

PRESENTATION SUMMARIES & SPEAKER BIOGRAPHIES

Keeping it Clean:
Protecting and Managing Groundwater
Quality in Urban Environments



Minnesota Ground Water Association Fall Conference, 2020

Sharon Kroening

MN Pollution Control Agency

Contamination in the Groundwater Underlying Minnesota's Urban Areas

Presentation

- Focus is on ambient groundwater contamination, not known spill sites
- Description of MPCA's ambient groundwater monitoring approach
- Discussion of the occurrence and distribution of several classes of urban contaminants, including chloride, volatile organic compounds, contaminants of emerging concern, and per- and polyfluoroalkyl substances (PFAS)
- Concluding remarks

Education

M.S. (civil engineering), University of Minnesota, 1993

B.S. (chemistry), University of Minnesota, 1990

Experience

1994-2007, U.S. Geological Survey

2007-present, Minnesota Pollution Control Agency

Affiliations

Minnesota Groundwater Association (MGWA)



David J. Fairbairn, PhD

MN Pollution Control Agency

Stormwater transport and infiltration - are there concerns for groundwater quality?

Presentation

- Stormwater quality
- Stormwater control measures (SCMs), aka best management practices (BMPs)
- Potential concerns to groundwater
- Ongoing work & discussion

Education

BS (2) Zoology; Philosophy UW-Madison
MS Environmental Public Health UW-Eau Claire
PhD Water Resources Science UMN-Twin Cities

Experience

Research Scientist, 2014-Present, MPCA, Municipal Division (Stormwater Program);
Environmental Analysis & Outcomes Division (CEC Program)

Research Assistant, 2009-2014, UMN, Water Resources Center

Environmental Health Specialist, 2008-2009, Eau Claire City-County Health Department



Michael Trojan

MN Pollution Control Agency

Impacts of Stormwater Infiltration on Chloride in Minnesota Groundwater

Abstract

Infiltration is a preferred practice for managing stormwater runoff, but it is ineffective for treating chloride. This presentation examines potential impacts of stormwater infiltration on chloride concentrations in and loading to groundwater.

Education

- Ph.D. (soil science), University of Minnesota, 1993
- M.S. (forest hydrology), University of Minnesota, 1988
- B.S. (soil and water resource management), University of Minnesota, 1980

Experience (most recent first):

- 2007-present, Minnesota Pollution Control Agency Stormwater Program, Hydrologist
- 1993-2007, Minnesota Pollution Control Agency Groundwater programs, Hydrologist
- 1992-1993, Minnesota Department of Natural Resources County Atlas Program, Hydrologist

Affiliations

Minnesota Groundwater Association



Sophie Kasahara

St. Paul Public Schools, Math teacher

E. Calvin Alexander, Jr

Earth and Environmental Sciences, University of Minnesota (Emeritus)

Water Quality Trends in Coldwater Spring, MNRRA, Minnesota

Presentation

- Coldwater Spring's water quality has been significantly impacted by human activities.
- Chloride levels in Coldwater Spring have increased from 4.5 ppm in 1880 to varying between 320 to 450 ppm in 2013 to 2015.
- Nitrate levels in Coldwater Spring peak in the winter and are lowest in the summer and ranged from ~2.5 to 5.2 ppm in 2013 to 2015.
- Temperature at Coldwater Spring has increased from 7.8 C in 1836-37 to ranging from 11 – 13 C in 2013 to 2015 and lags surface temperature changes by about 4 months.
- There are three distinct sources of water coming into the Coldwater Springhouse.
- The recharge to Coldwater Spring appears to be very local and is not impacted by Minnehaha Creek.

Sophie Kasahara

Education

M.Ed. (Mathematics Education), University of Minnesota, 2020

B.S. (Geo-Engineering), University of Minnesota, 2016

E. Calvin Alexander, Jr

Education

Ph.D. (chemistry), Univ. of MO Rolla, 1970

B.S. (chemistry), OK State Univ, 1966

Experience

2014-present, Retired

1973-2014, Univ, of MN, (Geology & Geophysics/Earth & Environmental Science Dept. Faculty)

1970-1973, Univ. of CA Berkeley (Physics Dept., Post Doc)

Affiliations

Minnesota Ground Water Association (MGWA)

Geological Society of America (GSA), Fellow

National Speleological Society (NSS), Fellow

American Geophysical Union (AGU)

American Society for the Advancement of Science (AAAS)

Meteoritical Society

Sigma Xi

Steve Scott

Vanessa Demuth

Dakota County Environmental Management Department, Groundwater Protection

Groundwater Quality of the Principal Aquifers in Dakota County - Current Conditions and Trends, 1999-2020

Abstract

The Ambient Groundwater Quality Study sampled 77 private drinking water wells over a 20-year period to characterize groundwater quality and to monitor long-term trends in groundwater contamination from both natural and human sources.

Domestic wells, representing the three principal drinking water aquifers in the county – the unconsolidated sediments, Prairie du Chien and the Jordan Aquifers (in order of depth) and various hydrogeologic and land use regimes, were sampled as many as 16 times.

The study found both natural and manmade chemicals at levels of concern. Of the 77 wells sampled over the course of the study, 62 percent of wells contained concentrations of at least one chemical contaminant exceeding current Minnesota Department of Health drinking water guidelines. Exceedances were observed for nitrate, cyanazine breakdown products, manganese and gross alpha. PFAS was detected in 79% of the wells, none over guidelines. The presence of anthropogenic compounds is correlated with well casing depth and land use.

A report summarizing the data collected from 1999 through 2019 was recently published, which includes data from other sampling events and studies that occurred in the County including the Hastings Area Nitrate Study (HANS), the MN Department of Agriculture's (MDA) Township Testing Program, the Wells and Increased Infant Sensitivity and Exposure Study (WIISE), and the Burnsville, Greenvale and Lakeville Community- Focused Private Well Sampling.

The report can be accessed on the Dakota County webpage:

<https://www.co.dakota.mn.us/Environment/WaterResources/WellsDrinkingWater/Pages/ambient-groundwater-quality-study.aspx>

Stephen Scott

Education

M.S Environmental Health, University of Minnesota, 2001

M.A Education, University of St. Thomas, 1997

B.S Biology, St. John's University, 1979

Experience

1991-present, Dakota County, Environmental Health Specialist

Vanessa Demuth PG, REHS

Education

B.A. Geology, University of St. Thomas 1991

B.A. Business Administration, University of St. Thomas 1991

Experience

1993-present, Dakota County, Environmental Specialist

1991-1993, WW Engineering and Science (formerly MECC), Staff Geologist

Affiliations

American Institute of Professional Geologists (AIPG)

Minnesota Ground Water Association (MGWA)



Jill Trescott

Dakota County, Environmental Resources

Updating the Dakota County Groundwater Plan: Communications and Money

Abstract

Dakota County is in the process of updating its Groundwater Plan. It was one of the first counties in the state to have a groundwater plan, but its most recent state-approved plan was adopted in 2000. County Groundwater Plans are allowed by state statute, but not required. Why would a county commit the resources needed to go through the demanding and time-consuming process to prepare one and have it approved?

Communications

The groundwater planning process is an opportunity for County staff to communicate with their Board of Commissioners, residents, public water suppliers, state agencies, Soil and Water Conservation District, watershed management organizations, well drillers, farmers, and business people about current and anticipated problems with groundwater quality and quantity. In return, those stakeholders communicate their priorities and concerns and identify gaps as the plan is being put together.

Money

The groundwater planning process creates a framework for County staff to seek funding for their programs and projects. Having identified current and future issues, staff develop strategies to address those issues and identify the resources and timelines needed to implement those strategies. With this information, the County Board can make informed decisions about what they support. In addition, when the County seeks funding from the State of Minnesota for groundwater projects, the Groundwater Plan will show how the County intends to achieve the prioritized, targeted, and measurable results State funding agencies are looking for.

Education

B.A. (English), Wellesley College

M.S. (Environmental Science), University of North Texas

Experience

Holocene Epoch, Dakota County Environmental Resources

2018-present, Senior Groundwater Advisor

2009-2018, Groundwater Protection Supervisor

1999-2009, Groundwater Protection Specialist

Notable

Minnesota Department of Agriculture

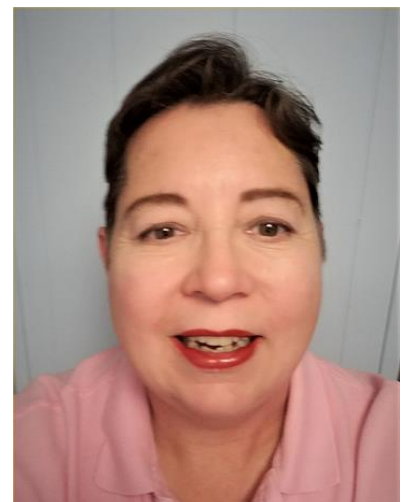
Pesticide Management Advisory Committee

Nitrogen Fertilizer Management Plan Advisory Committee

National Groundwater Association, "Groundwater Protection Project of the Year"

National Association of Counties Award, Innovation in Health

Minnesota Groundwater Association, former Board member



Kelton D. L. Barr

Kelton Barr Consulting LLC

Potential Hydraulic Connections Between Bedrock Aquifers and Surface Water in the Twin Cities Metropolitan Region

Abstract

A summary of an investigation of the time-of-travel from the water table to the subcropping bedrock aquifers in the 11-county Twin Cities metropolitan region using two methods. Vertical travel time was estimated using hydrogeologic parameters; also, vertical travel time was assessed using conservative anthropogenic chemical indicators. The results from the two methods are compared.

Education

M.S. (hydrogeology), University of Minnesota, 1978

B.A. (geology), Carleton College, 1972

Experience

1976-present, working as a hydrogeologic consultant for a variety of companies, ranging from self-employment to national firms, all the while residing in the Twin Cities.

1974-1976, U.S. Geological Survey (hydrogeologist)

1966-1974, Barr Engineering Co. (geologist, technician)

Affiliations

American Institute of Professional Geologists (AIPG)

Minnesota Ground Water Association (MGWA)

National Ground Water Association (NGWA)



Ken Bradbury

Wisconsin Geological and Natural History Survey,
University of Wisconsin-Madison, Division of Extension

Detection of human viruses in deep groundwater in south-central Wisconsin: implications for sources, pathways, and travel times

Abstract

The finding of human viruses in deep groundwater in Wisconsin caused hydrogeologists to rethink long-held ideas and conceptual models for groundwater movement and groundwater protection in sandstone aquifers. Our research group repeatedly detected human enteric viruses in water produced from deep (over 800 ft) bedrock water-supply wells in southern Wisconsin.

How and why do viruses reach these wells? Our evaluation of potential virus pathways and transport mechanisms suggests that the viruses originate from a widespread, distributed source, probably sanitary sewers, related to an entire urbanized area rather than to one or more discrete point sources. Several lines of evidence support this concept. First, viruses were detected in every one of 10 wells sampled repeatedly over an approximately 30 mi² area. It is difficult to devise a single transport mechanism that explains this widespread virus occurrence. Second, the temporal virus detection pattern is statistically similar throughout the study area, again implying a regional rather than localized phenomenon. Third, both visual inspection and regression analyses show that spikes in virus concentrations are related to regional recharge events following large storms or snowmelt. Fourth, virus species (serotypes) detected in well water correlate with serotypes in sewage, and variations in the virus composition of sewage correlate with variations in the viruses detected in the wells.

These findings are significant for several reasons. First, the widespread virus occurrence in the deep wells shows that exfiltration from sanitary sewers can have a significant impact on urban groundwater quality. Second, the frequent virus detections show that the deeply-cased municipal wells are not well-protected from near-surface contaminants. Finally, rapid transport times from the surface to the wells imply that discrete features, which might include fractures, cross-connecting wells, improperly abandoned wells, or failing well casings, are controlling vertical and horizontal pathogen mobility.

Education

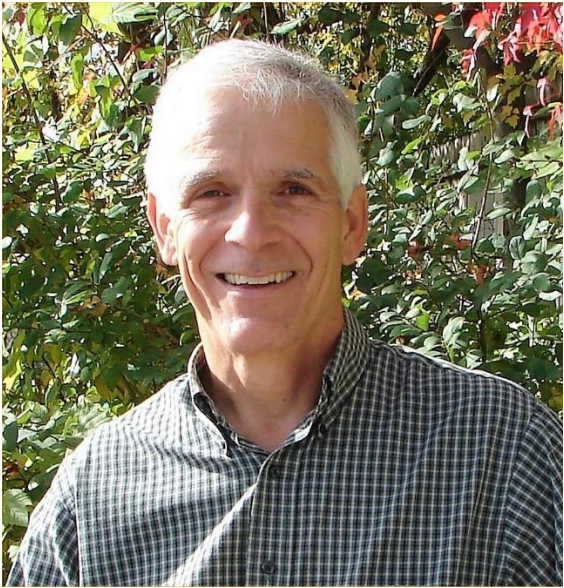
Ph.D. (geology), University of Wisconsin-Madison, 1982
M.A. (geology), Indiana University, 1977
B.A. (geology), Ohio Wesleyan University, 1974

Experience

2015-present, Wisconsin Geological and Natural History Survey (Director and State Geologist)
1992-2015, Wisconsin Geological and Natural History Survey (Research Hydrogeologist)

Affiliations

National Groundwater Association (NGWA), Geological Society of America (GSA)
American Geophysical Union (AGU), Association of American State Geologists (AASG)



Andri Dahmeier

Liz Kaufenberg

MN Pollution Control Agency

Management Approach to Safe and Sustainable Drinking Water; Addressing PFAS Contamination across Fourteen Communities

Abstract

On February 20, 2018, the State of Minnesota settled its Natural Resources Damage lawsuit against 3M for \$850 million to address the approximately 150 square mile groundwater contamination plume affecting more than 174,000 residents in 14 communities within the East Metro.

The objective of this presentation is to discuss the approach used in the development of a Conceptual Drinking Water Supply Plan (CDWSP) for the East Metro area. The CDWSP is currently being developed and is intended to define the path to provide safe, sustainable drinking water in the East Metro Area while addressing each community's needs now and in the future. The plan considers both public water systems and private wells, using a region-wide approach. Several phases of the approach will be discussed including:

- Stakeholder communication and management;
- Development of a new groundwater model;
- Identification and evaluation of drinking water supply improvement options;
- Development, screening and evaluation of concept-level projects; and
- Development, evaluation and recommendation of scenarios.

Stakeholder communication and management will also be presented as well as how the drinking water system modeling, groundwater modeling, concept-level projects and scenarios were developed and integrated to drive the comprehensive regional approach.

Andri Dahmeier

Education

B.S. (geophysics), University of Minnesota, 2007

Experience

2016-present, MPCA (3M settlement technical workgroup coordinator, Superfund project manager)

2008-2016, Amec Environment & Infrastructure (now called Wood) (field geologist/geophysicist, project manager)

2007-2008, Minnesota Department of Natural Resources (geologist)

Affiliations

Minnesota Groundwater Association (MGWA)

Interstate Technology and Regulatory Council (ITRC)



Liz Kaufenberg

Education

B.S. (environmental science), UW – River Falls, 2009

M.S. (water resources science), University of Minnesota, 2013

Experience

2013-present, MPCA (3M Settlement program coordinator, Superfund project manager, research scientist)

Affiliations

Interstate Technology and Regulatory Council (ITRC)



Rebecca Higgins PG

MN Pollution Control Agency, East Metro Unit

Al Gorski

AECOM

Project 1007 PFAS Investigation East Metro

Abstract

This presentation will provide an overview of the surface and subsurface investigation into the transport of PFAS compounds across 14 miles of the east metro. A Remedial Investigation and Feasibility Study are requirements of the 2018 3M Settlement. A multi-faceted and time-sensitive approach is being deployed to assess risks to receptors from a mix of PFAS compounds. This expedited investigation is ultimately aimed at completing a feasibility study of long-term remedial options in the corridor. We are gaining a greater understanding PFAS fate and transport mechanisms within this corridor of complex glacial and bedrock geology. The investigation includes development of a combined groundwater-surface water model which will evolve to include fate and transport mechanisms, incorporating long-term PFAS surface and groundwater monitoring data from the system-wide monitoring network.

In bullet form

- PFAS Investigation Objectives and Progress
- Surface Water and Groundwater Investigation and Sampling Protocols
- Geologic Interpretation
- PFAS Risk Assessment
- Fate and Transport Comprehension through Modeling
- Remedial Treatment Feasibility Study Targets

Rebecca Higgins

Education

B.S. Geology, North Dakota State University, 1998

Experience

2007-Present, Hydrologist III, Minnesota Pollution Control Agency

2004-2007, Braun Intertec (Project Scientist)

1998-2004, Versar, Inc., AG&W Environmental Engineering (Project Scientist)

Affiliations

MN AELSLAGID, Professional Geologist

ITRC, Board of Advisors

SURF, Member



Al Gorski

Education

B.S. Natural Resources and Environmental Science, University of Minnesota, Twin Cities, 1992

Experience

2014-Present, AECOM (Senior Scientist)

2000-2014, Stantec (Project Scientist/Senior Scientist)

1996-1998, Research Specialists (Project Scientist)

1991-1996, Pinnacle Engineering (Project Scientist)

Paul R. Jackson

Pace Analytical Services, LLC

PFAS Project Set-up with a Lab

Presentation

- Project Set-up Questions
- Matrix Considerations
- Compound Lists
- Test Method Selection
- Applicable Certifications
- Field Sampling Guidance and Resources

Education:

Chemistry and Business studies, Towson University

Experience (most recent first):

2009 to present, Pace Analytical (Program Manager for PFAS, Emerging Contaminants, Drinking Water, and Local/State Government

2006-2009, NSF International (Program Manager for Water and Wastewater Treatment Technologies)

2003-2006, Severn Trent Laboratories (Project Director)

2000-2003, Strategic Diagnostics (Southeastern U.S. Sales Manager)

Affiliations:

National Rural Water Association

American Water Works Association

Florida Society of Environmental Analysts