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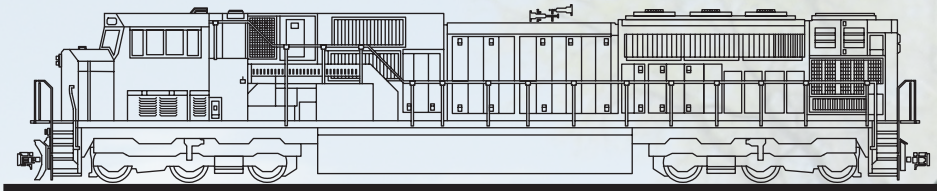

28-29 October 2014

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Improving Compliance & Reducing Liability Through Employee Awareness

Kimberly Vaughn - CSX Transportation, Inc.
Ray Hays - PRC Digital Media

Demonstrate how CSX has evolved environmental awareness training from simple videos to an interactive Multimedia Instruction System (IMI) that is innovative, effective, affordable, easy to administer and distribute, and achieves measurable results. The training design allows for both classroom and self-directed learning which gives the training the potential to be adapted to the Class I and regional and short line railroad community.

CSX considers employee training on environmental awareness, compliance and sustainability to be an integral part of the company's overall environmental responsibility. Each annual training course concludes with a written examination. This record establishes that the employee completed the training and adequately comprehended the presented material. However, the real measure of success is that this integrated training approach, combining a proactive Public Safety, Health & Environment Department and effective employee training has resulted in a measurable reduction of Notice of Violations and Permit Exceedances.

With an increasing focus on storm water and enforcement of the Clean Water Act, short lines and contractors may face a potential increase in inspections and enforcement actions. Implementation of an effective and documented environmental awareness training program is a good faith effort by a company to improve its environmental compliance and should be viewed favorably by the Environmental Protection Agency (EPA) if an accidental release occurs. This training program is designed to fulfill the EPA required annual training for Groundwater, Storm Water, Spill Prevention Control and Countermeasures (SPCC) and Universal Waste regulations.

CSX partnered with PRC Digital Media to develop a CSX employee-centric IMI program that enables non- environmental trainers to lead a class like an experienced professional. The course combines live-action video recorded entirely within the CSX operating environment with narration, graphics, and supporting reference materials in a simple to use program that operates on any Windows equipped personal computer.

The award winning program is a derivative of the Multimedia Job Performance Aids (MJPA) that PRC helped develop for the US Navy and has deployed successfully to Naval Aviation, Surface, Submarine, and US Marine Corps commands. The course without modification, can be used as a self-paced instruction by an individual employee, or may be delivered online through an "Online University" portal.

CSX has spent the last 20 years drafting, revising and refining our Environmental Certification training program for Engineering and Mechanical employees. Through these revisions, it was determined that modern railroad workers learn differently and the numerous operating groups require flexibility in their training options. To respond to these specific needs, CSX developed a highly innovative and interactive training course which actively engages users in t h e learning process and can be delivered using multiple platforms. CSX has compiled comments and suggestions from employees at all levels to ensure the training is comprehensive, relevant and effective. The product is a high quality interactive multimedia instruction program administered to more than 15,000 engineering and mechanical employees.

One of the primary goals of the training is to instill in employees the idea that environmental protection is an integral part of their daily job. The training identifies how employees must comply with environmental regulations in all aspects of CSX operations and emphasizes that our employees are empowered to act in

an environmentally responsible manner.

The Environmental Certification training includes video components, interactive learning portions and knowledge retention evaluations. All referenced material mentioned throughout the training is embedded in the video and is printable. Topics include Housekeeping, Waste Management (Hazardous, Non-hazardous, Used Oil, and Universal Waste), Storm Water Management, SPCC, Chemical and Container Management, Clean Air, Asbestos, and Transformer Management. Each topic provides detailed information regarding environmental programs implemented at CSX and environmental responsibilities of both CSXT and individual employees. Additional CSX environmental training programs designed by CSX and PRC Digital Media include Hazardous Waste Awareness, Contractors Safety, Security and Environmental Guidelines (for environmental contractors and consultants working on CSX Property), Mechanical Fuel Certification and Direct-to-Locomotive Fueling (for mobile fuel vendors).

CSX is able to develop our environmental training programs through continuous efforts to provide employee training that is both beneficial and productive. By providing information that directly impacts employees and incorporating employee feedback and suggestions, we believe we have developed a successful and captivating environmental training program. CSX is also proud that the 2013 Engineering Environmental Certification training was recognized with the prestigious Silver Reel award at the 44th Annual Media Communications-International Organization (MCA) Medial Festival.

Re-Thinking Risk: Establishing a More Comprehensive View Of Environmental Risk In The Age Of The Internet

Domonic Lees - BNSF Railway

Recently, the internet celebrated its twenty-fifth anniversary. During the preceding two and a half decades, the world has changed in the way we communicate, date, read the news and maintain human relationships. Social media has changed the way we view news events, changed the dynamics of public elections, and the way the public-at-large views incidents involving private industry.

The advent of YouTube, Instagram, Facebook, Pinterest, and other social media outlets should be considered when determining risk and also managing risk. Traditional risk assessment and management tools have not considered the effect social media exerts on a regulatory agency's view of an incident and may also indirectly affect official opinion and public interaction with the Railroad industry.

Given that a website with user-generated content can reach millions of people in an instant, personnel involved in risk management need to consider how to weigh an environmental risk based on the influence social media can have on public opinion, how officials are influenced by public opinion, and how a company responds to an environmental incident. Examples of how social media can sway or even change public opinion include the civil unrest known as, "The Arab Spring" in the Muslim world, The Casselton, North Dakota Derailment or the Lac-Mégantic derailment.

CSX Curtis Bay Piers Coal Pier – Intelligent Stormwater Management to Achieve Zero Discharge

Scott Landers - Geosyntec Consultants
John Calhoun - CSX Transportation

CSX Transportation (CSXT) is committed to environmental excellence and as part of improvements to existing dust suppression system (DSS) at the Curtis Bay Piers (Piers) coal facility in Baltimore, Maryland, has elected to install a patented advanced rainwater harvesting system. This system uses a real-time monitoring and control platform for rainwater harvesting (RWH) to dually optimize on-site water supply and wet weather capture goals. By using integrated hardware and software, this application of "Internet-of-Things" technology is able to improve system performance above that of the Piers existing

conventional system. By combining field-based sensor data with web- based weather forecasts, the new system is able to proactively inform the on-site system in preparation for pending storms with the goal of eliminating wet-weather stormwater runoff.

The new control system was specifically designed to help achieve the Piers' goals of zero discharge of stormwater to Curtis Bay and zero discharge of fugitive coal dust from the site. The system automatically provided on-site operators with 48-hour forecast information for precipitation, wind, and temperature, which allows personnel to proactively exercise the DSS, thereby creating the necessary capacity for stormwater capture as well as pre- emptively mitigating the generation of fugitive coal dust.

This presentation will focus on the system as currently implemented at the Piers facility as well as proposed expansions to the system's scope. After implementation of the initial control panel and web dashboards, CSXT further coordinated the development of a solution for expanding their system to include a dust monitoring and control network. This scope would include near real-time monitoring of particulate dust at the edges of the facility and would feed back into the operational logic of the DSS to specifically target coal piles generating fugitive dust.

The end goals for the Piers facility as laid out by CSXT are zero discharge of stormwater, zero discharge of fugitive coal dust, and zero use of potable water for dust suppression. These high standards have required the development of new control algorithms, which can seamlessly integrate large amounts of data from disparate sources to proactively advise on-site personnel how to operate the DSS for system-wide optimization. With this advanced rainwater harvesting system coupled with state-of-the-art dust suppression and management system, CSXT plans to make the Curtis Bay Piers facility a model facility for environmental management in the twenty-first century.

A Framework for Sustainable Remediation Applied at a 100-Acre Railroad Remediation Site

Currie Mixon - GEI Consultants, Inc.
Scott M. Keating - GEI Consultants.com
C. Russell McDaniel - Norfolk Southern

The Lenoir Car Works Site in Tennessee is a significant environmental remediation site for Norfolk Southern. The remedy selected and implemented for this site involved the removal and isolation of 300,000 cubic yards of impacted materials to protect human health from exposure to these materials. However, the process of cleanup can create its own environmental footprint, consuming resources and producing byproducts. The bigger the site, the larger the potential environmental footprint from the cleanup activities.

Practices that incorporate sustainability as a framework are important to a company's business, neighbors and the environment. As such, the design and construction of the remedy for this large site was implemented within a framework of green and sustainable principles that, in general, minimize total energy, water and new material use and minimize air emissions, while protecting land and ecosystems in an economically responsible way. This presentation provides an overview of the principles of sustainable remediation and a summary reporting of the intent and the real-world outcomes (including lessons learned) of the remedy implementation at this site.

Particular attention will be given to the green components of the design and the drivers within the construction contract documents.

Environmental Issues Affecting the Association of American Railroads and North American Rail Industry

Robert Fronczak – Association of American Railroads

The Association of American Railroads (AAR) represents the freight railroads in North America. AAR is a trade association whose membership includes freight railroads that operate 82 percent of the line-haul mileage, employ 95 percent of the workers, and account for 97 percent of the freight revenues of all railroads in the United States; and passenger railroads that operate intercity passenger trains and provide commuter rail service. AAR also represents the Canadian railroads through the Railway Association of Canada, and two Mexican railroads including Ferromex, and KCS DeMexico. This presentation will discuss current regulatory, legislative, environmental awareness, and pollution prevention initiatives at AAR. Some of the regulatory activities include the current status of the Construction and Development Effluent Limitation Guidelines and associated efforts to further regulate stormwater, getting used crossties listed as Non-Hazardous Secondary Materials so railroads will continue to be allowed to burn them for cogeneration, the status of EPA's electronic hazardous waste manifest, the status of EPA restrictions on sulfometuron methyl (a key railroad weed control ingredient), the SmartWay Program, the US-Canada Regulatory Cooperation Council initiative to reduce Locomotive Emissions, as well as a brief summary of other environmental issues important to the railroad industry.

Risk & Liability Management

Research of Inactive Wells along Railroad Rights-of-Way using Historical Interstate Commerce Commission Records

Craig Larson - AECOM
Scott Zurn - Canadian Pacific
Davidson Ward - RL Banks and Associates Inc

Canadian Pacific is undertaking an aggressive program to reduce liability associated with inactive water wells. Historically railroads maintained an extensive network of water stations to supply steam locomotives with water. The presence of inactive wells along railroad rights of way (ROW) presents both a worker and public safety concern and an environmental liability to railroads. AECOM, working in conjunction with R.L. Banks & Associates, Inc. (RLBA), completed an in-depth records research project at the National Archives and Records Administration (NARA) to identify the location and construction of inactive wells.

The NARA maintains approximately 8,500 cubic feet of textual records collected between 1910 and 1974 under Interstate Commerce Commission (ICC) jurisdiction. The ICC performed a survey of all railroad properties in the

U.S. under the "Valuation Act of 1913" to identify what railroad corporate property existed. Those valuations, conducted between 1915 and 1920, served as a basis for setting freight rates stringent enough to yield profit to the railroads, but not so high as to discriminate against shippers.

The NARA ICC records include hand-written inventory sheets and valuation maps. The inventory sheets identified and assessed all railroad items of value including water stations, wells, and other water-supply features. The valuation maps included detailed information including ROW boundaries, wells, structures, and other property uses (i.e., stockyards, elevators, bulk petroleum tanks, etc.).

The ICC records were available for over 95 percent of CP's current ROW in the US. Based on the well sealing program to date, we have a high degree of confidence that the level of detail on the inventory

sheets and valuation maps accurately matched what exists in the field. Wells were commonly identified that were associated with locomotive watering stations, depots, and stock yards. The information gathered from the ICC documents allows the well program to properly and efficiently seal inactive wells that may have been improperly sealed, greatly improving worker and public safety as well as reducing the railroad's environmental liability.

The level of detail on the inventory sheets was highly variable with respect to well construction details; however, most included the diameter and depth of the well casing/curbing. In some cases the sheets included detailed well pit information, including several sites with large diameter hand dug pits of depths greater than ten feet, some with deep drilled wells advanced through the bottom of a well pit that would not otherwise be known.

It has been common practice for the railroads to 'up-date' station maps and erase removed structures from the maps thus destroying the historical record. Therefore, since the ICC maps have not been modified since their preparation, they provide an accurate snapshot of the railroads and adjacent areas at the time they were prepared. While not part of this project, the records could be used for Environmental Assessments and other research since the maps identify major features and near-by property lines and uses of large areas surrounding the railroad ROW, and many times include information for entire towns and cities.

Closure Strategies for Legacy Environmental Sites

Leroy Leonard - Geosyntec Consultants
Duane Graves - Geosyntec Consultants
David Patten, L. Chistopher Oakes, Steven Aufdenkampe - Norfolk Southern

This presentation discusses an approach to site closure that emphasizes the importance of open communications with regulatory agencies and understanding of the particular sensitivities of the involved parties. A case study is used to illustrate our general approach for understanding regulatory requirements and railroad interests to identify a technical solution based on site history and literature research that satisfied the various parties and eliminated the need to collect additional data.

The project team developed a closure strategy for a legacy train derailment in Burnside, Kentucky. In 1979, a NS train derailed at Antioch Pass near Burnside, spilling various commodities including 60,000 bottles of a human de- lousing shampoo that contained pyrethrins. Some of these commodities, including the shampoo, were buried with the approval of state and Federal authorities alongside the tracks where the derailment occurred. The Kentucky Department of Environmental Protection (DEP) maintained regulatory jurisdiction over the site since the derailment. From 1979 to 2012, various correspondence and reports were exchanged between NS and DEP; however, the site was never closed due to uncertainties of the potential exposure risks of pyrethrins.

In 2012, DEP provided a path to site closure and formally requested an assessment of the site which would have included media sampling and laboratory analysis for the detection of pyrethrins. Soil and ground water sampling and analytical costs to test for pyrethrin were estimated between $80,000 and $100,000. As an option, DEP also suggested that administrative controls, such as environmental covenants or land use restrictions, could be implemented in lieu of sampling. Since pyrethrins do not have an United States Environmental Protection Agency (USEPA) Risk Screening Level (RSL), DEP provided NSRC with a calculated risk screening level for soil impacted by pyrethrins. The project team developed a different site closure strategy and presented a case for no further action (NFA) to DEP which involved no field work. The scientific literature on pyrethrin and its natural degradation rate and documents from the derailment indicated that the concentrations of pyrethrin in the shampoo and amount of shampoo

buried would have produced contaminant concentrations 200 times lower than the state's cleanup standards. NS concluded that even under the most favorable conditions for pyrethrin to remain in soil, concentrations would be far below regulated levels after 33 years. Based on the research and its conclusions, the DEP agreed to grant project closure in 2013. Approximately $50,000 to S70,000 in on-site investigation costs were saved and service interruptions to the adjacent main were avoided.

Closure for this legacy site was achieved using alternative strategies that relied on technical arguments to satisfy the needs of the engaged parties. Key aspects of the resolution included:Understanding and communicating the physical and chemical characteristic of pyrethrins and their fate in the environment;Researching the chemical composition and calculating the approximate quantity of pyrethrins versus inert and environmentally benign ingredients;Comparing calculated concentration of pyrethrins at the time of burial against regulatory risk screening levels; and Providing a quantified description of the potential for environmental or human health exposure to unacceptable concentrations of pyrethrins.

Managing Continuing Obligations Associated with Contaminated Site Closure using a Geographic Information System

Andrew Mott, Sarah LeMoine, Dennis Lawton - AECOM
Maura Matthews, Yves Decoste - CN

Continuing obligations are legal requirements established by some state environmental regulatory agencies upon closure of contaminated sites that have residual contamination. The purpose of continuing obligations is to ensure the maintenance of certain physical or engineered systems or to limit land use or groundwater use. Common continuing obligations include:

Proper management of contaminated soil if excavated.

Obtaining approval for construction of water supply wells.

Keeping clean soil and vegetation over contaminated soil.

Keeping a cover of pavement, soil, asphalt or an engineered cover over contaminated soil or groundwater.

Notifying the state if a structural impediment (e.g., building) that restricted the cleanup is removed, the owner may then need to conduct additional state-approved environmental work.

Operating and maintaining a vapor mitigation system.

Maintaining industrial zoning for sites where industrial soil standards were applied for closure.

Maintaining a specific use of the property, as defined in the closure letter, and notifying the state before changing that use.

AECOM assisted CN in establishing a tracking system to manage their continuing obligations at closed contaminated sites in Wisconsin. A primary goal was to develop a tool to implement and track annual site inspections and the need for corrective actions at sites with an engineered barrier (cap) or an existing surface cap that were subject to a Cap Maintenance Plan. The first step was to query the Wisconsin Department of Natural Resources (WDNR) Bureau of Remediation and Redevelopment Tracking System (BRRTS) database of contaminated sites using more than ten different search names associated with current and former CN entities. From this search, a list of sites with continuing obligations was established, and sites with a Cap Maintenance Plan that required annual site inspections were identified. Additional information for some sites was obtained from the WDNR Geographic Information System (GIS) Registry of sites with residual contamination. Specific continuing obligation requirements associated with the sites with Cap Maintenance Plans include maintaining the cap in accordance with the maintenance plan, inspecting the cap annually and recording the inspection, and notifying the agency with

administrative authority if a change in the cap is proposed.

To assist in managing the sites with continuing obligations, AECOM developed an adaptable GIS database that includes information associated with the continuing obligations and records from the annual cap inspections. Information for sites with annual cap inspections includes a completed inspection form, a photograph of the cap

Facility Decontamination, Demolition and Decommissioning; How to Maximize Assets, Identify Costs and Minimize Risks

Michael Kraeski - Environmental Resources Management
Matt Graham - BNSF Railway Company

Facility expansion, operational modifications or property sale/redevelopment, often require decontamination, demolition and decommissioning of buildings and structures. At railroad facilities, these structures can be of significant age and may have been built with materials not commonly used in more recent construction. In addition, locomotive maintenance shops, car shops, fueling facilities, and certain lease site operations often house storage and handling equipment and out-of-service infrastructure that could still contain fuels, lubricants, wastes and other chemicals. Addressing these materials and wastes complicates the decommissioning process. This is a specialized area of construction that requires experience to minimize the costs of decon and demo and maximize the residual value of the assets being decommissioned. The purpose of this presentation is to provide an overview of how potential assets can be identified and valued, what costs may be incurred other than those involved in conventional building demolition, and what pitfalls may be encountered in executing these projects. ERM has a dedicated team of engineers, construction managers and safety professionals who focus exclusively on this area of environmental remediation and restoration.

The business goals and resulting work scope for a particular project vary depending on whether the facility is simply to be decommissioned and idled for the short or long term, or actually closed with partial or complete demolition. Activities supporting decommissioning or demolition will further vary depending on whether the property is to be retained and redeveloped or sold.

Demolition and decommissioning typically allow the owner to offset the costs of work with the recovery of assets. Potential assets, which should be inventoried and valued as part of the project, not only include scrap metals (steel, non-ferrous), but can also include equipment, pumps, valves, piping, electrical transformers and switchgear, unused raw materials, leftover products, and heavy or otherwise valuable timber and lumber. Structures that can be disassembled or moved, and docks or other waterside improvements typically have residual value and demand. Each of these different types of assets can be managed in such a way to maximize their value, for example, stockpiling scrap metal to release at a favorable price point. Finally, the decommissioning and demolition program should be designed to maximize the market value of the land itself in accordance with its planned future purpose.

In the process of executing a decontamination, decommissioning and/or demolition project, our experience has identified a number of common mis-steps that can add cost or retain future liabilities to the Owner. These can include: not fully characterizing environmental concerns prior to wastes and demo debris being generated, developing a loose scope of work and specifications with contractors, not properly identifying and valuing assets, allowing assets to become liabilities, minimal contractor screening and bid review, or moving forward without recognizing emerging issues during project execution. These potential landmines can be avoided through a number of best practices, which will be further detailed in this presentation.

Determination of Environmental Liability Costs During Railway Divestitures in Canada

Tim D. Westgate - AMEC Environment & Infrastructure
Paul Kurzanski, Daniel S. Dyer - CSX Transportation, Inc.

This presentation highlights lessons learned during the divestiture of a railway line in Southwestern Ontario which was initiated by CSXT in 2006 and was concluded in 2013.

In Canada, the divestiture of railway lines is governed by the Canada Transportation Act (CTA). The process for railway line divestiture requires that the railway company solicit interest from parties to acquire the line for purposes of continuing railway operations. If there are no offers, the line must subsequently be offered to federal, provincial or municipal government agencies, who may acquire the property for its net salvage value (NSV). The NSV of the railway line is the value of the assets (i.e., land, tracks, other structures) less the cost associated with their disposal. The valuation of the land component also considers liabilities associated with environmental remediation that may be required.

Environmental impacts commonly occur along railway corridors resulting from activities such as; locomotive fuelling, lubrication, loading/unloading of hazardous commodities, disposal of cinder/ash/clinker, creosote and herbicide use, as well as from adjacent land-uses. Given the common occurrence of environmental impacts along railway corridors, environmental liabilities can dramatically reduce the NSV. The magnitude of the liability estimate is subject to significant variability due to the assumptions that are made including: sensitivity of the assumed "future" land-use; proposed approach to address the impacts; and, inclusion of costs to address soil and/or ground water impacts from inferred off-site sources. Consequently, liabilities estimates can become a key negotiation factor during the divestiture of railway lines. If both parties do not agree on a mutually acceptable NSV, the Canadian Transportation Agency (the Agency) will determine the NSV.

AMEC supported CSXT with the evaluation of environmental conditions during the divestiture of a 26 mile railway line in Ontario. Due to differing assumptions utilized by each entity in deriving the estimated costs, the liability determined by the potential purchaser of at least $15.7 million, was orders of magnitude higher than the estimate that was prepared on behalf of the CSXT. The disparity in these estimates resulted from conservative assumptions made by the purchaser including: application of more sensitive "future" land use standards instead of the standards based on the current industrial land use; use of cost-intensive remediation methods to address soil impacts, rather than risk-based approaches; and the inclusion of costs to address soil and/or ground water impacts that were identified on the railway lands from inferred off-site sources.

Following their review, the Agency issued a decision which ruled that environmental liability costs must be determined on the basis of existing industrial land-use. The Agency also confirmed that risk-based approaches were a viable remedial option for purposes of evaluating liability, and that no deduction in NSV should result from any environmental impairment from off-site sources, the redress of which should be sought from a third party.

Lastly, the Agency ruled that the total environmental liability cost would be capped at a value equal to the appraised land-value. The Agencies rulings on these matters resulted in a NSV that was at least $9.4 million higher than the NSV that would have been calculated if the conservative assumptions had not been challenged.

Proposed EPA Changes in the Toxicological Assessment of Benzo(a)pyrene and the Potential Impact on Corrective Actions at Railroad Sites

Brian Magee - ARCADIS
Glenn Hoeger, Shawn Sager - ARCADIS U.S., Inc.

The United States Environmental Protection Agency (USEPA) released a draft toxicological assessment for benzo(a)pyrene for public review in August 2013. USEPA proposed a new oral cancer slope factor (CSFo) as well as four new toxicity values not currently on USEPA's Integrated Risk Information System (IRIS): inhalation unit risk (IUR), oral reference dose (RfDo), inhalation reference concentration (RfC), and a first ever dermal slope factor (DSF).

These toxicity factors for benzo(a)pyrene have far reaching implications because benzo(a)pyrene is used to assess the risks posed by other potentially carcinogenic polycyclic aromatic hydrocarbon (PAHs). The new CSFo and IUR indicate that benzo(a)pyrene is 7 and 2 times, respectively, less potent as a carcinogen compared to current toxicity values. However, the new DSF is 48 times more potent than the current toxicity value used to evaluate dermal exposures. This is the first dermal toxicity factor ever issued by the USEPA. Furthermore, this is the first time USEPA has proposed noncancer toxicity values (RfDo and RfC) for benzo(a)pyrene.

In addition to changing BaP toxicity values, the USEPA is proposing to modify the approach to evaluate PAH mixtures. Specifically, the USEPA is proposing to increase the number of carcinogenic PAHs from 7 to 26 and is proposing new relative potency factors (RPFs) relative to the toxicity of benzo(a)pyrene for these PAHs. In addition, a number of PAHs are being assigned an RPF greater than 1, indicating that the USEPA believes that these compounds have a greater potential to cause cancer than benzo(a)pyrene.

PAHs are frequently detected at rail sites and often affect final corrective actions. There are a number of implications that these proposed changes, if adopted, could have on the regulated community, including:

Soil cleanup levels for PAHs will decrease.

More sites will require action due to PAHs. Some sites may be reopened.

Analytical costs will increase due to a longer list of PAHs requiring chemical analysis.

+This talk will discuss the proposed changes to benzo(a)pyrene's toxicity factors and the implications for railroad sites.

Managing Environmental Risks When Third-Parties Seek Access to Your Site

John Gullace - Manko, Gold, Katcher & Fox, LLP
William Parry, Julia B. Herron - CSX Transportation, Inc.
Michael T. Feamster - PEENVIRON International Corp.

Third-parties frequently seek access to railroad property for intrusive work, whether it is to install a pipeline, install new electrical towers, or other activities. Before the work begins, it is critical to address what will be done, how it will be done, and how environmental liabilities arising from the work will be managed. This program will explore ways to manage risks associated with right-of-entry programs.

Risk and Liability Management at Kansas City Southern de Mexico

Timothy Wippold - ARCADIS
Miguel Antonio Flores Puente - Kansas City Southern de Mexico
Carl Akins - Kansas City Southern

On June 24, 1997, Kansas City Southern Railway bought the concession of line 1 in Mexico and formed Kansas City Southern de Mexico (KCSM). KCSM extends from the United States border at Laredo to the pacific port of Lazaro Cardenas. As a part of the concession agreement with the Mexican

government, the Mexican government retains the liabilities for all pre-existing soil and groundwater contamination. This presentation will discuss the measures that Kansas City Southern has taken to minimize their risk in Mexico. This paper will specifically address the following topics:

- The concession agreement with the Mexican government.
- Methods used to manage risk:
    - Pre-concession audits by the Mexican government.
    - Pre-concession due diligence by KCS.
    - Elimination of facilities.
    - Environmental capital improvements.
    - Historical aerial photography.
    - Post-concession inspections and investigations.
    - Meetings with the Mexican government.

Keeping your Eye on a Moving Target - Effective Risk Management Approaches for Emerging Contaminants

Shalene Thomas - AMEC Environment & Infrastructure, Inc.

The US Environmental Protection Agency (EPA) has defined Emerging Contaminants as "chemicals or materials characterized by a perceived, potential, or real threat to human health or the environment or by a lack of published health standards". Since most emerging contaminants lack published health standards, they are often off the radar from a risk management perspective until standards are published or State regulatory directives shift focus to include the contaminants, thereby making management actions reactive. This presentation describes a proactive definitive process for railroads to implement risk management strategies for emerging contaminants. The presentation specifically illustrates the process with a relevant emerging contaminant class called "Perfluorochemicals (PFCs)". Key elements of the risk management process as they relate to PFCs are discussed including but not limited to identification of risks, evaluation of priority drivers, qualitative and quantitative measurement of risk, and development of a risk response, mitigation and monitoring plan.

PFCs are chemicals that are used in a multitude of surface treatment products to impart soil, stain, grease, and water resistance. They can be found in paints, textiles, coatings, cleaning products, and fire-fighting foams and are potentially present as fire-fighting foams at operational yards or were historically used during derailments or fires. They are extremely persistent in the environment and bioaccumulate and biomagnify. They have been manufactured since the early 1950's and although phased out in the last decade by the primary manufacturer 3M, they are still being manufactured outside of the US and imported for use. At present, there is no regulatory driver or minimum risk level (MRL) in the US, however, Health Advisory Levels have been published by the EPA and some states such as MN, NC, NJ, CA, WA and MI. PFCs have been gaining regulatory momentum in recent years with the addition of these action levels, the addition of PFCs to the to the Unregulated Contaminant Monitoring Rule (UCMR the third (UCMR 3)) published on May 2, 2012, publically-available clean-up requirements defined in Superfund Agreements and Consent Orders, and extensive site investigation and research efforts across the nearly 600 Department of Defense (DoD) sites contaminated with PFCs. Preliminary evaluation of PFCs and potential site contamination at railroad sites should be proactively considered along with other relevant emerging contaminants so that business risks can be quantified and proactive risk management strategies implemented.

"Conflagration, Collaboration and Corrective Action"— Early Community Engagement, Multi-Disciplinary Teamwork and Innovative Decision-making Leads to Rapid and Effective Emergency Response to the Rosedale, MD Derailment & Explosion

Megan E. Kellner , David Polter, - ARCADIS
S. Michael Austin - CSX Transportation, Inc.
Paul J. Kurzanski - CSX Transportation, Inc.

On Tuesday May 28th, 2013, a CSX Transportation, Inc. (CSXT) train collided with a roll-off truck causing sixteen rail cars to derail, including a car carrying the hazardous material sodium chlorate and four cars carrying the non- hazardous material purified terephthalic acid (PTA). The derailment sparked a fire and massive explosion that shook the community and made national news. The enormity of the event and the potentially unstable nature of the residual sodium chlorate required a rapid and effective response to restore the community, the environment, and rail service. The first step in the process was to assemble and deploy an integrated response team comprised of CSXT representatives from the Hazardous Materials Group, Claims, L.E.A.D.S., Asset Recovery, Engineering, Field Services, Train Control, and multiple consultants and response contractors. The team consisted of seasoned professionals well-versed in rail emergency response and with a strong history of collaboration and teamwork.

Secondly, CSXT drew upon and engaged with personnel from first responder agencies, including the Baltimore Fire Department, the Maryland Department of the Environment (MDE), the U.S. Environmental Protection Agency (EPA), and the National Transportation and Safety Board (NTSB) to rapidly assess and respond to the situation. Key to this engagement was previous legwork and relationship-building with these organizations that fostered trust and a solid basis for subsequent decision-making. These relationships fostered the quick decisions which led to restoration of CSXT track infrastructure (within 60 hours), environmental restoration of the derailment Site (within 22 days) and waste management activities (completed within 76 days of the derailment).

Early on in the project, the team identified and proposed certain innovative regulatory and technical solutions that would allow for the management and on-site treatment of approximately 2,126 tons of waste soil and debris deemed to be hazardous waste due to the presence of the oxidizer sodium chlorate. Bench and field scale testing demonstrated the viability of the proposed on-site de-characterization options, namely the application of sodium thiosulfate or polyethylene glycol (PEG) to sodium chlorate contaminated materials to neutralize the oxidation potential and enable disposal of the material as non-hazardous waste. Application of ten percent PEG solution was selected as the best alternative and within days of proposal, EPA issued a temporary and emergency permit allowing for on-site hazardous waste treatment. Within approximately one week of permit issuance, on-site treatment commenced and was completed within 3 weeks. The on-site treatment/decharacterization activity rendered the material non-hazardous and significantly reduced project duration and ultimate waste transportation and disposal costs.

This presentation will present this case history and provide key learnings, approaches and regulatory and technical solutions.

Characterization and Remediation of Lac-Mégantic

Denis Millette - Golder Associates Ltd

During the night of July 6, 2013 , a freight train carrying Bakken crude oil derailed in the heart of downtown Lac- Mégantic, resulting in a spill of approximately 6 million liters. A series of explosions followed, and a fire destroyed part of the city center. Most of the spilled oil was burned in the fire. However, a portion of the oil seeped into the soil and reached the shallow groundwater aquifer. A few hundreds of thousands of liters of oil migrated at the surface of the impact zone and entered the storm water manholes located of the area and spread over a large proportion of the sewer system. Part of the spilled oil reached Lake Mégantic and the Chaudière River at the storm sewer outlets or as surface run-off or subsurface flow through the surface fill. Strong winds from the southwest pushed some of the burning oil floating on Lake Mégantic onto the riprap-protected shoreline of Veterans Park.

On July 7, 2013, MMA (the railway owner) commissioned Golder to act as the environmental consultant in support of emergency operations being conducted in Lac-Mégantic. This mandate was renewed by Pomerleau (the general contractor on site for the Government of Quebec), on August 10. The main objectives of the work carried out by Golder were: (1) to recommend measures to eliminate contaminant migration to water bodies; and (2) to characterize the area affected by the spill, and (3) to implement emergency measures in order to secure the area for the winter season. This required a high level of collaboration among the various levels of government, the fire department, the Sûreté du Québec, and the contractors.

Given the inaccessibility of the derailment site immediately after the accident, the first characterization effort focused on the periphery of the site. This work included the installation of monitoring wells along the edge of the Chaudière River and Lake Mégantic. Investigation of the subsurface infrastructure was initiated in order to detect and map the free-phase oil migrating along the granular fill around the subsurface utilities. Video camera inspections were completed as part of this task. Other work being conducted during this period included the excavation of trenches around buildings, in order to determine if oil had accumulated along foundations. As the derailment site became accessible, the characterization efforts were redirected to this sector.

An emergency remediation plan was also produced following the initial emergency response operations. Given the large volume of data generated by the project, a team of specialists was mobilized to the site, in order to capture and georeference the data in EQuIS™, and to process the data with GIS, as the work progressed.

This presentation will describe the characterization and emergency remediation work which was carried out between July and December 2013 at Lac-Mégantic, with the goals of defining the conceptual site model and supporting the design and implementation of measures to secure the derailment site and surrounding land before the onset of winter. The results of this work will be presented and discussed.

Implementing Preventative Measures to Resolve a Violation Notice - A Collaboration of Multiple Railroad Departments

Kevin Peterburs - ARCADIS
John Hasterlo , Geoff Reeder - Union Pacific Railroad

The Illinois Environmental Protection Agency (Illinois EPA)’s process to resolve a Violation Notice (VN) through the Office of Emergency Response requires demonstration that measures will be implemented to prevent similar incidents from occurring in the future. The nature of the preventative measures may vary as a function of the nature and cause of the incident. Failure to meet the Illinois EPA’s expectations for demonstrating that efforts have been made to implement preventative measures may

result in enforcement action and even penalties. The following is a case study that illustrates how the environmental and mechanical departments of Union Pacific Railroad (UPRR) collaboratively established preventative measures to reduce the risk of diesel releases, including improvements to the process of staging locomotives and diesel fueling procedures.

UPRR experienced two diesel releases in January and February 2013 at the Proviso North Yard located in Melrose Park, Illinois. Both incidents included the release of diesel fuel from staged locomotives due to a piping failure associated with the diesel fuel tanks. Typical emergency response and remediation activities were implemented to address environmental impacts associated with the release. Activities included diesel recovery, recovery trench installation, soil removal, and soil confirmation sampling. Soil confirmation sampling demonstrated that emergency response and remediation efforts were successful in achieving remediation objectives.

The Illinois EPA issued a VN associated with both releases. The VN resolution process includes the execution of a Compliance Commitment Agreement (CCA) between UPRR and the Illinois EPA. The CCA required UPRR to demonstrate that preventative measures are implemented to address the potential of diesel fuel releases from staged locomotives at the Proviso North Yard. UPRR's mechanical department implemented multiple process improvement measures including the following.

Locks were installed on the locomotive diesel fuel tanks to restrict access to only UPRR personnel who are authorized and properly trained to conduct fueling activities;

The Locomotive Maintenance Procedures (LMI) for staging locomotives was revised, including an electronic submittal from mechanical department staff to their supervisors indicating that all procedures have been completed; and

The Maintenance Control System (MCS) was revised, including a notification to mechanical staff supervisors that the LMI has been completed.

By implementing the changes, the accountability and tracking of staging locomotives are improved. The changes were reviewed by the UPRR environmental department to verify that the process improvements would satisfy the requirements of the CCA prior to submittal to the Illinois EPA.

The Illinois EPA recognized the measures as improvements that demonstrated UPRR's fulfillment of the CCA requirements, and issued a Return to Compliance letter closing the projects without penalty. Implementation of the preventative measures represents a positive business outcome by the UPRR mechanical and environmental departments' collaboration in response to the incident.

Use of Hydrology and Hydraulics to Support Environmental Response at a Derailment Site

Dilan Singaraja - Conestoga-Rovers & Associates
Ryan Shepherd - Conestoga-Rovers & Associates
Jeffrey Peister - Canadian Pacific Railway

In the Spring of 2013 a Canadian Pacific Railway (CP) train derailed at a remote location with restricted access northwest of the Town of White River, Ontario. Several rail tank cars released their contents during the derailment, which occurred approximately 200 metres (650 feet) from the banks of the White River.

During containment and remediation efforts, several factors relating to weather and river conditions were vitally important for decision making and design purposes. Immediately after the derailment, Daily Hydrology Reports were prepared to provide Site personnel with weather data, snow depth, river ice conditions, river flow conditions, anticipated change in river ice and water levels, and Site dewatering requirements. This information helped the Site personnel decide how to stage the remediation activities

and to protect workers and equipment from rising river levels, as the derailment occurred during the typical spring thaw and ice breakup period. As no floodplain information was available for this area, a floodplain model was prepared to determine options for temporary storage of impacted soils and to evaluate the feasibility of several potential permanent soil treatment locations near the derailment site. A calibrated floodplain model was prepared by first preparing a calibrated hydrologic model to estimate flow to the river from a 4,200 square kilometre (1,640 square mile) watershed, using flow data from a nearby hydrometric station, obtaining topographic data by flying fixed winged aircraft with LiDAR equipment for approximately 20 kilometres (13 miles) of the river reach, processing the LiDAR data using GIS based utilities and extracting river cross sections, preparing a detailed 1-D hydraulic model using HEC RAS, and calibrating the HEC RAS model to observed data. Once calibrated, the models were used to determine flooding levels for various return period storms. Based on the model results, the impacted soils were temporarily stockpiled at locations that were outside of the 100-year flood plain and were protected during the spring freshet.

Don't let the track department design your OWS wastewater treatment system! – Have your OWS treatment system designed by someone specifically experienced in design of railroad wastewater treatment systems. If you don't, you will live to regret it. Track engineers are not wastewater engineers.

This presentation will provide real-world examples of how application of these principles have contributed to more successful OWS O&M and discharge compliance in railroad applications.

Sustainability

Modernizing a Historic Mode of Transportation

W. Troy Neisz, Lucien Tender - AMEC Environment & Infrastructure, Inc
Keith Brinker- CSX Transportaion
D. Dale Dowling - Breedlove, Dennis and Associates

In recent years, the rail industry has experienced tremendous growth. With growth comes the need to expand and maintain infrastructure to meet customer needs. The modern rail industry strives for corporate sustainability/responsibility; therefore, CSXT has made a commitment to being both a good neighbor and steward of the environment in the communities in which they operate. This is accomplished in a programmatic approach that includes securing the necessary permits for project development, and the use of modern technology to operate in a more efficient/enviro-friendly manner. The Winter Haven Intermodal Terminal, located in central Florida, demonstrates the opportunities and challenges of developing a new 330-acre facility within what was once a waste water plant spray field as a focus on the natural environment and sustainable business practices.

During preliminary engineering, the track designers/environmental consultants worked as a cohesive team to identify environmentally sensitive areas and minimize environmental impacts. Throughout construction, CSXT worked with the reviewing agencies to ensure the project design minimized impacts and possible criticism from the community. Internal environmental compliance inspections were also performed during construction to ensure permit compliance.

CSXT incorporated eco-friendly design features, and worked with permitting agencies and local conservation groups to achieve the following:

In lieu of utilizing the permitted taking of species, engaged in the voluntary excavation/relocation of T&E species;

Allowed authorized parties to collect T&E plant species seed specimens for relocation;

Instituted "bird/avian-safe" initiatives

Installed porous pavement within the administrative parking area; and

Segregated the vehicle fueling and maintenance areas and designed stormwater control features (oil/water separators, valves, etc…) to minimize spread of contaminants in the event of a release.

CSXT incorporated many environmentally sustainable technologies in the facility. Features of this facility include:

LEED certification;

Electronic tracking of trucks entering the property to assist with locations for drop-offs/pick-ups to help greatly reduce time onsite and the number of lifts/idling;

Use of alternative/renewable energy sources within "non-critical" areas;

Exterior lighting utilizes LED to reduce wattage, energy consumption, and light pollution;

The facility utilizes electric cranes that generate energy on downward moves;

The crane control system utilizes algorithms that minimize the required moves, and associated energy use;

Solar panels have been installed on the administration building.

Water from on-site stormwater ponds can be utilized for irrigation.

A walk through the CSXT Winter Haven Terminal provides a view into the opportunities available to railroad project developers to create environmentally sustainable facilities.

Sustainability at Amtrak: From Policy to Program

Celia Ann Pfleckl - Amtrak
Joanne Maxwell - Amtrak

The Amtrak Executive Committee approved the company's first Sustainability Policy in July 2013. The policy clearly defines what "corporate sustainability" means for Amtrak. Additionally, it outlines environmental, economic, and social sustainability and provides Amtrak-specific examples of each.

Several external sustainability commitments preceded the approved Policy. Amtrak was a charter member of the Chicago Climate Exchange (CCX) and succeeded in exceeding our locomotive fuel reduction target. Subsequent to signing on with CCX, Amtrak joined The Climate Registry and committed to produce an annual comprehensive greenhouse gas (GHG) inventory for all operations. Amtrak also signed onto the American Public Transportation Association (APTA) Sustainability Commitment, and in 2013 achieved the Bronze recognition level by completing a sustainability inventory, implementing green initiatives (such as installing energy efficient lighting) and setting goals for reducing fuel use in locomotives and electricity at facilities. This past year, Amtrak began reporting our GHG inventory to the Carbon Disclosure Project (CDP), along with reporting on climate initiatives.

The Sustainability Policy and experience with external sustainability commitments has provided a solid foundation for development of the company's Sustainability Program. Once the Policy was approved, we developed an implementation plan to provide a framework for the Program. Additionally, we conducted a benchmarking analysis which included interviews with other railroads and transit agencies to gather information on their sustainability programs, including their successes and barriers. Other tasks planned for FY14 include development of the company's first annual Sustainability Report.

A primary focus of our initial efforts has been internal stakeholder engagement through a series of small Sustainability Program workshops held with small groups throughout the organization. This initiative is of critical importance as it is our first opportunity to familiarize individual departments and business lines with sustainability and the developing Program. These workshops also provide excellent opportunities to

collect baseline data on current initiatives and projects with a material sustainability component. Thus far, the workshops have generated productive discussions and provided opportunities for cross-departmental collaboration with successful results.

This presentation will focus on the development of the Amtrak Sustainability Program from the approval of the Policy and participation in external commitments through the first year of Program development. We will include a specific focus on the importance of internal stakeholder engagement both in fulfilling our external commitments and in conducting productive Sustainability Program workshops.

Environmental Assessment of Rail Infrastructure in Illinois

Ning Ai, Marcella Bondie, Anthony Grande, Shuo Ma & Shi Yin - University of Illinois at Chicago

This presentation will report on a comprehensive "sustainable rail check-list" and mapping tool for environmental impact assessment of rail infrastructure in Illinois. The objective of this study is to integrate the latest development in environmental impact studies and provide a system view of sustainability metrics in a one-stop, spatial planning database accessible through a web interface. The sustainability metrics are designed to be used in a tiered approach that specifies minimum regulatory requirements or a "best practice" sustainable alternative for each rail system (i.e., transit, freight, and commuter rail). Metrics are also classified as spatial or non-spatial. Spatial metrics can be measured for a specific location; non-spatial metrics are designed for a system-wide evaluation. Data that are relevant to the spatial sustainability metrics are collected, processed, and integrated in a Geographic Information System (GIS) framework. Users can draw an area or corridor of interest, specify buffer parameters, and obtain a summary report for site-specific impacts. Transportation professionals and environmental planners can use this application to consider a wide range of impacts early in the decision-making process, before significant funds and time have been devoted to rail project design.

Stormwater & Wastewater

Corbin Wastewater Treatment Facility

Scott Menniti - Geosyntec Consultants
John C. Calhoun - CSX Transportation, Inc.

CSX is committed to environmental stewardship and seeks applications where new technologies can provide operational and environmental benefits. Within the existing wastewater treatment facility (WWTF) an Electrocoagulation Unit generates coagulant used to aid in flocculation production and solids and oils separation within the Dissolved Air Floatation (DAF) treatment process. Need for the project improvements was due to excessive corrosion to facility equipment and appurtenances due to the acid and caustic vapors associated with generating the coagulant, ferric chloride (FeCl3). The project improvements involved the design and construction of a chemical resistant storage building addition to the existing WWTF to house and store chemicals necessary for the treatment process. The design was to achieve a user friendly system with automated controls and monitoring, integrated into the existing systems onsite, as well as, to remove the excessive corrosion from the interior of the existing WWTF. The improvements were designed in accordance with the Chlorine Institute's Hydrochloric Acid Storage and Piping Manual such that storage and ventilation is environmentally friendly, with no impact on the environment or facilities located adjacent to the existing WWTF building.

The presentation will discuss the benefits and reasons for installing the updated acid handling improvements system for the WWTF, as well as, the design and operating objectives and challenges related to system in the railroad environment. The presentation will also discuss design requirements for storing and conveying hydrochloric acid (HCl) and requirements for ventilation and safety associated

with the chemicals required at the WWTF.

John C. Calhoun, P.E. is an engineer in the Environmental Engineering Division of the Public Safety, Health and Environment Department at CSX. He has a B.S. in Civil Engineering from West Virginia University, an MBA from the University of North Florida and is a Six Sigma Green Belt. He has over 30 years of experience in environmental engineering and has been designing and managing environmental engineering projects for 30 years with CSX.

J. Gregory Menniti, P.E., P.S. is a Principal with Geosyntec Consultants and has over 36 years of experience in water, wastewater and environmental facility design for the rail industry. He has a B.S. in Civil Engineering from The University of Pittsburgh and has extensive environmental engineering, project management, facility design and operation consulting project experience with industrial client on over seven hundred and fifty projects throughout the United States.

Scott Menniti, EIT is a water resources and environmental engineer with Geosyntec Consultants. He has a B.S. in Civil Engineering from West Virginia Institute of Technology with a focus on environmental and wastewater systems. He has designed and managed environmental control systems for stormwater collection and conveyance, stormwater reuse for dust suppression, and acid handling and is the chief designer for the acid handling improvements at the Corbin Terminal in Corbin, KY.

Development and implementation of corporate stormwater and wastewater standards - Canadian Pacific

Ted Bailey - Aureus Solutions Inc.

CP owns or manages approximately 90 industrial wastewater and storm water systems. Currently, challenges exist within the organization related to consistent management, operations, maintenance and design of these systems. As a result, CP is facing unnecessary risks related to regulatory enforcement, high operations and maintenance costs, and disruption of CP's core business activities. To mitigate these risks, CP has developed the Draft Standard: Industrial Wastewater and Storm Water Systems, which prescribes the following major requirements:

- Establishment of system ownership and management;
- Implementation of operational control through documented standard operating procedures and re-enforced through regular training;
- Standardized system design and safety requirements; and
- Documentation, record keeping and regular reporting on system status.

This Standard, through improved standardization, record keeping and reporting, will ensure CP owned wastewater and storm water treatment systems risks are appropriately managed at least cost. A pilot study was recently completed by Aureus Solutions Inc. (Aureus) at Winnipeg, MB and Binghamton, NY to assess the efficacy of Canadian Pacific's (CP) Draft Corporate Standard: Industrial Wastewater and Storm Water Systems (Standard).

Defining All Known, Available, and Reasonable methods of Prevention, Control, and Treatment (AKART) for Industrial Stormwater

Ross Dunning - Kennedy/Jenks Consultants

Defining All Known, Available, and Reasonable methods of prevention, control, and Treatment (AKART) for Industrial Stormwater

Industrial stormwater permit requirements are becoming more stringent across the nation. Nowhere are the changes more pronounced than in Washington (WA) State where the requirements of the State

Department of Ecology (Ecology) Industrial Stormwater General Permit (ISGP) are costing industries millions of dollars to comply.

WA State railroad and marine terminals have been having a particularly difficult time achieving the stringent pollutant benchmark levels included in the ISGP due to their traffic intensive operations and operational requirements. In addition, WA State law requires industrial permittees to implement All Known, Available, and Reasonable methods of prevention, control, and Treatment (AKART) for stormwater discharges to waters of the State. This term is analogous to the federal requirement to provide Best Available Technology economically achievable (BAT). Neither term nor what it takes to implement have been very well defined as they pertain to stormwater.

The Washington Public Ports Association (WPPA) commissioned a study intended to aid WA State ports and marine terminal operators in establishing what constitutes AKART at their facilities and help provide certainty and protection from 3rd party Clean Water Act lawsuits.

The study identifies applicable operational, structural, and source control and treatment Best Management Practices (BMPs) specific to Washington State industrial facilities and includes the most comprehensive and relevant existing performance data for proprietary stormwater treatment technologies known to exist anywhere in the country.

The paper to be presented will discuss the particular challenges railroads and marine terminals face with compliance with ever tightening industrial stormwater permit requirements and describe methodologies for stormwater management developed in collaboration with Ecology, several northwest ports, and the environmental community presented in the WPPA WA Marine Terminal AKART & ISGP Corrective Action Guidance Manual recently issued for public review and comment.

Amtrak Best Practices in Implementation of Current Storm Water Program in Southern California and Effect of New California Industrial Permit

Maheshwar Mettu - AMEC Environment & Infrastructure, Inc.

Storm water runoff from an industrial site may contain pollutants such as sediment, bacteria, metals, nutrients and toxics that are regulated through National Pollutant Discharge Elimination System (NPDES) permits. Amtrak has multiple locations in California where locomotive maintenance occurs, with operations that range from minor activities such as fueling to performing major maintenance (e.g. progressive and/or defective maintenance) on rail cars. AMEC Environment & Infrastructure, Inc. (AMEC) has been supporting Amtrak for over 10 years with its storm water monitoring program to comply with the State Water Resources Control Board adopted Water Quality Order (97-03-DWQ) for discharges of storm water associated with industrial activities (General Permit).

The current California General permit mandates quarterly non-storm water inspections, two rounds of storm water sampling, monthly storm water inspections between October and May, annual site review and annual reporting at each facility that has potential sources from railroad maintenance and support operations. One of the biggest challenges is to show consistency (e.g. sampling protocol, inspection comments etc.) among facilities in implementation of storm water program activities. Over a period of time, AMEC has worked with Amtrak and managed pollutant sources, improvised sampling protocols, fine-tuned Storm water Pollution Prevention Plans (SWPPP), and recommended the means to reduce storm water pollution via best management practices (BMPs).

The streamlined communication and support of local Amtrak personnel has resulted in good implementation of BMPs. Amtrak has also implemented multiple facility specific actions to improve the performance of BMPs (such as cleaning oil-water separators at the beginning of the storm season; as

necessary added fabric filter or filter sock to storm drains etc.).

California has promulgated a new industrial permit that will become effective July 1, 2015. The new permit differs substantially from the current requirements. Most significantly, the new permit deemphasizes the current approach of protecting water quality through iterative implementation of structural and nonstructural BMPs. It focuses on minimum BMPs, incorporates numeric action levels, exceedance response actions, and increased inspections and sampling, specifies new training requirements, the electronic filing of documents, and a range of other administrative actions.

The onset of the new permit and associated numerous changes brings a range of new challenges. This presentation will illustrate how the storm water team can achieve compliance through proper training and judicious application of BMPs to reduce, eliminate, or prevent storm water pollution from railroad maintenance activities.

Challenges of Handling Storm Water Runoff through Municipal Sewer Systems

Gaymeon Gibson - Norfolk Southern Railway
Mark Neal - Cardno MM&A

The presentation will address challenges freight railroads face when storm water is discharged to municipal sewer systems, including:

Impacts on existing industrial wastewater discharge permits,

Impacts on the renewal of industrial wastewater discharge permit,

Elimination of storm water discharges,

Approvals from local municipal authorities,

Impacts of anti-degradation rules,

Additional technical and economic feasibility examinations, and (not least of all)

Additional fees for discharge of storm water to municipal collection and treatment systems.

A case study focused on a South Carolina freight equipment maintenance facility will examine the process used to resolve these issues, and discuss how the final outcome was negotiated with the municipal sewer authority.

Wastewater and storm water from a fixed locomotive fueling operation at an active rail yard were collected and routed to an on-site oil/water separator (OWS). Effluent from the OWS was discharged to the publically owned treatment works (POTW). Prior to expiration of the POTW permit and before renewal, the railroad eliminated the fixed fueling operations. Because the discharge from the OWS was now primarily storm water, the local sewer authority did not want to reauthorize coverage under the Industrial Wastewater Discharge Permit.

Following negotiations, the municipal sewer authority granted interim (one-year) coverage for the OWS discharges to allow the facility time to eliminate storm water discharges to the municipal sewer system. During this time frame the facility was able to complete the necessary modifications to discharge the storm water in compliance with state NPDES industrial general storm water regulations.

This particular storm water discharge issue was successfully resolved with the local sewer authority. However, this issue is being dealt with by other railroads across the county and will continue to become more challenging as storm water regulations become more stringent and municipalities see storm water fees as a new and growing source of revenue.

Waste Reduction through Innovative Sludge Dewatering

Stuart Boykin - CSX Transportation, Inc.
Donnie Seward - AECOM

Waste minimization as a sustainable practice is a lynchpin to most Class I railroad environmental programs. WWTF sludge often contains more liquid than solids. As such, disposal can sometimes be challenging because the high moisture percentage precludes the sludge from landfill disposal and the high solids content may exceed typical surface water discharge or Public Owned Treatment Works (POTW) permit limits. Furthermore, in remote areas where POTW and surface water discharges may not be readily available, the facility operator may be faced with transporting the sludge to a centralized facility for further treatment. CSX Transportation, Inc. (CSXT), partnered with AECOM, has developed an innovative approach to minimizing sludge waste from Industrial Wastewater Treatment facilities (WWTF) throughout the Eastern US. In lieu of transporting sludge by rail or tradition disposal of sludge that contains high water content, CSXT has elected to significantly reduce sludge volume and subsequent disposal volumes through use of the Geotube® dewatering technology that allows sludge to pass through high- strength, permeable, specially engineered textiles designed for containment and dewatering of high moisture content sludge and sediment. Volume reduction is significant, which produces high solid levels that make removal and disposal easy. AECOM personnel led a pilot study at a select railyard to determine the viability of Geotube® treatment and to develop system design parameters. Proprietary polymer injection systems, system flow rates, infrastructure evaluations, disposal options, and life-cycle cost analyses were performed to vet project feasibility. Subsequently, AECOM developed system design plans and supervised construction during the pilot installation.

Based on the success of the pilot facility CSXT is planning to implement this approach at additional rail facilities in the near future.

How to train your OWS Dragon!

T. Chris Evensen - ARCADIS

Railroad environmental operations and compliance managers' responsibilities often include the operation, maintenance, and permit-compliant discharge from a number of oil/water separator (OWS) systems within their territory. When discharge is compliant, these OWS-based systems are often easy to overlook and forget. However, when the OWS discharge is non-compliant or experiences operation and maintenance difficulties, these systems can quickly become unwanted headaches.

Most environmental operations managers are not industrial wastewater treatment experts. This presentation provides a manager-level, railroad-specific overview of key knowledge principles with regard to OWS-based industrial treatment systems that will give managers the power to more efficiently and effectively manage these systems, maintain compliance, and reduce headaches.

Managers will learn the OWS Dragon Trainer Top Ten List:

The address of fantasy land is "<30 mg/L Oil & Grease (O&G). – Avoid Notices of Violation. Don't assume an OWS reduces O&G below 30 mg/L.

BMPs: Get it out! Keep it out! – The wastewater treatment best management practice (BMP) is to minimize waste by keeping diesel, lube oil, sand, soap, trash, etc. out of wastewater.

Get the solids out! – Solids create sludge and sludge is an OWS killer. Use BMPs and grit chamber to keep sand, grit, and dirt out of your OWS.

Set my oil free! Do not emulsify! Do not emulsify! Do not emulsify! – An OWS will not remove emulsified oil – Ever! Do not chemically emulsify oil with soap or mechanical emulsify it with pumps.

All OWS's are not created equal! Don't hate yourself in the morning! – To the non-expert, all OWS's can appear equal. They are not equal and you will pay for a bad choice over and over again in future O & M costs. Get expert help by someone with railroad-specific wastewater experience.

Coalescing media, the silver bullet that can ricochet and kill you! – Locomotive sand that creates sludge is the killer of coalescing media in railroad wastewater treatment systems. Choose wisely media that will not accumulate sludge and can be readily cleaned.

See your OWS! - The unseen OWS will not be maintenance. Avoid in-ground OWS systems and if it must be in-ground, do all you can to make it readily accessible.

Hear your OWS! - Many OWS O&M personal don't really know how the OWS works or the O&M requirements. Make sure they have training, O&M manuals and drawings so they can "hear" the OWS's needs.

Speak to your OWS! - Often O&M doesn't happen until failure. "Speak" to your OWS by performing regular O&M for success.

Rags To Riches: Transforming A USEPA CERCLA Hazardous Waste Site Into A Wildlife Habitat

Anthony Hoffman - Gannett Fleming, Inc.
Paul Kurzanski - CSX Transportation, Inc.
Ronald Leins, Todd Falkner - Gannett Fleming, Inc.

The authors will present rehabilitating a railroad property that was a hazardous waste site and transforming it into a wildlife habitat certified by the Wildlife Habitat Council (WHC). The property had soil, sediment and groundwater impacted by lead; acres of solid waste (automotive battery casings, construction materials, tires); wetlands in need of restoration and native plant species suffering from the advance of invasive species.

The Raleigh Street Dump Site (RSDS or Site) is an approximately six acre parcel of property located in Tampa, Florida, on land that was the result of illegal dumping. The Site is located along the northeastern shore of McKay Bay with a section of Delany Creek entering the northwest portion of the Site, creating a salt marsh wetland (known as the "bird's foot).

A total of approximately 23,000 tons of contaminated soil and sediment and 10,000 tons of hazardous soil were removed and disposed of from RSDS between March and October 2013. During the environmental remediation work exotic species, such as Brazilian Peppers, were removed from the south shore of the wetland areas and the mangroves located in the wetlands were maintained. The Site was then backfilled with clean native soil and graded to allow proper drainage toward the wetlands. The site is now dedicated to be used as a wildlife habitat.

CSXT and GF worked closely with the WHC to develop a management plan and have implemented the expansion of the restored wetland, created a wildflower meadow in the upland backfill area, installed nesting boxes, created brush piles and managed non-native, invasive exotic plant species to enhance the site.

The size of the wetland was increased by approximately one acre (to approximately 2.6 acres) by extending the western and southern boundaries of the wetland. A stormwater ditch from the east side of the property that was previously filled was tied into the "bird's foot" through the excavation of a small stormwater basin that also increased the size of the wetlands to the east. The wetlands were replanted with 600 White Mangroves, 120 Buttonwoods, 230 Dune Sunflowers, 230 Saltmeadow Cordgrasses and 130 Sand Cordgrasses.

Non-native and invasive plant species on the north side of the wetland and across the entire site were also

identified and removed. Areas for brush pile construction were selected and constructed along the northern, eastern and southern borders located in and around oak tree habitat.

To supplement previous wetlands plantings 140 White Mangroves, 10 Buttonwoods, 98 Seaoxeye Daisies and 100 Railroad Vines were planted. Two separate plantings of wild grass seed and wildflower mix from the Florida Wildflowers Growers Co-op were planted in the meadow. Eight nesting boxes for small birds were also installed.

Future projects include placing reptile and amphibian basking logs in the wetland, planting Florida native Milkweed to establish Monarch butterfly habitat, and installing drying perches in the wetlands for birds.

The site is now an environmental showcase and the USEPA, NOAA, Florida DEP and local water management district are very pleased with the outcome of the project.

Environmental Planning of Passenger & Freight Rail Projects

Comparison of Passenger Train Energy Consumption with Competing Modes

Giovanni C. DiDomenico - University of Illinois at Urbana-Champaign
C. Tyler Dick - University of Illinois at Urbana-Champaign

During the past decade there has been much interest in establishing new commuter rail operations and increasing service frequency on existing commuter and regional intercity passenger rail corridors. One of the key benefits cited to justify investment in the passenger rail network is its improved energy efficiency and reduced greenhouse gas (GHG) emissions in comparison to other modes. On an annual gross average basis, intercity passenger rail (Amtrak) in the United States consumes 43 percent less energy per passenger-mile compared to air transportation and 65 percent less energy than automobile transportation. However, such averages are not representative of specific passenger trips, as energy efficiency and GHG emissions vary with trip distance, speed, route geometry, equipment, motive power and on-board passenger amenities. Furthermore, such averages do not consider regional variation, time of day, trip purpose and the impact of access and egress modes of travel to and from the terminal stations on the modal comparison of main travel segments. Direct modal comparisons can also be complicated by the involvement of different energy sources such as internal combustion engines using fossil fuels and electricity generated from various sources. The objective of this research is to provide like-for-like, door-to-door passenger- trip comparisons of energy consumption and GHG emissions between passenger rail and competing travel modes. In the context of this research, “passenger rail” includes high-speed, higher-speed, intercity, and commuter rail services operated under the jurisdiction of the Federal Railroad Administration (FRA). Competing modes of passenger transport include automobiles, light-duty trucks often used for personal transportation, suburban commuter bus services, intercity bus services, and air transportation. To accomplish this objective, an analytical framework and quantitative decision-support tool for equivalent trip-based comparison of modal energy consumption and GHG emissions has been developed and applied to selected case study corridors. This tool includes the ability to consider the energy efficiency and emissions of access and egress by several modes, including walking, bicycle, automobile, rapid transit, and commuter rail. It is anticipated that practitioner use of the tool to assess the efficiency and emissions of door-to-door passenger trips on specific rail corridors will allow for better-informed decisions regarding the environmental benefits of passenger rail compared to other modes. Development of this modal comparison framework, data collection efforts and preliminary case study comparisons will be the focus of this presentation.

Leveraging Transit Lines and Properties for Community Revitalization: A NJ TRANSIT and City of Paterson Partnership

Ileana Ivanciu, Charles Stebbins - Dewberry
John Geitner- NJ TRANSIT

The City of Paterson, New Jersey, has a rich history as the Nation's first planned industrial city. In fact, Paterson has been called the birthplace of the Industrial Revolution in the United States. Like many similar cities, Paterson has struggled since industry and manufacturing moved elsewhere. But the City has bold revitalization plans; in fact in 2009, Paterson's Great Falls became a National Park celebrating how one of the largest waterfalls in the Nation fueled the Industrial Revolution.

Not far from the Falls, sits NJ TRANSIT's former Madison Avenue Bus Storage and Maintenance Facility. The former NJ TRANSIT facility, now owned by the City of Paterson, is located along the proposed NJ TRANSIT Passaic-Bergen Passenger Service Restoration Project. This rail line restoration project is planned to reintroduce passenger service on an existing rail corridor with nine new train stations including one near the former Bus Storage Facility.

This session will look at the series of strategic steps being taken to remediate the hazardous waste areas of concern at NJ TRANSIT's former Bus Storage Facility to make way for a mixed-use redevelopment that will serve the community, stimulate the economy, and feed back into the economic engine of the rail line restoration project.

Remediation approaches designed to make way for the redevelopment include "un-coupling" the Bus Facility's parcels so that less contaminated areas can be redeveloped quickly, and advancing the remediation under New Jersey's revolutionary Site Remediation Reform Act. Contamination at the site stems from the bus storage operations as well as an earlier use as a car dealership during Paterson's heyday.

Remediation

Improving the Efficiency of an Existing Groundwater Remediation System

Aimee Zack & LeeAnn Thomas - Canadian Pacific
Heather Lin, Chris Munson, Barbara Johnson, Jim Su, P.
Steve Finn & Claire Mackler - Golder Associates, Ltd

A groundwater recovery, pre-treatment, and discharge system was enhanced to take advantage of site characteristics to improve its environmental sustainability and to reduce the overall costs of the system operation, while retaining the same cleanup effectiveness.

A portion of the rail yard(Site), located in northeast Minneapolis, Minnesota, was leased to wood-treating businesses that operated between 1926 and 1972, resulting in pentachlorophenol (PCP) releases. Corrective actions for soil at the Site involved the excavation of approximately 18,000 cubic yards of PCP contaminated soil, including on-Site treatment of 10,000 cubic yards in an on-site constructed biopile, followed by off-Site disposal at a local non-hazardous landfill. The groundwater remediation system was completed in 2007 and includes groundwater recovery wells and an on-site pre-treatment system discharging under permit to the municipal sewage treatment plant. In situ groundwater treatment options were evaluated, but determined to be ineffective for the site-specific conditions.

Groundwater extraction and ex situ treatment, although effective, involved depletion of the groundwater resource, long-term utilization of municipal infrastructure, long-term energy usage, and costly annual fees to support the municipal infrastructure. Monitoring of the remedial system demonstrated that the pre-treatment system is highly effective and was consistently discharging clean water to the municipal

system. As a result, fees were imposed to discharge clean water to a system designed and operated to treat sanitary sewer water.

A more environmentally sustainable and cost-effective discharge option utilizing an on-site infiltration basin to provide aquifer recharge was evaluated and, with regulatory agency support, constructed on the Site. To further improve the sustainability of the system, solar panels were installed to supply local and renewable energy to operate the system and to serve as the primary energy supply for the system.

The infiltration basin is functioning extremely well and has resulted in substantial operational cost savings. The solar arrays were installed in Fall 2013. The site conditions, design approach, and overall pay-back of the systems will be presented in terms of economic, environmental, and social benefits.

Natural and Enhanced Attenuation of a Comingled Carbon Tetrachloride and Trichloroethene Plume: Field Observations and Microcosm Studies

L. Christopher Oakes - Norfolk Southern Railway
Raymond Vaske - URS Corporation
Frank Loffler & Yi Yang - University of Tennessee

Detailed research into the biochemical conditions in the subsurface at the Norfolk Southern Railway Company (NS) Elkhart Yard – part of the Conrail Railyard Superfund Site – has revealed a complex interaction between magnetite and bacteria that are reducing concentrations of carbon tetrachloride (CT) and trichloroethene (TCE). The combined natural biological and chemical attenuation processes are an emerging and promising area of study and practical application. At the Rail Yard, a discriminating understanding of these processes is helping NS evaluate and support the feasibility of natural attention for the contaminating solvents.

The comingled plume originates from separate releases of CT and TCE in two general areas inside a system of 72 classification tracks. Since 2004, the onsite portion of the plume has been contained by a groundwater pumping and treatment system operating on three to five extraction wells at a combined pumping rate of up to 800 gallons per minute. Water samples collected from one of the 5 pumping wells always exhibits high ratios of chloroform (CF) to CT, suggesting localized conditions favoring the abiotic or biotic transformation of CT to CF.

To pursue a deeper understanding of natural attenuation processes at the Rail Yard aquifer, laboratory microcosm studies were performed on groundwater and sediment samples collected from monitoring wells where higher ratios of CF and CT were observed. The microcosm studies demonstrate the potential for microbial detoxification of TCE (to ethene) following the transformation of CT to CF by magnetite, a reactive mixed ferrous/ferric iron mineral that is present at the Rail Yard. These findings suggest that a combined abiotic-biotic process could be a feasible strategy for contaminant removal.

Based on the body of evidence from related studies, the substantial conversion of CT to CF, mediated by microbially produced magnetite, could be followed by the complete removal of chlorinated methanes. This may be accomplished by the application of consortia of microbes that reductively dechlorinate CF to dichloromethane and non-chlorinated products. Bench-scale and in-situ pilot-scale studies are ongoing to explore magnetite formation by iron-reducing bacteria and to develop a better understanding of how this process can be enhanced to achieve more rapid CT transformation, and sustainable long-term natural attenuation.

In Situ Chemical and Biological Treatment of TCE in Groundwater at a Legacy Railroad Site

Vibhav S. Mankad & Nathan Diem - Conestoga-Rovers & Associates
Lauren Mancuso - Union Pacific Railroad Company

Background/Objectives. Conestoga-Rovers & Associates (CRA) evaluated the treatment effectiveness of in situ chemical and biological reduction of trichloroethene (TCE) in soil and groundwater at a legacy railroad site in Mountain View, CA. The TCE plume, originating from the site, is commingled with a regional TCE plume, which originates at an upgradient Superfund site. The subsurface lithology is characterized as organic-rich silty clay to clayey silt, extending to roughly 5 feet below ground surface (bgs) and 2- to 3-foot thick sand channels inter- bedded with silts and clays between 5 and 20 feet bgs. TCE concentrations ranging from 50 to 300 micrograms per liter were observed in the site groundwater prior to the treatment.

Approach/Activities. The treatment design consisted of an in situ chemical reduction (ISCR) agent – EHC® (PeroxyChem, Philadelphia, PA), composed of controlled-release carbon and zero-valent iron (ZVI) – along with a bioaugmentation culture (SDC-9TM, CB&I Government Solutions, LLC, Baton Rouge, LA) containing Dehalococcoides type dechlorinating microorganisms. EHC® and SDC-9TM were injected between 7 and 18 feet bgs using direct-push technique (DPT). EHC® was injected as a slurry containing 23% EHC® by weight and water through a total of 907 DPT borings spread across five source areas. Approximately 208,000 pounds of EHC® (0.15 to 0.25 % of soil mass) was injected. Following EHC® injection, SDC-9 TM was injected in a total of 229 DPT borings (one in four EHC® injection points) spread across five source areas. Approximately 916 liters of SDC-9TM (4 liters per point) was injected.

Groundwater monitoring wells within the target treatment zones were monitored for geochemical parameters during implementation. Specifically, oxidation-reduction potential (ORP) and conductivity were evaluated to confirm the influence of injected material. Groundwater samples were collected quarterly from the monitoring wells within the target treatment zones to evaluate treatment effectiveness. The performance evaluation was based on the following lines of evidence: 1) Primary: TCE, cis-1,2-dichloroethene (cDCE), vinyl chloride (VC), and ethene concentration trends over time, 2) Secondary: Geochemical parameters – nitrate, ferrous iron, sulfate, methane, dissolved organic carbon, volatile fatty acids, alkalinity, and ORP – trends over time, 3) Tertiary: Bacterial population counts over time and compound-specific carbon stable isotope analysis for TCE, cDCE, and VC.

Results/Lessons Learned. Reducing geochemical conditions (-200 millivolts ORP) were observed within 72 hours following EHC® injection. Decline in TCE concentrations combined with increase in concentrations of dechlorination product – ethene – was observed within six months following injection. The results demonstrated that ISCR combined with biological enhancement was effective for treatment of the TCE plume originating from the site.

Collaboration for Environmental Remediation in Active Rail Areas

Paul J. Kurzanski - CSX Transportation, Inc
Sandy Conard, Janette D. Wilson & Andrew T. McManus -ARCADIS

Historically, the majority of remedial solutions for a source under a mainline railroad track have been in-situ remediation techniques. However, with pre-planning and collaboration the removal of the affected constituents is able to be completed by an excavation. A 1988 derailment of a train carrying di-ammonium phosphate (DAP) occurred in the community of Griffin, Florida. Fifteen hundred tons of DAP were released when the 33 cars derailed during a hurricane. Multiple remediation efforts for ammonia

and nitrate affected groundwater and soils occurred at the site but source material remained underneath the tracks and contributed to a persistent groundwater plume. In-situ remediation methods for ammonia and nitrate are largely unproven and were not recommended given site specific conditions at the site. Source removal remained the most practical remedial strategy but was the most impractical due to the majority of source material occurring within the rail bed of the single line main track.

After several months of planning and collaboration between CSX engineering, transportation, mechanical, signaling, and environmental departments, contractors, consultants and regulatory agencies - the main line source removal event took place over the weekend of June 28, 2013. Unprecedented in the state, a single track mainline was taken out of service for 48 hours to accommodate environmental activities.

During this work, CSX Standard of Care was implemented and CSX offered residents from the surrounding neighborhood the opportunity to relocate to local hotels, security was provided for the neighborhood, and local businesses were engaged to provide food for workers. In total, over 100 CSX employees and contractors worked together to make this field event a success.

While in situ methods will likely remain the most prevalent sub-track remediation strategies, this project provides a clear demonstration of the possibility of mainline excavation given proper planning, communication and environmental commitments on the part of cooperative and environmentally aware railroad departments.

A Derailment Legacy: Cleaning Up Hexavalent Chromium Using Emulsified Vegetable Oil

Bonani Langan, James A. Bennett - AMEC Environment & Infrastructure, Inc.
Matthew L. Adkins - CSX Transportation, Inc.

In November 1986, a train derailment resulted in the release of significant quantities of methanol, sodium dichromate, ethylene glycol and chromic acid. Much of the materials released were contained through emergency response activities and removal of impacted soil and track ballast; however the shallow aquifer was impacted by hexavalent chromium (Cr(VI)) dispersion from the sodium dichromate and chromic acid. A groundwater recovery and treatment system consisting of an ion exchange system was constructed and operated from 1990 through 1996. From 1997 through 2008, monitored natural attenuation was implemented as the remedial alternative. In 2011, a pilot study was conducted to demonstrate enhanced bioremediation using emulsified vegetable oil (EVO).

Chromium can persist in the environment as Cr(VI) and trivalent chromium (Cr(III)), which have widely different toxicity and transport characteristics. Cr(VI) tends to be more mobile in the environment as it partitions weakly to solids in soils and groundwater; whereas, Cr(III) has limited solubility and forms strong complexes with the soil matrix making it relatively immobile. Cr(VI) can be reduced by both biological and chemical processes which may be coupled with the reduction of microbial metabolites such as iron and sulfate. In situ biological treatment using EVO consists of chemically lowering ORP so that the soluble Cr(VI) is converted to Cr(III). Cr(VI) undergoes biologically mediated reduction to Cr(III) under anaerobic conditions. Indigenous micro-organisms utilize the EVO as a carbon source for biomass generation and as an electron donor for energy production. The process to reduce Cr(VI) may occur in a single step or in multiple steps. In the single step process, electrons are directly transferred from electron donor to Cr(VI) resulting in the oxidation of the electron donor to Cr(III). In the two step process, the anaerobic conditions brought about by the addition of EVO result in the reduction of iron and sulfur which then reduce the Cr(VI) to Cr(III). The two primary pathways for the conversion of Cr(VI) to Cr(III) are as follows:

Direct microbial oxidation of a generic carbohydrate coupled with reduction of Cr(VI). $C_3H_6O_3 + 4CrO_4^{2-} + 8H^+ \rightarrow 3CO_2 + 4Cr(OH)_3 + H_2O$

$CH_2O + 4CrO_4^{2-} + 8H^+ \rightarrow 3CO_2 + 4Cr(OH)_3 + H_2O$

Indirect microbial reduction of Cr(VI) via iron hydroxide reduction. $C_3H_6O_3 + 12FeOOH + 24H^+ \rightarrow 12Fe^{2+} + 3CO_2 + 21H_2O$

$3Fe^{2+} + CrO_4^{2-} + 8H_2O \rightarrow 4Fe_{0.75}Cr_{0.25}(OH)_3 + 5H^+$

Approximately 5,000 gallons of EVO with lactate were injected into two injection wells to treat the shallow aquifer. Four post-injection sampling were conducted to evaluate reduction of Cr following the injection. Results indicate a significant decrease in Cr(VI) and total Cr; Cr(VI) concentrations decreased approximately 97%, and total Cr concentrations decreased approximately 90%. The results indicate that EVO was successful in converting Cr(VI) to Cr(III) and decreasing total aqueous concentrations of total Cr in the aquifer. Activities are currently underway to develop a full scale distribution system to target Cr(VI) concentrations site-wide.

Innovative use of a CN Sustainability Tool for Stakeholder Engagement on a Complex Remediation Project

Stefano Marconetto, Tim Robertson, Phil Moddle - Golder Associates Ltd.
Stella Karnis - CN

GoldSET-CN was initially developed by Canadian National (CN) and Golder Associates Ltd. (Golder) as a tool to integrate sustainability principles as part of project planning and design. Through continuous upgrades and refinements, GoldSET-CN is now becoming a broader and more comprehensive decision-support system that allows users to make objective, informed project decisions in the context of environmental protection, social acceptability, technical performance and financial constraints. For the first time since its development, GoldSET-CN was interactively used as a stakeholder engagement tool for a remediation project at a remote site along a former CN rail line in Canada. The site is located on a rail corridor which is bordered on each side by water (wetlands) and is impacted by metals due to a historic derailment. The project started in 2006 and included various stages of environmental site assessments, biological surveys and risk assessment to deal with impacts in soil, sediment, surface water and groundwater at the CN site and nearby Crown land. The project is currently in the full scale remediation planning stage. GoldSET-CN was leveraged to engage with regulators and the Crown (adjacent property owner) for the selection of the preferred remedial option. These project stakeholders were directly involved in the selection and evaluation of GoldSET indicators. They appreciated the transparency of the process as well as the opportunity to provide feedback and witness the impact of their feedback on the overall evaluation of the remedial options. Through the direct involvement in GoldSET-CN, the regulators and the Crown also gained an improved understanding of the project challenges. This interaction helped CN to build trust with them with the objective of ultimately reaching a practical solution for the site. As a next step, visualization tools are being developed with Golder's MediaLab to illustrate the GoldSET-CN workflow and convey the information to other stakeholders less familiar with remediation projects such as First Nations and environmental groups.

Remediation and Restoration of the Lac-Mégantic, Québec Oil Train Disaster

Bruce Noble - AECOM

On July 6, 2013 an unattended train derailed in the centre of the Town of Lac-Mégantic, Québec, approximately 3 hours east of Montréal. The train's cargo, Bakken North Dakota formation crude oil contained in 74 rail cars, spilled and resulted in multiple explosions with the fire destroying a portion of the downtown killing 47 residents and creating a major environmental disaster. The spill and resultant explosions and fire destroyed over 30 buildings and municipal infrastructure, impacted soils and

groundwater in the immediate spill area as well as surface water and sediments in Mégantic Lake and Chaudière River. Following five months of emergency response activities the site has been stabilized, major urban restoration planning has been completed and a soil, sediment, and groundwater remedy is being implemented.

AECOM was contracted by the Town of Lac-Mégantic and the Québec Ministry of Sustainable Development, Environment and Climate Change to design and oversee construction of all remediation and restoration activities. AECOM's objectives were to: develop and administer a site-wide Health and Safety Plan, Remediation Plan, impacted building Assessment and Rehabilitation Plan, and oversee and report on all spill site restoration and ancillary commercial renovation activities.

Approach

Site remediation consisted of utilizing existing emergency response soil, groundwater and sediment data to develop a remedial strategy, integrate the strategy into infrastructure and building restoration and demolition activities as well as numerous off-site activities all related to the revitalization of Lac-Mégantic. Impacted soil volumes requiring removal and treatment are anticipated to be 400,000 tonnes and all treated soils are required to meet Québec Level A soil standards. Soils from impacted areas within the "zone incendiée" (area destroyed by fire), around remaining building foundations, storm sewer replacement and miscellaneous other related construction activities will be removed and transported off-site to a treatment area. Three different treatment technologies will be used including thermal and biologic treatment as well as soil washing. Remediated materials will be reused where appropriate in the site wide restoration. In addition, a groundwater cut-off trench and strategically located recovery wells situated throughout the site collect and transfer impacted groundwater to a stationary carbon- based treatment system. Additionally, Chaudière River and some Mégantic Lake sediments impacted by the spill will be further delineated and removed.

Results and Lessons Learned

The schedule for the remediation is aggressive with expected completion date by December 2014. As a result, a strategically staged and sequenced plan has been developed with construction beginning in May 2014. The various components of the plan will ensure clean-up of the downtown area to performance objectives, re-installation of required municipal infrastructure, successful treatment of removed soil, groundwater recovery, treatment and monitoring, and flexibility to enable future site development in concert with on-going discussions and consultations with the residents of Lac-Mégantic.

This presentation will provide an update on restorative construction activities, overview of the application of innovative and sustainable remedial technologies and approaches, and provide the basis for the vision of the future of Lac-Mégantic.

Building a New Railroad Track Through a Superfund Site

Kevin Peterburs, Ali Wright - ARCADIS
Geoffrey Reeder - Union Pacific Railroad

When the Alton & Southern Railway Company (A&S) (a wholly owned subsidiary of Union Pacific Railroad) designed the Third Rail Extension project in January 2012, they didn't plan on having to work through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process to construct a portion of the track that ran through the Operable Unit 1 (OU-1) of the North Alcoa Superfund Site in East St. Louis, Illinois. The primary Responsible Parties, Alcoa and the City of East St. Louis, were in the end stages of finalizing a Consent Decree (CD) and a Remedial Design/Remedial Action (RD/RA) Plan when it was discovered that a strip of land on the east side of OU-1 was on A&S

property. The A&S portion represents just four percent of the overall area of OU-1.

The challenge for A&S was clear: in order to complete the track construction project, the area that was inside of the OU-1 boundary would be required to adhere to the RD for the greater North Alcoa Superfund Site. In order for A&S to achieve their goal in completing the track construction, an increase to the project costs would be realized and a delay in the project schedule would be unavoidable.

The A&S design team (A&S, Design 9, and ARCADIS) worked through the Superfund process to amend the Third Rail Extension plans to incorporate the selected remedy for the North Alcoa Superfund Site. The subsurface remedy included removal of waste material, the placement of two feet of clean soil, and the installation of a geotextile liner. The two primary waste materials to be addressed by the RD were identified as bauxite residue ("red mud") and gypsum. Therefore, the constituents driving the remedial action included radium 226, radium 228, and metals. The construction of the railroad track and adjacent access road, including gravel and sub-ballast, would be required to be incorporated into the design. The construction of a gabion wall would also be required to separate future railroad operations from the end use of the adjacent property.

In parallel to the A&S team revising the design, UPRR legal representation negotiated revised terms of the CD. The revision of the design and negotiation of the CD included communication and collaboration of multiple stakeholders, including the primary Responsible Parties and their consultants, the United States Environmental Protection Agency (USEPA) Region V, and the Illinois EPA.

Once the CD was finally issued (approximately 18 months after the initial engagement of A&S in the North Alcoa Superfund Site), construction of the RD/RA and the Third Rail Project was top priority for A&S. ARCADIS worked with the general contractor to sequence construction activities to maximize efficiency and minimize exposure to the waste material. The result was expedited completion while ensuring the work was conducted safely.

The construction of A&S's railroad track on top of the remedy for the North Alcoa Superfund Site was precedent- setting for USEPA Region V. The adjacent property is planned for a solar power generation facility. These two examples of beneficial reuse of a former environmental liability represent a positive outcome for the community of East St. Louis, the Responsible Parties, and the regulatory community.

Recent Success Achieving Regulatory Closure of Low Profile Spills at CSXT Rail Yards in Western NY

Ben Girard- ARCADIS
William Parry - CSX Transportation, Inc.

CSX Transportation (CSXT) and ARCADIS have had recent success with achieving State regulatory closure of relatively low profile spill sites undergoing prolonged investigation and/or remediation. The New York State Department of Environmental Conservation inactivated or closed several multi-year spill investigation and remediation efforts at CSXT sites in Western New York in 2013 and 2014. Attention to closure at these low profile sites reaffirms the CSXT commitment to Environmental Stewardship.

For the purpose of this presentation, sites of a low profile nature are considered petroleum impacted areas within a CSXT rail yard that pose minimal risk to operations, health and safety, and the environment. The petroleum impacts resulted from historic operations, spills, leaking underground storage tanks, deteriorated infrastructure, sewer infiltration/exfiltration, and derailment. The impacted areas typically made up less than one percent of the surface area of the rail yard.

The closure strategy involved open dialogue with the regulatory authority, commitment to an aggressive but achievable schedule, refocusing of goals, and tailoring of approach and methodology under changing conditions. This presentation will provide an overview of the strategy, including financial investment and

savings, regulatory drivers and involvement, opportunities for efficiency improvement, and lessons learned.

Use of Ground Penetrating Radar (GPR) to Locate Contaminant Beneath Railroad Track

James Hyslip - HyGround Engineering
L. Christopher Oaks, C. Russell McDaniel - Norfolk Southern Railway

A mainline freight train derailment in Ohio in 2011 resulted in the release of approximately 800,000 gallons of denatured ethanol. Most of the ethanol was consumed by flame, but a significant portion of the liquid penetrated downward through the ballast and subballast of the track and collected in pockets created by less permeable layers of the subgrade. The mainline track was quickly returned to service after the derailment, but approximately six months later when remediation was believed to be nearly complete, contaminant was identified seeping from the toe of the ballast slope.

This paper describes how ground penetrating radar (GPR) was used as an assessment tool to define a contaminant plume and provide valuable information for remediation design. Ground penetrating radar (GPR) was used to identify subsurface layers and to contour the top of impermeable subgrade beneath the track, and thereby locate pockets of contaminant that were seeping to the toe of the ballast slope. The paper describes the work performed, which included an on-track and off-track GPR field survey using different GPR antenna frequencies, as well as integration of other information such as digital video, Flimap aerial lidar data, global positioning system (GPS) location information, and soil boring data.

This paper describes the GPR data processing and interpretation, as well as the results of the investigation that produced depictions of layer thickness and contours of impermeable boundaries. Distinct layers were identified, including an upper roadbed layer consisting of silt, sand and gravel and a lower layer of fine-grained, impermeable material. Utilizing the contour map of the track subsurface, horizontal air sparge wells were installed, and air was injected to stimulate in situ biodegradation of the remaining pockets of ethanol and ethanol-impacted liquid trapped beneath the mainline track.

GIS-based Method for High-resolution Mapping of LNAPL Plume Transmissivity, Recoverability, and Longetivity: Case Study at CSXT Stadium Project

Peter Guerra, Marie Dowd - AMEC Environment & Infrastructure, Inc.
Sorab Panday - GSI Environmental, Inc.
Ravindra Dwivedi - University of Arizona
Paul Kurzanski - CSX Transportation, Inc

A GIS-based framework tool which advances the American Petroleum Institute (API) LNAPL Distribution and Recoverability Model (LDRM) was developed for high-resolution evaluation of LNAPL transmissivity and recoverability at the CSXT Stadium Project site, which was a major rail yard that was operated for approximately 100 years by CSXT predecessor railroads. The 92-acre site, which currently contains an approximate 20-acre footprint of LNAPL impact, was transferred to a higher learning academic institution for their athletic facilities while the environmental liability remains with CSXT. The initial redevelopment of the property earned the Phoenix Award in 1999. Development of the GIS-based LDRM model requires two primary datasets; hydrogeologic and fluid-interface data, formatted in the same datum and entered into a GIS database. The hydrogeologic dataset built for the CSXT Stadium Project site included lithological information at more than 300 locations across the project site; well geometry and construction details; and, soil/sediment properties, including saturated and unsaturated flow characteristics, from 144 tests conducted on 16 select soil core samples. The fluid-interface dataset included LNAPL and groundwater properties test results (viscosity, density, interfacial tension) and in-well, liquid-level gauging records. A computational grid combining these datasets over the footprint of

the LNAPL plume was developed within ArcGIS using a raster format. By means of the information in the fluid-interface dataset, the corrected groundwater elevations across the LNAPL plume were first interpolated onto the ArcGIS raster grid (10 meter). The capillary head, integrated relative permeability value, and the flux magnitude and direction of LNAPL per unit width were then calculated at each raster node using this corrected water-table surface, hydrogeologic and fluid-interface datasets, and the Darcy Flow tool, which is part of the Spatial Analyst Extension of ArcGIS® Version 10.0. The outputs from these analyses were used to build high-resolution plan views of the distribution of LNAPL specific volume, transmissivity, and flux across the plume and under ambient flow conditions. Mean- and maximum-water-table/LNAPL-thickness scenarios were analyzed. The model results from the mean condition scenario, which was based on period-of-record mean water/LNAPL elevations and mean LNAPL thicknesses, were used to define areas of the plume where LNAPL recovery would be successful; zones of higher LNAPL transmissivity and LNAPL flux direction were revealed. The model results from the maximum condition scenario, which was based on period-of-record minimum water/LNAPL and maximum LNAPL/air interface elevations, were compared to the mean results to identify areas likely to contain LNAPL in the vadose zone (smearing) and saturated zone below residual saturation. This comparison was found to be useful for evaluating the extent of containment and excavation remedial alternatives; as well as, the boundaries for institutional and engineering controls intended to isolate or restrict exposure to LNAPL (e.g.; environmental restriction on construction activities). Finally, the longevity of the plume under natural source zone depletion (NSZD) was analyzed considering the long-term (up to 20 years), sufficient-resolution (monthly) records of in-well, liquid-level gauging results. Using the model the volume of LNAPL as a function of its thickness was estimated in the vicinity of each of eleven wells considered for NSZD rate analysis. The integrated solution for estimating the time to reach LNAPL compliance thickness was applied to transform the current spatial distribution of LNAPL specific volume (initial conditions) to a pictorial representation of the spatial distribution of the LNAPL plume longevity. Compared to other methods, including carbon-dioxide flux analysis and the API LNAPL Dissolution and Transport Screening Tool, this approach to estimating NSZD has provided a more detailed solution that yields a higher level of certainty; moreover, it has been completed with existing information. The results of this modeling are being used to support a hybrid no further action status on the site due to the low LNAPL transmissivity; low risk of exposure; and, lines of evidence supporting a receding LNAPL plume.

Innovative In-Well Oil/Water Separator for LNAPL Recovery

Stewart A. Emhof - ERM
Matt Graham - BNSF Railway Company

At remediation sites where recovery of light non-aqueous phase liquid (LNAPL) petroleum hydrocarbons is being implemented, the production of significant volumes of groundwater requiring treatment is a major constraint. In response to this constraint an innovative in-well LNAPL/water separation device was developed to reduce treatment and disposal costs. Based on a conceptual design provided by BNSF, a two-chamber LNAPL/water separator was designed using polyvinyl chloride piping and tubing. The device was designed for use in product recovery wells having a minimum diameter of 6 inches. It is operated by compressed air and is currently designed to receive total fluids at a maximum rate of approximately 1 gallon per minute, as part of an LNAPL skimming recovery system.

Bench-scale testing was conducted using potable water and vegetable oil. Initial pilot testing was conducted at a site impacted by LNAPL consisting of a mixture of bunker oil and diesel fuel ranging in thickness from 2 to 5 feet on the groundwater column in the well. Based on the results, various

modifications were implemented, including use of aluminum and brass components for its construction to extend service life. The two chambers of the in-well device consist of an LNAPL/water separation chamber having a capacity of approximately 2.5 gallons, and an LNAPL chamber having a capacity of approximately 2 gallons.

A full-scale pilot test, using one in-well LNAPL/water separator positioned in an existing product recovery well was conducted at a rail yard in Montana during February through May 2013. Initial LNAPL thickness on groundwater was measured at 0.02 feet. Depths to groundwater ranged from approximately 17 to 20 feet below top of the product recovery well. An air-driven pump was used to deliver total fluids from the LNAPL layer and upper few inches of the groundwater column in the well. Pumping rate to the in-well LNAPL/water separator ranged from

0.13 gallons per hour to approximately 23 gallons per hour. Approximately 22,000 gallons of total fluids were treated by the in-well LNAPL/water separator during the full-scale pilot test. LNAPL was separated and no water was delivered to the surface, indicating that the separator functions effectively over a wide range of LNAPL thicknesses.

A full-scale application is underway at a rail yard in Southern California and plans are to employ it at other sites. Results and lessons learned will be presented.

How to Remediate a Tie Treating Plant with an Active NAPL Discharge without Long-Term Operations and Maintenance

Jeff Gentry - CH2M HILL
Tom Hutchinson - CH2M HILL
Geoffrey Reeder - Union Pacific Railroad

The former Escanaba Tie Treating Plant, operated by a predecessor to Union Pacific Railroad, is located above Little Bay De Noc, an inlet connected to Lake Michigan. In 1995, a seep of non-aqueous phase liquid (NAPL) was discovered by the current land owner. Further investigation identified that a former tie treating facility was located on the site and the seep material was identified as primarily creosote. Interim measures were implemented to control the seep. Remedial investigations identified the nature and extent of the seep and an area was identified where concentrations of creosote constituents in groundwater and sediment pore water exceeded Michigan Part 201 standards for the groundwater surface water interface (GSI). The creosote impacts include a sand flat in Lake Michigan adjacent to a dredged berth which allows freighters to dock for loading.

This presentation is an overview of the data analysis methods and results that were used to demonstrate remedy compliance with Part 201 regulations without active treatment. CH2M HILL analyzed remedial alternatives using a groundwater flow model (MicroFEM©) to determine groundwater flow paths and travel times under various simulations. Calibration to baseline conditions showed that the naphthalene in the sand flat attenuated to below the GSI standard in 400 days of groundwater travel time from the NAPL source area, without treatment. Remedial measures were simulated with the groundwater model to slow the groundwater flux, direct the groundwater discharge to the sand flat and elongate the groundwater flow paths to attain a 400-day travel time before discharge to the GSI.

To address NAPL impacts in surface sediment in the sand flat (an area of 21,000 square feet), excavation of sediment to a depth of 5 feet is proposed. The remaining NAPL impacts from 5 to 40 feet identify the leading edge of NAPL impacts in the groundwater simulations. Barrier walls along the shoreline were simulated to slow and direct the groundwater discharge to the sand flat. 400-day travel time mapping from the leading edge of NAPL and the discharge around the barrier wall was used to determine the

extent that an impervious cap would be installed on the sand flat to elongate the groundwater flow path prior to discharge to the GSI.

The analysis demonstrated that a set of three barrier walls (1,700 feet total), sediment excavation of NAPL impacted sediment, and a 6.3 acre impervious cap would prevent further NAPL impacts in surface sediment and allow the naphthalene in the groundwater to attenuate before reaching the GSI. A Response Activity Plan will be prepared and submitted to Michigan Department of Environmental Quality for approval of this innovative and sustainable approach to address tie treating impacts at this site.

Insights into NSZD Rate Measurements of LNAPL from Multiple Sites

Keith Piontek, Keith Woodburne & Jason Leik - TRC Solutions
Scott MacDonald – BNSFRailway

The Interstate Technology and Regulatory Council (ITRC) recommends using NSZD rate determination as an "objective benchmark by which to compare the relative effectiveness of different remedial alternatives" . TRC has been implementing innovative technology at a number of sites in order to better quantify the NSZD rate. The carbon dioxide trap provides an integrated measurement of carbon dioxide flux from the ground surface, which can be converted to a rate of fuel hydrocarbon biodegradation. Measurements of soil gas flux by means of carbon dioxide traps have been made at seven sites across five states including three railyards. At two of these sites, a minimum of four quarterly NSZD rate measurements have been performed. At one site, a second line of evidence on NSZD rate is being generated through subsurface thermal flux monitoring.

Generating multiple NSZD rates at individual sites and measuring NSZD rates at a portfolio of sites allows for valuable insights into both ZSZD rates and the most appropriate methodology for making the measurements. Of primary importance is the methodology employed to correct for background sources of CO2, and the number of sampling locations and events. Factors potentially affecting the rate of natural attenuation to be discussed include temperature, groundwater elevation, soil moisture, and hydrocarbon type.

Popular approaches for product recovery often result in significant expenditures with little product removal. Furthermore, the endpoint of product recovery efforts is often a point of contention and hurdle to gaining regulatory agency consensus that corrective action is complete. Ultimately, the findings from this and similar studies have the potential to spark a paradigm shift for the management and regulatory closure of hydrocarbon- impacted sites. This presentation will also cover the status of efforts to gain regulatory agency concurrence on NSZD rates and appropriate incorporation of NSZD rate information into LNAPL site management decision-making.

Longevity Analysis using LNAPL Distribution and Recoverability Modeling

Trevre Andrews - CH2M HILL
Morgan Bruno - CH2M HILL
Gery Honeyman - Union Pacific Railroad

Recovery of free-phase hydrocarbons is being performed at a railroad facility, as an approved remedy under the state Voluntary Remediation Program. As a condition of the Remedy Agreement, financial assurance for remedy completion is required, which is based on the length of time estimated for remedy completion (i.e. removal of all LNAPL).

A longevity analysis was performed to determine the time remaining to operate remediation systems for two separate LNAPL plumes at the railroad facility. The API LNAPL Distribution and Recoverability Model (API 2008) was used to determine the time required to meet the state requirement of no

measureable (less than 1/8 of an inch) product remaining in the well, recognizing industry and regulatory changes taking place across the country indicate LNAPL thickness is a poor performance metric.

The API model uses a combination of fluid and soil parameters to estimate the distribution of pore fluids and relative fluid permeabilites. Site specific gauging data and visual soil type descriptions from wells in each recovery area were used for some model inputs. Site specific parameters which were not available were determined based on ranges of input parameters provided in the API database which were similar to site-specific soils and fluids.

For the recovery portion of the model site specific inputs based on the active recovery systems including extent, pumping rates, background hydraulic gradients, and aquifer thickness were used. Based on the remedial system configurations and plume locations, both a recovery well and a trench were used to simulate the two LNAPL plumes present at the site. The distribution and recoverability model input parameters were adjusted within the ranges provided in the API parameter database to fit the model outputs to the operational data from the historical recovery systems.

After the LDRM models were calibrated to historical recovery data, forward simulations for the recovery systems were modeled until the modeled LNAPL well thickness fell below 1/8th of an inch of thickness under the existing recovery system configurations to determine the remedial time remaining.

This talk will provide a conceptual understanding of the input parameters used in the model, how they affected the model results, and how these results were used to determine the remedial timeframe for meeting regulatory requirements for ending remediation. This talk will also present a discussion of the uncertainties associated with the model and the potential ramifications of these uncertainties on the longevity analysis.

Energy, Emissions & Air Quality

Utility Management

Jim Brannen - Union Pacific

Where does your company consume most of its energy? What energy conservation initiatives provide the greatest impact to your business's bottom line? How do we know we are making the right choices? How do we properly account for and measure energy use? How do we address the challenge of instilling accountability in the field when the utility bills are paid through the corporate office? How do we pinpoint the best energy saving opportunities when the company's largest railyards run off of one meter? The answers to these questions are often difficult to answer. In January 2012, Union Pacific created a position dedicated to help answer these questions and many others.

Union Pacific manages more than 29,000 utility accounts that serve our operations and facilities over 32,000 miles of track. These utilities include electricity, natural gas, water and others. They keep our lights burning, our shops warm in the winter, and our locomotives clean year round. But with so many utility accounts comes the question, how do you manage all that data to make smart business decisions? This presentation will explain how Union Pacific has approached energy conservation thru data management, project management, and employee engagement. You will learn how UP has used data to refine project focus into areas like air compressor upgrades and maintenance, high bay lighting upgrades, and shop heater replacements. We will discuss successes, failures, and areas we see as future opportunities. You will also hear first hand examples of how utility data and employee outreach can engage employees and impact your bottom line.

Operational Considerations of Transitioning to Ultra-Low Emission Locomotive Technologies for Line-Haul Freight Rail Applications

Garrett Fullerton - University of Illinois at Urbana-Champaign
C. Tyler Dick - University of Illinois at Urbana-Champaign

In recent decades, the North American freight railroads have made tremendous improvements to increase fuel efficiency and reduce locomotive emissions. These improvements have been driven by a combination of industry desire to reduce operating expenses, federal regulations and environmental stewardship. From a regulatory standpoint, EPA Tier 4 locomotive emissions standards represent the practical minimum levels that conventional diesel-electric locomotives can achieve. Further emissions reductions require onboard after-treatment systems or a shift to an alternative, ultra-low emission locomotive technology. Such reductions have been achieved within certain urban areas with strict emissions standards via the deployment of new locomotive technology in captive yard and terminal switching service. Reducing the emissions of mainline freight rail operations in a region via a similar approach where new locomotive technology is introduced to line-haul traffic poses a much more difficult operational challenge for the industry. Regulations and the practicalities of a phased transition may dictate that initial line-haul operations using a new locomotive technology are confined to a certain portion of the rail network. When transitioning to ultra-low emissions locomotives in this manner, there are many important economic and operational considerations to evaluate. Economically, while the cost of locomotives, fuel distribution networks, and appropriate maintenance and servicing facilities are the primary direct expenses to be considered, there are other indirect costs that arise from eliminating complete interoperability of all locomotives across the network.

Operationally, depending on the exact deployment strategy, new yards may be needed to allow trains to exchange diesel-electric locomotives for ultra-low emissions locomotives as they enter zones with tighter emissions standards. Not only does this incur a capital expense to construct yard infrastructure to efficiently perform the exchange, the extra idle and switching time en route introduces the potential for large delays that could shift freight traffic to competing modes. For time-sensitive freight that is more competitive between modes, particularly high priority and intermodal freight, this type of delay and subsequent loss of traffic is potentially detrimental to railroad revenues. Modal shift could also offset any decrease in emissions due to the resulting increase in less efficient truck traffic. This presentation will present a framework to address these considerations in transitioning to ultra-low emissions technologies and conclude with a case study evaluation of a rail corridor carrying high-priority intermodal traffic.

Noise & Vibration

Mitigating Multi-source Noise Conditions at Hump Yards

Stuart Boykin - CSX Transportation, Inc.
Donald O. Seward, Jr. - AECOM

Class I Railroads across the US are challenged with mitigating ambient noise levels at Classification, or Hump Yards, due to the high-pitched noise created from “retarders” that reduce the speed of railcars as they roll from the high point of the Hump Yard through a series of tracks and switches until ultimately being attached to a designated train. CSX Transportation, Inc. has partnered with AECOM to improve ambient noise conditions around Hump Yards to protect workers’ hearing environment, particularly at outdoor activity areas. During this project, noise measurements were conducted using Bruel & Kjaer Investigator 2260H and Quest 1900 meters. A mathematical noise model to predict ambient Lmax noise levels resulting from operations of the master retarder and group retarders was developed using an advanced stationary source noise model (SoundPLAN). The SoundPLAN model was

further used to simulate various barrier options to determine feasible barrier configurations that would provide maximum hearing protection for workers near the hump. AECOM performed noise sensitivity analyses on numerous barrier material types with various Sound Transmission Class (STC) codes. The barrier surface absorption requirement was also tested with various Noise Reduction Coefficients (NRC). Challenging aspects of this project included multiple noise sources as well as receptors which created the need for area protection prioritization and blended noise level analyses. In addition to the noise modeling, AECOM performed noise barrier design services; including foundations, structural steel, noise panel material specification, anchor bolts, base plates, removable panels, drainage systems, and erosion and sediment control.

The Use of GIS in Rail Noise Modeling

Ahmed El-Aassar - Gannett Fleming Inc.

New and expanded transportation infrastructure is a key component in creating livable communities in congested urban areas. As part of the National Environmental Policy Act (NEPA) process, public involvement is required and public feedback and support are important for projects to move forward. Generally, such accessibility improvements are welcomed by the public, but the potential for increased noise is often met with opposition and concerns about railroad noise can stifle initiatives. One way to build community acceptance is to accurately compare railroad options. The quality of the results of noise effect studies depends on the quality of the data and models used. The integration of Geographical Information Systems (GIS) and noise models makes it possible to analyze an 84 mile corridor in South Florida between the cities of Miami and West Palm Beach.

The authors explain how they conducted the noise analysis for several railroad combinations; Freight Rail, Commuter Rail, Light Rail, Rail Rapid Transit, and Bus Rapid Transit, and the use of GIS modeling in evaluating these alternatives. The goal of the study was to compare existing freight train sound levels (with and without horn) to the proposed rail technology vehicle sound levels, in addition to providing an acoustic comparison between the proposed rail systems. Based on these comparison studies, the design with the least environmental impact can be selected and measures can be devised by which further environmental impact is reduced. Finally, the goal of this study was to support the decision-making process in choosing the locally preferred alternative.

Environmental Analysis

Management of the In-Situ Chemical Oxidation Using Compound Specific Isotope Analysis

Robert Pirkle - Pace Analytical/MicroSeeps
Patrick W. McLoughlin - Microseeps.com
Matt Burns - WSP Environmentsl

Traditional performance monitoring techniques for in-situ degradation rely on layers of costly and often misleading performance data to demonstrate contaminant destruction. This is because definitively attributing contaminant concentration decreases to degradation can’t be efficiently performed using concentration data alone. Compound specific isotope analysis (CSIA), when combined with concentration data can provide definitive evidence, which discerns contaminant destruction from non-destructive physical processes such as dilution and displacement. This presentation will discuss the fundamentals of CSIA and will then describe its use in the management of in-situ chemical oxidation.

Carousel of Progress: Progression of Data Management Techniques throughout the Lifecycle of Investigative and Remedial Actions at a Former Railroad Foundry

Andrea Brazell - GEI Consultants, Inc.
Andrea Brazell, Scott M. Keating - GEI Consultants, Inc
C. Russell McDaniel - Norfolk Southern

At a large remediation site in eastern Tennessee, a progression of data management techniques have been employed throughout various phases of investigation through remediation to improve engineering decisions and lower overall project costs. The site involves the remediation of hundreds of thousands of cubic yards of arsenic and lead impacted materials, in addition to the construction of 7 acres of water management features that will ultimately assist the city with their overall storm water management plan.

Initially, data were being managed in the form of hard copy laboratory data reports and simple Microsoft Excel® spreadsheets. As the project matured and more investigations were completed, site data, including analytical, geological and positional data were gathered from various sources to populate a relational database, powered by SQL Server and managed via EQuIS™. The relational database was then used to create Geographical Information System (GIS) figures that aided in remedial design and construction costs estimates. During remedial implementation, new data collection techniques were implemented to automate air quality monitoring, weather station data collection, in-situ X-ray fluorescence (XRF) data collection and high-precision global positioning system (GPS) data collection. The new data collection techniques involved the use of a rugged field tablet personal computer (PC), portable XRF instrument, air quality monitors with telemetry (real-time data), and customized EDGE™ software.

This presentation will illustrate how the data management and innovative data collection techniques used throughout the lifecycle of the project have improved and influenced engineering decisions and lowered overall project costs, especially during the remedial phase of the project.

Historical site data (analytical, geological and positional) were compiled from multiple sources to create a single relational database.

Outputs from the relational database aided in remedial design and construction costs.

Real-time data collection and monitoring via a cloud-based telemetry system at five air monitoring stations allowed for quick response to deteriorating air quality conditions during remediation. The fast response times resulted in site hazard and risk indices that have run below the site action levels.

Field analyzed metal concentrations in soil using a portable XRF in conjunction with tablet PC allowed field personnel to confirm that large areas of the site met/failed remedial goals, which allowed field teams to make real- time construction decisions.

High-precision GPS in conjunction with the tablet PC allowed field personnel to quickly geo-locate confirmation sample locations and mark-out designed key site features (water management ponds).

What's in a Number? Understanding Analytical Data Uncertainty, Reporting, and Data Qualification

Ann Bernhardt - AMEC Environment & Infrastructure, Inc.
Paul Kurzanski - CSX Transportation

The quality of environmental data directly affects the quality of management decisions made using the data. Poor quality data can lead to violations of permits or other regulatory requirements, cause unnecessary concern to potentially affected parties, or result in failure to take action in cases where action is needed. Despite all this, the role of result uncertainty and the interpretation of quality control results are poorly understood by many end users who rely on environmental analytical data as vital inputs to

management decisions.

Many factors affect the analytical result we receive in a laboratory report. While we may be quick to take a laboratory result and use for project decisions, it is important to take a closer look at the lab report and field quality control to gain assurance the reported data meets the data quality objectives for the site. The effect of formal result uncertainty on management decision quality is almost completely overlooked under standard USEPA data evaluation procedures. The quality control parameters that we evaluate are incomplete indicators of overall uncertainty, and need to be carefully evaluated to allow the data user to reach valid conclusions regarding result uncertainty and its effect on decision quality or compliance evaluation.

This presentation will provide an overview of the role of uncertainty in environmental sample results, along with practical tools and techniques for identifying and managing result uncertainty.

Attendees will learn:

-What is uncertainty in an analytical result?

-Key elements to check when reviewing analytical laboratory reports to evaluate extent of data variability and uncertainty.

-Review of field quality control data to determine field variability.

-How to interpret laboratory and validation qualifiers and effect on data use.

-Proactive measures to implement in a quality management program to limit sampling and analytical uncertainty.

Lost in the Cloud? There's an App for That

David McConaughy - Locus Technologies

How long does it take you to find every pizza place in your vicinity with a smart phone? Now, how long does it take you to see where your latest environmental samples exceed regulatory criteria?

The arrival of mainstream web-based mapping tools has provided the general public with spatial tools to support all kinds of activity, from GPS for navigation, to map-based search engines for finding goods and services, to simply exploring the world from their internet devices. Before the advent of Google Maps, Bing, GPS and smart phones, such spatial tools were reserved for GIS practitioners and cartographers. The question to be addressed in this presentation is: How have Environmental Management Information Systems (EMIS) kept pace with these technological advances?

Cloud-based EMIS provides a platform for the electronic management of analytical data, emissions data, compliance activities, and sustainability data, from the capture of electronic data, to the analysis of data, and culminating in regulatory reporting. When companies use Software as a Service (SaaS) models, they eliminate most of the difficulties associated with the management of complex data sets, and provide themselves the opportunity to more easily meet the changing regulatory requirements of the railroad industry. Since almost all environmental information can have a spatial component, particularly for railroads where assets are distributed over large areas, the ability of the software to provide spatial context to non-GIS professionals is a valuable function.

Mr. McConaughy will explore opportunities to leverage web-based technology to capture, manage, and report environmental data using cloud-based EMIS. Railroad-centric use cases including environmental incident investigation and response, risk assessment, field sampling & audit activities, analysis and interactive review of remediation sites, and preparation of map-based regulatory deliverables will be evaluated with respect to the applicable spatial technology. Regardless of the size and nature of an

environmental program, or the sophistication of the users, an EMIS equipped with these map-based tools will enhance understanding and facilitate decision making.

When less is more; data reduction as a data management strategy

Emma Driver - AMEC Environment & Infrastructure, Inc.

Recent trends in environmental site assessment have highlighted a shift towards more continuous data collection approaches including the use of laser induced fluorescence (LIF) sensors and membrane interface probes (MIP). With near continuous data collection comes a whole new set of data management challenges including how do you accurately analyze, manipulate and present large volumes of data without breaking your budget.

Using a number of case studies from 3D visualization projects completed as part of ongoing environmental site investigation and remediation projects, AMEC demonstrates how using appropriate data reduction tools can be an effective approach for visualizing large volumes of data in a 3D environment. Case studies to be illustrated include the collection of LIF and MIP data from multiple Sites. Large volume of LIF/MIP data was analyzed and reduced to effectively illustrate the distribution of non-aqueous phase liquid (NAPL) and provide almost real-time presentation of data to allow decisions regarding additional data collection to be made in the field.

Not only did the use of data reduction tools enable AMEC to create almost real time presentations of NAPL at select sites, but the accuracy of the data was maintained while reducing the statistical oversampling frequently produced by continuous data collection.

Compliance

Dragonfly Interactions with Rail Traffic vs. Roadway Traffic: a Comparison near Habitat of the Endangered Hine's Emerald Dragonfly

Matthew Hildreth - AECOM
Brian Smith – AECOM
Lori VanderKam – AECOM
Devin Sprinkle, Michael Avans - CN

The federally-endangered Hine's emerald dragonfly (Somatochlora hineana) (HED) breeds in shallow groundwater- fed marshes and seeps where dolomite bedrock is near the surface. Several remnant breeding populations occur in the lower Des Plaines River valley in Cook, DuPage and Will counties in northeastern Illinois. Two populations within a federally-designated critical habitat area are adjacent to the Illinois Central Railroad (ICRR) right of way (ROW) between Lemont and Lockport, Illinois, which carries Amtrak, Metra, and freight rail train traffic.

Due to the critical habitat designation, the U.S. Fish and Wildlife Service (USFWS) expressed an interest in the potential impacts from landowner activities, including rail traffic, in the vicinity of the HED habitat. ICRR contracted AECOM to conduct a multi-year ecological field study along a one-mile section of rail in Will County, Illinois that lies adjacent to critical habitat for the HED. The purpose of this study was to document the nature and extent of dragonfly/train interactions in the vicinity of the HED habitats in the area and to determine whether any strikes are occurring.

AECOM worked as a liaison for ICRR with USFWS and designed a survey protocol to provide needed data regarding HED presence and behavior in the rail corridor of concern. AECOM combined expertise in the biology and life history of the listed species and the USFWS regulatory process, along with a strong understanding of ICRR operations, to devise and execute a study that was performed during annually for a period of five years.

AECOM observers trained in dragonfly identification conducted visual surveys along a one-mile section of railroad right of way each summer for five consecutive years. Observers documented whether dragonfly species were present in the rail corridor, and made observations of dragonfly behavior during the passage of trains. The study also included inspecting the railroad tracks and bed, as well as an adjacent two-lane public road, for signs of dragonfly and other insect mortality. The study required the mobilization of a dedicated team of surveyors, biologists, and safety specialists to the study area within a six-week annual HED activity period during specific weather conditions, while at the same time maintaining ICRR safety protocols and operational requirements.

The study evaluated and quantified the presence or absence of HED in or near the rail corridor each year, and also documented changes in the number of total dragonfly observations over the course of the five year period. No HED or other dragonflies were observed being struck by passing trains and no HED or other dragonfly mortality was observed within the railroad ROW. In contrast, several dead non-HED dragonflies were observed among the larger group of insect carcasses found along the adjacent public road each year, and were presumed to have been struck and killed by cars or trucks.

The Trouble with Towers

Kevin Keller - HDR
Keith Brinker - CSX
Aubyn Williams - HDR

CSX, like many other railroads, has been working to meet the December 2015 deadline for Positive Train Control (PTC) towers to be operational. In order to construct PTC towers, the railroads must obtain Federal Communications Commission (FCC) licenses for each antenna and new tower. The FCC is authorized under the Communications Act of 1934, as amended, to require applicants who are planning to construct new antenna support structures or antennas collocated on existing structures by or for the use of applicants, tower owners, and licensees of the FCC to comply with environmental and historic preservation laws including National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA).

CSX developed a streamlined and methodical process to ensure all of its PTC towers are compliant with NEPA and NHPA. The process involved a preliminary desktop screening for environmental resources, followed by a detailed review of cultural resources and processing through the FCC's E-106 system. The preliminary desktop screening was simplified using a Geographic Information Systems (GIS) model. CSX first developed a database of environmental resources within one mile of its entire track, containing floodplains, wetlands, Native American lands, recreation areas, protected lands, and national register of historic places sites. The model was then used to simultaneously screen hundreds of tower locations and flag any towers with environmental resources in a specified distance. Towers located within 100 feet of a resource were flagged for further review. Once a tower passed NEPA review, qualified cultural resources professionals prepared cultural resource reports that documented any known archaeological and historic resources within the defined area of potential effects. The tower was then entered into the FCC's E-106 system. Once all tribe/THPO and SHPO concerns were satisfied, the tower was closed in the FCC's E-106 system and allowed to proceed to construction. CSX diligently documented all steps, analyses, and coordination in a Microsoft Access database hosted on a SharePoint site allowing the information to be easily accessible and formatted for back up storage. This presentation will provide a summary of these above processes.

Cultural Resources Clearance – Always Expect the Unexpected. CSXT Inspection Yard Project, Casky, KY

Marty Marchaterre - AMEC Environment & Infrastructure
Mary Motte Fikri, Rich Stallings - AMEC Environment & Infrastructure
Keith Brinker – CSX Transportation, Inc.

It's always best to start early and to "expect the unexpected" when coordination with the State Historic Preservation Office (SHPO) is required for a project, regardless of size. Jumping through the cultural resources hoops for the 283-acre Casky Inspection Yard Project was no exception. As part of the environmental due diligence, CSXT reviewed the project area using existing databases to ensure that no known cultural resources sites were recorded within the project area. Additionally, CSXT sent concurrence requests to the SHPO that no archeological and/or architectural sites were known to occur within the proposed project area. Within the same time frame, CSXT submitted an individual USACE 404 permit application for the project. Subsequently, the USACE issued a public notice seeking comment.

Although somewhat unexpected due to the size of the site, initially the SHPO responded to the USACE's public notice that the project was cleared by their office and no additional surveys would be required. However, later in the review process - discussions between the SHPO and the USACE led to a request for a full Phase I archaeological survey and an architectural viewshed survey for the 283-acre site. As this request came somewhat late in the process, CSXT had to take action immediately and stay in close coordination with both the SHPO and the USACE archaeologist to ensure that concurrence could be achieved in a timely manner to limit the adverse impact to the project schedule.

CSXT's consultant (AMEC) quickly mobilized to the field and completed the Phase I archaeological survey within one week of the SHPO/USACE's request by working through a weekend. Several archaeological (historic and pre- historic) sites were discovered within the ROW. Overall, AMEC identified 8 archaeological sites from the field investigation. Through careful archival research and site evaluation, CSXT was able to satisfy all parties that the sites were not eligible for the National Register of Historic Places and therefore, no further investigation was needed.

Simultaneously, for the architectural viewshed survey, area reconnaissance and archival research was adequate for evaluating indirect visual, lighting, noise and vibration impacts for the majority of the project area. At one end of the project, a more detailed investigation was required due to the number of known historic properties within the town of Pembroke. To expedite the process, coordination with SHPO resulted in preparing a letter report instead of the usual full report.

Through close coordination, accelerated field activities, and weekly conference calls, archaeological field surveys and management summaries were completed within two weeks of notice to proceed. The full Phase I archaeological report was delivered three weeks later on the day before Christmas. While the full report was being reviewed, USACE and SHPO granted grading work on the lead-in tracks to proceed. Full concurrence on the Phase I report was received in February.

Early coordination and clear communication of survey requirements from both the USACE archaeologist and SHPO is vital to avoid delays later in the permitting process.

Does your rail yard really need a Facility Response Plan?

James Cunningham - BNSF Railway
Peter T. Masson - Conestoga-Rovers & Associates, Inc.

Federal regulations require all facilities that store more than 1 million gallons of fuel to consider developing a Facility Response Plan (FRP). The purpose of the FRP is to protect sensitive biological and water resources that could be damaged by a catastrophic release of fuel. But what if those resources are

not present? Or what if even a catastrophic release would not impact any biological or water resources? In those cases, does your rail yard still need a FRP? While some operations managers may assume that a FRP is needed, this presentation will examine recent case studies in which modeling the potential release per 40 CFR 112 provided valuable insight into the fate and transport of fuel, helping to answer those key questions that determine whether an FRP may or may not be required under Federal law along with the associated costs to maintain the plan.

Understanding Changes to the Fisheries Act and the Impact on Rail Industry Projects

Laura Lawlor - Conestoga-Rovers & Associates
France Moreau - Canadian National Railway

Rail industry Environmental Managers are constantly challenged with acting as stewards for their rail corporation while working with Construction Managers to achieve corporate operational objectives. This can be a fine balance… especially when the rules change.

In July 2012, the Canadian Fisheries Act (Act) underwent significant changes which may impact on-going and new rail projects, as well as the responsibilities of Environmental Managers. The changes focus the Act on protecting the productivity of recreational, commercial and Aboriginal fisheries by avoiding serious harm to fish/fish habitat that support a fishery.

The recent amendments to the Act also shift the responsibility in avoiding serious harm to fish that support fisheries onto the proponent for project self-assessment, leaving Environmental Managers tasked with ensuring project compliance with the Act and regulations.

This paper will present:

•Former review and approval process

•Key changes to the Act

•What proponent project self-assessment means

•When is agency review required

•Rail industry examples

Early consideration of Fisheries Act implications remains important to any rail activities in or near water. Understanding the changing regulatory landscape will provide rail industry Environmental Managers and Construction Managers with the necessary tools to effectively plan, budget and execute works while conducting these works in an environmentally responsible manner.

Utilization of an Environmental Management Information System for an Environmental Auditing Program

Eric Chang - Norfolk Southern Railway

The Norfolk Southern Environmental Auditing Program utilizes an Environmental Management Information System (EMIS) to provide a process by which several key stakeholders can execute the many components of an auditing program. These include initiating and scheduling an audit, reviewing and commenting on audit findings, proposing resolutions and completing corrective actions, approving and rejecting resolutions and corrective actions, and verifying and confirming that the findings have been closed.

The relational database capability of the EMIS also helps the auditing program capture, analyze, and report audit data. Through the use of reports and dashboards, management can be notified of outstanding issues, be involved in risk prioritization, and share knowledge. The data can also be used for trending, risk evaluation, and root cause analyses to implement proactive incident prevention and company-wide long-

term solutions, such as the creation or improvement of awareness and training programs and corporate-wide policies.

This presentation will step through how Norfolk Southern created its Environmental Auditing Program Module, and will discuss the beneficial outcomes and lessons learned from the process and emphasize these 3 main points:

The EMIS is highly dependent on how a company organizes and executes its audit program. Know how your business is organized. Fit the EMIS to your organization, not the other way around. Only use the EMIS where it improves the program, not complicates it.

Configuration flexibility is key: You must revise on the fly, more in the first year of the EMIS audit module than in any other years.

Know your stakeholders: You should seek review and feedback of the system from your Law Department, Environmental Support Staff, and a random sampling of auditees during early development, and even after a few "dry runs." Simpler is better.

Fueling System Compliance – Inspect, Report, Repair and Maintain for Efficiency

Christopher Gunn - TRC
John Hasterlo - UPRR
Craig Schellbach - TRC

Rail yard fueling systems are central to railroad operations and the movement of freight. Over time, fueling systems will age, and maintenance issues will arise. Regular inspection, reporting, repairs and maintenance are critical in avoiding fuel system downtime, maintaining railroad efficiency, and maintaining compliance with Spill Prevention Control and Countermeasures Plan (SPCCP) requirements.

TRC provides monthly inspections of Union Pacific Railroad's (UPRR) locomotive fueling facilities and quarterly inspections of tank systems at 56 locations throughout the UPRR system through implementation of the Designated Site Representative (DSR) program. The DSR inspects each component of the fueling system including loading/unloading equipment, piping, pumps, tanks, and service track equipment. The DSR also observes and recommends safe operation practices for fueling procedures.

Inspections are followed with written reports that include a rating for each component and a recommendation for each deficiency. TRC catalogues each deficiency in a database and tracks each item from the time it is discovered to resolution. TRC assists UPRR in obtaining contractors to remedy issues in a timely matter and provides progress reports on each deficiency. This information is made available to all UPRR environmental managers and local personnel.

The DSR program documents all inspections, tracks all deficiencies system-wide, and tracks repairs to maintain compliance with SPCC regulations. As an independent contractor, TRC's staff is able to provide a discerning eye that is consistent system-wide, reducing the potential for variability in reporting deficiencies. TRC's management of the DSR Program provides a streamlined, single point of contact and enables a system wide environment of compliance and improvement in the performance of environmental monitoring for locomotive fueling and storage facility systems.

Compliance

Challenges of replacing or repairing railroad assets in sensitive areas. CSXT Culvert Outfall Repair Project, Cumberland, MD

Lance Rasnake - AMEC Environment & Infrastructure, Inc
Troy Neisz - AMEC Environment & Infrastructure, Inc.
Paul Kurzanski - CSX Transportation, Inc.

In winter 2013, CSX Transportation, Inc. (CSXT) began evaluating damage at a culvert outfall that carried stormwater from the CSXT Cumberland Terminal and discharged into the historic Chesapeake & Ohio (C&O) canal. In 1957, the Maryland Department of Transportation presented plans, to what is now CSXT, to construct MD Route 51 adjacent to the Cumberland facility which would lead to more stormwater runoff in addition stormwater from urban development in the Town of Cumberland. At this time, the original culvert was replaced with a 72" culvert across the terminal to convey stormwater from MD Route 51 to the C&O canal.

In 1828, the United States initiated construction of the historic C&O canal; after 22 years of construction, the canal was completed to Cumberland, MD (the original plans to extend it to the Ohio River in Pittsburg were abandoned). Due to right of way issues and legal battles, the C&O Canal and the Baltimore and Ohio (B&O) Railroad, now known as CSXT, shared the canal right of way until CSXT obtained full ownership in 1889.The canal was used from 1830 to 1924 until devastating floods ultimately caused the canal to cease operations. In 1938, the abandoned canal was obtained from the B&O by the United States in exchange for federal funding. The area is now known as the C&O Canal National Historic Park, which offers hiking and biking along the historic towpath.

Over the years the canal in Cumberland, MD has silted in and does not convey water as it was intended to do. This condition forced the stormwater from the outfall to erode/cut a new flow path from the outfall to the Potomac River. The new flow path consisted of 30 ft. gully across the C&O canal and its towpath. To allow continued use of the bike path, the National Park Service (NPS) constructed a temporary pedestrian bridge across the gully until a repair could be funded and constructed.

In early 2013, CSXT agreed to fund and construct a repair of the gully. CSXT, AMEC, and NPS worked with design engineers to come up with a solution to transport the stormwater to the Potomac River, while allowing for restoration of the damaged C&O canal and its tow path.

To expedite the project, CSXT and NPS began coordination with MD SHPO, the United States Army Corps of Engineers, Maryland Department of Environment and, Allegany County to obtain the appropriate authorizations to begin the work immediately. All parties agreed to allowing the project to proceed under emergency authorization. The project is a great example of how early and close project coordination by the railroad and the reviewing agencies can foster a sense of team work towards a common goal – all for the better of the community in which we operate and live.

Compliance Challenges in Meeting the EPA Area Source Boiler MACT Rule with 59-Year Old Coal-Fired Boilers

Bill Wagner - Norfolk Southern Railway
Kevin Jameson - AMEC

Norfolk Southern (NS) operates three 80-million British Thermal Units per hour (80 MMBTU/hour) coal fired boilers constructed in 1956 at its locomotive overhaul and rebuild shop in Juniata, PA. Throughout

much of this time these boilers were grandfathered from many of EPA's new source rules. Having to meet the latest environmental standards with antiquated operating equipment presented many challenges. This presentation will explore the operational and environmental challenges of complying with the Area Source Boiler Maximum Achievable Control Technology (MACT) Rule.

EPA published its Final Rule for National Emission Standards for Hazardous Air Pollutants for Area Source Boilers (40 CFR Part 63, Subpart JJJJJJ) in the Federal Register on March 21, 2011. On December 23, 2011, EPA proposed specific parts of the standards for reconsideration, and then on February 1, 2013, published its final action on reconsideration for those specific elements. This Rule contains compliance provisions for both new and existing boilers, and its initial compliance deadline for existing sources was established as March 21, 2014.

Prior to conducting any compliance tests, NS made extensive investigations geared towards identifying specific improvements for air flow, heat capture, and overall combustion efficiency within the boilers.

As required by the MACT Rule, NS had to perform a complete energy assessment of the entire boiler system. NS also had to develop an understanding of its emissions in advance of formal compliance tests. Since the boilers were previously grandfathered from source testing requirements, NS needed to have a solid understanding as to where we stood with actual boiler emissions and compare these to the new MACT emissions limitations.

Boiler operating procedures were evaluated in order to optimize boiler efficiency and minimize products of combustion (principally carbon monoxide, CO). More specifically, the railroad:

Developed a compliance test plan.

Developed a site specific monitoring plan.

Inspected and repaired the air pollution control equipment to optimize removal efficiencies.

Conducted initial performance tests for mercury (Hg), and CO.

Established operating limits during the performance tests.

Conducted coal sampling and performed a fuel analysis.

Monitored and collected scrubber and boiler operating data during the compliance tests.

Established operating limits based on the data collected.

Operated the monitoring system and collected data at all times while the boilers are operating

General Secondary Containment for Above-Ground Fuel Piping

David Warchol - Norfolk Southern Railway
Lara Thurn, Katherine Gurd - AECOM

In the last few years, many railroads have decided for economic, maintenance, and environmental reasons to construct fuel oil lines above ground rather than buried below ground. In doing so, the new above-ground fuel lines are regulated by 40 CFR 112 – Oil Pollution Prevention. One particular provision of the law is that fuel piping that is outside of traditional secondary containment (such as diked areas around large above ground storage tanks) must have "general containment." This presentation will discuss what general containment is, a programmatic approach to compliance with the requirement, and the various ways that the Federal requirement can be met based on site inspections and various design and construction methods.

Containment method, design, and capacity are determined by good engineering practice to contain a potential oil discharge until cleanup occurs. For general containment, engineering solutions can include:

double-wall piping, curbing, culverts, gutters or other drainage systems, spill diversion or retention ponds, concrete walls, and sumps and collection systems.

Norfolk Southern (NS) initiated a programmatic approach to evaluate secondary containment across its network. Initial assessment activities began at a yard in Georgia to evaluate existing aboveground piping for potential migration of fuel oil spills to storm water discharge locations. A number of areas were identified as requiring additional general secondary containment measures and were evaluated in order to determine the most cost- effective methods for adhering to the requirements in 40 CFR 112. From the Georgia project, a systematic approach to evaluating and meeting site-specific needs for general containment was developed and rolled out system wide across NS to over two dozen facilities.

Environmental Analytical Issues

The Use of LVI in Environmental Analysis to Meet Project Goals: Advantages and Pitfalls

Charles Neslund - Eurofins Lancaster Laboratories Environmental

Analytical instrument manufacturers and chromatography product suppliers all have applications espousing the use of LVI (Large Volume Injection) as a valuable application to achieve better (aka lower) limits and meet project requirements. But when these techniques are used with real samples and analysts, do they live up to the hype.

We will discuss a lab's motivation for using LVI, does it generate equivalent data? What is the benefit to the client? Is it faster, better, cheaper? Are there environmental benefits to employing the LVI technique?

Environmental Response & Emergency Planning

Maintaining the Confidentiality of Information During an Emergency Response: Your Counsel May Be Your Best Friend

Christopher D. Ball, Esq. - Manko, Gold, Katcher & Fox, LLP

During an emergency response, a great deal of communication occurs between railroad personnel, their outside emergency responders and the regulators. In an environment where the events resulting in an emergency response, or the emergency response itself, will often give rise to litigation or government action of some type, it is important for all responders to be familiar with basic concepts such as the attorney client privilege, attorney work product and client work product protections. This program will also address best practices for maintaining the confidentiality of sensitive information during an emergency response.

Shoreline Cleanup and Assessment Technique

Matt Stokes - STARS, LLC

Provide an introduction and instruction on the Shoreline Cleanup Assessment Technique and its tools, aiding in critical near-water or waterborne incident planning.

Narrative: Oil spill preparedness is paramount to assuring a timely and cost effective approach towards an event that is highly variable in complexity. Shorelines vary greatly requiring a systematic and habitat specific approach to cleanup operations. The physical properties of the released material and the degree of shoreline contamination should be factored along with the physical and biological makeup of the habitat. Subsequent cleanup guidelines and endpoints provide important structure to response efforts.

The Shoreline Cleanup Assessment Technique had its genesis during the Exxon Valdez spill where a segmented and systematic approach to containment and cleanup efforts was necessary. NOAA has developed this system with input from the USEPA, USCG and USFWS. This methodology continues to be refined with recent releases on the Yellowstone and Kalamazoo rivers providing valuable insights to

the critical role of SCAT in the management of an incident. Located in the Planning section of the Incident Command System (ICS), the SCAT Team provides critical input towards incident objective creation. The team continues its role by evaluating tactics as to their effectiveness and environmental impacts of the spill and associated cleanup efforts.

This presentation will provide an overview of the SCAT process and the role of the responsible party in the SCAT. Specific roles within the system are reserved for the responsible party allowing for input toward endpoint setting and tactics to reach those goals. Past incident specific examples will be used to underscore the benefits associated with a railroad's understanding of the process and importance of their inclusion of trained representation in this process.

Working Collaboratively to Rapidly Respond to a Leaking Underground Fuel Line at an Active Intermodal Facility

Thomas Wurzinger - Geosyntec Consultants

When a diesel fuel release occurs, it is imperative to stop the release and contain the fuel in a timely manner. When the source of the release is from an underground fuel line that is located underneath an active intermodal yard, working with other departments to stop and contain the release while minimizing disruptions to operations is critical. Personnel from Operations, Mechanical, and Environmental worked with emergency responders, regulators, consultants and contractors to minimize short and long term impacts to the environment while minimizing disruptions to operations and track downtime.

This presentation will provide a summary of Norfolk Southern' s response to this release and what was done to minimize impacts to the environment while maintaining intermodal yard operations. Emergency responders used barrier booms to contain the release at an offsite creek, used vacuum extraction and absorbents to remove fuel from the creek, and isolated a 400-ft section of storm water pipe that had diesel fuel impacted groundwater infiltrating into it. Operations discontinued fueling operations from the suspect fuel line and used tanker trucks to perform direct-to-locomotive fueling operations. Mechanical conducted pressure and leak testing on the suspected fuel line, while Environmental installed soil borings and wells adjacent to the fuel line to evaluate the presence and distribution of free product in groundwater.

Once the source of the release was identified, emergency responders managed storm water accumulation from the isolated storm water pipe, while mechanical excavated soil, and removed and replaced an approximate 400-ft section of fuel line from underneath five active rail lines. Environmental oversaw the recovery and disposal of 380,000 gallons of impacted water, the disposal of impacted soil, the installation of recovery wells and monitoring wells, the replacement of a cracked manhole, and the in-situ lining of 400-ft of storm water pipe with chemical resistant cured-in-place pipe (CIPP).

With personnel from multiple departments working collectively and collaboratively, the source of the fuel release was identified, short term impacts to the creek were mitigated; the leaking fuel line was repaired; and additional long term liability was reduced by removing impacted soil and groundwater from the release area and by slip lining a leaky storm water pipe to mitigate infiltrating groundwater.

Fight Fire with Teamwork

Daniel Dyer – CSXT
Michael Sykes – AMEC
Mike DeLong -AMEC

On the eve of Saturday, April 26th, a fire engulfed an 800 foot long timber-lined railroad tunnel near Robinson Creek, KY, cutting off service to two active coal mines that employ over 500 personnel and

produce over 2 million tons of coal per year.

The response included a team of safety specialists, structural engineers, construction and environmental resources to inspect the damage reconstruct the tunnel and manage environmental impacts that included community air quality, fire suppression waste water run-off, and resultant solid wastes.

First responders attacked the blaze for two days but could not bring the fire under control due to the large fuel source (wood) and limited access. At that time the ends of the tunnel were filled with soil to limit the fire intensity and allow time for the fire to consume more of the fuel before reopening the tunnel for assessment and reconstruction activities.

The challenges that had to be overcome in an accelerated timeline included:

Community air quality (smoke, relative close location of homes and a school) concerns.

Safe work access to the tunnel (burning fires, coal seams, ventilation, heat).

State environmental permits secured in days.

Fire suppression water in a remote location.

On-site water treatment for particulates, chlorine, VOCs and PAHs.

On-site treatment of particulates (PM10) from smoke to meet National Ambient Air Quality Standards (NAAQS).

Waste management of over 25,000-tons of stone, soil and post fire debris.

Construction and safety management of a 24-hr work force.

Chemical concerns for site soils and water from creosote treated timbers.

Community and public relations management due to the associated stoppage of the affected coal mine.

Site restoration efforts started with several project and regulatory driven documents including a Health and Safety Plan (HASP), run-off water treatment plan and a waste management plan. Two environmental permits were secured (water use and on-site wastewater treatment and discharge). A wet scrubber was field constructed to treat over 40,000-cfm of smoke pulled from the tunnel to ventilate the space for access and construction. An on-site wastewater treatment plant was constructed to treat the site run-off and firefighting water for sediments and organic compounds. These environmental systems allowed engineers and contractor to access the tunnel structure to perform the debris removal and structure restoration needed to put the tunnel back in service.

Structural integrity was regained foot by foot in the tunnel by scaling loose rocks and installing hundreds of rock bolts in the ceiling and walls and then covering that area with a layer of shotcrete. Once a portion of the structure was structurally secured the rock debris was removed.

Over 25,000 tons of rock, soil and fire debris were removed from the tunnel, much of it was still very hot (over 1,700˚F). Work proceeded seven days a week, around the clock extinguishing fires, controlling air emissions, securing the tunnel structure, treating VOCs and PAHs in runoff water, and managing debris returning the tunnel and coal mine back to work in 45 days.

Remediation

Field Performance of In Situ Geochemical NAPL Stabilization

Jim Mueller - FMC Corporation

In situ geochemical stabilization (ISGS) entails the use of modified sodium permanganate (NaMnO4) designed for in situ management of non-aqueous phase liquids (NAPL). When added to an impacted aquifer, the ISGS reagents react with organic (and certain inorganic) constituents of interest (COI) present

as soil residuals (e.g., NAPL or ganglia). Various reactions associated with ISGS processes serve to physically encrust NAPL and rapidly reduce aquifer permeability, thereby stabilizing NAPL residuals and accelerating remediation by natural attenuation of dissolved phase COI / plume constituents via source stabilization and flux reduction.

Field testing of the ISGS approach was undertaken in January 2008 at the Cabot Carbon / Koppers wood-treating site in Gainesville, Florida where soil and groundwater are impacted by organic wood preservatives. After only 60 days post-treatment, the ISGS technology was shown to provide safe, rapid, effective and predicted long-term treatment as follows:

Reduced Soil COI Concentrations. An average 50% reduction of total PAHs in soil was observed, with the average soil PAH concentration being reduced from of 7,250 mg/kg soil to 3,600 mg/kg soil.

Reduced COI Concentrations in Soil Leachate: The amount of site-specific COIs present in soil leachate was reduced by 95%, with an average total of 11,700 mg/L total PAHs present in the leachates prior to treatment and an average of 560 mg/L of total PAHs being present in the leachates from the soil cores recovered after treatment.

Rapid, Uniform and Environmentally Stable Encrustation of NAPL residuals: Optical Microscopy, Electron Probe Microanalysis, Scanning Electron Microscopy and Transmission Electron Microscopy studies showed that the precipitates formed coatings around aquifer grains and NAPL droplets. The coatings were composed of crystalline aluminum silicate hydroxides that were not representative of conventional manganese oxyhydroxides that would typically form with the use of standard permanganate. Unlike the manganese oxyhydroxide coatings, these coatings are not expected to be affected by changes in the redox potential of the aquifer and are therefore considered to be stable and persistent with time.

Reduced Permeability: Between 27 to 81% of the pre-injection pore space was filled in lightly coated to heavily coated areas, respectively.

The presentation will summarize subsequent regulatory acceptance (State and Federal) and subsequent full-scale technology implementation. Results from field scale applications at other NAPL-impacted sites in Alabama (karst), Colorado (fill), Idaho (silty, clay) and New Jersey (silty sand) will be summarized. The presentation will outline field challenges encountered, and will present engineering designs and cost data associated with large-scale field application. Issues associated with longevity and performance monitoring will also be discussed.

Coupling Oxidative and Reductive Treatment Technologies for Integrated Site Remediation to Overcome Site Challenges

Stephanie Turkot - Geo-Cleanse International, Inc.

Chlorinated solvent DNAPL site remediation remains a daunting challenge that often requires integration of multiple technologies in order to achieve cleanup objectives. Technologies must be adapted to variable site conditions and flexible to the evolving nature of the source and plume as remediation proceeds. We present a pilot test case study of a novel combination of technologies to address a particularly challenging site characterized by relatively high source area TCE concentrations (>200,000 µg/L), low permeability saprolite and highly transmissive bedrock, low natural attenuation, and a large plume area with limited accessibility. Our approach couples an aggressive source-area remedy with a long-lasting, low maintenance plume area remedy to address long-term advection and diffusion of VOCs from inaccessible areas. We integrated in-situ chemical oxidation using potassium permanganate in the source area, with in-situ chemical reduction using zero valent iron barriers in the downgradient plume area. Reagents were injected as high-solids slurries to distribute large reagent volumes effectively within specific and focused

target zones in the low-permeability saprolite and a fractured zone in bedrock. Modeling and monitoring were conducted as part of the design and implementation, respectively, as a basis for reagent requirements, injection point horizontal and vertical spacing, scale-up for future expansion of the treatment, and to ensure that the antagonistic reagents do not interact and destroy each other. Eighteen months of monitoring has been complete to date. Permanganate has persisted in the source area groundwater, with a radius of influence of up to 40 feet and VOC reductions of 84-100% in groundwater. Coring has documented that the ZVI was distributed at least 15 feet horizontally from each boring, with associated shifts in pH and ORP, and VOC reductions ranging from 46-100% in monitoring wells farther downgradient of the ZVI barrier. Quarterly monitoring of VOC and inorganic chemical parameters is ongoing to confirm the lifetime and effectiveness of the remedies. Full-scale expansion of the pilot test remedies is currently underway.

Effective Field Screening Technique to Delineate Arsenic Impacted Soil and Reduce Assessment Time and Costs

John Spencer - Geosyntec Consultants
Samuel Ross - CSX Transportation

Geosyntec Consultants (Geosyntec) successfully utilized field screening techniques to assess arsenic impacted soil at several CSX Transportation, Inc. (CSXT) sites to reduce assessment time and costs. Geosyntec utilized a handheld X-ray Fluorescent (XRF) analyzer to gather real-time arsenic concentrations within shallow soils during the assessment of several former switchyards and sections of former rail lines. The XRF was used in the field to identify and delineate areas for excavation as well as refine the excavation limits of previously delineated areas, therefore reducing the volume for remediation. Soil samples were initially homogenized and then scanned multiple times with the XRF to determine a mean arsenic concentration of the sample. If the results of the field screening were within acceptable target criteria a split sample was submitted to a fixed based laboratory for confirmation. If the results were above the target criteria, a step-out sample was collected for screening and the process was continued. The results of the confirmatory analysis consistently indicated greater than 95% correlation success. By utilizing the XRF for field screening prior to submitting soil samples to a laboratory, Geosyntec was able to minimize field mobilizations and unnecessary laboratory analysis as well as reduce assessment and remediation cost. This approach can be used for multiple common contaminants including various metals and polycyclic aromatic hydrocarbons (PAHs).

Risk & Liability Management

Know your Aroclor! PCBs in Building Materials and Relevance to the Railroad Industry

Frank Ricciardi, George Naslas - Weston & Sampson

Polychlorinated biphenyls or PCBs are substances that were widely used in construction materials and the electrical industry due to their favorable physical properties such as fire resistance, flexibility, and low flammability. The presence of PCBs has been recently documented in numerous common building materials including caulking, paints, sealants, hydraulic fluid, electric cable coatings, sealants, plasticizers, roof/siding products, molding, and HVAC systems. These materials that act as sources of PCBs are referred to in the Toxic Substances Control Act (TSCA, 40 CFR 761) as "Bulk Product Waste" The United States Environmental Protection Agency (EPA) considers the presence of PCBs in bulk product waste at concentrations greater than 50 parts per million an "unauthorized use" and a violation of the TSCA regulations. Concentrations in common building materials such as caulking, paint, and plasticizers have been documented up to 100,000 mg/kg. In addition, these materials often contaminate

adjacent materials such as concrete, brick, and wood.

Railroad environmental professionals need to be aware of this reinterpretation with regard to management of building materials that may contain PCBs. Heavy maintenance facilities, including train wash stations and engine terminals, may contain dozens of materials that can potential pose human health risk, contaminate stormwater or washwater discharges, and require special management/disposal procedures for renovation or demolition projects. For a large train wash facility, PCBs were routinely being detected in the required monthly NPDES discharge testing program. The owner of the facility tested numerous materials on the train (and spent significant resources) to determine the source of the PCBs. In the end, the PCB source was discovered as the caulking in the concrete train wash trench.

Also, numerous owners have been dealing with the issue of PCBs in building materials for renovation and demolition projects. The Toxic Substance Control Act (TSCA, 40 CFR 761) stipulates that the occurrence of PCBs in building materials at regulated levels constitutes an unauthorized use and the disposal of these materials must comply with the TSCA regulations (and sometimes state-specific PCB regulations). A general knowledge of the various types of Aroclors (the Monsanto trade name for PCB mixtures) that are present in building materials versus the type of Aroclors that railroads use in operations is essential for evaluating PCB sources. Management of these materials may require extensive testing, risk characterization, remediation plans, and construction controls.

This presentation will discuss these issues and other related PCB topics for railroad environmental staff to understand and appropriately manage PCB-impacted materials. In addition, we will discuss analytical issues related to the forensics and testing of PCBs relative to specific railroad operations/facilities.

area, regulatory closure documents outlining the requirements of the cap and maintenance program, and general regulatory information for the site from the State's database. A process is also being developed to notify CN personal where use restrictions are present at a site.

In addition to information about the cap inspections, the GIS database includes locations of all State of Wisconsin BRRTS sites, as well as separate identification of other closed CN BRRTS sites (and inclusion of related closure documents) that do not have annual cap inspection and maintenance requirements, but have continuing obligations regarding future soil and groundwater management as described in the GIS Registry documents for such sites. Other currently open CN BRRTS sites are also included on the GIS database.

Proposed Revisions to Louisiana Department of Environmental Quality Risk Evaluation/Corrective Action Program – RECAP 2014

Lance Fontenot - ARCADIS

The Louisiana Department of Environmental Quality (LDEQ) Risk Evaluation/Corrective Action Program (RECAP) regulation (LDEQ 2003; Louisiana Administrative Code (LAC) 33:I.Chapter 13) is LDEQ's primary statutory mandate for risk-based remediation activities. The program was developed in 1998, with revisions in 2000 and 2003. Eleven years have passed since the last comprehensive update of RECAP.

LDEQ RECAP includes a Screening Option (SO) and three management options (MO-1, MO-2, MO-3) that are used to determine if remediation is necessary to achieve protection of human health and the environment. RECAP Screening Standards (SS) are conservative standards used to rule out the potential risk from exposure to constituents released into the environment and to determine if additional evaluation is required under a management option. RECAP MO-1 standards are regulatory standards that are protective of human health and the environment and that utilize recommended default exposure

parameters and toxicity criteria. RECAP MO-2 and MO-3 standards are derived with the increasing use of site-specific data, but are also more complex and require increased regulatory involvement.

Proposed revisions to RECAP were issued for formal rulemaking and public comment in early 2014. Proposed revisions to the evaluation of TPH, PAHs, and lead are of particular importance for railroad sites. Additional text and figures are being added to clarify "soil source area" and Constituents of Concern (COC) with special considerations for Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAH), Produced Water, Lead, Dioxins, Mutagens, Nitrogenous Compounds, Sulfates, and Acids/Caustics. The key proposed technical changes are to revise the regulation in accordance with current USEPA risk assessment recommendations which will result in a more consistent approach to evaluating sites across regulatory programs.

Evaluation of TPH will focus on the more definitive TPH fractionation analytical methods which typically results in less remediation. Revised soil standards for TPH fractions representative of diesel are generally higher and some fractions will have standards above 10,000 mg/kg. However, groundwater TPH standards are generally lower which may result in more stringent cleanups at railroad sites. For PAHs, a benzo[a]pyrene equivalent approach (BAPE) has been added for addressing anthropogenic background levels in soil which should decrease cleanup costs.

For railroad sites with shallow groundwater impacts, less remediation should be required. The revised rule will use the 95% upper confidence level (UCL) on the mean concentration instead of the maximum concentration as the point of comparison for Groundwater Classification 3 (non-drinking water) sites.

An overview of the proposed changes to RECAP will be presented with an emphasis on the impact to the investigation and remediation of railroad sites.

Refining a Consent Order Boundary: Benefits to Responsible Parties and the Community

Ali Wright - ARCADIS

During Consent Order (CO) negotiation, there is often limited understanding as to where the site boundaries need to be drawn to capture the environmental issues because investigation data are limited and/or the quality of the data may be questionable. Once the CO boundary is established and until the conditions of the CO are met, any potential purchaser will face liability challenges when attempting to return that land to productive use. This can lead to time and money being spent to address non-impacted land that could be on the market. By defining the site boundary to accurately capture the environmental issues, the CO obligations can be focused on the areas of environmental liability and the non-impacted property can be restored to productive use.

In the early 1900s, Reilly Tar and Chemical (now known as Vertellus Specialties Inc.) operated a creosote-based wood treating facility on leased property owned by Union Pacific Railroad in southern Illinois. In 2007, a CO was signed obligating the Responsible Parties (Vertellus Specialties Inc and Union Pacific Railroad) to conduct a Remedial Investigation and Feasibility Study (RI/FS) at the site. The site is regulated by the Illinois Environmental Protection Agency's (Illinois EPA) Federal Site Remediation Section and therefore the RI/FS must adhere to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) guidelines.

As is often the case, the CO established a site boundary based on the entire property owned by Union Pacific Railroad (approximately 230 acres in this instance) instead of only the area containing the former process, waste management, and potentially impacted surrounding areas (approximately 74 acres). The Responsible Parties set out an initial approach for defining the soil impacts in the former process areas and distinguishing the process areas from the non-process areas of the site using Laser Induced

Fluorescence (LIF). This investigation technique resulted in high data density while reducing sample analysis costs. This initial investigation allowed the site to be addressed as two areas, process and non-process, with separate data collection requirements. The process areas were addressed by more focused investigations in subsequent phases, both in sample numbers and parameters. As described in a 2011 RREC poster presentation, a large scale grid approach for the non-process area was implemented to address Illinois EPA uncertainty that it was not impacted while minimizing the amount of data collected.

Once the data confirmed that the non-process area was not impacted by the former wood treating facility operations in June 2011, the Responsible Parties engaged the Illinois EPA and the Illinois Attorney General to establish a process for revising the CO boundary. This process included approval of the RI by the Illinois EPA, verification that there were no outstanding requirements from the CO that involved the non-process area and providing an updated map and legal description that described the area to be retained in the CO (i.e., the process area). While issuance of the revised CO (expected in April 2014) is a success, efficiencies in the process could have been realized if the process for refining the boundary had been built into the CO.

The RI/FS process will continue at the site with a much narrower focus. A new CO will be issued with a 68 percent reduction in area. The human health and ecological risk assessments can focus on the data that matter – one third of the sample locations were in the non-process area and will not need to be evaluated further. The former non- process area can be sold for productive re-use to the benefit of the land owner and the surrounding community.

Review and Recommendations for TCE Short-Term Action Levels in Indoor Air

Laura Trozzolo - TRC Solutions

Confusion and misinterpretation is the state of the 2014 regulatory environment as it pertains to short-term trichloroethylene (TCE) action levels for indoor air. In September 2011, the US Environmental Protection Agency (EPA) lowered the non-cancer inhalation toxicity value, which is called the inhalation reference concentration [RfC]) from 10 micrograms per cubic meter (ug/m3) to 2 ug/m3 (EPA, 2011). This change resulted in a five-fold decrease in TCE's indoor air screening levels for workers, which could be a significant concern for any industrial facility with indoor operations, including railyards.

The basis of the 2 ug/m3 is a controversial study (Johnson et al., 2003), where fetal heart malformations were observed during the 21-day gestational period of the Sprague-Dawley rat based on drinking water (oral) exposure. The concern of this study is that the critical effect occurred from in utero exposure (Johnson et al, 2003), which could translate to cardiac development issues after short-term exposure to TCE in the early stages of worker's pregnancy.

This presentation provides a review of a wider literature base on the topic and suggests alternate short-term indoor air action levels protective of human health, until such time that USEPA Headquarters finalizes their assessment on this topic.

Natural Resource Damages – Are You at Risk?

Amy Desai - Farallon Consulting, LLC

This presentation will show that railroad facilities that have released hazardous substances to rivers, associated shorelines, floodplains, and habitats may not only have responsibility for investigations and cleanup costs but may also have responsibility for significant costs for Natural Resource Damages (NRD) or injury. The purpose of the presentation is to define that railroads need to be aware of the potential NRD liabilities when estimating long term environmental costs.

An injury is loss or degradation of functioning habitat, loss of recreational use, or other uses affected by releases of hazardous substances to waterways or sediments. NRD Assessment Trustees, which includes Tribes, regulators, and other public entities, use highly conservative assumptions to conduct a Habitat Equivalency Analysis (HEA), a model that quantifies injuries to aquatic habitat. The results of a HEA can be used to scale in-kind or out-of-kind restoration projects, are extremely sensitive to the input parameters and; therefore, provide a wide range of injury estimates, resulting in lengthy negotiations with the Trustees. The injury calculated by the HEA is quantified as Discount Service Acre Years (dSAYs), which is a metric used to define a cost for the injury. The cost for the dSAYs can be allocated as a negotiated cash-out payment to the Trustees or the creation of improved or additional habitat near the site where the injury occurred. Trustees prefer restoration within the same drainage basin that the injury has occurred. This preference gives the Potentially Responsible Parties (PRPs) some leverage to negotiate the injury assessment via a proposed restoration project.

As an example, BNSF Railway Company (BNSF) and Portland Terminal Railroad Company (PTRR) currently operate a 146 acre railroad switching and intermodal transfer facility in Portland, Oregon that is located about 700 feet west of the Willamette River. The Willamette River is within the Portland Harbor Superfund Site, a U.S. Environmental Protection Agency (EPA) federally listed NPL Site and both BNSF and PTRR have been identified as PRPs. Although the railyard is not located on the river front, stormwater discharges directly to the Willamette River via pubic outfalls. EPA has completed the Remedial Investigation and is looking to allocate past costs, which are known.

Future costs for the Feasibility Study and cleanup actions can be reasonably estimated; however, the estimated costs for NRD liability have not been determined and can be extremely expensive. Both BNSF and PTRR have conducted independent evaluations of the NRD liabilities and are considering the potential NRD costs in negotiations with EPA and other PRPs.

Decommissioning and Demolition Contracting Options at a Rail Yard Operations

Greg Sampson - AECOM

Case studies of Class I rail yards involving environmental/engineering planning of pre-demolition activities; demolition, engineering construction services. Decommissioning and demolition projects require careful planning and active management to achieve budget and schedule objectives, as well as maintain compliance and assure safe operations. There are significant opportunities to structure these decommissioning projects that will minimize potential liabilities associated with hazardous materials and to maximize returns that can be realized from asset recovery, salvage, scrap and property reuse/sale. Identification of the optimal decommissioning and contracting strategy requires financial analysis to identify the lowest-cost and economically supportable approach to decommissioning these assets, providing a basis to make informed business decisions. Using Class I Rail case studies, this presentation will catalogue the various management and technical approaches used to address an array of environmental and hazardous materials issues in conjunction with asset recovery, salvage and demolition work. The benefits and shortcomings of the various decontamination and decommissioning strategies will be displayed with recommendations of applicability to context and circumstance. Key elements of the presentation will describe how the financial analysis of options and development of cost estimates can be used effectively to guide decision making.

Presentation of a Geophysical Road Map for Making More Informed Decisions about Environmental Liabilities

Andri Dahlmeier - AMEC Environment & Infrastructure

Rail yards commonly have a history of environmental liability associated with release of fuels, maintenance fluids, derailments, and changes in rail yard use and/or historical operation. These events, coupled with sometimes limited direct knowledge or evidence of activities performed within leased properties, can result in difficulties in establishing accurate and focused site investigation work plans. Geophysical surveys can be used to help manage potential liabilities by providing a clearer understanding and visualization of the subsurface environment, thereby improving site investigation project efficiency and reducing project costs, ultimately leading to closure more quickly. A number of geophysical techniques can be used to locate buried pipelines, underground storage tanks (USTs), structure foundations, disturbed soil and uncontrolled fill, and detect and map subsurface bedrock surfaces and groundwater preferential pathways. AMEC routinely provides guidance on scoping geophysical surveys and conducts geophysical surveys in an effort to characterize subsurface conditions and prioritize potential sampling and drilling locations for site investigations.

The objective of this presentation is to provide a general geophysical study roadmap for the use of geophysics in support of managing environmental liabilities. Several geophysical techniques will be evaluated, discussed, and compared in an effort to highlight the positives and negatives of each technique, circumstances under which each technique is most beneficial and least beneficial, as well as cost and schedule impacts related to each technique. Techniques will include but are not limited to Electromagnetic, Electrical Resistivity Imaging (2D and 3D), Seismic, and Ground Penetrating Radar surveys. The presentation will provide participants with several tools to evaluate the validity of a proposed geophysical study approach as well as pertinent questions to ask to ensure that appropriate methodologies or a combination of methodologies are considered.

EHS Best Practices for Decommissioning

Dean Kreds - Antea Group

As assets approach the end of their life cycle, critical EHS decisions must be made on their decommissioning and considerations for reuse. The primary challenge is finding an appropriate balance between engineering feasibility, environmental protection, public health, worker safety, risk and budget. This presentation will explore how an EPCM-based approach and proper management can set a clear path forward for obsolete assets and ensure the greatest return on investment.

Through the use of two recent project case studies, audiences will gain insight on EHS best practices for decommissioning. Content will be structured around four key areas:

Pre-planning, strategy and expectations

Addressing compliance responsibilities

Ensuring worker safety

Managing residual liabilities Topics discussed will include:

Safety planning

Contractor Oversight

Demolition strategy

Utility removal

Regulated materials compliance

Waste minimization

Environmental liability

Site restoration and future land use

Stormwater & Wastewater

CSX Transportation Sewer Mapping and Tagging

Adam DeCarlo - Geosyntec Consultants

CSX Transportation, Inc. (CSXT) is committed to environmental excellence and, for many years, has been among the leaders in environmental awareness. As part of this ongoing commitment to environmental stewardship, CSXT has taken the initiative to investigate their sewer systems throughout numerous rail yards identifying industrial, sanitary and storm sewer facilities within. The objective of the sewer mapping and tagging service is to determine and appropriately label the destination and flows of the industrial, sanitary and storm sewer systems within the confines of the CSXT rail yards and to update existing maps detailing the sewer system upon completion. By establishing a standard nomenclature that will be utilized throughout their various facilities, CSXT has created a blueprint for their personnel to follow when reviewing and/or working on the sewer systems. Most importantly, the maps generated can be used as a tool in the event of a release. Whether it is field personnel within CSXT or first responders, knowing the sewer system layout, flow directions and drainage destinations, a serious release can quickly be contained or diverted.

Testing methods used in determining and identifying the sewer systems included visual inspections of the inlets within the yard, dye testing of inlets and structures to trace flows throughout the system, and smoke testing to verify connections between inlets. Dye tracing was effective in determining connections and flow directions between manholes due to the visual appearance of the colored water exiting the pipes and into the structures. It was found more difficult to visually inspect the inlets with dye due to the depth of the inlets and limited visibility. Smoke testing was the preferred method of testing due to the rapid results associated with this type of testing.

Testing revealed that within some inlets, piping appeared to either be entering or exiting the inlet structure but with no connections being confirmed or other inlets located. This indicated that lines may be collapsed and that inlets had been covered over or even removed. Further testing with an alternate means of inspection would be required to identify these connections. Records of these inlets and piping locations are marked should CSX desire further investigations in these locations.

While identifying the manholes and drain inlets within the sewer system, GPS coordinates and photographs were taken for use in updating existing maps and visual documentation. Upon completion, 4" stainless steel "No Dumping" tags were installed for each location both inside buildings and throughout the Yard. These tags were used to appropriately label and identify the discharge locations of the various drainage structures. Three (3) different types of tags were used: Sanitary "green", Industrial "yellow" and Storm "blue".

This poster will discuss the process of documenting, investigating, testing and identifying the sewer system drainage destinations as well as how the maps will be utilized in the event of a spill.

Giving Environmental Equipment a Second Life

David Warchol - Norfolk Southern Railway
Bob Stolt, Sam Karlovich, Lara Thurn - AECOM

On many railroad sites for environmental projects, there are existing structures, tanks, and equipment that must be demolished and disposed of to make room for the new facilities that are to be constructed. Often

times, these existing items are in good condition but do not fit in the scheme of the improvement project and they are unnecessarily demolished, resulting in unnecessary project costs. If it is possible to effectively utilize these facilities in the improved project, demolition project costs can be eliminated and repurchasing costs can be reduced, resulting in an overall lower total project cost.

At a rail yard in Pennsylvania, Norfolk Southern (NS) is rebuilding the locomotive shop. The old shop had two 20,000 gallon used oil tanks and one 2,000 gallon lube oil tank that were scheduled to be demolished. Meanwhile and under a separate capital construction project, at the yard's wastewater treatment plant, there was a need to add equalization volume for storm flows and to temporarily store raw wastewater when the plant was unmanned. The used oil and lube oil tanks were in very good condition and it was decided to repurpose them for the wastewater treatment plant area equalization project. The 20,000 gallon tanks were de-certified as oil storage tanks and converted into flow equalization tanks, and the 2,000 gallon tank was converted from a lube oil tank to a used oil tank.

In addition to the used tanks, there were two pumps at the yard that would no longer be used in their current location. Rather than demolish the old pumps and purchase new for the flow equalization project, the pumps were able to be repurposed and moved to accommodate the new design. The pressure capabilities of the existing pumps were not able to fill the repurposed 20,000 gal tanks, so the pumps were placed in series to be able to increase the pressure needed to take full advantage of the capacity of the tanks.

In this case, approaching two different capital projects with an eye toward integrating the projects into one resulted in substantial cost savings for NS.