as an environmental technician for large-scale assessment and remediation projects at contaminated sites	Wetland Delineator	Duluth
Lauren Brady	Scientist 2	--	6	BS, Environmental Science, Policy, and Management	6 years of experience as a data management technician, including assisting with data entry and review of laboratory data, producing database documentation, and preparing and sending out monitoring reports for remediation sites	--	Minneapolis
Evan Christianson, PG	Scientist 2	HAZWOPER	10	MS, Geology and Environmental Science BA, Geology	10 years of experience with groundwater-flow modeling, GIS, geophysical surveying, aquifer characterization, geologic mapping, data processing and visualization, and monitoring well installation and sampling	PG: MN	Minneapolis

name	job classification	OSHA certification	years w/ firm	education experience	work experience	licenses and certifications	location
Irvin Mossberger, PG	Scientist 2	HAZWOPER	10	MS, Geological Sciences BS, Geology	20 years of experience with Phase II subsurface investigations, including drilling and excavation oversight; sediment, groundwater, and rock core sample collection; and surveying and GPS data collection	PG: MI, WI	Duluth
Alex Puetz	Scientist 2	HAZWOPER	7	BS, Geological Engineering	11 years of experience managing and performing fieldwork for environmental investigation and remediation projects	Asbestos Inspector EIT	Minneapolis
Alex West	Scientist 2	HAZWOPER	2	BS, Environmental Science	5 five years of experience with the operation of groundwater-remediation systems, environmental sampling, and soil excavation and remediation	--	Minneapolis

AS = Associate of Science degree

BS = Bachelor of Science degree

EIT = Engineer in Training

GIT = Geologist in Training

HAZWOPER = Hazardous Waste Operations and Emergency Response

MS = Master of Science degree

PE = Professional Engineer

PG = Professional Geologist

PhD = Doctor of Philosophy degree (doctorate)

solid-waste facility investigations and designs

Barr works with municipal and industrial clients on projects involving solid and hazardous wastes and wastes from environmental cleanups. We can develop and execute integrated solutions for your company's waste management projects. Our services include:

- site characterization (geology, geotechnical, hydrology, and hydrogeology)
- groundwater and contaminant-transport flow modeling
- stormwater flow modeling
- environmental monitoring network design and operation
- water-quality data collection, quality assurance and quality control (QA/QC), reporting, and interpretation
- seepage and slope stability analysis
- air quality impacts and compliance modeling
- statistical monitoring and reporting
- landfill siting
- landfill gas systems
- liner designs
- cap designs
- construction oversight

number of projects

Barr has or is performing site investigation, remedial investigation, or remedial designs at 10 solid waste facilities in Minnesota in the past five years. Our experience at these facilities is summarized below.

Industry Served and Landfill	Waste Type	Liner/Leachate Collection System Design	Cover System Design	Construction Quality Assurance	Monitoring and Reporting
Utilities					
Hoot Lake Landfill, Otter Tail Power • Fergus Falls, MN	Ash				●
Laskin Energy Center Ash Pond, Minnesota Power Company • MN	Ash	●	●	●	●
Boswell Energy Center Ash Ponds, Minnesota Power Company • MN	Ash		●		●
Confidential					
Papermill Sludge Monofill • MN	Sludge/ Ash	●	●	●	●

Industry Served and Landfill	Waste Type	Liner/Leachate Collection System Design	Cover System Design	Construction Quality Assurance	Monitoring and Reporting
General Industry					
Industrial Waste Landfill, Northshore Mining Company • MN	Ash/Misc. Wastes	●	●	●	●
Municipal Solid Waste (MSW)					
Freeway Landfill • MN	MSW	●	●		●
Brookston Landfill • MN	MSW		●		●
Elk River Landfill, MSW & Demolition Landfill • MN	MSW				●
Louisville Landfill • Shakopee, MN	MSW				●
RCRA/CERCLA and Other					
Black Dog Coal Yard and Ash Ponds, Xcel Energy • MN	Coal Yard & Ash Ponds		●		●

experience with federal and state agencies

Barr has long term experience working with numerous Federal and State Agencies on a variety of contracts involving environmental work. Our work has included projects with numerous Minnesota state agencies, and highlights of that work include:

- Working in MPCA's Closed Landfill Program on the Freeway and Brookston landfills
- Being currently contacted to work with MPCA on a variety of stormwater management projects
- Having active projects with Minnesota Department of Natural Resources related to dams, water quality studies, recreational facilities, and habitat restoration
- Completing more than a hundred projects for the Minnesota Department of Transportation, including many site investigations and response action plans to address legacy contamination

Barr has worked for several U.S. Army Corp of Engineer districts for more than 25 years on numerous projects spanning environmental studies and review, sediments, flood control, environmental investigation, and cleanup.

knowledge of state and federal regulations

Barr has unsurpassed knowledge about the efficient characterization and remediation of contaminated sites in Minnesota. Over the past 35 years, we have completed hundreds of investigation and remediation projects under the Minnesota solid waste rules, National Contingency Plan (NCP); Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); Resource Conservation and Recovery Act (RCRA); and Minnesota Environmental Response Liability Act (MERLA). Barr has worked on more than three quarters of Minnesota's 46 former or current National Priority List (NPL) sites. In addition, Barr has worked in nearly all regulatory programs associated with investigation with investigation and remediation within the MPCA and MDA, including the Petroleum Remediation program, Brownfields program, and both the Petroleum Brownfields (PB) and VIC programs. We have a deep understanding of the regulatory framework and the underlying science of those programs.

3. project descriptions

The following project descriptions are included in this section:

1. **Municipal Solid Waste (MSW) and (CD) Debris Landfills (multiple sites)** for Waste Management, Inc. at Burnsville, Elk River, and Spruce Ridge Landfills
2. **Freeway Landfill Investigation and Design** for MPCA Closed Landfill Program at Freeway Landfill in Burnsville, MN

Project #1:
Municipal Solid Waste (MSW) and Construction and Demolition (CD) Debris Landfills (multiple sites)

Client: Waste Management, Inc. (and predecessors)

Location: Minnesota

Reference: Mr. Terry Johnson, Sr. Director, Groundwater and Technical Programs, 952-471-9469

Dates: 1993 to present

Services:

- groundwater monitoring and remediation alternatives evaluation
- hydrogeologic investigation, groundwater modeling, and risk assessment
- facility design, final cover design, and expansion plan design
- permit and regulatory assistance
- wetlands delineation and mitigation
- facility compliance monitoring
- O & M manual preparation

Personnel:

- Jim Berkas (engineer)
- Bill Bangsund (geologist)
- Al West (field geologist)

Subcontracted services:

- water sampling
- laboratory analysis
- drilling and well Installation

Site description: The Burnsville Landfill, Elk River Landfill, and Spruce Ridge Landfill are active facilities located in and around the Twin Cities Metropolitan area that are permitted to accept MSW, Industrial, and CD debris. The facilities have lined and unlined (Pre-Subtitle D) waste areas, active landfill gas extraction systems, landfill gas-to-energy plants, and groundwater monitoring networks.

Project description: Barr and our current staff have provided a wide range of consulting services at the Burnsville Landfill, Elk River Landfill, and Spruce Ridge Landfill for many years. Our work has included landfill expansion services, hydrogeologic investigation, air quality permitting, and facility design and operations planning, final cover design.

Barr has designed environmental monitoring networks, managed long-term groundwater monitoring and reporting programs, completed hydrogeologic investigations to characterize groundwater flow and evaluate groundwater quality, and developed information to risk evaluations. Barr has also supported the establishment of groundwater and surface-water compliance boundaries.

Barr has provided ongoing air permitting and compliance assistance, including the air permitting of several landfill gas-to-energy plants in which an active landfill-gas-recovery system recovers landfill gas used as a fuel in Caterpillar engine/generator sets for the production of electricity.

Barr designs have involved final covers, surface-water-runoff controls, gas-venting systems, composite liner system and leachate collection systems. We also have prepared the construction documents and permit applications and assisted with regulatory negotiations in addition to preparing operations manuals, contingency action plans, closure and post closure care plans, and financial-assurance cost estimates.

Outcome achieved: the facilities continue to operate in compliance with reporting and operational requirements.

Project #2: Freeway Landfill investigation and design

Client: MPCA Closed Landfill Program

Location: Burnsville, MN

Reference: Pat Hanson, 651-757-2409

Dates: 2015 to present

Services:

- groundwater modeling
- stakeholder coordination
- site investigation
- preliminary design and evaluation

Personnel:

- Evan Christianson (groundwater modeling)
- John Greer (groundwater modeling)
- Eric Lund (predesign investigations)
- Seth Hueckman (preliminary design options)
- Dan Fetter (stakeholder coordination)

Subcontracted services:

- test trenching
- also worked with MPCA's drilling and lab contractors

Site description: The Freeway Landfill was one of Minnesota's first landfills permitted by the MPCA in the early 1970s, and it does not have a liner beneath the waste. The site involves a unique setting with relatively shallow bedrock, located between the Minnesota River and a deep rock quarrying operation where significant dewatering has been ongoing for decades. The existing groundwater conditions had been heavily influenced by the long-term dewatering, leaving the water table depressed into the bedrock below the landfill waste and the groundwater from the vicinity of the landfill typically flowing from the river toward the quarry.

Project description: Barr has completed several efforts for the Minnesota Pollution Control Agency's (MPCA) Closed Landfill Program (CLP) at Freeway Landfill. Barr's investigations, groundwater modeling, and preliminary designs are helping the MPCA and a complex stakeholder group through a decision-making process to evaluate options and establish a recommended alternative for final site closure.

Barr's groundwater model predicted changes to the groundwater elevation and flow paths that will eventually occur when the quarry operations are discontinued and the deep pit fills with groundwater. Barr's groundwater model assessed the anticipated rebound in the water table and its interaction with the unlined waste in the current landfill configuration and estimated potential future contaminant impacts to groundwater including potential for contaminant migration toward the river. Essentially, Barr modeled groundwater conditions that do not yet exist and will be vastly different than existing conditions.

The predicted changes from Barr's groundwater model were critical in helping the MPCA and a group of local stakeholders as they consider future plans for the landfill and the surrounding properties. The landfill is part of a larger, aging industrial area of Burnsville located near two major highways where future redevelopment plans are being considered. Additionally, the MPCA and landfill owner were evaluating alternatives and developing plans to complete a final closure of the landfill, a significant step forward toward determining future land use and redevelopment potential for this area.

Barr is currently assisting MPCA CLP with site investigation and preliminary design for landfill closure, including the potential incorporation of a nearby older dump into the project. We are also developing several preliminary layouts

and budget estimates for landfill closure with MPCA. Ongoing work is anticipated to include wetland and floodway evaluations, selection of a preferred alternative, and more detailed design for the selected alternative.

The project has involved coordination across a diverse group of stakeholders, including the MPCA, U.S. EPA, the City of Burnsville, Dakota County, the landfill owner, quarry owner, development interests, and neighboring properties owners. The results of Barr's efforts is helping to clarify a technically challenging issue that had been complicating the group's long-range planning and redevelopment efforts.

Outcome achieved: Groundwater modeling of future conditions is complete and supported the need to address the old landfill with a new closure design. Predesign investigations and development of preliminary design options are ongoing in 2018.

4. scope of services

Barr has completed more than 20 projects related to landfill engineering design and construction oversight in the last ten years. These projects have included work related to liner and leachate collection system design, cover system design, construction quality assurance, and monitoring and reporting. Barr's experience with landfill siting, design, permitting, operation and maintenance investigation, and closure began in the early 1970s. Our multidisciplinary teams have experience with all 45 items listed in Category C of the MPCA's request for proposals.

assessment and remediation

Barr has more than four decades years of experience on all aspects related to the assessment and remediation of contaminated sites including dumps and permitted landfills. Barr's assessment and remediation specialists in Minneapolis, Duluth, and Hibbing excel in projects that are complex, require a high level of accuracy, benefit from cold-climate expertise, and focus on the restoration of natural resources. Our services include:

- ✓ **designing remediation systems and strategies for remediation of subsurface contamination**—Barr has designed numerous remedial actions in Minnesota in accordance with MPCA guidance documents to address contamination in the form of soil, solid waste, groundwater, methane, and other vapor. Barr's remedial designs have addressed these concerns at numerous ash landfills in Minnesota, as well as former dump sites in Excelsior, Mound, and New Brighton, Minnesota.
- ✓ **conducting and overseeing Phase I and Phase II site assessments, limited site investigations, and remedial investigations**—Barr has completed hundreds of Phase I ranging from single-parcel commercial facilities to large corridor tracts and multi-parcel industrial areas, in accordance with USEPA All Appropriate Inquiry and ASTM-1527-13 and the forestland or rural standard ASTM E2247-16, where appropriate. We currently have more than 30 ASTM-defined environmental professionals. Additionally, Barr has performed numerous Phase II site assessments, limited site investigations, or remedial investigations, depending on the regulatory program.
- ✓ **conducting surface water, ground water, air and vapor receptor surveys**—Receptor surveys are often beneficial in understanding the urgency at which investigation should be performed. These surveys include walking surveys to identify relevant features and conditions associated with water supply wells, surface water, vapor, and surface soil, or additional data collection to assess water line permeation. Barr regularly conducts receptor surveys during environmental investigations and assessments in accordance with the petroleum guidance (c-prp4-02).
- ✓ **arranging for transportation, storage, and proper management of wastes**—Barr manages wastes according to Minnesota Administrative Rules Chapters 7035 and 7045 for non-hazardous and hazardous wastes. These activities are performed for investigation-derived waste (IDW) or for unanticipated situation, as was the case during a building demolition when an UST filled with solvent was found beneath the floor slab in Edina, MN.
- ✓ **coordinating and cooperating with other state-contracted services**—Barr regularly engages with contractors for numerous activities, including sampling and analytical,

drilling, hazardous materials surveys, emergency response contractors, and hazardous waste services. As part of our work with the Closed Landfill Program, we are working with drillers and analytical services provided through state-contracted services.

- ✓ **preparing and reviewing quality assurance project plans (QAPPs) and sampling and analysis plans (SAPs) in accordance with state and federal requirements** – Barr has a long track record of developing SAPs and QAPPs in accordance with state and federal requirements. This background gives us the ability to obtain approval of these documents in a timely matter – because we know what is needed to complete them.
- ✓ **arranging for geophysical activities**—Barr has in-house geophysics professionals and also works with geophysical contractors for specialty investigations. Our in-house knowledge allows us to not just hire a subcontractor when necessary, but to also be able to better understand and evaluate the data that is collected. Geophysics was recently used at a site with a long history of redevelopment and uncertainty associated with remaining USTs. The geophysical screening allowed drilling to be performed with confidence that an UST would not be encountered.
- ✓ **overseeing subcontractors and state contractors**—Barr is working with and overseeing subcontractors and state contractors during investigations, cleanups, and tank removals on a regular basis. Barr's engineers also serve as the owner's representative on remediation projects to direct their activities in accordance with plans and specifications.
- ✓ **preparing and evaluating reports**—timely, well-written reports (e.g., investigation reports, monitoring reports, and free product recovery reports) are an important part of nearly every project that Barr completes whether it is a technical memorandum or a more formal site investigation report. Barr is accustom to tailoring these reports to the guidance of the regulatory program whether it is VIC, AgVIC, PBP, or Superfund.
- ✓ **evaluating the need for and overseeing the implementation of alternative drinking water supply**—Barr has worked on numerous projects where private drinking water supply wells were impacted by groundwater contamination. We have provided coordination, planning, sampling, and design support to quickly implement point-of-use and/or point-of-entry treatment systems for these private wells.
- ✓ **conducting vapor/air monitoring for health and safety and air quality criteria**—Barr has an experienced team of professionals who have the appropriate training—including field safety practices and OSHA 40-hour HAZWOPER training—to monitor vapor and air for health and safety. As part of potential vapor intrusion assessments, Barr has collected sub-slab, indoor, and ambient air sampling along with completing a vapor intrusion interior building survey in accordance with the *Vapor Intrusion Assessments Performed During Site Investigations (Guidance Document 4-01a)*.
- ✓ **perform/oversee remedial action plans**—Barr has prepared and implemented many remedial action plans, corrective action designs, and other environmental remedies for a range of sites, including a wide variety of solid-waste facilities.
- ✓ **perform/oversee evaluation of soil borings, test pits, environmental boring and soil testing**—Barr is currently overseeing a subcontractor performing soil borings, test pits, environmental borings and evaluating the results of soil testing from these activities to determine cover integrity and availability of suitable soils for the MPCA's Closed Landfill

Program at the Brookston Landfill and the Freeway Landfill (and a nearby older dump). Additional examples are included in the Landfill Experience Matrix

- ✓ **conduct/oversee studies of hydrogeology, geology, and soils utilizing geophysical studies, modeling, and dye trace studies**—Geologic and hydrogeologic study is a fundamental service offered by Barr in support of our projects, including many Minnesota-based geoscientists with deep knowledge of Minnesota's geology. Barr's geophysical practitioners regularly perform and interpret geophysical surveys, and we also have existing partnerships with specialty geophysical firms when required for unique project needs. Barr's hydrogeological modeling practice group that includes nationally recognized experts, and we have conducted successful dye trace studies to determine hydrogeological conditions for many projects, including one for the Minnesota Department of Transportation.

numerical modeling

Groundwater flow involves an intricate mix of geology, fluid mechanics, and hydrogeology, made even more complicated by being underground. Every landfill setting is different and every problem to be solved is unique. Similarly, fate and transport modeling takes the level of expertise to the next level by adding contaminants to the mix. Barr is recognized as a worldwide expert in fate-and-transport modeling. Our services include:

- ✓ **overseeing hydrogeologic investigations, including fate and transport modeling, capture zone analysis, and pump tests** – Barr has one of the largest teams of computational hydrogeologists in Minnesota in our Minneapolis, Duluth, and Hibbing offices. These specialists (most have advanced degrees) have completed numerous investigations for private, and government entities for the purpose of characterizing and evaluating groundwater flow and contaminant transport. In addition to in-house numerical groundwater modeling capabilities, Barr understands how to plan and complete hydrogeologic investigations to best inform the project goals.
- ✓ **conducting surface water, groundwater, and hydrodynamic modeling** – As mentioned above, Barr has extensive background in numerical modeling including surface water, groundwater, and hydrodynamic modeling. We have used hydrodynamic sediment modeling to support litigation, evaluate dredging projects, and answer questions about sediment transport during floods.

field investigation/field work

Field investigations define whether a real problem exists and if it needs to be addressed. Keeping the end use in mind, we plan and implement investigations that help our clients make good decisions regarding property transactions and redevelopment. Our services include:

- ✓ **arranging for site access**—Barr coordinates site access at numerous sites across the state and in other states. Barr successfully coordinated the access of nearly 350 properties in 9 months as part of a vapor intrusion project in the metro area.
- ✓ **coordinating utility locates by contacting the appropriate entity and, if applicable, coordinating traffic control**—For any subsurface work, Barr confirms that a public utility locate is performed, and more often than not, a private utility locate is also conducted. Barr is a pre-qualified environmental contractor with MnDOT. Through this contract and for

other clients, Barr coordinates utility locates and traffic control at numerous sites across Minnesota.

Barr oversaw environmental investigations at the University of Minnesota's UMore Park to determine whether historical activities had resulted in releases of hazardous substances or petroleum products to the environment.

- ✓ **conducting sampling and monitoring**—Barr has dedicated in-house technicians whose experience includes groundwater, soil, surface water, sediment, and air sampling and monitoring. These activities are the basis of our investigation and subsequent remediation. Our standard operating procedures (SOPs) associated with these activities are reviewed and updated every two years.
- ✓ **overseeing site investigation services for soil boring advancement and monitoring well installation**—These services, along with sampling and monitoring, are the bread and butter of investigations and from which site decisions are made. Consequently, for nearly every project, collecting this data is one of the first steps. Our field staff provide oversight for soil boring advancement and monitoring well installation using both standard drilling methods and direct-push methods on a regular basis in accordance with MPCA guidance and Barr's SOPs.

data management and data quality

Technology makes it easier than ever to collect, share, and store data, but that can make it increasingly difficult for you to manage the information, isolate precise portions of it, and present the data in meaningful ways. Barr's team of information management specialists processes data accurately and delivers it in accessible and reliable formats to support informed decisions, and our data quality team evaluates the data, develops project-specific sampling and analysis protocols, and performs field and laboratory audits. Our data management and data quality services include:

Barr's team of data quality specialists work closely with analytical laboratories, including annual audits and report review.

- ✓ **collecting and managing field and laboratory data for electronic submittal in an MPCA-specified format**—Barr has a team of professionals who specialize in data management and data quality. We use an EQUIS system for electronic deliverables of analytical data (EDD) that facilitate QA/QC review and table generation. Additionally our SOPs for many field activities include a field form to standardize our data collection activities.
- ✓ **evaluating data quality and data verification reports**—Barr has dedicated in-house environmental professionals who evaluate data received from laboratories for quality standards. This team communicates directly with the laboratories to identify and clarify

issues during QA/QC. In addition, Barr performs independent audits of regularly used laboratories for data quality purposes.

environmental engineering

Even the best remediation technologies won't succeed if they fail to take site-specific features into account. Barr's more than 70 environmental engineers have designed award-winning remediation systems at sites that posed significant challenges, such as dense urban neighborhoods and protected waterways. Adaptable remediation systems work well with, and sometimes take advantage of, the natural features of a site, and reliable systems work without babysitting, minimizing operating and maintenance costs. Our environmental engineering services include:

- ✓ **provide evaluation and design of energy-recovery systems utilizing landfill gas** - Barr has worked on numerous landfill gas energy-recovery projects in Minnesota and across the country. The services we have provided for these projects include design for electrical and controls systems, flares and flare controls, gas blowers and condensate systems, standby power, monitoring and alarm systems, electrical for the regulatory monitoring systems, and remote monitoring and control systems.
- ✓ **preparing corrective action design documents**—Barr's professional engineers are very experienced in creating corrective action design documents (e.g., CAD design reports, pilot test reports, installation notification reports, monitoring reports, plans, and as-built reports) that range from preliminary site layouts with details regarding the contamination to full-scale plans and specifications for bidding purposes. Additionally, Barr works as the owner representative for which reporting requirements for monitoring, changes, and final as-builts are typical and expected.
- ✓ **preparing operation and maintenance (O&M) manuals**—Barr has prepared many operation and maintenance manuals for systems, including fluid handling (e.g., groundwater pump-and-treat and soil vapor extraction), vapor intrusion mitigation, and landfill cover and venting systems.
- ✓ **following MPCA green practices and procedures for remediation projects**—During remediation projects across Minnesota, Barr has implemented many green practices and procedures. The focus of these practices is to reduce the environmental, social, and economic impacts of contaminant investigation and remedial tasks. These practices follow EPA-suggested BMPs and include conducting stakeholder input and public meetings, and performing life cycle assessments consistent with the MPCA's *Green and Sustainable Remediation Guidance*.

innovation

Gaining regulatory approval for innovative techniques often requires proof of their effectiveness, which can be accomplished with well-planned bench testing to evaluate and demonstrate remediation and control technologies. Bench testing is typically used iteratively with predictive modeling to determine the likely effectiveness of the evaluated technologies at full scale—without having to perform a large field demonstration project. Barr is an industry leader in testing and applying innovative technologies to remediate complex sites. Our services include:

- ✓ **Research, evaluate and implement innovative technologies** – Barr has prepared a preliminary design for implementing PlumeStop® liquid activated carbon within a permeable reactive barrier to address chlorinated solvent impacts to groundwater. Another example is Barr's work with industry representatives to develop and implement sampling and analytical techniques for perfluoroalkylated substances (PFAS) for all matrices (solids, liquids, air) since the early 2000s. Barr is currently working with our clients to develop appropriate remedial strategies to remove PFAS from drinking water and industrial discharges.

For the SLRIDT Superfund site in Duluth, Barr conducted extensive bench testing, including this seepage-induced consolidation test to determine the consolidation properties of watery sediments not testable with conventional equipment.

technical review and oversight

One of Barr's services offerings is an approach we term "cold-eye review." A cold-eye review is an unbiased, third-party review of contaminated site management that evaluates the environmental assessment and remediation work completed thus far and provides guidance on the appropriate path forward, given a set of objectives. It provides critical review of the conclusion and recommendations and goes to more depth than a Phase I environmental site assessment by looking into the heart of the issue that typically confound remediation site managers and owners. Our services include:

- ✓ **review groundwater remediation technologies and recommend alternatives and optimization options**—Barr has extensive experience reviewing groundwater remediation technologies and recommending alternatives and optimization options through the many feasibility studies and alternatives analyses that we have performed for Superfund sites, petroleum sites and solid waste facilities.
- ✓ **overseeing or conducting bench-scale lab treatability studies, pilot testing, and field demos**– Barr's civil, chemical, and environmental engineers regularly conduct or oversee feasibility and treatability studies to evaluate the most efficient and cost-effective path forward for a specific problem. With dedicated field offices in both our Duluth and Minneapolis locations, we have ample space, equipment, and experience in developing and testing innovative solutions to our clients' questions.
- ✓ **conducting third-party review and analysis of technical information**—Barr conducts review of technical information for our clients and the state in many roles, including third-party review, consideration for operational efficiency of environmental units prior to acquisition, and expert testimony on behalf of responsible parties for many high profile environmental litigations.
- ✓ **performing five-year reviews and site reviews**—Barr routinely helps our clients with Superfund projects by navigating through the five-year process review process and has participated in five-year reviews on behalf of the responsible parties.

- ✓ **providing technical assistance to the state in the evaluation and interpretation of data and information**—In 2005, Barr developed solute-transport models for the MPCA to evaluate the emerging PFOA and PFOS groundwater contamination in Washington County, Minnesota. Barr was instrumental in identifying a link between surface and storm water pathways and groundwater contamination.

construction engineering

Barr provides abroad range of planning, design, and construction engineering services for industry and government clients. We provide solutions for grading, site preparation, and erosion control based on site-specific geology and compliance with local building codes. Our services include:

- ✓ **preparing and evaluating bid documents for landfill cover systems, remediation systems, landfill gas systems, and erosion repair projects**—Barr prepares and evaluates bid specifications for landfill cover systems, remediation systems, landfill gas systems, and erosion repair projects in compliance with rules and requirements for the Minnesota Department of Administration and the MPCA.
- ✓ **preparing and determining Stormwater Pollution Prevention Plan (SWPPPs) are being followed and make recommendations**—Barr has developed hundreds of SWPPPs for clients and projects to keep construction sites in compliance with NPDES/SDS CSW permits. Additionally, Barr regularly performs inspections and proposes recommendations if SWPPP revisions are needed during the life of the construction project.
- ✓ **preparing erosion control plans and oversee implementation** – Barr regularly prepares erosion control plans for a variety of projects including solid waste facilities and caps over contamination at Brownfield and Superfund Sites.
- ✓ **preparing construction cost estimates using standard engineering practices** – Barr routinely prepares cost estimates consistent with standard industry practices defined by AACE International.
- ✓ **assisting the MPCA during the bidding process**—Barr regularly assists our clients throughout the entire bidding process from developing plans and specifications through recommendations for bid award. We often develop, advertise, distribute plans and specifications and addenda, answer bid questions, conduct pre-bid meetings, evaluate bid submittals (including bidder qualifications) and provide a recommendation for bid award.
- ✓ **preparing construction documentation reports**—Barr has prepared construction documentation reports for many construction projects—ranging from small groundwater treatment systems to large-scale landfill construction and contaminated soil earthwork projects.

project management

Successful project management entails defining the scope, schedule and budget from the outset; proactively tracking these elements; and then identifying and managing any changes as they arise. At Barr, effective management of projects and excellent customer service begin with the development of a "client service plan," which assists our project managers in understanding a specific client's business, concerns, needs, and desired outcomes. To develop a client service plan for a project, Barr meets with the client's project managers to discuss their service needs before

the work begins—helping set the stage for effective project management. Our other project management services include:

- ✓ **preparing health and safety plans (HASPs)**—Barr has a well-established safety program that includes training and lessons learned (close-call/good-call communication). As part of this program, Barr has prepared hundreds of HASPs for projects in Minnesota and other states. Along with our base health and safety requirements, we conform our safety to the level prescribed by our clients. Over time, this has also elevated our level of protection. Barr's experience modification rate (EMR) for 2018 is 0.67.
- ✓ **evaluating invoices and data reports**—Effective project management encompasses all aspects of the project's scope, schedule and budget. Barr's project managers and accounting staff manage invoices on a daily basis.
- ✓ **providing project management and construction oversight**—Over the past 50 years, Barr managed thousands of projects in Minnesota, including providing construction oversight of solid-waste facilities for ash, sludge, unique industrial wastes, municipal solid waste, contaminated soils, and mine tailings. Our oversight has included providing qualified representatives for full-time onsite coordination and subcontractor management, maintaining work consistent with specifications (by reviewing tests such as liner and concrete testing, evaluating equipment and material submittals, materials placement, and elevation grades), leading project site meetings, tracking and maintaining project schedules, and taking meeting minutes. We have reviewed and approved subcontractor invoices and performed onsite erosion control inspections. We have overseen remediation system construction, including equipment installation, start-up, and troubleshooting. We have participated in many public meetings to help our clients provide information, answer questions, and address concerns from the public and other project stakeholders.

technical communication

Stakeholder communication is a crucial part of environmentally or publicly sensitive projects. Because projects can stand or fall on the ways they're perceived by the public, clear and upfront communications are critical to project success. Barr helps clients tell complex technical stories in a direct, nontechnical manner—for instance, by developing documents and presentations that incorporate maps, charts, and tables to let audiences quickly comprehend information. Our technical communication services include:

- ✓ **preparing presentations and presenting information at meetings**—Barr has experience in all aspects of preparing and presenting information—from venues such as technical conferences to public meetings.
- ✓ **assisting and providing training (as requested by the MPCA or MDA)**—Barr has hosted and taught trainings—ranging from overviews of regulatory requirements to best practices for sampling—internally.

5. Scenario C

For the site described in Scenario C in the MPCA's RFP—Barr has provided a workplan and an estimate of the number of hours in the MPCA's formats. Both the workplan (Attachment B) and the example scenario spreadsheet (Attachment B) are uploaded separately as requested in the RFP.

Appendix 1:
resumes of key staff

Experience

Eric Blodgett has more than 12 years of experience in environmental engineering and consulting. He is experienced in site investigation, remediation, and project management. His focus is on soil vapor intrusion and his experience includes the development of investigative work plans and reports; conducting, overseeing, and providing training on soil vapor sampling methodologies; developing plans for and overseeing the installation of soil vapor intrusion mitigation systems; and tracking, interpreting, and implementing the latest science, research, and state and federal guidance on vapor intrusion. Eric has applied his vapor intrusion expertise at Superfund, petroleum, and landfill sites and in the context of residential, commercial, and industrial exposures scenarios. Eric has shared his vapor intrusion experience and knowledge through his participation on the Interstate Technology and Regulatory Council Petroleum Vapor Intrusion team developing a guidance document, through presentation of posters and talks at local and national vapor intrusion conferences, and by providing feedback to the Minnesota Pollution Control Agency on draft vapor intrusion best management practices documents.

Eric's project work has included:

- Leading the sampling and assessment effort for a large vapor intrusion investigation at a site in Minneapolis, Minnesota. A large plume of trichloroethylene contaminated groundwater became the subject of a rapid vapor intrusion investigation and response. The shallow contaminated groundwater is a potential source for vapor intrusion in the largely residential overlying neighborhood. Developed soil vapor intrusion investigation work plans. Performed soil vapor intrusion investigations including the collection of soil gas and groundwater samples in the public right of way. Prepared summary reports of soil vapor intrusion investigation activities. Prepared materials to support community outreach including site factsheets, frequently asked questions (FAQs), and project website content. Prepared sub-slab sampling and mitigation work plan to support the installation of soil vapor intrusion mitigation systems in multiple types of buildings. Led a team of staff that conducted sub-slab soil gas and indoor air sampling at over 300 properties.
- Planning and leading the field effort to perform a vapor intrusion investigation at a former manufactured gas plant (MGP) in North Dakota. A former MGP was razed and the area had been redeveloped to include commercial and residential properties. Below-ground MGP infrastructure remained in place including residual dense non-aqueous phase liquid (DNAPL) or coal tar. The vapor intrusion investigation included collecting sub-slab soil gas analytical samples for volatile organic compounds (VOCs) and monitoring sub-slab soil gas for methane, carbon dioxide, and oxygen in multiple buildings. The vapor intrusion investigation also included evaluating the feasibility and pilot testing of a vapor intrusion mitigation system at a large residential apartment building with an extensive drain tile system.
- Planning and implementing a vapor intrusion investigation at a former tool manufacturer in Duluth, Minnesota. A release of chlorinated solvents to site soils and groundwater was identified prior to the site being redeveloped into a commercial shopping center and clinic. The vapor intrusion investigation included collecting sub-slab and soil gas analytical samples for VOC analysis. Planned and led a subsequent

investigation to further evaluate and delineate VOC impacts to soil and groundwater off-site.

- Providing technical support for vapor intrusion investigation and large scale vapor intrusion mitigation at a former manufacturing facility in Mound, Minnesota. The use of chlorinated solvents at the manufacturing facility resulted in the release of chlorinated solvents to soil and groundwater below the building floor. Developed and implemented vapor intrusion pathway investigation including collection of sub-slab and indoor air samples of radon and VOCs; long-term monitoring of radon, sub-slab/indoor air pressure differential, and temperature; and evaluation of building HVAC systems. Assisted with the development and implementation of interim mitigation measures including HVAC modification, floor-crack sealing, and indoor air purification. Used the results of investigation and diagnostic/pilot testing to design sub-slab depressurization system for approximately 175,000 square foot building area.
- Providing a technical review of a methane-vapor-intrusion mitigation system for a large commercial brownfield redevelopment destination brewery project.
- Serving as environmental engineer at a former chlorinated solvent storage and transfer facility in Minneapolis, Minnesota. Releases of volatile organic compounds to the soil and groundwater have resulted in impacts to the groundwater and soil vapor in the area. Maintained and operated several soil-vapor extraction systems including the sampling of soil-vapor monitoring points and system inlets and effluents. Prepared annual reports documenting the operation and maintenance of the soil-vapor extraction systems. Assisted with design, planning, and oversight of the expansion of an existing soil-vapor extraction system, including two horizontal vapor extraction wells and several vapor monitoring points. Designed and oversaw the installation of soil-vapor monitoring points. Also assisted with the design, plan, and construction oversight of an in-situ bioremediation system, including an infiltration gallery for the delivery of cheese whey/molasses solution to the groundwater to promote enhanced reductive dechlorination.

Eric's work for the Minnesota Pollution Control Agency (MPCA) under previous cycles of the Remediation Master Contract include:

- Performing a vapor-intrusion site study in St. Paul, Minnesota, to help the MPCA get a better understanding of potential vapor intrusion risk within their portfolio of sites as a whole. Reviewed over 300 Minnesota Pollution Control Agency files for closed or inactive sites that may have a risk for vapor intrusion. Following review, the sites that ranked the highest for risk of vapor intrusion were investigated. Performed file review, conducted soil-vapor investigations at high-ranking sites, and coordinated subcontractors and site access.
- Managing the investigation and remediation of a former dry-cleaning chemical distribution site in St. Louis Park, Minnesota, for the MPCA. Two documented spills had resulted in chlorinated volatile organic compound (VOC) impacts to soil, groundwater, and soil vapor. Reviewed historical files to develop a site conceptual model related to the source, location, and distribution of soil-vapor impacts at the site. Also developed a work plan for and performed sub-slab and soil-vapor sampling to evaluate the

magnitude and extent of the soil-vapor impacts and delineate the source of these impacts. Prepared a report summarizing the results of the assessment and sampling with recommendations for further investigation and a soil-vapor extraction pilot study. Developed preliminary design for soil-vapor extraction system.

- Managing the vapor-intrusion mitigation at the site of a metal salvage and paint reconstitution operation that has now been developed into residential town homes in White Bear Township, Minnesota, for the MPCA. Worked with the MPCA to develop the scope of work necessary to assess the soil-vapor intrusion risk at the site. Reviewed historical documents to develop a site conceptual model. Developed a site factsheet and informational letters for site property owners on behalf of the MPCA. Performed vapor intrusion assessment including: conducting a passive soil-vapor sampling survey, negotiating access to private homes, conducting indoor air surveys, designing and installing sub-slab vapor sampling points, and collecting sub-slab vapor samples.
- Managing the investigation of a vacant filling station in Winnebago, Minnesota, for the MPCA, where petroleum impacts to the soil and groundwater had been discovered. Performed vapor-intrusion evaluation including soil-vapor sampling and indoor air building survey. Performed groundwater monitoring and LNAPL recovery testing. Prepared text, tables, and figures for the investigation report pursuant to the MPCA's Petroleum Remediation Program guidance documents.
- Performing environmental investigation work at a former filling station in Winthrop, Minnesota, for the MPCA, with petroleum impacts to the soil and groundwater. Performed soil, groundwater, and soil vapor sampling as part of additional investigation work following the initial limited site investigation. Prepared text, tables, and figures pursuant to Petroleum Remediation Program guidance.
- Serving as environmental engineer for a Nike missile-launch facility in St. Bonifacius, Minnesota, for the MPCA. Site was transferred to a group of fire departments that used it to conduct fire-fighting-training exercises. Site had documented petroleum, chlorinated volatile organic compound, and perfluorinated compound impacts to the soil and groundwater. Developed and implemented a site-specific soil-sampling plan to delineate the depth and extent of contamination of site soils.
- Performing a site investigation of a former industrial facility in Princeton, Minnesota, for the MPCA. This site was a former industrial facility that had releases of volatile organic compounds to the groundwater, resulting in a mile long plume. Developed project budget, sampling plan, and coordinated access for multiple well locations on private property. Worked with the City of Princeton to allow for the storage of contaminated groundwater during and after the sampling event. Conducted groundwater sampling and coordinated waste disposal.

Education BCh, Chemical Engineering, University of Minnesota–Twin Cities, 2004

Registration Professional Engineer: Minnesota, Iowa

Training OSHA 40-Hour Hazardous Waste Training (HAZWOPER) and annual refreshers

Experience

Lynette Carney has 24 years of environmental consulting experience working as a geologist and project manager on petroleum- and industrial-release sites and landfills for public, private, and industrial clients throughout Minnesota and Wisconsin. Prior to joining Barr, she was the lead project manager on several multi-site contracts with the Minnesota Pollution Control Agency (MPCA), including the Closed Landfill Program (CLP) and the petroleum-only multi-site contract. She has extensive experience in project scoping, work plan development, field management, technical review of project data, and preparation of deliverables for regulatory review. Lynette's experience includes:

- Serving as project manager for the investigation and remedial action plan development related to the Duluth Seaway Port Authority Garfield Docks C&D redevelopment property. Worked with project engineers to develop and incorporate environmental remediation technical plans and specifications into overall project design.
- Serving as environmental project manager for the investigation, remedial action plan development and construction monitoring related to the City of Duluth's Superior Street reconstruction. Worked with project engineers to incorporate a Phase II investigation with a geotechnical study and to develop and incorporate environmental remediation technical plans and specifications into overall project design.
- Serving as senior geologist and technical resource for an industrial legacy chlorinated solvent release site property in the Twin Cities Metro area. Helped prepare a focused feasibility study work plan summarizing 30 years of historical site data and compiling extensive research on surrounding legacy sites and potential contributors. The information was used to identify areas targeted for additional investigation and establishing a long-term vapor and groundwater monitoring network.
- Completing and managing Phase I environmental site assessments (ESA) for redevelopment properties associated with private commercial real estate transactions, public infrastructure and public works projects, corporate due diligence and EPA brownfield assessment grants. Completed the Phase I ESA ASTM 1527 standard training and is a qualified Environmental Professional (EP).
- Serving as senior geologist and project manager for public and private clients on MPCA petroleum remediation and voluntary investigation and cleanup (VIC) sites. In conjunction with the project team, responsible for leading the review, interpretation and compilation of geologic and hydrogeological data, identifying sensitive receptors and negotiating with the regulatory agencies to determine risk-based corrective action for soil, groundwater, and vapor cleanup.
- Serving as project manager and marketing executive for a regional consulting firm based in Duluth, Minnesota. Core responsibilities included project scoping, progress assessment, and technical oversight; training, mentoring, and review for entry- and mid-level staffers; preparing and managing bid specifications and design plans for projects incorporating soil and groundwater remediation; and directing hundreds of underground storage tank removals and release-site investigations and cleanups.
- Managing environmental investigation, design planning, bidding, and construction implementation on numerous remediation sites. Managed dozens of environmental

design projects and facilitated successful outcomes for projects involving multi-disciplinary project teams. Partnered and worked with diverse groups of stakeholders and regulatory agencies in both the private and public sector. Management experience also includes closure of more than 50 projects under the MPCA Petroleum Remediation Program.

Education

MS, Geology, University of Minnesota Duluth, 1994

BS, Geology, University of Wisconsin (Hydrogeology minor), 1992

Registration

Professional Geologist: Minnesota (42474)

Professional Geologist: Wisconsin (1138)

Publications

Carney, L.S. and Mooers, H.D., 1998. "Landform Assemblages and Glacial History of a Portion of the Itasca Moraine, North-Central Minnesota." *Contributions to the Quarternary Geology of Minnesota; Minnesota Geological Survey, Report of Investigations* #49.

Certification

OSHA HAZWOPER 40-hour certification

Dale Carnegie training

Environmental Assessment Association certified environmental inspector certification

AR03P061.18

Experience

Evan Christianson joined Barr in 2007 after completing work on his master's degree in geology and environmental science from Iowa State University. His thesis involved a hydrogeologic investigation of Ada Hayden Lake in Ames, Iowa, where he evaluated the lake's future water supply and water quality. He has extensive experience with groundwater-flow modeling, geographic information systems (GIS), geophysical surveying, aquifer characterization, geologic mapping, data processing and visualization, and monitoring well installation and sampling. Evan's experience includes:

- Developed an integrated groundwater-surface-water model of the Little Rock Creek watershed—an irrigated, agricultural area in Minnesota with a designated trout stream. Performed code modification to link SWAT with MODFLOW and used this model to evaluate the effects of irrigation wells on stream flows, cycling of nitrate between surface water and groundwater, and assisted in the development of TMDLs for Little Rock Creek.
- Designing and calibrating a three-dimensional groundwater flow model of all the aquifers and aquitards within the entire eleven-county Twin Cities metropolitan area for the Metropolitan Council. This model is known as Metro Model 3. The model is used to assess long-term water-supply options of individual communities and as a base model for wellhead protection area delineation work in the Twin Cities metropolitan area.
- Performing a hydrogeologic evaluation and groundwater flow modeling to assess future dewatering demands for the limestone quarry in central Alabama.
- Developing a groundwater flow model of tailings basins in Saskatchewan to evaluate different dewatering approaches to improve dam stability.
- Developing a groundwater flow model in support of an environmental impact statement for a proposed 1,657-acre gravel-mining operation at the University of Minnesota's UMore Park.
- Developing a groundwater flow and transport model for a large refinery in Minnesota. The model was used to evaluate remedial alternative and predict the long-term impact associated with a large groundwater contamination plume.
- Developing a groundwater flow and transport model of the largest groundwater contamination plume of TCE in Minnesota to assist in identifying remedial strategies and data gaps.
- Developing a groundwater flow and transport model for a large landfill in Minnesota. The model was used to assess the influence of a large nearby quarry on groundwater at the landfill and the implications of a higher water table in the future after quarry operations end.
- Performing a detailed hydrogeologic evaluation and groundwater flow modeling in support of an environmental impact statement for a frac-sand mining operation in central Minnesota.
- Assisting with the wellhead protection area delineations, drinking water supply management area delineations, and aquifer vulnerability assessments for Part 1

wellhead protection plans and/or Part 1 wellhead protection plan amendments for the cities of Chanhassen, Hastings, Lakeville, Mounds View, New Brighton, North Branch, North St. Paul, and Rosemount.

- Developing groundwater-flow models to assess the viability of tailings basins and hydrometallurgical-residue cell design for use over the expected 20-year period of mine operations for PolyMet Mining's proposed mine in Hoyt Lakes, Minnesota.
- Developed a surface-water–groundwater model by coupling the modeling codes SWAT and MODFLOW in assessing a total maximum daily load (TMDL) for a sensitive trout stream in central Minnesota.
- Performing aquifer tests at a waste disposal site in Michigan. The site sits atop a fractured limestone aquifer in an area where karst features have been identified.
- Assessing the groundwater-surface water interaction for all lakes, wetlands, and streams in the Twin Cities metropolitan area.
- Assisting in the development, calibration, and predictive analysis of the telescopic mesh refinement model for a groundwater analysis project in East Bethel, Minnesota, for the Metropolitan Council. Assisted in development of new methods to incorporate detailed 3D stratigraphy models into the hydraulic conductivity fields of the groundwater model.
- Developing a groundwater flow model and assisting in a comprehensive risk assessment for a proposed large-scale redevelopment project at a complex site in the Minnesota River Valley.
- Assessing water supply options and conducting aquifer testing for an ethanol facility in central Iowa.
- Processing lake water quality data for the Twin Cities' Basset Creek Watershed Management Commission for visualization and report figures.
- Assisting with the assessment of water supply issues for the city of Ames, Iowa, as a graduate research assistant at Iowa State University. Work included:
  - Constructing a 3D groundwater-flow model to characterize groundwater-lake interactions.
  - Performing a nutrient budget analysis of a gravel-pit lake used as an emergency water supply.
  - Compiling previous studies and existing data into a new database and GIS.
  - Providing 3D characterization of the stratigraphy in the Ames area.
  - Installing and monitoring piezometers.

Education MS, Geology and Environmental Science, Iowa State University, 2008

BA, Geology, Gustavus Adolphus College, 2005

Registration Professional Geologist: Minnesota

Experience

Dan Fetter has 30 years of experience in the areas of regulatory analysis, site investigation, remedial design, brownfields redevelopment, cost estimating, hazardous waste management, and remedial action coordination. He specializes in addressing legacy environmental issues at contaminated sites and industrial facilities and developing practical, cost-effective environmental solutions for redeveloping contaminated land. Select examples from his experience include:

- Directing investigations, preliminary design, and groundwater modeling efforts at two landfills in MPCA's Closed Landfill Program (Brookston and Freeway in Burnsville). At Freeway, the project initially involved review of MPCA investigations and development of a groundwater model to predict contaminant transport towards surface water receptors under future conditions when an adjacent, large scale dewatering/quarry operation ceases to operate. That work was closely coordinated with a complex stakeholder group to plan for the future re-closure of the landfill. More recently, Barr has been working with MPCA at Freeway to conduct additional investigations and develop updated closure plans for the landfill and a related nearby dump. At Brookston, Barr has completed the initial phase of investigation, and will be conducting a second phase of investigation and developing final plans to consolidate and cap the landfill.
- Assisting with a wide ranging, multi-media remedial investigation, feasibility study, and interim response actions involving the presence of per- and polyfluoroalkyl substances (PFAS) at confidential sites in the Eastern United States. The projects involve a complex group of potentially responsible parties (PRPs) working with local, state, and federal regulatory authorities. The work includes evaluation of potential PFAS release mechanisms from multiple facilities, including sampling and analyses of process streams, soil, air, groundwater, sediment, surface water, and water supply wells. Complex site conceptual models are being developed and modeled through iterative efforts, and various remedial strategies are being considered to address the risk concerns for this emerging class chemicals. All work has been completed following high levels of quality assurance protocols, and with close coordination between the PRPs and the regulatory authorities as they work to address a significant public interest in these sites.
- Assisting International Paper Company with several efforts to address concerns from a Superfund Site related to a former wood-treating facility located in Cass Lake, Minnesota. The work has included investigations and a feasibility study to evaluate many alternatives for addressing widespread areas of dioxin in soil at the site and in nearby residential areas. The potentially impacted areas under study involve hundreds of acres of land, including more than 100 residences in surrounding neighborhoods. Also directed interim remedial actions to remove areas of soil at the site with high concentrations of dioxin, cover residential yards near the site with clean soil, and arrange for periodic cleanings of residences and dust suppression on unpaved roads. The site is located within the Leech Lake Band of Ojibwe Reservation, and investigation and cleanup efforts are subject to complex negotiations between the International Paper, U.S. EPA, state agencies, local government, and the tribe.
- Assisting the city of New Brighton with one of the largest and most complex brownfield redevelopments in the state. The work includes conducting Phase Is, Phase IIs, and preparation of response action plans in support of the city's planned acquisition and redevelopment of the 100-acre Northwest Quadrant redevelopment area adjoining I-

694 and I-35W. The redevelopment involves 15 properties that include nine petroleum release sites, a former refinery and Superfund site, two former dumps with landfill gas (methane) migration concerns, and other concerns related to past solvent and chemical use. The work includes assessing the soil, groundwater, and vapor impacts and developing and implementing response action plans in support of a mixed-use redevelopment and new public infrastructure. The majority of the cleanup has been completed, and the city and its developer partners have developed about eighty percent of the project, including five corporate offices, a luxury apartment building, two new parks, and a 25-acre residential area with 126 homes and townhomes.

- Directing investigations, cleanup planning, and geotechnical assessments for a new building development at the Minneapolis Impound lot, which is the site of the old Irving Avenue Dump, a former state Superfund site. The project included environmental and geotechnical assessments, and developing cleanup plans to address vapor intrusion risks (methane and hydrogen sulfide) and treatment of RCRA hazardous wastes that would be encountered during redevelopment excavations. Site construction and remediation is planned for 2018.
- Directing a remedial design and remedial action under CERCLA (Superfund) at a former waste-oil disposal facility at Douglassville, Pennsylvania. The work included negotiating, planning, designing, and providing project management for a $15 million cleanup effort that involved excavation, on-site stabilization, and on-site landfilling of 46,000 cubic yards of used-oil filter-cake sludge. Detailed procedures were developed for monitoring and controlling waste treatment, air emissions, and runoff wastewater.
- Directing the investigation and cleanup planning for the new Surly Brewing Co. development located on the border of Minneapolis and St. Paul. The redevelopment site has a long history of industrial use, including a variety of environmental legacy concerns. Work has included helping to secure $2 million in environmental grant funding, conducting Phase I/II site assessments, assessing geotechnical requirements, response action planning, regulatory coordination, site demolition with beneficial on-site reused of crushed aggregate, and rehabilitation of an existing water supply well in support of the new brewery development. The brewery opened in December 2014.
- Assisting Hennepin County on a series of projects under Barr's master services agreement, including Phase I and Phase II environmental site assessments and development of response action plans. The work has spanned a wide variety of projects including brownfield redevelopment, stormwater projects with legacy contamination, and litigation support to help resolve a dispute between the county and their highway construction contractor over the cost of unexpected contamination.
- Directing long-term operations and improvements for a groundwater remediation system at a Superfund site that addresses a large solvent release from an old chemical dump in Oakdale, Minnesota. The work has involved regulatory negotiations and evaluating various enhancements to the system to ensure that remedial objectives are met while economically maintaining the groundwater remediation system.

Education BS, Civil Engineering, University of Minnesota, 1988

Registration Professional Engineer: Minnesota, Iowa, Michigan, Wisconsin

AR03P061.18

Experience

Seth Hueckman has more than 10 years of experience on projects involving landfills, dams, wind turbine sites, and mine site development. His services include site design and planning, grading, 3D modeling, drafting, cost estimating, and construction oversight and management. Examples of his experience include:

- Providing extensive permitting, design, construction oversight, documentation, and quality control work for industrial solid-waste-management facilities located throughout the midwestern United States.
- Providing extensive field engineering work on landfills, dams, and mines on Minnesota's North Shore.
- Evaluating ash- and waste-management scenarios for sites throughout the Midwest, including:
  - Conceptual layout design
  - Forecasting capital and O&M costs
  - Performing cost-benefit analyses
- Playing a lead role in partial capping and new-cell construction of a composite-lined and geomembrane-covered coal-ash landfill in northern Minnesota, including:
  - Facility design and preparation of construction drawings
  - Design of leachate collection system
  - Preparation of technical specifications
  - Development of stormwater pollution-prevention plan (SWPPP)
  - Development of construction cost estimates and forecasting of future landfill construction timing
  - Performing full-time onsite construction observation, construction QA/QC, and certification surveys
  - Preparing construction documentation reports
- Playing a lead role in preparing permit renewal documents for a coal ash landfill in northern Minnesota, including preparation of:
  - Facility engineering report and plans and specifications
  - Operations plan and post-closure care plan
  - Financial assurance cost estimates
  - Construction QA/QC plan
- Participating in the design and construction of a vertical dam raise at an existing composite-lined ash pond in northern Minnesota.
- Providing permitting assistance and serving as the lead landfill designer on a new oilfield special waste landfill in North Dakota.

- Serving as lead designer and construction observer for a new 30-acre flue-gas-desulfurization (FGD)/fly-ash pond in North Dakota.
- Preparing permit-level drawings, template specifications, a QA/QC manual, contingency action plan, and closure/post-closure cost estimates for three additional FGD/fly-ash ponds at a power plant in North Dakota.
- Serving the lead role in permitting a vertical expansion of an existing lined coal-ash landfill in North Dakota.
- Evaluating alternatives for expansion of fly-ash and bottom-ash landfills and ponds for several sites in Minnesota and North Dakota that included preparing conceptual designs, estimating future CAPEX and OPEX costs, and identifying advantages and drawbacks of multiple landfill/pond expansion scenarios.
- Developing options for an uncapped landfill in Missouri, including:
  - Evaluating corrective actions
  - Running HELP (Hydrologic Evaluation of Landfill Performance) models for various liner configurations
  - Comparing clay and geosynthetic caps
  - Estimating costs for permit renewal, continuing landfill operations, prescriptive clay and composite covers, and corrective action probabilities for each capping option
  - Developing options to improve leachate collection systems and groundwater monitoring wells
- Serving as lead engineer in the evaluation of several soil and geosynthetic cover options for capping waste-rock stockpiles on Minnesota's Iron Range.
- Planning and developing site infrastructure for mine sites in Minnesota, Wisconsin, and Canada.
- Providing road layout and design for wind turbine sites in Minnesota, California, Kansas, and South Dakota.
- Providing construction observation and management for a dam project in Minnesota.
- Observing construction at wind turbine sites in Minnesota and Washington.
- Providing design and drafting for dam and stream restoration projects.

Education

BCE, Civil Engineering, University of Minnesota, 2007

BA, Physical Sciences, Bethany Lutheran College, 2007

Registration

Professional Engineer: Minnesota, North Dakota

PETER M. KERO, PE
Senior Environmental Engineer

BARR

Experience

Peter Kero is a senior environmental engineer with more than 22 years of experience in environmental consulting. His areas of expertise include the development, protection, monitoring, investigation, and cleanup of water resources; regulatory negotiations, compliance, and permitting; and design and construction oversight for water-supply and soil- and groundwater-treatment projects. Peter has successfully managed and completed dozens of environmental projects and is skilled at planning and accomplishing technical objectives, financial planning and tracking, and coordinating teams of coworkers, contractors, and subconsultants.

Peter has a wide variety of experience with the investigation and remediation of contaminated sites, including site assessment, soil and groundwater investigations, feasibility studies, remediation design, construction, operation, maintenance, and optimization. His assessment and remediation experience includes:

- Performing more than 32 Phase I environmental site assessments across Minnesota and Michigan.
- Conducting soil and groundwater investigations for organic and inorganic contaminants, including:
  - VOC and PAH investigations at UNOCAL sites in Minnesota and Wisconsin.
  - Groundwater investigation for nitrate contamination at an explosives manufacturer in Minnesota.
  - Soil investigation for arsenic and lead contamination at a foundry site in Michigan.
  - Investigation and mitigation of wastes and soils at a former wood-treating operation in Michigan.
  - Volatile organic compound (VOC) investigations at multiple Speedway sites in Wisconsin.
- Performing feasibility studies and probable cost estimates, including:
  - Feasibility studies and pilot tests for vapor extraction and groundwater treatment of methane and its source products at a Superfund site in Michigan.
  - Focused feasibility studies for closure of iron mine dumps in Michigan.
  - Focused feasibility studies for fuel-oil remediation in soil and groundwater at a former iron mine in Michigan.
  - Probable cost estimates for soil, sediment, and groundwater remediation at a former manufactured gas plant and foundry in Michigan.
- Providing remediation design, construction, operation, maintenance, and optimization at contaminated sites, including:
  - Design, construction, and operation of groundwater pump-and-treat systems at five petroleum release sites in Wisconsin and Michigan.
  - Construction of soil stabilization project with an impermeable cap at a coal-tar pit on a Superfund site in Minnesota.

  - Design and oversight of numerous source removal and hazardous waste recovery projects in Minnesota, Wisconsin, and Michigan.
  - Pilot-testing, operation, maintenance, and optimization at soil-vapor extraction (SVE) and air-sparging (AS) treatment units in Minnesota and Michigan.
  - Pond-sediment armoring design and construction in Minnesota and Michigan.
- Providing project management for litigation support services regarding issues at contaminated sites, including:
  - Management of a four-year expert evaluation and testimony regarding pollution abatement efforts at a Superfund site in California contaminated by acid rock drainage.
  - Evaluation of chemical releases related to the presence of MTBE in 540 high-capacity municipal wells on Long Island, New York.
  - Assessment of releases of chlorinated solvents at multiple release sites in an industrial park in Illinois.

Education MS, Civil/Environmental Engineering, University of Minnesota, 2003

BS, Environmental Engineering, Michigan Technological University, 1994

Registration Professional Engineer: Minnesota, Wisconsin, and Michigan

AR03P061.18

Experience

Eric Lund has ten years of experience and a degree in civil engineering from the University of Minnesota. Eric's work experience has included project management; assisting with Phase I site assessments, Phase II site investigations, and other environmental investigations; and providing construction oversight and monitoring for remediation projects. His specific project work has included:

- Serving as project manager for Capitol Region Watershed District as it evaluated a potential location for a new district headquarters. Project work included meeting with stakeholders, identifying potential environmental impacts associated with former uses, and developing a scope to investigate potential impacts. Duties also included managing field staff during investigation activities, preparing a Phase II investigation report, a response action plan, enrolling the property in the MPCA Voluntary Brownfield Program, and assisting the client in evaluating the feasibility of infiltration as a stormwater management practice on a site with known contaminants. Work resulted in MPCA approval of the RAP and helped the client reach a negotiated closing.
- Serving as project manager in assisting a Minneapolis client in addressing property impacts associated with chlorinated solvent releases. Ongoing duties include scoping and directing field investigations, engaging with remediation contractors to design, and constructing a retrofit building mitigation system, and supporting the client by interacting with the MPCA to develop appropriate and protective response actions.
- Serving as project manager for the Freeway Landfill investigation and closure design project with the MPCA Closed Landfill Program. Duties are ongoing and have included scoping and managing field staff during the investigation, managing a team of engineers working on evaluating closure options, and presenting options to various stakeholders.
- Serving as project manager for a dredging project in southern Minnesota. Duties are ongoing and include managing Barr's scientists and engineers in preparing permit applications, plans, and specifications. The intent of the project is to remove more than 500,000 cubic yards of accumulated sediment to allow for better recreation opportunities on the lake.
- Serving as the project manager for several emergency spill-response projects for petroleum-pipeline releases in north-central Minnesota. Managed staff that performed activities including field screening of soils to help identify impacted material for excavation, collecting soil and groundwater samples, and assisting in preparation of a documentation report.
- Assisting Xcel Energy with planning for and implementing decommissioning of the Black Dog generating plant. Work included assisting in preparation of the response action plan (RAP), technical memorandums, and Phase II summary reports. Work also included management of field staff and subcontractors during investigation activities. Duties also include serving as the environmental lead during implementation, which

includes preparation of environmental plans and reports, management of field staff during implementation, and interaction with the client and the MPCA.

- Providing construction oversight for a large remediation project at a cement-kiln-dust (CKD) site in Michigan, including overseeing contaminated material consolidation, impermeable cap installation, storm-sewer-system construction, shoreline protection construction, earthwork and grading, seeding and installation of erosion-control measures, slurry wall construction, and well abandonment. Other activities at the site include water-level measurements, surveying, pH profiling in wells, development of monitoring wells, development of several models to estimate flux of contaminated water, and preparation of a construction documentation report and memos for flux analysis. Project has included oversight of USEPA and Michigan Department of Environmental Quality.
- Serving as project engineer during the feasibility study at a former steel and coking facility in the Upper Midwest with metals- and PAH-impacted sediment. Work included development of remedial alternatives and cost estimates and assistance in preparation of the feasibility study. Ongoing duties include coordinating with numerous stakeholders and assisting with remedial design.
- Providing emergency spill-response assistance to several petroleum-pipeline releases in north-central Minnesota. Activities included field screening of soils to help identify impacted material for excavation, collecting soil and groundwater samples, and assisting in preparation of a documentation report.
- Assisting the City of Excelsior with the development of a former dump site into a municipal park in Excelsior, Minnesota. Assisted with the Phase I environmental site assessment, preparation of a work plan for a Phase II site investigation, Phase II investigation activities, preparation of response action plans to address soil and soil gas impacts, assisted with contracting and provided oversight for implementation of the response actions, assisted in documenting the remedial action in an implementation report, and assisted in preparation of monitoring reports that have resulted in assurance letters for soil and groundwater at the site. Project is funded by grants received from Hennepin County and is performed under MPCA oversight.
- Assisting the Capitol Region Watershed District with planning for and managing contaminated soil and groundwater encountered during realignment of the Trout Brook Interceptor stormwater tunnel. The fast-track project involved review of other consultant Phase I reports, designing and managing a limited Phase II investigation to fill in data gaps, scoping a Soils Management – Response Action Plan for MPCA approval, securing permits from MCES and MPCA for discharging impacted groundwater to both sanitary and stormwater sewers, and managing field staff during construction. Project involved many stakeholders, including MN/DOT, MPCA, BNSF Railway, and CRWD.

Education BS, Civil Engineering, University of Minnesota, 2007

Registration Professional Engineer: Minnesota

AR03P061.18

Experience

Bryan Pitterle has more than five years of experience on projects involving landfills, dams, mine-site development, and brine ponds. His services include site design and planning, grading, 3D modeling, HELP (Hydrologic Evaluation of Landfill Performance) modeling, drafting, and cost estimating. Examples of Bryan's experience at Barr include:

- Assisting Minnesota Power with ash management projects at Boswell Energy Center, Laskin Energy Center, and Taconite Harbor Energy Center. This work has involved permitting assistance, evaluating ash-management and ash-transport alternatives, and designing long-term stormwater plans.
- Evaluating alternatives for transporting ash or capping legacy ash ponds at various sites throughout Minnesota.
- Evaluating ash- and waste-management scenarios for various sites throughout the Midwest and Canada, including:
  - Developing conceptual layout design
  - Forecasting capital and O&M costs
  - Performing cost-benefit analyses
  - Evaluating ash-management alternatives
  - Evaluating ash-transport alternatives
  - Designing long-term stormwater plans
- Providing design and performing fieldwork for industrial solid-waste facilities located throughout the Midwest. This includes:
  - Preparing construction drawings
  - Preparing technical specifications
  - Preparing Stormwater Pollution Prevention Plans (SWPPPs)
  - Preparing construction documentation reports
  - Performing construction QA/QC
  - Developing construction cost estimates
  - Forecasting of future landfill construction timing
  - Designing leachate collection systems
- Evaluating several soil and geosynthetic cover options for capping waste-rock stockpiles in Minnesota's Iron Range.
- Assisting in landfill design and construction management for a new oilfield special-waste landfill in North Dakota.

Prior to joining Barr, Bryan held a civil engineering co-op position at a Wisconsin consulting firm from winter through spring of 2011. His work there included:

- Drafting site, elevation, and grounding plans for cell towers

- Managing and training newly hired engineers and co-ops

Education BS, Civil Engineering, University of Wisconsin-Madison, 2012

Software AutoCAD, Civil 3D, HELP Model, HydroCAD, Microsoft Project, Navisworks Manage

Experience

Alex Puetz has 11 years of experience performing fieldwork and project management for environmental investigation and remediation projects. Alex's work at Barr has included:

- Serving as lead field geologist on projects throughout the Midwest. Responsibilities include development of work plans, sample and analysis plans, project health and safety plans, and project specifications; preparation of bid documents and access agreements; coordination with contractors and regulators and property owners; investigation oversight (with various drill rigs, including hollow-stem auger, push-probe, rotosonic, CPT probe, and laser-induced fluorescence probe) troubleshooting, and reporting. Examples of project work include:
  - A groundwater investigation that included the advancement of over 75 borings and installation of nearly 40 monitoring wells within rights-of-way corridors in a high-traffic urban setting.
  - A geotechnical investigation for a new pipeline corridor that stretched across northern Minnesota.
  - A sensitive multi-phase cleanup site involving a large monitoring well network, groundwater extraction remediation, and a point-of-entry treatment system using granular activated carbon.
  - A geotechnical investigation for a wind farm in central Indiana. A dozen locations spread across several square miles. Special care had to be taken with access due to the polarizing issue.
- Assisting with site supervision and task management for various vapor-intrusion investigation projects at locations ranging from residential to large industrial complexes. Project work included coordination; obtaining access; installation of permanent vapor-sampling ports; indoor-air, outdoor-air, and sub-slab vapor and soil-gas sampling and reporting.
- Assisting with site supervision and task management for various brownfield and Superfund projects. Project work included development of a sample and analysis plan, coordination with contractors and regulators, investigation oversight and troubleshooting, and reporting.
- Providing assistance for a pipeline industry client, including project management. Responsibilities have included coordinating and managing work at sites with specific safety procedures, including right-of-ways, stations, and pipeline terminals; Serving as field manager for remedial excavations and petroleum release investigations; Preparing technical reports, subcontractor bids, waste profiles, and health and safety plans for both emergency response and scheduled work.
- Serving as project manager for a hydrogeologic investigation at a North Dakota power plant. Directed the installation of monitoring wells, conducted field tests, and analyzed data to develop a revised site conceptual model.
- Assisting with contaminated-site investigation at a refinery. Provided oversight and direction of installation of monitoring wells in bedrock using rotasonic methods and assisted drafting the remedial action options report.

- Providing oversight and direction for various projects at a steel mill facility. Project work included sediment coring, dredging oversight, waste management, geotechnical soil boring investigation, and storm water sampling.

Prior to working at Barr, Alex served as geologist and assistant project manager for an environmental consulting firm in the Twin Cities. Work included spill-response activities, monitoring well installation and abandonment, remedial excavations, and assisting with the design, construction oversight, and ongoing observation and maintenance remediation systems such as soil-vapor extraction and solar-powered pump systems. Alex's previous project work has included:

- Conducting several soil boring investigations for a railroad client throughout Minnesota and Wisconsin. Projects included work within railroad corridors and inside rail yards in Minneapolis and Willmar, Minnesota.

Education

BS, Geological Engineering, University of Wisconsin-Madison, 2005

BS, Geology, University of Wisconsin-Madison, 2005

Certification

Engineer in Training (EIT)

HAZWOPER 40-hour training

HAZMAT technician training

Experience

Alex West has five years of experience with the operation of groundwater-remediation systems, environmental sampling, and soil excavation and remediation. His experience includes:

- Serving as associate geoscientist for a firm in the Twin Cities. His work involved:
  - Managing all field operations at three ongoing groundwater remediation project sites in the Twin Cities metropolitan area.
  - Leading all operations of a high-volume groundwater treatment facility.
  - Assisting in the preparation and writing of technical groundwater hydrology reports.
  - Overseeing subcontractors in the installation, rehabilitation, and maintenance of groundwater pumping and monitoring wells.
  - Training and managing a new plant operations technician.
  - Designing and performing multiple forms of sampling, including groundwater, surface water, pore water, and soil sampling.
  - Assisting in projects involving contaminated groundwater containment and contaminated soil excavation/remediation.
  - Analyzing large quantities of data while creating boring logs, hydrographs, and report figures.
  - Collaborating with geologists, engineers, managers, and subcontractors to complete projects on time and under budget.

  At the University of St. Thomas, Alex worked on several projects, including the creation of a detailed water budget for the Highland Lakes Water Supply Reservoir in Texas. The goal of the project was to identify the most efficient use of a dwindling water reservoir using STELLA modeling software and to propose a redistribution of resources through changes in water allocation legislation.

Education

BS, Environmental Science (emphasis: Geology), University of St. Thomas, 2012

Training

40-hour OSHA HAZWOPER

Certification

First Aid/CPR certification

AR03P061.18

RAY WUOLO, PE, PG, P.Eng., P.Geol.
Vice President, Senior Hydrogeologist

Experience

Ray Wuolo has more than 30 years of experience in characterizing and investigating groundwater flow and groundwater contamination. He is an expert in computer modeling of groundwater flow and contaminant transport, aquifer testing, well design, pump-and-treat system design, and automated inverse calibration methods. At Barr, he has technical and project management experience in hydrogeologic site evaluation, mining hydrogeology, aquifer remediation, environmental chemistry, landfill permitting, and environmental impact statements. Ray's project work includes:

- Applying groundwater flow and solute transport models to more than 80 contaminated sites throughout the U.S. using the Single Layer Analytic Element Model (SLAEM), the Multi-Layer Analytic Element Model (MLAEM), the U.S. Geological Survey Modular Finite-Difference Model (MODFLOW), the solute transport codes MT3D and RT3D, and the inverse optimization model PEST. Used the models to characterize groundwater flow, determine contaminant migration, assess risk, and evaluate remedial designs. Sites include:
  - former coal gasification sites
  - petroleum refineries
  - operating and closed municipal landfills
  - Resource Conservation and Recovery Act (RCRA) permitted facilities
  - U.S. EPA National Priority List sites
  - soda ash, taconite, and lead mines
  - paper mills and wood-treating sites
  - electrical generating facilities
  - former and operating chemical plants
  - manufacturing and processing facilities
- Managing development of a groundwater flow and solute transport model of a National Priority List site with dissolved arsenic in groundwater for the U.S. Environmental Protection Agency. Used the model to quantify the risk to the environment from the site.
- Developing a multi-aquifer groundwater flow model for a petroleum refinery and using the model to calculate contaminant flux rates to a nearby river and to evaluate several remedial alternatives.
- Managing the remedial investigations and feasibility studies for numerous groundwater and soil contamination sites, including sites contaminated with metals, PCBs, petroleum, and chlorinated solvents. Performed detailed analyses on contaminant transport, LNAPL and DNAPL remediation.
- Performing hydrogeologic analyses at numerous electric generating facilities for ash disposal, NPDES permitting, power-plant siting, ash-basin dewatering, expansion, and contaminant remediation.
- At the Waukegan coke plant site in Illinois, developing groundwater flow models for simulation and design of large-scale pumping-injection recirculation cells to reduce levels of ammonia and pentachlorophenol, as well as to predict the effectiveness of monitored natural attenuation.

- Providing expert opinion and solute-transport modeling analyses for the City of Sullivan, Missouri and their counsel. The city well field is contaminated by TCE from one or more sources, including a former manufacturing facility.
- Managing the hydrogeologic characterization and groundwater remedial design of large petroleum and product contamination problems at refineries and an international airport where product and dissolved plumes entered unconsolidated deposits and fractured bedrock.
- Performing hydrogeologic characterization and remedial design at large former wood-treating facilities that involved characterization, containment, and remediation of dissolved phase organic contaminants, as well as LNAPL and DNAPL phases.
- For MnDOT, serving as principal and project manager for groundwater and solute transport modeling of a former fuel loading site in Wright County, Minnesota.
- Managing the remedial investigations of scrap yards, arsenic burial sites, landfills, coal yards, ash storage facilities, coal tar sites, and trona mines.
- Serving as lead hydrogeologist for remedial investigations and feasibility studies of refineries, municipal landfills, industrial landfills, ash landfills, demolition landfills, RCRA-permitted facilities, chemical facilities, manufacturing facilities, lead mines and smelters, former wood treating and coal gasification sites, paper mills, and other sites.
- Investigating and assisting in the remedial design of sites contaminated with dense non-aqueous phase liquids (DNAPLs), including solvent-contaminated sites, coal tar sites, and former wood treating sites.
- Conducting a hydrogeologic investigation of TCE contamination and designing a groundwater remediation system for the former General Mills research facility on East Hennepin Avenue in Minneapolis. The projected included well design, aquifer testing, and groundwater modeling.
- Conducting a remedial investigation of the American Iron & Supply scrap yard along the Mississippi River corridor in north Minneapolis. The investigation included soil borings, monitoring wells, groundwater sampling, and evaluation of groundwater flow.

Ray was associate editor of *Ground Water* for three years and continues to provide periodic peer reviews for submitted manuscripts dealing with aquifer and pumping test analyses, groundwater flow modeling, inverse calibration methodologies, and capture-zone analyses. He provided technical peer review of water-resources proposal for the Legislative Citizens Commission on Minnesota Resources (LCCMR). He was also an adjunct professor of geology at the University of St. Thomas in St. Paul for six years, where he taught senior-level hydrogeology classes.

Education

MS, Geological Engineering, South Dakota School of Mines & Technology, 1986

BS, Geological Engineering, Michigan Technological University, 1983

Registration

Civil Engineer: Minnesota, Missouri, Michigan, Idaho, Alberta

Licensed Professional Geologist: Wyoming; Minnesota; Missouri; Kansas; Alberta, Canada; Saskatchewan, Canada

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