



WISCONSIN GROUND WATER ASSOCIATION

2015 Annual State Conference

“Budgeting and Characterizing the Vadose Zone”

Friday, March 13th, 2015

Milwaukee Marriott West, Waukesha WI



2015 WGWA Annual State Conference

Friday, March 13th, 2015

Milwaukee Marriott West - Waukesha WI

7:30 - 8:15 *Sign-In & Registration*

8:15 - 8:35 President's Welcome
Aaron Schneider - WGWA President

8:40 - 9:10 "Radon in Groundwater at a Wisconsin Fish Hatchery"
Jessica Maloney - Radon Program Manager, Wisconsin Department of Health Services

9:15 - 9:45 "Wonewoc Formation and Tunnel City Group Rocks:
Potential Natural Sources of Groundwater Contaminants in Wisconsin?"
Dr. Jay Zambito, Wisconsin Geological and Natural History Survey

Morning Break Sponsored by **WGWA**

9:45 - 10:15 *Break & Poster Presentations*

10:15 - 10:45 "Unsaturated Soil Mechanics: Principles and Applications"
Dr. William (Bill) Likos, University of Madison, Geological Engineering

10:50 - 11:20 "Vapor Intrusion: Pathways to Liability"
Laren Harpe & George Marek, Quarles & Brady, LLP

11:25 - 11:45 "Identification of Risks Due to Historical Dry Cleaners"
Judy Fassbender, Policy & Technical Section Chief, Remediation & Redevelopment, Wisconsin DNR

Lunch break is sponsored by **Midwest GeoSciences Group**

11:45 *Lunch Served*

12:30pm Keynote Presentation is sponsored by **WellIntel, Inc.**

Keynote: Dr. Todd McAlary, Principal Engineer, Geosyntec Consultants
*"Vapor Transport, Characterization and Mitigation - How to Resolve a Vapor Intrusion
Concern without holding your Breath"*

1:45 - 2:15 "Conceptual Site Model Development for Vapor Intrusion"
Brian Hennings - Hydrogeologist, Natural Resource Technology, Inc.

Afternoon break is sponsored by **EnviroForensics**

2:15 - 2:45 *Break & Poster Presentations*

2:45 - 3:15 "Evaluation of Observed Vapor Intrusion Attenuation Factors and Exposure
for 50 Commercial facilities in the Midwest"
Megan Hamilton, Risk Assessor, EnviroForensics

3:15 - 3:45 "Phase 3 Ecological Consideration"
Mike Marek, Ecologist, Marek Landscaping, LLC

3:50 - 4:20 "Global Warming/Climate Change: Should we let the facts get in the way of a good story?"
James Bannantine - (WGWA, Past President) Environmental Consultant at Geosyntec Consultants

4:30 - 6:00 Networking & Social Reception



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WGWA Members Enjoy:

- You will automatically be sent an informative WGWA Newsletter each Quarter. The newsletter contains a mix of technical articles, breaking news, and calendar events.
- The Newsletter gives you the opportunity to publish your own articles on projects you've worked on, problems you've solved, conferences you've seen, or places you've been.
- You will be sent timely bits of critical information in the form of a WGWA Notes between newsletters.
- Additional educational opportunities exist in our events and resources. Annual Conference (hear the industry's best speakers), our Fall Field Trip (gain hands-on knowledge of hydrogeology), and access to our groundwater sand models are just a couple examples available to our membership.
- Discounts to events hosted by WGWA and sometimes invites to events hosted by WGWA sponsors.
- Events that create networking opportunities. Meet with the best and brightest to advance your work and your knowledge.
- Participation on our Committees and Task Forces also presents the opportunity for networking, while accomplishing something good for the groundwater industry.
- Possible selection for Board positions, Committee Chairs, or Area Coordinator positions helps to develop your leadership skills and gain recognition in the community.

Ground Water Sand Model Reservations

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PRESENTATION:

"Radon in Groundwater at a Wisconsin Fish Hatchery"

Jessica Maloney - Radon Program Manager, Wisconsin Department of Health Services

Bio:

Jessica is a Public Health Educator for the Wisconsin State Health Department. She received her Bachelors in Environmental and Public Health from the University of Wisconsin Eau Claire. Jessica started her career as a Registered Sanitarian at a local health department in Wisconsin, and eventually became an Environmental Investigator at the State Department of Natural Resources for over 6 years. As an investigator she pursued illegal dumping and hazardous waste management compliance, as well as enforced Wisconsin's municipal recycling program initiatives. She began with Wisconsin's ATSDR Cooperative Agreement program at DHS in 2006 and has since worked on a variety of projects including fish consumption advisories, mercury thermometer take back programs, and administration of a mini-grant program for local health departments to do sampling projects across the state. Jessica became the Radon Program Manager at DHS in 2012 and has since succeeded in getting radon awareness on the Wisconsin state cancer plan for 2015-2020. The radon program has been funded from a grant by the US EPA for over 20 years to raise public awareness and train professionals in the science of radon measurement and mitigation.

Abstract:

Radon is a naturally occurring colorless, odorless gas commonly found in indoor air in Wisconsin. Occasionally radon is found in groundwater in areas throughout the state. For every 10,000 pCi/L in a water supply, a time average of about 1 pCi/L of radon is added to the air. This session will focus on the initial discovery of elevated radon in the air at a local DNR fish hatchery, how it related to the groundwater, and the future plans for remedying the problem.

Notes:

PRESENTATION:

"Wonewoc Formation and Tunnel City Group Rocks: Potential Natural Sources of Groundwater Contaminants in Wisconsin?"

Jay Zambito, Mike Parsen, Pat McLaughlin
Wisconsin Geological and Natural History Survey, UW-Extension

Bio:

Jay's research involves the synthesis of sedimentary, stratigraphic, geochemical, and paleontological data to better understand Earth's history. As a scientist working for the Wisconsin Geological Survey, he pursues research projects that produce objective scientific information about the geology of Wisconsin in order to support informed decision making by Wisconsin's citizens, government, businesses, and industry.

Abstract:

Wisconsin faces a variety of groundwater quality issues that include both natural contaminants, such as arsenic from sulfide minerals, and human-induced contaminants, such as nitrate from agricultural land-use practices. Although some Cambrian age sandstone-dominated rock units have been suggested to be potential natural sources of groundwater contaminants, little detailed rock composition data exists for these units. At the WGNHS, we are in the beginning phases of a project to 1) characterize the elemental composition of rocks of the Cambrian Wonewoc Formation and Tunnel City Group across western and central Wisconsin; 2) identify the minerals present in rock intervals with complex elemental compositions; and, 3) understand potential pathways by which various mineral phases could degrade and contribute natural contaminants to groundwater.

Preliminary geochemical data was collected using a handheld x-ray fluorescence (XRF) analyzer from drill cores from Columbia and St. Croix counties. This dataset indicates that the elemental composition of rocks from the Wonewoc Formation and Tunnel City Group include a variety of elements for which groundwater quality standards and advisory levels exist, including aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel, vanadium, and zinc. In addition, geophysical data compiled for a well in La Crosse County suggests a relationship between poor water quality (including metal enrichment and low pH) and groundwater movement through these rocks. Our preliminary data suggests that a regional geochemical and mineralogical dataset for the Wonewoc-Tunnel City interval should be collected to determine the potential for these rock units to be contaminant sources.

Notes:

The morning break is sponsored by **WGWA**.

Please take time during this 30 minute break to visit the poster presentations.

WGWA is proud to host another annual state wide conference focused on bringing groundwater professional and industry experts together for a full day of presentations and networking.



POSTER PRESENTATIONS:

Characterizing Unsaturated Zone Permeability Using Geophysical Techniques

By: Sarah Elizabeth Knutson, Haillie Noel Passow, and Katherine Grote

Relationship of Soil Moisture and Air Permeability during a Soil Vapor Extraction Pilot Study

By: Audra Hanks and Dr. Steve Van der Hoven

Determining Effects of Physical Characteristics of Urban Storm Sewer Sheds on Water Quality

By: Alicia O'Hare, Catherine O'Reilly, Kevin Kothe, RJ Rowley, John Kostelnick.

Determining the Sources of Chloride Contamination in Surface Water and Groundwater in Eau Claire, Wisconsin

By: Tanner Bakke, Gregory Burgess, Justin Dowling, and Katherine Grote

Modeling Flow Regimes for a Cyclical Wetland Using Groundwater Temperatures in McLean County, IL

By: Eileen Maxwell

(Additional Space for Notes on Pages 18, 19, 20, 21, and 22 of this program)



PRESENTATION:

"Unsaturated Soil Mechanics: Principles and Applications"

William Likos, Ph.D.

Professor, University of Wisconsin-Madison

Department of Civil and Environmental Engineering, Geological Engineering

Bio:

Bill Likos is Professor in the Departments of Civil and Environmental Engineering and Geological Engineering at the University of Wisconsin-Madison. He received a Ph.D. in Engineering Systems from the Colorado School of Mines in 2000. Bill's research interests are in basic and applied unsaturated soil mechanics, including expansive clay behavior, capillary-induced stress and strain, and fluid and heat transport in near-surface geotechnical applications. He is co-author of the textbook *Unsaturated Soil Mechanics* published by Wiley in 2004. Bill currently serves as Co-Editor of the *ASTM Geotechnical Testing Journal* and as Associate Editor of the *ASCE Journal of Geotechnical and Geoenvironmental Engineering*. He has received numerous awards for his research, including the ASCE Casagrande Award (2005), the ASCE Walter L. Huber Civil Engineering Research Prize (2014), and the ASCE Norman Medal in both 2007 and 2014.

Abstract:

This presentation will clarify some of the basic principles of unsaturated soil mechanics and will highlight practical applications in geotechnical engineering where such considerations are warranted. Major differences between saturated and unsaturated soil behavior will be described. Case histories involving heat transport in near-surface unsaturated soils and precipitation-induced landslides will be presented.

Notes:



PRESENTATION:

"Vapor Intrusion: Pathways to Liability"

Laren Harpke & George Marek - Quarles & Brady, LLP

Bios:

George Marek is a partner in the Milwaukee office of Quarles & Brady LLP, practicing in the area of environmental law. He regularly counsels clients in transactional due diligence and risk assessment in business and real estate transactions, including environmental assessments and cleanups. Mr. Marek's practice includes the redevelopment of Brownfields sites, the remediation of Superfund and other contaminated properties, advising clients on wind farm projects, underground and aboveground storage tank regulation, and coordinating the investigation and remediation of toxic mold. He also represents corporate, municipal and individual clients in environmental enforcement matters.

Lauren R. Grahovac Harpke practices in the Energy & Environmental Law Group at the Milwaukee office of Quarles & Brady LLP where she advises clients on regulatory compliance and site remediation. Ms. Harpke also works extensively with corporate clients to address environmental concerns arising in mergers, acquisitions and other corporate or real estate transactions, including conducting due diligence and risk assessments, drafting purchase and sale documents, and facilitating the transfer of necessary environmental permits and licenses. Ms. Harpke also advises clients on environmental, health & safety compliance and enforcement matters.

Abstract:

Vapor Intrusion is a growing concern in the remediation and development arenas. This presentation will focus on potential paths to liability including state and federal government cleanup programs and potential for private party actions.

Notes:



PRESENTATION:

"Identification of Risks Due to Historical Dry Cleaners"

Judy Fassbender, Policy & Technical Section Chief, Remediation & Redevelopment, Wisconsin DNR

Bio:

Judy is the Policy and Technical Resources Section Chief in the Remediation and Redevelopment Program at the Wisconsin Department of Natural Resources. She received her Bachelor of Science Degree in Geology from UW- Oshkosh, attended graduate school at the University of Alaska in Fairbanks and completed her graduate degree in Geosciences at UW-Milwaukee. Since starting her career as a hydrogeologist, Judy has held a variety of positions, including field and management roles at small and very large engineering/consulting firms. Judy was president of her own consulting firm prior to joining the DNR in 2013. As a leader of a resource group at DNR, Judy works to provide assistance to consultants and responsible parties in complying with the requirements of s. NR 700 Wisconsin Administrative Code to address soil, groundwater and vapor intrusion risk.

Abstract:

Historic dry cleaning operations present a potential significant risk to human health and the environment. A holistic approach to managing historical releases is outlined, focusing on identification of past drycleaner locations and target populations that may be at risk. Screening methods to evaluate potential risk are presented. DNR's Vapor Intrusion Prevention Partnership Initiative developed to support municipalities and local government is introduced. Several case studies from sites in Madison are included, documenting the use of historical research, along with passive soil gas, sub slab, soil and ground water sampling.

Notes:



Lunch Break Sponsor

The lunch break is sponsored by Midwest GeoSciences Group.



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May 13, 2015

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KEYNOTE SPONSOR



KEYNOTE PRESENTATION:

Dr. Todd McAlary, Principal Engineer, Geosyntec Consultants

"Vapor Transport, Characterization and Mitigation - How to Resolve a Vapor Intrusion Concern without holding your Breath"

Bio:

Todd McAlary is a principal engineer with more than 25 years of international consulting experience focused on the evaluation of contaminant fate and transport in soil and groundwater. Todd specializes in assessing and mitigating the migration of VOC vapor from the sub-surface environment into buildings and in the assessment of human health risks associated with inhalation exposure. He co-authored the first technical publication demonstrating the potential for enhanced groundwater contamination attributable to vapor diffusion in 1989. In 1997, Todd became the technical director of one of the world's largest studies of subsurface vapor intrusion (VI). He continues to advance the state of the practice by conducting pioneering research into alternative methods of assessing and mitigating VI, including passive samplers, high volume sampling, mitigation optimization, and rigorous field sampling protocols. He also is a member of the U.S. EPA's Expert Panel on Vapor Intrusion and teaches short courses on VI at conferences and workshops. In 2001, Todd was invited to be one of three co-authors of the EPA's Supplemental Environmental Indicator Guidance on VI. He has contributed to more than a dozen such guidance documents during the past decade

Notes:



PRESENTATION:

"Conceptual Site Model Development for Vapor Intrusion"

Brian Hennings - Hydrogeologist, Natural Resource Technology, Inc.

Bio:

Mr. Hennings has over twelve years of environmental consulting experience as a hydrogeologist for site investigation and remediation activities at sites with soil, groundwater, soil gas, and sediment contaminated with petroleum products, chlorinated organics, coal gasification byproducts, metals, and PCBs.

Abstract:

Development of a Conceptual Site Model (CSM) is the first step in the evaluation of vapor intrusion pathways at sites containing volatile compounds. Without the development of a CSM, vapor intrusion pathway screening (used to determine if the potential for vapor intrusion exists) cannot be completed. The complexity of the CSM should reflect the complexity of site conditions and the CSM should be updated as new data are collected. This presentation will discuss the components of a well-developed CSM, use of the CSM for vapor intrusion pathway screening, and, when necessary, use of the CSM for planning additional sampling.

Notes:



The afternoon break is sponsored by **EnviroForensics**. Please take time during this 30 minute break to visit the poster presentations.

EnviroForensics is an environmental engineering firm of veteran engineers and scientists who offer dynamic leadership and international experience in site Investigation and remediation, legal support and resource management.



POSTER PRESENTATIONS:

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By: Tanner Bakke, Gregory Burgess, Justin Dowling, and Katherine Grote

Modeling Flow Regimes for a Cyclical Wetland Using Groundwater Temperatures in McLean County, IL

By: Eileen Maxwell

(Additional Space for Notes on Pages 18, 19, 20, 21, and 22 of this program)



PRESENTATION:

"Evaluation of Observed Vapor Intrusion Attenuation Factors and Exposure"

Megan Hamilton, Risk Assessor, EnviroForensics

Bio:

Megan Hamilton is the Director of Vapor Intrusion and Risk Assessment for the Environmental Forensic Investigations, Inc. (EnviroForensics) team and has over 15 years of experience in environmental regulatory oversight and consulting. She develops, helps implement, and oversees the VI investigations and mitigation for all of EnviroForensic's projects. She is also the main contact for risk communication issues and community outreach development. Her diversified professional experience includes research, policy development, technical writing, public outreach, vapor intrusion investigation and remediation, data analysis and interpretation, human health risk assessment, and conceptual site model analysis. Ms. Hamilton served as the coordinator and team leader for the Indiana Department of Environmental Management's (IDEM) Vapor Intrusion Workgroup for six years and is the principal author of the current Indiana Vapor Intrusion Guidance. Ms. Hamilton has presented at several National Conferences, is a member of the National VI Science Advisory Committee, and currently serves on the Board of Directors for the Midwestern States Environmental Consultants Association (MSECA). Ms. Hamilton can be reached at (317) 972-7870 or mhamilton@enviroforensics.com.

Abstract:

Much effort has been expended by environmental regulators and researchers in attempts to develop a generic approach for identifying structures where vapor intrusion (VI) assessment is, or may be necessary near subsurface releases of VOCs. Guidance on VI assessments from many agencies promotes the screening of structures based on conservative, generic attenuation factors (AFs) derived from statistical analysis of past sampling data at other structures (i.e. the U.S. EPA Database). The majority of available data used to derive these AFs has been compiled from residential structures. Larger commercial buildings may exhibit characteristics that differ from residential structures and can affect the attenuation of contaminants from the subsurface into the indoor air, effectively lowering the AF. Although there is a lack of compiled data to support this theory, several state VI Guidance documents have incorporated an adjustment to the generic attenuation factors for larger commercial structures. This study presents the analysis of AFs derived from a combination of soil gas, sub-slab vapor and indoor air data for commercial structures at and surrounding 50 different drycleaner sites where subsurface releases of PCE have occurred. Each site was evaluated using the prescribed default screening approach. An analysis of the compiled data is presented and compared with observed trends from the U.S. EPA VI database. The result of this study provides a ground truthing of how the generic screening approach and default AFs compare for commercial structures, and whether there is a basis for an adjustment factor for commercial structures.

Notes:



PRESENTATION:

“Phase 3 Ecological Consideration”

Mike Marek, Ecologist, Marek Landscaping, LLC

Bio:

As founder of Marek Landscaping, LLC in 1996, Mike Marek has been committed to providing sustainable design and installation services using low impact development techniques in Milwaukee and its surrounding area. With a background in land restoration, landscape design and urban forestry, Mike leads projects involving planning, design, and construction for native plant restorations, green infrastructure, bluff stabilization, stream bank and shoreline stabilizations, as well as parks and trails.

Abstract:

Phase 3 site investigations are focused on understanding the type and extent of contamination and providing recommendations for remediation. While the resulting remediation can successfully remove contaminants and risk of exposure, it often leaves a greatly altered landscape such that other land use benefits, such as plant community, habitat, regeneration, and aesthetics, are missed. Mike Marek will share his approach to providing a restoration plan that sets the site for long-term ecological success.

Notes:



PRESENTATION:

"Global Warming/Climate Change: Should we let the facts get in the way of a good story?"

James Bannantine - (WGWA, Past President) Environmental Consultant at Geosyntec Consultants

Bio:

Jim is a long time member of WGWA and served as President in 2012. For Geosyntec, Jim is a leader in the environmental industry as a specialist in the biological dechlorination and chemical oxidation of VOCs, LNAPL recovery systems, and soil vapor extraction systems. Jim's project work has included contamination assessments as well as remediation strategy development and implementation at Brownfield sites, dry cleaners, railroad yards, and a variety of other commercial and industrial sites. Jim earned his MS in geology from Northern Illinois University, and his BS in geology from the University of Wisconsin-Oshkosh. He is a registered professional geologist in Wisconsin.

Notes:



POSTER PRESENTATION:

“Determining the Sources of Chloride Contamination in Surface Water and Groundwater in Eau Claire, WI”

By: Tanner Bakke, Gregory Burgess, Justin Dowling, and Katherine Grote

Abstract:

Runoff from road salting can negatively impact surface and groundwater supplies through dissociation of salt causing high chloride concentrations, which can harm aquatic ecosystems. This project investigates chloride concentrations in surface and groundwater in Eau Claire, Wisconsin. A strong positive correlation exists between chloride concentrations and electrical conductivity (EC) measurements in surface water, so EC measurements were acquired frequently. Measurements were taken from four stream sites and two groundwater wells. Samples were acquired to capture both background chloride concentrations (no recent precipitation) and chloride concentrations soon after road salting and melting had occurred. Similar data were acquired in the winters of 2011-2014; these data were analyzed to better understand the fluctuations in chloride concentrations over a longer time period. In addition to analyzing longer-term trends in chloride concentrations, this project investigates the connection between chloride concentrations in surface water and shallow groundwater. One well showed little correlation with chloride concentrations in streams, while the other well showed an approximately two week delay time between peak chloride concentrations in the well and a nearby stream. Relationships between temperature gradients and chloride concentrations in streams are also being investigated; initial results indicate that gradual warming events correspond to higher chloride concentrations than rapid warming, perhaps due to dilution of salt during more rapid melting events.

Data acquisition for the 2014-2015 season is still underway, but preliminary results show some expected trends. Smaller tributaries show more impact from road salting than larger streams, and more urban areas tend to have higher chloride concentrations than more rural areas; monitoring is now primarily focused on urban areas downstream of where infrastructure meets the tributaries. Large variations in chloride concentrations have been observed along relatively short stretches of a stream, reflecting rapid input of chloride from urban infrastructure along the stream.

Notes:



POSTER PRESENTATION:

“Determining Effects of Physical Characteristics of Urban Storm Sewer Sheds on Water Quality”

By Alicia O’Hare, Catherine O’Reilly, Kevin Kothe, RJ Rowley, John Kostelnick.

Abstract:

Increasing urbanization has consequences for surface water quality. Stormwater is a large component of urban water degradation that is poorly understood. Precipitation is quickly transported via underground pipes, from the land to the stream without following water’s natural flow path. Studies have correlated detention ponds with improved water quality and impervious surface cover with degraded water quality. However, other physical characteristics within a storm sewer shed including the presence of sump pumps, area and pipe miles may also affect the stormwater quality. We chose 18 storm sewer systems in Bloomington, IL. We measured pH, temperature, conductivity, dissolved oxygen, chloride, nitrate, phosphate, and total suspended solids Relationships and differences among the physical characteristics and water quality was determined using correlation and ANOVA analyses. We found that the presence of a pond significantly lowered total suspended solids and the greater the length of pipe the lower the concentration of nitrate. This research could contribute to how storm sewers are built and retrofitted in the future to decrease the water quality degradation from storm events.

Notes:



POSTER PRESENTATION:

“Characterizing Unsaturated Zone Permeability Using Geophysical Techniques”

By: Knutson, Sarah Elizabeth¹, Passow, Haillie Noel¹, Grote, Katherine R.²,

(1) Eau Claire, WI 54701, knutsone@uwec.edu, (2) Geology, University of Wisconsin-Eau Claire, 105 Garfield Ave, Eau Claire, WI 54702

Abstract:

This project uses recent advances in Ground Penetrating Radar (GPR) methodology to estimate the unsaturated and saturated hydraulic conductivity in the very shallow subsurface at the field scale. GPR data were acquired at a seven-acre, agricultural field site in northern Wisconsin before and after irrigation. These data were used to estimate the soil water content over a known depth. Using these water content values with the assumption of steady state flux during irrigation, the unsaturated hydraulic conductivity (K_{unsat}) was estimated. The water content values were then used in conjunction with van Genuchten parameters appropriate for the main soil texture observed at the site to estimate the saturated hydraulic conductivity (K_{sat}). To assess the accuracy of the GPR estimates of hydraulic conductivity, conventional point-measurement values of saturated hydraulic conductivity were obtained using a double-ring infiltrometer at 15 locations throughout the field. The infiltrometer locations were chosen to cover a range of soil textures, based on the previously acquired GPR data at this site. A comparison of the K_{sat} distributions derived from the GPR data and from the double-ring infiltrometer data showed that the GPR-derived distribution matches the pattern of the distribution from infiltrometer data well, although some discrepancies occur in the magnitudes of the values. The correlation between K_{sat} estimates from GPR and from conventional measurement techniques indicates that

Notes:



POSTER PRESENTATION:

“Relationship of Soil Moisture and Air Permeability during a Soil Vapor Extraction Pilot Study”

By: Audra Hanks and Dr. Steve Van der Hoven

Abstract:

Vadose zone contamination from volatile organic compounds is prevalent in the United States. Vapors may travel from areas of higher concentrations in the subsurface to lower concentrations in enclosed buildings, causing a health hazard of vapor intrusion. One way to remediate vadose zone contamination is through soil vapor extraction. Soil vapor extraction is a widely used method to extract contaminated air, treat the air, and discharge it to the atmosphere in order to decrease concentrations of volatile organic compounds in soil vapor. Many factors influence the effectiveness of soil vapor extraction; this study will focus on soil moisture and air permeability. Soil moisture and air permeability have been studied separately pertaining to their role in soil vapor extraction efficiency, but the two factors influencing each other in a deep vadose zone (50 feet) and during a soil vapor extraction system is less understood. When soil moisture decreases, there is more room in the soil matrix for air to flow, increasing the air permeability. This study uses three boreholes outfitted with soil moisture/temperature probes to measure soil moisture, and pressure drawdown calculations to calculate air permeability at a former nickel plating facility in South Gate, California. When soil moisture and air permeability data are obtained, a relationship between soil moisture and air permeability will be derived and statistically evaluated. Secondarily, a method of inferring soil moisture from temperature will be tested to see if temperature data from the probes is sufficient for an alternate, low-cost proxy for soil moisture. Relationships between soil moisture and air permeability will be useful in future soil vapor extraction systems, to achieve maximum efficiency in remediating contaminants in the vadose zone.

Notes:



POSTER PRESENTATION:

“Modeling Flow Regimes for a Cyclical Wetland Using Groundwater Temperatures in McLean County, IL”

By: Eileen Maxwell

Abstract:

Wetlands act as a sink in reducing excess nutrients through plant uptake and denitrification before entering into lakes, rivers, and streams. Additionally, seepage into the subsurface and the subsequent migration also serves as a sink for nutrients. Variation in the flow regime of the wetland may influence the fate of nutrients in the subsurface. In order to assess water quality of the wetland system, a groundwater model was used to determine fluid flow of solutes within the system. The constructed wetland has a flaw, and during the late summer, it goes dry. A bromide tracer test was completed in May 2013 to evaluate the wetland’s capacity to retain water. By the sixth day, the Br⁻ concentrations within the wells approached the mean concentration within the wetland, suggesting that the wetland is leaking. The similar concentrations between the water in the wells and in the wetland suggest there is limited dilution by groundwater. Also temperature data indicate different flow regimes associated with a filled wetland and the dry wetland. To assess the role of the conditions within the wetland on the groundwater flow regimes, a model was created using SURFER. The observed temperatures are used in SURFER. Preliminary data suggests that the presence of water within the wetland alters the local groundwater flow direction. While the underlying groundwater flow direction does not change, the presence of water within the wetland creates an area of recharge from which water appears to radiate in all directions.

Notes:

