15th RAILROAD ENVIRONMENT CONFERENCE

5-6 November 2013

Presentation Summaries
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Plenary

Railroad Fuels 104: Natural Gas
Mike Iden - Union Pacific Railroad

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.

Human Health Risk Assessment Techniques to Support the Establishment of Cleanup Target Levels for Infrequently Spilled Compounds
Barbara Pugh, Brian Magee, and Andrew McManus - ARCADIS
Raghu Chatrathi - CSX Transportation, Inc.

A seven car derailment resulted in the release of 20,000 gallons of crude sulfate turpentine (CST) to soil and drainage ditches in Jacksonville, Florida. As part of the time critical response effort, it was necessary to develop cleanup criteria for soil, groundwater sediment and surface water for CST in accordance with Florida Department of Environmental Protection (FDEP) regulations. Initial effort was required to distinguish the released material, CST, from turpentine whose nomenclature in the toxicological literature is both confusing and inconsistent. In the absence of toxicological data on CST, research was conducted into the various components of CST, which based on site specific analytical data include alpha-pinene, beta-pinene and camphene. The derivation of the cleanup criteria for CST was based on a derived oral reference dose for mixtures containing alpha and beta-pinenes, camphene and other compounds, and consideration of other potential sources of exposure to these compounds, including common household products (such as disinfectants and perfumants). This effort led to the development of reasonable and less conservative cleanup target levels for the project site than those proposed by following default state guidance. As a result of the non-default cleanup criteria, which were accepted by FDEP, cleanup activities of the CST were focused to a limited area while providing appropriate protection of human health and the environment.

Geographic Response Plans for River and Coastal Railroad Corridors (A Risk Management Tool)
Nic Winslow - BNSF Railway
Colin McWilliams - Kennedy/Jenks Consultants

Geographic Response Plans (GRPs) are linear GIS map-based response plans and site-specific boom deployment strategies for the initial response to an oil or hazmat material spill along railroads that parallel or cross inland or coastal waters. A GRP provides responders with essential information about the waterway, the spill response boom equipment needed to contain the spill, site access details, and emergency notification information. The U.S. Coast Guard, EPA and State agencies require development of GRPs along U.S. inland and coastal waterways in several regions. GRPs are used by railroads as a risk management tool to improve spill response readiness at critical locations using pre-defined booming strategies and pre-determined lengths of spill containment boom materials to mitigate a release. GRPs expedite the decision-making process during initial stages of spill as response managers develop site-specific response plans, determine the extent of the release, assemble the Unified Incident Command team, and interact with private and public stakeholders. Railroad corridor GRPs commonly: Identify key cultural, ecologically sensitive or economically significant receptors (areas of high consequence including municipal/irrigation river water intakes, parks, dams, fish hatcheries, and critical habitat areas for listed species). Use GIS-developed maps to describe oil spill booming strategies and the placement locations. Prioritize response strategies to minimize oil spill impacts. List emergency notification and contact information for key receptors, stakeholders, and responders. GRP Booming Strategy Development: 1. GRPs include GIS-based Railroad Milepost Track Map files overlaid on aerial photographs and topographic maps showing key boom placement areas, river boat launch access points, and critical receptor locations. 2. GRPs include Booming Strategy Forms for select waterway locations that present GPS coordinates, aerial photos, driving directions and boom deployment equipment materials needed to carry out an initial response. The booming strategies include simple boom deployment plans to control, contain, or deflect spilled oil or hazmat materials. 3. GRP data is collected using hand-held GPS units to map coordinates of key locations. Coordinate data are placed into GIS shape files with map layers of critical information. Data tables can be hyper-linked to track maps to allow queries and radius-of-impact searches for downstream receptors and plume travel time estimates. 4. GRPs include Emergency Notification
contact information listing railroad emergency operation, federal, state, county disaster emergency service reporting hotlines, key economic or ecological stake holders telephone numbers, and local spill response equipment and material vendor resources including vacuum truck and frac-tank providers, and spill clean-up equipment suppliers. The paper to be presented will describe two Northwest U.S. railroad river corridor GRP case studies and the methods used to prepare them. The information provided will be of interest to Environmental Operation and Hazmat Manager’s responsible for responding to and mitigating risks inherent with river oil or hazmat spills.

State Regulators Perspective on Greener Clean-Ups
Heather Nifong - EPA

Greener Cleanups are cleanup activities and technologies designed to increase the environmental benefits of remediation. Illinois EPA, along with U.S. EPA and other State regulators, is working to facilitate cleanup decisions that reduce greenhouse gas emissions, conserve natural resources, improve energy efficiencies, and reduce waste material requiring off-site disposal. Most recently, Illinois EPA has participated on ASTM’s task group for the Greener Cleanup Standard Guide, expected to be released November 2013. This standard guide provides a step by step process for implementing, verifying and recognizing greener cleanups across regulatory and voluntary cleanup programs. Unique aspects of the standard include a comprehensive list of greener cleanup best management practices, definition of elements that “set a bar” for achieving a greener cleanup, and a robust verification structure. State regulators are considering how to apply the standard for a variety of uses such as contracting and incorporating into program policy or regulations. Earlier this year, Illinois EPA worked with brownfields revolving loan fund borrowers to pilot the standard guide at four sites.

Stormwater & Wastwater

Whose Blood is on the Cutting Edge of Innovative Technologies?
J. Gregory Menniti - Geosyntec Consultants, Inc.
John C. Calhoun and Mike Casadonte - CSX Transportation, Inc.

CSX has over a decade of experience applying innovative treatment technologies to replace traditional railroad industry wastewater treatment approaches. CSX is also committed to environmental stewardship and often seeks applications where cutting edge technologies can also provide an environmental benefit. One such project used walnut shells as a filtration media in the industrial wastewater treatment process. Although this technology has been used previously by the petro-chemical industry, CSX successfully adapted walnut shell filtration to general industry use. The walnut shell media filtration system was installed downstream of an oil/water separator, replacing a more conventional process such as dissolved air filtration (DAF). The system provides the level of treatment necessary to meet stringent NPDES discharge effluent requirements at their mainline locomotive fueling facility in Euclid, OH and avoided the use of any chemicals in the treatment process.

However, there are risks associated with the early adoption of innovative technologies or with non-traditional application of proven technologists. This presentation will discuss the lessons learned for addressing the risks associated with the application of innovative technologies in the railroad environment. These lessons learned include managing the responsibilities of the owner, designer, equipment supplier, contractor, and operations personnel and how to successfully mitigate risks at each step to generate a positive outcome.

Stormwater Challenges and Solutions for Intermodal Facilities
Ross W. Dunning, P.E. - Kennedy/Jenks Consultants

With the advent of tightening industrial stormwater regulations across the nation, it’s increasingly important to understand the sources of contaminants at our facilities and to have strategies to address them. Many of the contaminants of most concern in stormwater runoff including suspended solids and metals like copper and zinc are linked directly to transportation equipment and operations. As the economy improves and traffic at our nation’s intermodal facilities picks up, the problems many facilities face with meeting the stringent stormwater regulations only intensify.

The paper to be presented will describe the sources of contaminants of concern in stormwater runoff at railroad and port intermodal yards and compare the regulations and resultant stormwater management requirements in the western states. Results and costs recognized from applying aggressive and innovative source control best management practices (BMPs) at a railroad intermodal yard will be compared to installation of active treatment methods at two port intermodal facilities where source control alone hasn’t been enough to meet stormwater permit limits.

The information provided will be of interest to environmental managers responsible for permit compliance at their facilities, operations folks that need to implement and maintain BMPs, and engineers that may need to design stormwater treatment systems to meet permit limits and want to hear about the most up to date approaches.
A low-impact development stormwater management system was designed and constructed at the Amtrak New Haven Maintenance of Way facility in order to improve stormwater runoff quality to the adjacent Quinnipiac River. The facility had been previously covered under Connecticut's General Permit for Stormwater Discharges Associated with Industrial Activities. This permit requires coverage for facilities that meet the following criteria: the facility is engaged in an industrial activity, as defined by the permit; and stormwater is discharged from a point source, which is directly related to the industrial activity. Since stormwater runoff from the facility either infiltrates directly into the ground or sheet flows off the property, the applicability of the permit to the site was questionable. Furthermore, frequent monitoring of stormwater runoff proved to be difficult due to the absence of stormwater drainage structures, storm drain system, or clearly defined stormwater conveyance at the site. To support Amtrak's position for discontinuing coverage under the permit, AMEC developed a design to improve drainage conditions in the northeast portion of the facility, where stormwater runoff would typically be concentrated into an off-site gully which discharged to the abutting Quinnipiac River and associated marsh. The subsequent installation of stormwater best management practices (BMPs) included a vegetated filter strip and gravel berm promoted sheet-flow of stormwater runoff and improved stormwater quality. Because of the existence of the off-site gully, which was largely created by tidal action in the adjacent river, the filter strip and gravel berm were installed upstream of that point to reduce the possibility of future erosion causing the gully to extend onto Amtrak property. Following the completion of the project, Amtrak was able to discontinue its coverage under the permit, eliminating the need for costly stormwater inspections, monitoring, and reporting.

The low-impact design included hydrologic modeling of the contributing drainage area, regrading the site, and specification of appropriate structural BMPs to improve stormwater quality and minimize erosion in an area subject to frequent flooding. The vegetated filter strip and gravel berm were designed in accordance with the 2004 Connecticut Stormwater Quality Manual. The vegetated filter strip included plantings of species capable of sustaining growth in areas subject to flooding, and potentially brackish water. In addition to the BMPs, a wooden guardrail was installed along the upgradient edge of the vegetated filter strip in order to prevent damage from truck traffic, which is heavy at the facility. Overall, the quality of stormwater runoff at the site was improved while eliminating costly stormwater monitoring.

How to train your OWS Dragon!

Railroad industry environmental operations and compliance managers' responsibilities often include the operation, maintenance, and permit-compliant discharge of a number of oil/water separator (OWS) based industrial wastewater treatment systems within their territory. When discharge is compliant, these OWS-based systems are often out-of-sight, out-of-mind. However, when the discharge is non-compliant, or experience operation and maintenance difficulties, these systems can quickly become unwanted headaches.

Knowledge is power!

Most environmental operations managers are not industrial wastewater treatment or OWS 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:

1. The address of fantasy land! <30 Mg/l O&G
2. BMP’S, Get it out! Keep it out!
3. Get the solids out!
4. Set my oil free! Do not emulsify! Do not emulsify! Do not emulsify!
5. All OWS's are not created equal! Don't hate yourself in the morning!
6. Coalescing media, the silver bullet that can ricochet and kill you!
7. See your OWS!
8. Hear your OWS!
9. Speak to your OWS!
10. Don't let the track department design your OWS wastewater treatment system!

This presentation includes examples of how application of these principles has contributed to more successful OWS O & M and discharge compliance in railroad applications.
Railroads have critical routes to maintain in order to keep rail operations running smoothly. Some of these critical routes experience natural disasters, navigate hard terrain, and require unique applications to protect their infrastructure and maintain safety. In desert climates where the land is vast and unobstructed, wind can create sand storms in patterns following the prevailing topography. These sand storms create visibility issues for locomotive operators and over time can also cause sand accumulation within in the ballast, ultimately leading to a derailment. Union Pacific Railroad (UPRR) operates a 30-mile critical route through the Mojave Desert that is one of only two routes linking the ports in Los Angeles to the rest of the UPRR system to the east. This same 30 mile route is the only direct route from these ports to the Midwest. In order to maintain proper drainage within the ballast, combat sand storms, and create a wind barrier, UPRR maintains a row of Tamarisk trees along its right-of-way. These trees are watered by an irrigation system that requires 3-miles of water main pipe for every mile of track. The original irrigation system was installed in the 1950s and operated on seven water wells powered by gas generators. At that time these non-native trees were allowed to be planted and are grandfathered to current regulations. Each well supplies water to roughly a 5-mile segment of the Tamarisk trees. California regulations restrict the number of watering hours in order to protect the water supply and limit the pollution created by the generators powering the system. UPRR evaluated the impact of the Tier IV air quality regulations on the existing generators and determined providing electric power was the best alternative. As a result of aging inefficient infrastructure and state regulations, it was determined that a new high efficiency system was needed to maximize water output. TRC assessed the current infrastructure and prepared a design to meet the constraints posed by the water supply and water demand to maintain the Tamarisk trees. Upgrades to the system include a variable frequency drive (VFD) on each pump, a process logic control (PLC), and water main interconnections to allow for a second source of water from an adjacent well. TRC experienced unique challenges for this project regarding maintenance of way, geography, accessibility, constructability, permitting, and logistics. The first 5-mile phase is complete, and the second phase will be constructed this year. TRC and UPRR were able to overcome the challenges of construction and operation of the irrigation system in the remote desert.

There has been an increasing trend for municipal governments to assess storm water drainage fees in order to fund: The inspection and repair of storm drains; Removing silt and debris from ditches, creeks and streams; Improving detention basins; Developing a master drainage plan; and, Flood management projects. The focus of presentation will be on how drainage fees impact railroads and methodologies to reduce that impact. Drainage Fees and Railroads Drainage fees are particularly burdensome to the railroads for the following reasons: Railroads are big land-owners. A given rail yard may be made up of 50 or more individual parcels of land. Because of this, some municipalities have been known to send the railroad 50 individual drainage fee bills for one rail yard. While an individual drainage fee bill may not seem excessive, the sum total of the drainage fees are. Some municipalities have used crude aerial imagery to classify areas such as track bed and unvegetated soil as impervious. For example, many municipalities use remote infrared imagery to classify surfaces as pervious and impervious. This methodology results in vegetated land being classified as pervious and unvegetated land being classified as impervious even though field infiltration tests demonstrated no difference in the permeabilities of the two types of land. Many of the drainage fees are billed by the municipality on the same bill as water and trash service. As a result, it is conceivable that the drainage fee bills are being sent to the accounts payable department of a railroad and are being paid without determining (a) the total financial impact of all the fees and (b) whether the fees were assessed in a technically sound manner. The railroad may own and maintain all of the storm water discharge infrastructure but still be billed under the fee program. Technical Approaches to Reducing Drainage Fees Determine whether good engineering methods were used in assessing whether a property is pervious or impervious. For example, many municipalities are using near infra-red imagery in a very simplistic manner to allocate what is pervious and impervious. As a result, it could be beneficial to challenge their allocation. Provide parcels inspections delineating areas in dispute. Consider conducing field infiltration tests to verify whether the original classification was accurate or not. Consider using more advanced remote sensing to develop your own allocation of what is pervious and impervious. Divide your property into drainage basins and determine whether those parcels that make up the drainage basin are benefitted by flowing through a maintained drainage system. The footprint of their operations, supporting sustainable development in their service area, and by engaging openly on
sustainability issues. CSX has embraced this vision at Curtis Bay Piers in Baltimore Maryland by completing several projects containing many aspects of both Civil and Environmental Design and that incorporates best management practices for water reuse and control of a site’s stormwater. These projects include aspects of wastewater and stormwater treatment and reuse, pollution control including water discharge eliminations, air pollution control, and groundwater protection. These projects not only benefit the operation at the facility but also provide sustainability in an industry under greater scrutiny at this time and limit the impacts of CSX’s operations on the local environment and Chesapeake Bay by greatly reducing discharges to the local water shed.

One such project included the installation of a geothermal cooling system for their coal dumping control building. The control building lacked proper ventilation and would consistently reach temperatures that are unsafe for the equipment and for working conditions. The geothermal system was a design build project and involved a vertical well grid which circulates an ethylene glycol solution through the earth to provide natural cooling. This presentation will describe the planning, design and the mechanics involved for installing a geothermal system in an industrial setting.

Waste - Still Opportunities After All These Years?
Bob Toy - Union Pacific

How does your company approach waste management? Do you know how much it generates? Do you know where it goes? All of it? 40 years after initial regulations, the opportunity to streamline an approach to waste is as great as ever from management, cost and resource perspectives. Union Pacific generates more than 1 million tons of waste a year and diverts ~75% from the landfill. While the company has a firmly established approach for managing waste by individual component, it sees opportunities to increase its diversion rate, look at the wastestream more holistically, and reduce waste generated.

Those are challenging initiatives when you have a 32,000-mile open-air assembly line and hundreds of players in the waste process. This presentation will show how Union Pacific has evaluated its waste approach and the opportunities it presents. Learn how Union Pacific has categorized its waste into more than 30 components, converted data types into a common foundation, and begun to address opportunities to manage the overall waste picture more comprehensively. As part of an overall sustainability picture, waste is the common denominator across all employee types. That opens employee engagement opportunities in new ways. We will discuss surprises and confirmed assumptions along the way. The presentation will include conversation with those attending to identify common opportunities across companies.

Environmental Analytical Issues
Analysis Techniques to Reduce the Positive Bias Associated with DRO Analysis Results
Jenifer Lewis, Charles Neslund and Robert Brown
Eurofins / Lancaster Laboratories, Inc

Historically, EPA and other regulatory methods designed to quantify environmental contamination in water due to or associated with petroleum fuel spills have used extraction techniques based on traditional procedures and lab equipment. Large volumes of sample are required and methylene chloride is used as the solvent. Most, if not all, organics (fuel as well as non-fuel) are removed from the sample using this approach. For example, methods such as SW846 Method 3510 and 8015 have proved to be the mainstay of analytical approaches and have been used throughout the 1990’s and through to the present day.

By including the term Diesel in the DRO analysis title, a prejudiced characterization for any positive/reportable result was created. Many environmental consultants have been misled over the years into thinking that a reportable result means there is diesel fuel on site that must be remediated – even if no history of fuel storage or use existed for the site in question. The use of methylene chloride as the extraction solvent and the non-use of an extract cleanup procedure (such as silica gel) has most likely caused many reported DRO results to be biased high or be false positives altogether, requiring after-the-fact investigations and in some cases resampling and reanalysis.

Eurofins Lancaster Laboratories has implemented a micro-extraction method using SW846 3511. This method has several advantages over the traditional approaches. Not only is it a greener technique - it drastically reduce sample size and the amount of extraction solvent volume required - it also utilizes a less polar solvent which is more specific in what materials are extracted from the sample matrix. Many of the non-petroleum organic compounds, like organic acids and oxygenates, that can contribute to a positive DRO result are never extracted in the first place. Results are therefore more representative of the actual contribution from fuel/petroleum organics. Additionally, if a cleanup procedure is employed to remove even more of the non-fuel organics, the method is even more efficient.

This new method and approach results in an improved DRO method that can be used for more accurate DRO reporting.

How Improper Field Sample Collection, Preservation, Shipment, and Storage Issues Can Affect Your Data
Ruth Forman and Rock Vitale - Environmental Standards, Inc.

Analytical laboratory results are used to demonstrate compliance, demonstrate that clean-up or remediation goals are met, obtain baseline data, determine extent of contamination, monitor exposure, and used to make a variety of decisions;
Real-time Kerosene and Diesel Fuel Footprint Differentiation using LIF-UVOST™ Waveform Signature Analysis
Curtis Bartz - CN
Michael Wolf, Barry Harding, Shea Muller and Lori VanderKam
AECOM

A case study is presented demonstrating use of Laser-Induced Fluorescence Ultraviolet Optical Screening Tool (LIF-UVOST™) to differentiate and delineate two different middle-distillate fuel contaminant footprints at a railyard. Two distinct LNAPL plumes were identified at the railyard through both LIF-UVOST™ field screening and laboratory fingerprinting of LNAPL samples. The LNAPL plumes are parallel and appear to comingle at some locations. One of the LNAPL plumes was previously known and delineated, and was historically identified as a Diesel fuel release. A recovery trench had been installed to recover the Diesel fuel, and the wells and recovery system were monitored for over ten years. A separate Kerosene plume was discovered when LNAPL was observed in a monitoring well which did not previously contain LNAPL. LIF-UVOST™ transects were used to determine the transverse extent of the both the Diesel and Kerosene LNAPL plumes. Subsequently, monitoring wells were installed and confirmed the existence of separate-phase LNAPL proximal to the Kerosene plume location. The real-time LIF-UVOST™ fluorescence indicated two distinct waveform signatures, suggesting that the plumes were from different sources. Additional lines of evidence substantiated the LIF-UVOST™ responses. In addition to the in-situ LIF-UVOST™ fluorescence, samples of the product were collected from wells within each of the plumes and analyzed using LIF-UVOST™. The LIF-UVOST™ “fingerprinting” results confirmed the observations of the LIF transects. Product samples were also submitted for Gas Chromatography Mass Spectrometer (GC-MS) fingerprinting. Forensic analysis of the samples confirmed that both Diesel fuel and Kerosene were present as two plumes at the railyard. These analyses also confirmed the different LNAPL sources. LIF-UVOST™ technology offers real-time identification of products based on waveform characteristics. However, caution should be exercised in confirming product types based solely on LIF-UVOST™ responses. Co-mingling of products, varying product formulations, weathering and soil matrix interference can challenge LIF data interpretation. Here, we offer lessons learned and suggestions to allow for multiple lines of evidence, including 1) calibration to site-specific LNAPL samples, and 2) forensic fingerprinting of LNAPL samples.

Environmental Response and Emergency Planning

Anticipating Crude Oil
Andrew McManus and Fred Payne - ARCADIS
Stella Karnis, Jean Ouellette and Lee Nelson - CN

Crude oil transport is the fastest-growing sector of the freight rail industry and is expected to exceed 100,000 carloads per year during 2013. Most commodities that ship by rail have well-defined characteristics and incident responders can anticipate their behaviors in the event of a release. Crude oil presents a very different challenge, with a wide range of critical behaviors that vary according to the well field of origin, how the oil was modified before shipment, and mixing that can occur at transloading facilities. In an effort to prepare for the possibility of an incident involving crude oil, CN developed an analysis of crude oil response challenges, in the form of a technical seminar that will be presented to various regulatory agencies as well as used for internal education at CN. The objectives of the seminar are to 1) distinguish between different types of crude oil and the implications for spill response, environmental investigation and remediation; and 2) generate a dialogue between CN and the attendees to discuss how the property differences of various types of crude oil impact investigation, remediation or mitigation approaches. Many lessons-learned can be drawn from pipeline and wellhead releases, but in those cases the nature of the crude oil is known at the outset. For a rail release, responders will have to quickly determine the source of the crude and, from that information, determine the behaviors of concern. Crude oil characteristics for each of the Western Canadian fields are well documented and that data has been tabulated in a quick-reference packet to support incident responders. Among the key crude oil characteristics for response are: sulfur content (possible H2S gas generation on heating), API density (possible DNAPL behavior), and BTEX content (possible benzene vapor issues). Based on pipeline loss experience, a worst-case release could occur with a heavy oil (diluted bitumen, in particular) near a waterway, generating a dense oil phase that runs on the stream bottom and may escape the attention of responders. In this presentation, the CN crude oil team presents a synopsis of its findings on the challenges associated with crude oil response and potential strategies for responders, along with a report on how the outreach effort has been received by the regulatory community.

Early Implementation of Risk-Based Strategy Leads to Accelerated Cleanup and Closure-A Case Study of Soda Ash, Cutting Oil, and Methanol Derailment in Cisco, TX
Andrew Pawlisz and Mark Murphy
Conestoga-Rovers & Associates, Inc.
Geoffrey B. Reeder - Union Pacific Railroad
Human health and ecological risk assessments (RAs) are typically viewed of lesser utility in initial decision-making at an emergency response site such as a derailment. RAs are normally implemented (if ever) late in the derailment life cycle after the primary recovery, assessment, and remediation activities have been completed. They are sometimes used to “risk-away” residual levels of spilled constituents in soil, sediment, water, and groundwater that would be otherwise cost-prohibitive to remove. This traditional approach to using RAs as a site closure tool may be adequate for most sites. However, those derailments where the potential for human health and ecological injuries are at the forefront of carrier, regulator, community, and special interest group concerns benefit immensely from having a risk-based strategy (RBS) in place on day one of the event. Current presentation uses a case study, where toxic constituents had the potential to affect a public water drinking supply, to demonstrate how RBS was used to shape key decisions in response, recovery, and restoration to secure an expedited regulatory buy-in and diminished compliance requirements. An unprecedented and unconditional, 180-day closure was granted for the site under the Texas’ spill rules.

**Energy, Emissions & Air Quality**

*Corporate Greenhouse (GHG) Inventory Verification at CSX - Advantages and Lessons Learned*

Meaghan Atkinson - CSX Transportation, Inc
Stephanie McMackin - CH2M HILL

As part of CSX's commitment to sustainability and transparency, CSX responds to the annual Carbon Disclosure Project (CDP) Investor questionnaire and includes detailed results of their annual GHG data collection. Third party verification of the GHG inventory is an important element of self-disclosure through CDP. Verification is a systematic, independent and documented process to evaluate whether a reported GHG inventory reflects the actual GHG emissions of the reporting organization. Inventory verification can result in increased transparency, improved data management and enhanced documentation.

Since 2010, CSX has conducted a third-party verification of their annual GHG emissions inventory of Scope 1 and Scope 2 sources. In 2011, CSX also obtained third-party verification of their Scope 3 emissions for employee business travel. The review included the infrastructure, activities, technologies, and processes as they pertain to emission sources identified within the CSX's specified boundary conditions as described in CSX's Inventory Management Plan.

The verification was conducted in a manner consistent with the International Standard ISO 14064 Part 3 (ISO 14064-3) as well as the World Resources Institute/ World Business Council for Sustainable Development (WRI/WBCSD) GHG Protocol. Verification evaluated the CSX Corporate GHG inventory and inventory management practices against key GHG accounting principles namely Relevance, Completeness, Consistency, Accuracy, and Transparency. CSX sought a reasonable level assurance of their GHG inventory.

The poster will present the steps of the verification including development of a verification and sampling plan, selection of facilities for site visits, selection of data to be reviewed and results of the verification. The presentation will also include an overview of challenges as well as benefits CSX experienced from completion of the third-party verification.

Meaghan Atkinson is the Manager of Environmental Programs and Sustainability for CSX. She has responsibility for ongoing development, management, and communication of sustainability strategy to both internal employees and external stakeholders. Her previous experience includes sustainability program management at the Florida Army National Guard and serving as a hazardous waste inspector for the Florida Department of Environmental Protection. Meaghan holds a Master's Degree from the University of Florida in Environmental Engineering and a Bachelor's Degree from Stockton College in New Jersey.

*Preparing a Credible Greenhouse Gas (GHG) Intensity Benchmark for the Railroad Industry*

Adam Loney, Gordon Reusing, and Douglas Smith
Conestoga-Rovers & Associates, Inc.
Ken Roberge - Canadian Pacific

Emissions from the transportation sector accounted for 27 percent of total GHG emissions in the United States and 24 percent of the total GHG emissions in Canada in 2011. In October 2006, the Government of Canada issued a notice of intent to regulate air pollutant and GHG emissions from the rail sector under the Railway Safety Act, with a target of establishing a collaborative framework with the United States by 2013. In May 2007, the Railway Association of Canada (RAC), Environment Canada and Transport Canada signed a voluntary Memorandum of Understanding (MOU) to reduce locomotive smog-forming and GHG emissions. Under this MOU, the RAC has since been quantifying and voluntarily reporting GHG emissions annually. The MOU was renewed on September 16, 2013, setting further GHG reduction targets by 2015. Although regulatory direction for the railroad industry on both sides of the border remains somewhat ambiguous, it is now standard compliance reporting for a range of industrial sectors in both the United States and Canada. Additionally, stakeholder pressures are requiring many organizations to report emissions voluntarily through fora such as The Climate Registry and The Carbon Disclosure Project. As pressure mounts on organizations to report and certify GHG emissions, so too will the pressure for organizations to reduce GHG emissions. The need to accurately and consistently quantify and benchmark GHG
emissions and intensities from railroads at an industry level, and the need for collaboration on both sides of the border is being felt through market and regulatory pressures.

Through this presentation, Conestoga-Rovers & Associates (CRA) and Canadian Pacific (CP) will discuss the need for, and the challenges and benefits of, effectively managing data to establish benchmark emission intensity for the railroad industry, and the need for a coordinated approach within the rail industry on both sides of the border to ensure the message is consistent, correct, and credible.

Verification Testing of the Diesel Particulate Control System on a NREC 3GS21B Gen Set Locomotive
Jose Ramirez, Paul Andersen, and Rita Aiello
Johnson Matthey Stationary Emissions Control LLC.

Diesel particulate filter (DPF) systems have been successfully applied to millions of on-road cars and trucks, off-road equipment, and stationary diesel generators, routinely reducing particulate matter (PM) by more than 85 percent. However, application of DPF technology to locomotives has been limited. The objective of this project is to demonstrate a Tier 4 locomotive DPF retrofit system on a 2,100 HP genset switcher locomotive. The test locomotive was UPY-2755, an NREC model 3GS21B which uses three diesel-driven generators to power the locomotive traction motors. The DPF system consists of a flow-through diesel oxidation catalyst (DOC) upstream of a wall-flow, catalyzed soot filter (CSF). The system oxidizes NO from the exhaust to NO2, which continuously oxidizes the soot trapped by the filter walls, regenerating the filter. This continuous, passive regeneration prevents excessive back pressure on the engine.

The locomotive and DPF system were tested according to procedures established by Title 40 of the U. S. Code of Federal Regulations (CFR), Part 92-Subpart B. Initial testing showed that PM emissions were reduced to 0.002 g/bhp-hr, 90 percent below the locomotive Tier 4 PM limits. HC emissions were reduced by 99 percent and CO emissions were virtually eliminated. The system was retested after 1,500 hours of field operation and results showed PM reduced to 0.010 g/bhp-hr, 76 percent below the Tier 4 PM limit. Additionally, the HC and CO emissions remained very low. Throughout operation the backpressure remained constant, at an acceptable level, indicating continuous passive regeneration of the DPF. UPY-2755 was returned to the field in July 2012 to complete the remaining 3000 hours of durability testing which was completed March 2013. The 3000-hour test results will be the focus of this presentation.

Risk and Liability Management

Liability Reduction through Creation of a Lease Review Program
Richard Adams and Lauren Alkidas - ARCADIS
Yves Decoste, Stella Karnis and Rick Verkler - CN

Class I railroads have thousands of properties that are leased to third parties for commercial and industrial purposes. Based on the high volume, it is challenging to have substantial oversight of these assets. Often, lease holders have poor environmental practices that result in impacts to the properties and potential liability for the railroad. It is not uncommon for lease holders to vacate the property or go bankrupt, forcing the railroad to address the environmental impacts. These impacts cost the railroads millions in environmental cleanup costs. Several Class I Railroads have embarked on setting up systems to address potential risk associated with leased properties. CN's approach is unique due to: 1) the development of a user friendly, interactive database and ranking system; and 2) maximizing value by focusing efforts on “high” risk leased properties. Although the program is only in its initial implementation, CN has already realized a number of tangible benefits. The program: Reduces CN’s potential liability by requiring lease holders to address environmental issues while they are still using the property and viable; Increases revenue for CN by identifying lessee land use that is not under agreement; Raises awareness for CN on actual site usage; Identifies properties with open releases/confirmed contamination and on-going obligations with regulatory agencies; Improves lease holder stewardship and public perception for CN. This presentation will go through program development, implementation, several case studies, and the results of the first full year of operation. CN has achieved significant savings and increased revenue through the implementation of this program.

Planning Capital Upgrade Events through Inspections
Beau Perry - TRC Environmental Corporation
Seble Afework - CN

Determining future capital improvements required throughout an entire system can be an exhaustive process when budgets are forecasted years in advance. Identifying the improvements that require immediate attention versus those that can be continued to be maintained prior to replacement is difficult as multiple people have varying priorities. Having an evaluation tool in place to prioritize these improvements allows an upfront process to determine issues and prioritize improvements address them.

On behalf of CN Railway, TRC has provided standard audit guidelines that provide detailed assessments of existing fixed locomotive diesel fueling systems (fueling systems) and wastewater treatment plants (WWTPs). These audits are not those typical performed for compliance, but rather focused on the functionality of the systems. TRC has applied multiple reviews
by having a detailed procedure in place, the evaluations and scores are transparent and allow CN to determine which systems are most vital for capital improvements, maintenance and/or repairs.

In addition to the standard audit guidelines, TRC and CN have standardized the design specifications for fueling systems. This allows the fueling systems to be installed with similar equipment, configurations, and operations across the network. Benefits from this include personnel being able to monitor multiple systems that maintain consistency of equipment, design and process. An additional benefit is that forecasting for future capital improvements is made simpler by having standard equipment and expectations for all fueling systems. Design of the fueling systems is governed by standardized specifications that assure facilities will be similar in many details such as appearance, performance, equipment, and construction details.

Land Use Controls through Constructed Wetlands/Wildlife Habitat and Long-Term Conservation; Preferred Land Use of a Residential Coastal Community on the Pascagoula River, MS

Jeff Beckner and Joe Shisler - ARCADIS
Matthew Adkins - CSX Transportation, Inc.

The Gautier Oil Site, Gautier, MS, located on the Pascagoula River, was used for wood treating operations for over 100 years. Following years of investigation, the land owner, CSX Transportation, Inc., implemented risk based remediation of the entire site in 2011. Long-term land use controls are a critical component to the accepted remedial action and risk management plan. The ecological sensitivity and resource value of the Pascagoula River Watershed was recognized early on and as such it was determined that the open space concept with limited public access would be the best future use of the Site. The Pascagoula River provides economic benefits to the area from healthy and sustanied marine resources and associated recreational use of the watershed. Preservation of the habitats of the Pascagoula River has become an interest to the community not only for the purpose of preservation, but to help promote eco-tourism in Jackson County. The remedial action/restoration plan included the creation of several natural habitats associated with the watershed, and the protection of same through a conservation easement. Habitat restoration benefits the overall health of the watershed and helps protect the estuary and adjacent uplands from the erosive forces of tropical storms and hurricanes. The conservation easement, coupled with the Brownfield Agreement between CSX Transportation, Inc. and the MS Commission of Environmental Quality, provide long-term land use controls that are protective of the permanent remedial systems, while providing critical estuarine habitats and associated public benefits for future generations.

Environmental Audits of “Trans-load” Activities

Norman Parker - Parker & Associates, Inc.
Erika Akkerman - CN

The rail industry has been a significant beneficiary of the oil and gas industry boom in North America. The crude oil transfer operations have shown particular growth. But this growth has been accompanied by unique environmental risks and operational challenges. The purpose of this presentation is to highlight the most pressing risks and share the CN approach for assessing these risks in the context of its formal environmental audit program. The examples and conclusions shared in the presentation are drawn from over three years of trans-load auditing experience in Canada and the US in a variety of operational, regulatory, and geographic settings. Not surprisingly, one of the key features of the CN CARGLOFLO (trans-load) audit process is the necessary embracement of environmental, safety, and dangerous goods competencies in the auditing efforts.

Risk Management & Contingency Planning – Class 1 Railroads in the Upper Mississippi Basin and North Dakota

Joseph Loer - Pinnacle Engineering

Increased transportation of hazardous materials by rail is occurring throughout the United States. Understanding that increased transportation creates additional risk, Class 1 Railroad companies have coordinated resources along the Upper Mississippi Basin in Iowa, Wisconsin and Minnesota, and are addressing the challenges arising from development of the Bakken oil field in North Dakota.

The railroads have teamed with communities and other industries along the Upper Mississippi Basin to develop risk management procedures and conduct joint contingency planning. Community Awareness and Emergency Response (CAER) groups have been formed to share materials and equipment, such as boom, response trailers, and boats. CAER organizations consist of industry and local governing bodies. These regional organizations combine knowledge of local landscapes, especially of sensitive areas, as well as promote interaction with local emergency responders. At hands-on meetings and in live drills, responders in the communities and within the railroads and the facilities they serve become better acquainted to
the emergency response equipment and procedures. Preparedness for emergency response efforts is now in place in several areas along the Mississippi River, with dedicated resources stored in key areas and community/industry teams trained to respond.

As transportation of petroleum products increases along routes in North Dakota, new challenges are arising. Many of the rail lines are in areas without nearby access to response equipment and materials, without contractors readily available to respond. Two Class 1 Railroads are working with Pinnacle Engineering to identify risks and develop contingency planning. A similar goal exists: to plan and develop joint resources, with other industries and local communities, to prepare for contingencies and create response capability.

This presentation will provide information on the successful development of contingency planning along the Upper Mississippi Basin, and will then describe the challenges and efforts related to the Bakken oil field. Important areas that will be addressed include the types of hazards from materials like petroleum and ethanol, identification and protection of sensitive areas, communication of information among stakeholders, staging and sharing resources, and how to respond to various situations. Pinnacle will draw upon its expertise in preparing for and responding to petroleum, ethanol and other hazardous spills to highlight specific concerns and actions.

**Environmental Management Information Systems**

*PTC and Other Wireless Communication Towers - Developing a Programmatic Approach for NEPA Screenings for Large Numbers of Sites*

Jay Diebold, Joseph Mion and Robert Sutcliffe  
Golder Associates, Inc.

Stella Karnis, Kari Harris and Dale Hein - CN

The railroad industry is currently in the midst of a major nationwide upgrade to communications systems, partially in response to The United States Congress (Congress) passage of The Rail Services Improvement Act of 2008 mandating implementation of a Positive Train Control (PTC) system for the largest of the U.S. railroads. To implement this system, thousands of new dedicated towers and antennas will be required to be built. Additionally, other railroad operations are implementing wireless communication solutions to enhance efficiency and improve monitoring capabilities. All installations subject to Federal Communication Commission (FCC) licensure must be compliant with the agency’s National Environmental Policy Act (NEPA) requirements to insure the proposed activity will not have adverse environmental impacts.

To accomplish these changes, Canadian National Railway (CN) has to screen over a thousand sites during the next several years for NEPA compliance. Owing to the technical issues of addressing NEPA compliance, coupled with the volume of sites and resultant quantity of data generated, CN retained Golder Associates to assist with the development of a program for screening and documenting tower sites for NEPA compliance.

A major part of managing the CN Tower Compliance Program has been adapting a web-based mapping solution, Orientis, coupled with a Microsoft SharePoint site for document sharing, collaboration, and storage. Orientis is a Geographic Information System–based database management system which has been designed, implemented, and managed by Golder Associates. Publicly-available mapping resources can be combined using Orientis to support site screening, with data captured and stored for future multi-purpose use. Work flows and file naming conventions are used to standardize and streamline the work process, data storage, and retrieval.

This presentation will highlight the CN Tower Compliance Program development, as well as the web-mapping and data management solutions, and potential for similar solutions to other common railroad projects.

**Modernizing the Environmental Liability Management Platform: A Business Case**

Stella Karnis - CN  
Roger Well - ENFOS, Inc.

Environmental liability management and reporting has become more and more complex due to the increasing demands from both internal and external auditors. Based on executive sponsorship, a cross-functional team, led by the Environment business department, was set in motion to assess existing practices and tools for the tracking and reporting of environmental reserves and related costs. Outcomes of the assessment resulted in an opportunity statement and business case for the replacement of legacy systems. After an extensive evaluation process in 2012, CN made a business decision to select and deploy a commercial software system. This presentation will provide an overview of the critical business decisions, business value drivers, and expected outcomes of the environmental liability management initiative.

CN made the first critical business decision by recognizing the need to evaluate and improve existing business practices and to assess the possibility of replacing legacy systems with modern information management technology. This and other critical business decisions made by CN are listed below, in a sequential order.
1. Executive Leadership Directive and Sponsorship (Project Creation)
2. Decision to Deploy a Commercial Software Solution (ENFOS) and Retire Legacy Systems
3. Software Vendor Selection
4. Business Planning, Blueprint, and Design

Business value drivers were determined by executive leadership as well as the project team responsible for execution. Value drivers included the need for improved financial transparency, improved financial performance and management control, and business process optimization. These value drivers were set in a context where the department was using an outdated database built in 2000 along with an assortment of other systems and spreadsheets. The department saw a doubling of the remediation site portfolio size over that timeframe compounding the problem and difficulties.

Expected outcomes in the form of goals/objectives and benefits were determined by the project team. Benefits were further classified as hard (cost reductions), soft (cost avoidance), and strategic (fit with high level strategy). The key objectives to be delivered by the commercial solution and related business design include:

- Tracking and managing detailed reserve estimates and forecasts within a common planning and approval framework
- Tracking accrual adjustments and reasons for changes so that assessments can be made across the organization for all projects as to the factors impacting reserves
- Integrating and automating the linkages between the reserve and actual work commitments/expenditures to vendors
- Standardize the streamline the vendor management process including site strategy development, work scope details, proposals, and invoices
- Integrate with the corporate ERP system (SAP) to reduce errors and redundant data entry
- Establish a common scheduling process for all project related activities such as due dates, deliverables, milestones, field work, and regulatory requirements
- Generate standard and customized reports for site management and financial management data

The benefit of this paper is to provide an overall roadmap for organizations that may select similar initiatives in the future as well as to discuss opportunities to achieve operational excellence in environmental liability management.

Important Considerations in Selecting an Environmental Management Information System (EMIS) Solution for the Railroad Industry
Graeme Dykes - Enviance

It’s clear from the current Whitehouse’s renewed sense of urgency in mitigating carbon emissions and addressing climate change that business-as-usual, excel based and disparate environmental compliance and management efforts will not be sufficient in keeping up with inevitably more stringent & expanding regulations. As a sector heavily invested in carbon-intensive power sources, the railroad industry will be among those that benefit most from streamlining their environmental management process – from tracking and reporting to analysis and risk mitigation assessments – with an effective Environmental Management Information System (EMIS).

In this presentation, Graeme Dykes, vice president at Enviance, will give an overview of what to consider when evaluating, choosing and deploying a railroad EMIS solution, given the current state of environmental regulations. He will discuss key disciplines, focus areas and who the crucial players are within an organization for successfully implementing an EMIS solution from legal to end user testers.

Key considerations Graeme will cover:
- Scalability: EMIS system selection should focus on both short- and long-term objectives.
- Integration: The EMIS isn’t a stand-alone system, it has to interact with the data entry interface, legacy systems and support mobile or spreadsheet uploads.
- Mapping: It’s important to obtain buy-in and flesh out any potential problems, conflicts and functionality requirements before the system is actually deployed.

Above all, Graeme will provide an overview of the chief benefits of adopting EMIS solutions for the railroad industry and associated benefits for the company’s balance sheets. The purpose of the presentation will be to educate and inform attendees about EMIS solutions regardless if they are using or considering implementing a platform. Graeme will present as an objective expert on the subject and avoid mentioning any commercial preference.

Rapid Deployment of Tablet Computers for Field Data Collection
Robert Sproles and Mark Murphy
Conestoga Rovers & Associates
Geoff Reeder - Union Pacific Railroad

Tablet computers such as Apple’s iPad have found their way into all aspect of our lives. During an environmental response, these devices can be used to quickly, accurately, and efficiently collect field data. The connected nature of the device allows it
The new and rapidly changing ecosystem of tablet computers offers many free and inexpensive applications for field data collection. A select number of currently available commercial applications as well as custom-built applications are showcased in this paper. The advantages and disadvantages of using a single device for field data collection are discussed, and example data collection tools are demonstrated using a train derailment scenario as a case study. A cost-benefit analysis is presented to illustrate the financial viability of using tablet technology for field data collection.

**Noise & Vibration**

**Noise Reduction in Curves**
Brigita Altenbaher - Elpa d.o.o.

In years of our research we first developed a new Composite Heavily Fluid Compound (CHFC) material which contains more than 40% of solid particles, is capable of taking extremely high pressure loads, reduces noise and wear out and is environmentally friendly. In next phase of our research we developed new technology for applying the CHFC material on the rails. The dosing method can be with blades or with boreholes certified by us. The boreholes had been made into the rail head, which enabled expanding of the material onto the precisely defined point on the rail head. After developing and mounting we tested the technology and material by measuring the wear out of rails. The results showed, in a very short time, positive ecological effects; with the use of CHFC material the wear out was reduced more than 2.5 times, therefore the emission of steel into the environment was significantly lower. We also tested the technology and material by measuring the noise reduction. The results had shown a decrease of the squealing noise up to 14 dBA at low frequency and up to 30 dBA at high frequency, which is, in comparison to other noise solutions, a significant added value to noise mitigation on railways. Noise reduction was audible as soon as the material had been applied.

With our research and results we had proven that by using one, but appropriate material applied to an exact position, it is possible significantly reduce the wear out and the noise. Our results pointed out that CHFC material have positive economic and ecological effect. We know that noise can cause serious health problems; therefore we can claim that our technology has positive effect on social and economic costs (i.e. house prices, distributional impacts).

**Under Tie Pads and Their Effect on Track Stability, Ballast Degradation and Ground-Borne Noise Levels in Special Trackwork**
Bruno Meira y Duran and Patrick Carels - CDM Novitec
Jan Mys - INFRABEL
Luc Schillemans Technum - Tractebel

Trains passing on turn-outs in urban track is a major cause of noise and vibration complaints for people living nearby the track. Turn-outs are built to allow for safe deviation of rolling stock from one track to another; this imposes the use of moving rail parts and discontinuities in the rolling surface. Trains moving over turn-outs (more specifically the frog), generate impacts and therefore higher load transfer to the environment, ...with effects on ground borne noise and track stability. Due to the complex turn-out structure with high dynamic excitations, introduction of resilient elements to mitigate the effect of higher loads, is not as straightforward as in classic tangent and curved ballasted track; possible interventions are limited to level 2, being resilient under-base-plate supports on ties or under tie pads (or UTP), and level 3 (resilient underballast mats, also called UBM).

Since the late 1990’s, resilient UTP-interventions have gained acceptance throughout the professional track world as easy and economic means to reduce ground-borne noise in tangent and curved track.

This paper describes the research work done by CDM in collaboration with the Belgian Railway Company NMBS/SNCB and TECHNUM to investigate the effects of high resilience under tie pads on track stability and ground-borne noise. The work englobes:

- Laboratory tests with 3 Million Cycles fatigue tests on ballast in the trough with and without resilient UTP. Ballast granulometry curves for excitation with and without UTP protection were measured and compared.
- The implementation of UTP in a turn-out retrofit on line nr. 35 near Testelt – Belgium (axle loads up to 225 kN and speeds up to 160 kph), with one frog treated and the other one non-treated for comparison. The ground-borne noise levels, rail response and track stability were measured before and after the intervention, allowing comparison between classic turn-out renewal versus UTP treated turn-out renewal.

**FCM/RAC Proximity Initiative**
Cynthia Lulham - FCM-RAC Proximity Management Program

How can we improve urban planning and building designs to avoid noise, vibration and safety issues inherent when urban development and railways are in close proximity? The current need to intensify urban development to avoid urban sprawl has lead to increased development on lands in close proximity to rail operations. These new developments include the conversions of industrial or commercial properties to residential, usually built without any mitigation measures and sited...
next to major railway corridors. The absence of mitigation measures leads to complaints due to noise and vibration and creates serious safety issues for residents. When proximity issues arising from the growth and expansion of rail facilities and/or municipalities are not understood and addressed, problems can often be intractable and long lasting.

The Federation of Canadian Municipalities (FCM) and the Railway Association of Canada (RAC) are committed to building common approaches to the prevention and resolution of issues that may arise when people live in close proximity to railway operations. Together we have created the FCM-RAC Proximity initiative whose members include elected officials and senior railway representatives from across Canada.

The FCM-RAC Proximity Initiative has developed new Guidelines for New Development in Proximity to Railway Operations (May 2013) to address land use issues. The new guidelines will assist municipal governments and railways in reviewing and determining general planning policies, provisions for the conversion of lands in proximity to rail facilities, as well as in the process of making site-specific recommendations and decisions to reduce any incompatibilities of development adjacent or in proximity to rail operations, by addressing such issues as noise, vibration, emissions, safety, and trespassing. The goal of this report is to provide the necessary tools to facilitate decision making in urban planning processes and provide a framework for building safe, sustainable communities.

With the launch of the report in May, the FCM/RAC Proximity Initiative have created an outreach program for 2013 to communicate the Guidelines to municipal, railway and government stakeholders across North America.

We propose to give a presentation on the new guidelines including an overview of the following areas: set-backs, noise and vibration impact studies, sound barriers, berm and crash wall construction and a development viability assessment model. We will demonstrate how good planning, effective land use and communications are the necessary tools to avoid proximity safety issues today and tomorrow.

Tools for Assessing Noise Impact from Freight Rail Operations

Lance Meister - Cross-Spectrum Acoustics LLC

Unlike many environmental issues faced by freight rail operators, such as air quality or hazardous materials, there are no clear cut laws or rules governing how noise from freight operations, including sources such as mainline operations, horns, yards, sidings and layover facilities, should be addressed. There are however, a number of different tools available to the freight community to help in assessing, quantifying and responding to noise issues, whether they are complaints from abutters, NEPA type actions, or proactive implementation of noise reduction measures. These include guidance, models and rulemaking from both the Federal Transit Administration (FTA) and the Federal Railroad Administration (FRA), noise standards from the Department of Housing and Urban Development (HUD), and rulemaking by the Surface Transportation Board (STB). By applying these tools appropriately, freight operators have a framework for addressing noise issues. This presentation will explain the use of each of the available tools, how and when to apply each tool, and where to find more information to assist freight rail operators with noise issues.

The Correlation Between Maximum Mean Sound Level per Hour and Equivalent Sound Level per Hour for Taiwan High Speed Train Noise

Yun-chung Lee, Ming-kun Tseng, and Yao-sen Chen
Tawian High Speed Rail Corporation (THSRC)

To efficiently and precisely predict the hourly equivalent continuous sound pressure level (L_{Aeq(1h)}) of Taiwan high speed train based on the hourly maximum mean sound pressure level(L_{Am,mean(1h)}) and the number of hourly passing trains (N), we referred the “Railway Noise Prediction Model” (Formula: L_{Aeq(1h)} = L_{Am,mean(1h)} + 10 \log N + A), which EPA declared in Taiwan, and used the on-site measurement data to calculate the constant A values. In terms of the hundreds of hourly measurement data with widespread conditions, such as structure types (viaduct, embankment, cut and tunnel portal), heights of noise barriers, train speeds and noise receiver’s coordination, the average constant A value was 29.899 dB(A) and the standard variation \( \sigma \) was only 0.57 dB(A).

The above “Railway Noise Prediction Model” is validated to predict the L_{Aeq(1h)} of Taiwan high speed train because the track and core system of Taiwan high speed rail are the single system.

Compliance and Permitting

The Mysteries of Permitting Transloading Facilities: Real Life Experiences

Jan Barnes - Transflo

As a subsidiary of CSX Corporation and a sister company to CSX Transportation, TRANSFLO Terminal Services Inc. (TRANSFLO) provides transloading services to non-rail served customers providing them the opportunity to take advantage of the economic and environmental benefits of rail transportation. Transloading is the process of transferring bulk materials from one mode of transportation to another. For TRANSFLO this typically means from rail cars to trucks or vice versa. Permitting facilities that transload bulk commodities can be challenging but are not insurmountable. This presentation will
provide an overview of the various permitting challenges and decisions driving the permit requirements and the approach that we find to be successful. The four facilities that will be highlighted in this presentation have been permitted and/or constructed within the last year so are relevant in today’s regulatory and economic climate. The facilities to be discussed are located in Florida, Massachusetts, Pennsylvania and West Virginia and handle a variety of commodities that include ethanol, frac sand, crude oil and other hazardous and non-hazardous commodities. The permit requirements for ongoing operations at TRANSFLO’s 58 terminals will also be briefly discussed.

**Building a Strategic Environmental Audit Scoring System**

Amtrak Moore and Craig Caldwell - Amtrak

Amtrak recently revised its environmental compliance audit scoring system to establish a more transparent tool for identifying accountability with regards to Department-based environmental functions. Amtrak’s internal Auditing Program is used to assess the state of compliance at 32 large and medium maintenance facilities, with each facility compromised of multiple Departments. Since the conception of its Auditing Program in 2001, several iterations of the Audit Scoring System have occurred to address program evolution and application. The Scoring System has been modified over time to issue Facility-Based Numeric Scores, that recognize not only items of non-conformance and non-compliance, but enhanced programs and initiatives beyond that of compliance and to account for evaluations of environmental management components.

The facility-based numeric audit score is a key measurement of environmental performance and is used to gauge environmental improvement and program deterioration. In 2010, there was increasing demand for selecting a more meaningful and effective tool for environmental performance measurement with the establishment of an Audit Score Goal as a metric within the Company’s Strategic Plan. In 2012, the Audit Score Goal started being included as a unit of measurement within Department-established performance goals. In order to strengthen internal-department accountability and establish audit scores representative of an internal-department’s environmental function at an audited facility; the Audit Scoring System was once again modified. The current Audit Scoring System issues a numeric audit score for the overall facility and numeric audit scores for each internal department performing a function at the audited facility.

The overall Facility Based numeric audit score is used as the benchmark for comparison against Amtrak’s Strategic Goal; the Department-based scores establish a unit of measurement for performance goal comparison. The facility-based corporate Audit Score Goal is increased over time as Amtrak strives for continuous improvement in environmental performance. This paper shall serve to detail the evolution of Amtrak’s Audit Scoring System and its role as a key indicator of the effectiveness of facility programs and practices in achieving environmental compliance.

**Can the Valley Elderberry Beetle Derail Capacity Improvement Funding**

Jeffry Rice - URS Corporation
Michael Stanfill - BNSF Railway

BNSF Railway Company in conjunction with Union Pacific Railroad has been processing environmental documentation under the California Environmental Quality act (CEQA) in order to qualify for State Transportation funds set aside for goods movement infrastructure improvements. Natural resources studies were complete for the project and included jurisdictional delineations, habitat assessments, and evaluations for impacts to threatened and endangered species protected by either the federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA). The results of these studies found no presence of endangered species. The lead agency, Caltrans, initially concurred with that assessment. As the project progressed, change in agency staff lead to the reconsideration of the ESA determination. A new natural resources reviewer from Caltrans had a more comprehensive understanding of some of the nuances of the species found in the southern portion of the San Joaquin Valley and found that because of the presence of host trees, the determination related to no presence would need to be re-evaluated. Within the existing right-of-way (ROW) of the project are several Elderberry shrubs. These shrubs are the exclusive host to the Valley Elderberry Longhorn Beetle (VELB).

The U.S. Fish and Wildlife Service guidelines for the VELB have very clear standards and criteria for evaluation and mitigation related to the species when there is some form of “take.” Although no clear “presence” of the species could be found in the surveys conducted, because the Elderberry shrubs are the exclusive host for the species, and there are exit bore holes on the bark of some of the trees that would be removed as a result of the rail improvement project, Caltrans changed their determination to presumed “presence.” As such, the rail improvement project was entered into a consultation process for the VELB with USFWS. In the addition to the mitigation required, the project delays created by a new process without statutory processing timelines could severely impact the project. The VELB is at the farthest reaches of its mapped habitat, the species has been in recovery mode for several years, the USFWS has begun a “delisting” process that is anticipated to be complete in December 2013, and there is no practical way to determine presence other than removing the shrubs in question and cutting them open to determine if there are boring pupae under the bark. This presentation looks at how the railroads manage the new process, build consensus with Caltrans and USFWS, and prepare a Low Effect Habitat Conservation Plan to expedite the consultation and Incidental Take Permit on this species.
The New Cesar Chavez National Monument Changes the Setting and Dynamic of Environmental Review
Jeffry Rice - URS Corporation
Michael Stanfill - BNSF Railway

BNSF Railway Company in conjunction with Union Pacific Railroad has been processing environmental documentation under the California Environmental Quality act (CEQA) in order to qualify for State Transportation funds set aside for goods movement infrastructure improvements. Identified abutting the existing right-of-way (ROW) of the project is the retreat property for Cesar Chavez which contains his grave site, the home where he lived in his later years, the current residence of his widow, a visitor center, and the home of the National Chavez Center, an education based non-profit. The cultural resources assessment found that although there are many features on the property that would be historic, and overall, as a district, there are many contributing features, the age of much of the site did not warrant the significance for historic impacts initially expected. However, given the social justice issues surrounding Cesar Chavez and the United Farm Workers, and the railroads’ long relationship with organized labor and the Chavez organization, clear sensitivities needed to be considered and maintained. Within the processing of an environmental impact report for funds for the double tracking project, President Obama designated the National Chavez Center and Memorial, a site abutting the existing railroad ROW, as the latest national monument in the National Park system. With the creation of the Cesar Chavez National Monument, the baseline conditions, federal agency involvement, and cultural resources sensitivities, changed dramatically. This presentation explores how BNSF has managed these changing conditions as part of the entitlement processing for this import trade corridor improvement project.

Union Pacific Railroad, Louisiana Capacity Expansion: Integrated Design, Construction, and Permitting to Expedite Project Construction
Debra Schafer - Union Pacific Railroad
Christine Roberts and Doug Urry - CH2M HILL

In response to demands for increased rail capacity in the southeast United States, Union Pacific Railroad (UPRR) initiated a series of projects to expand its Louisiana subdivisions serving the Gulf Coast markets. The comprehensive design and permitting effort addressed 12 capital investment projects, including several discrete second-track, siding-track, and rail yard construction projects for 2012 and 2013, serving 17 customer facilities on the Livonia Subdivision along the Mississippi River corridor between Baton Rouge and New Orleans. Project construction typically includes embankment construction (fill) parallel to existing track, and use of existing rail corridors and rights-of-way for: Construction of siding track, second main track, balloon track (typically 1-6 miles in length), Rail yard facility enhancements including support yard expansion and staging slot additions, MOP Interchange construction, Structure replacements. Based on environmental sensitivities related to waters of the United States in coastal Louisiana, much of the design, permitting, and construction of the Louisiana projects focused on clear identification of: The wetlands baseline in the project areas, A design that avoided, to the extent practicable, impacts to those waters, and An integrated review of construction requirements, such as temporary disturbance areas, that could also affect delineated waters. To accomplish this, UPPR developed, refined and implemented a step-wise and iterative Clean Water Act Section 404 permitting that scheduled essential survey work to match design schedules so that sensitive resources in the project area were considered for avoidance early in the design process. In addition, iterative meetings that reassessed the effect of design changes were essential to capturing all design changes during 30 percent and 60 percent design review to avoid data gaps in permit applications. These desktop exercises were followed by pre-construction field visits with members of the design, permitting, and construction teams to ensure that construction requirements, such as staging areas and grading boundaries were considered in the permit packages. Subsequent to approval by all key team members, the permit applications were submitted for agency review. Benefits of this approach are a dramatic reduction in agency data requests and the ability to fast-track permits for construction projects to meet essential demand for rail service. This presentation presents the benefits of developing this collective process and provides a step-wise blue print useful for other similar multi-project programs. UPPR and CH2M HILL are currently using this process throughout the Louisiana and beyond to efficiently and accurately permit new projects and minimize project impacts.

Sustainability - Wetland Permitting Delays Turned Into a Project and Environmental Gain

In 2010, CN evaluated potential improvements to the border crossing freight inspection process in Northern Minnesota. Since 9-11, US bound cargo containers have been randomly inspected by the TSA. The removal and placement of inspected freight became a logistical nightmare in the small, wetland-bound border yard in International Falls, Minnesota. Positioning the train for removal of a single container required several moves to disconnect and reconnect, along with leaving “hostage” cargo tied up during the inspection process. The proposed improvements included a 10,000-foot siding and adjacent live lift pad area where cargo could be quickly removed and replaced without having to disconnect the train.

Because cargo was randomly selected from any part of the inbound train, CN required that access was needed for the entire length so mobile reacher-stacker equipment could be used. Unfortunately, the proposed live lift pad area contained approximately 80% wetland. Based on a 10,000 foot siding, the impacted area totaled 18.71 acres.

Working closely with federal, state and local regulators, CN started the permitting process. Federal regulations were outlined and followed a standard timeline and performance metrics. State required submittals were subject to a first come
first served process without clear timelines for completion. In addition, state wetland mitigation requirements were not
specified and were unclear. While the state permitting timelines were unclear, the construction timeline was very clear. The
construction timeline required winter construction to minimize wetland impacts during construction.

The process started by involving the Army Corp of Engineers with a project overview meeting to obtain sound advice to
advance through permitting process. Federal 404 permits applications were completed along with obtaining the necessary
wetland mitigation credits. Based on finding available credits within the same regional watershed, CN was able to secure a
mitigation ratio of 1:1. The 404 permit hinged on the 401 water quality certification issued by the state agency. Based on their
timeline, a winter construction schedule was not possible.

Because the winter construction window was missed, wetland construction was not feasible. Therefore, design modifications
were made and construction was completed on the 20% of the lift pad in upland areas. Live lift pads were designed at two
independent locations to use all of the available upland area. CN was able to increase productivity by 75% through the use
of the new upland pad areas and construction of the remaining 80% in wetland conditions is not justifiable based on the cost
benefit ratio.

Additional aspects of the project included potential rock quarry permitting, evaluating and creating wetland credits in the
rock quarry excavation and re-using or re-purposing unused purchased wetland credits.

**Remediation**

**Increasing the Bottom Line and Decreasing Risk –**

**A Next-Generation Programmatic Approach to Managing Storm Water, Wastewater, and Water**

Jason Carter - ARCADIS

Stephen Tew - Progress Rail Services Company

Railroads make significant investment in storm water, wastewater, and water management (collectively referred to here as
“water”). A next-generation programmatic approach to managing these water streams can increase operational effectiveness
and efficiency as well as reduce risk.

This presentation describes an industry-leading approach that is being applied to water management, which baselines storm
water, wastewater, water inflow and outflow and risks that provide companies the ability to anticipate, prioritize, and plan
facility upgrades or operational modifications while avoiding unanticipated compliance costs.

Traditional drivers for water management typically revolve around addressing compliance issues and often result in
disconnected efforts to document and modify water use practices between locations. This leads to isolated problem solving
and “silo-ing” of innovative solutions in water management. By establishing a standard protocol for rapid water use data
collection and risk assessment, environmental managers can proactively identify compliance challenges before they occur,
water use optimization or reuse opportunities, system sustainability improvements, as well as builds a consistency of system
wide practice for water management.

The two keys for building a successful water management program are a robust data collection process and a risk assessment
methodology that reflects the philosophy of the organization. A data collection and analysis methodology has been
developed that gives field teams the ability to collect detailed information about water sources, conveyance, treatment, and
discharge and to create initial water balances to verify data integrity. In addition, this approach gives the team the ability
to collect asset information regarding equipment age and appropriate process application. Finally, this approach provides
an opportunity for local personnel to engage in the data collection process and assessment, which often leads to innovative
solutions to identified water management challenges.

The risk assessment approach for this program is built on assessing the completeness of water system data at sites based
on location specific water management practices, regulatory compliance history, system process condition, system physical
condition, system efficiency, maintenance practices, and alignment with organizational philosophy regarding sustainability.
Information related to each of these decision-making elements is gathered in advance of field collection activities. Armed
with this information, field teams provide an initial rating that is then evaluated further for the development of relative risk
scores for water sources, systems, and discharges as well as a combined risk score for the facility. These risk scores provide
environmental managers with a tool to target highest risk areas for mitigation and for communicating with plant operations
management. Location level risk scoring can also be used by system environmental management directors to plan activities
and allocate resources to the highest risk areas. “Risk” can also be defined as lost opportunity for optimization. These scores
can be used to identify elements of overall water management practices that can improve the financial bottom line.

This presentation will summarize how Progress Rail Services Company has applied the described approach. By identifying
and managing risk through building water inventories and risk-based prioritization, its environmental managers have
gained the ability to anticipate and proactively manage compliance issues as well as leverage operational optimization
opportunities by gaining the full value of location data, operational staff insight, and industry asset knowledge.
Evaluation of Monitored Natural Attenuation to Optimize a Sampling Program at a Chlorinated Solvent Site
Elizabeth Cohen and Lauren Alkidas - ARCADIS
Paul Kurzanski - CSX Transportation, Inc.

An evaluation of the effectiveness of monitored natural attenuation (MNA) as a remedial measure was completed at an active rail yard Site in the Midwest. The Site has been an active rail yard for over 100 years. Groundwater at the Site is impacted primarily by the chlorinated volatile organic compounds (CVOCs) cis-dichloroethene (cis-DCE) and vinyl chloride (VC); however, detectable concentrations of tetrachloroethene (PCE) and trichloroethene (TCE) are also present.

An evaluation of the effectiveness of MNA was completed mid-project lifecycle, in order to optimize the sampling program at the Site. Changes to the monitoring program, based on a successful evaluation of the effectiveness of natural attenuation at the Site, were accepted by the state regulatory agency and led to a reduction in the frequency of sampling, the number of monitoring locations, and the overall analytical suite. Evaluation of MNA mid-project lifecycle ultimately led to a more comprehensive understanding of degradation processes at the Site, greater confidence in the effectiveness of the selected remedy, a reduced monitoring program and annual cost savings of approximately 40%.

MNA as a remedy at the Site began in 2006, with the state regulatory agency approving semi-annual sampling for CVOCs and geochemical parameters at 20 monitoring wells. Concentrations of CVOCs at the Site are currently above guideline values at selected locations. A lines of evidence approach was used to evaluate natural attenuation of CVOCs at the Site. Plume stability and long-term concentration trends were assessed using statistical methods. A geochemical conceptual model was developed, and specific degradation processes elucidated.

Typically, geochemical parameters are analyzed for indication of anaerobic reductive dechlorination of chlorinated ethenes in support of natural attenuation. Reductive dechlorination of PCE and TCE occurs efficiently under anaerobic conditions, however, under anaerobic conditions biodegradation of cis-DCE and VC occurs at progressively slower rates and aerobic biodegradation of these species is the preferred pathway. At this Site, geochemical data were analyzed for evidence of aerobic degradation processes, in addition to the traditional analysis for anaerobic reductive dechlorination processes. The geochemical data indicated a combination of anaerobic and aerobic biodegradation is occurring to reduce concentrations of CVOCs resulting in an overall stable to deceasing plume.

The enhanced conceptual understanding of degradation processes occurring within the CVOC plume provided a scientific basis for proposing a targeted reduction in the monitoring scope. The evaluation supported negotiations for a reduction in sampling frequency for monitoring wells which exhibited declining and stable trends. The monitoring frequency at sentinel locations was also reduced due to the increased confidence in MNA as a remedy. The final monitoring program represented a 50% decrease in the total number of samples collected each year. Collection of geochemical data was also eliminated from the monitoring scope as the existing geochemical site model was found to be sufficiently robust that additional data collection was no longer required.

Risk Management and Liability Control: A Holistic Approach to Addressing Rail Yard Environmental Impacts
Michele Gurgas, Jackson Parker and Michelle Rumler - ARCADIS
Paul Kurzanski - CSX Transportation, Inc.

The CSX Transportation (CSXT) Barr Yard facility located in Riverdale, Illinois has been an active yard since 1920. Typical historic and current site activities include rail car and locomotive maintenance, repair, and fueling. Several aboveground and underground petroleum storage tanks have historically been and/or are currently located on-site.

In February 2002, initial response activities were conducted following an uncontrolled release of diesel to the environment. These activities included removal and off-site disposal of ballast, soil, and groundwater. Following the initial response, site characterization and remediation activities related to the incident were conducted under the supervision of the Illinois Environmental Protection Agency (Illinois EPA) Office of Emergency Response from April 2002 until October 2005. Subsequently, the area of investigation increased and CSXT submitted an application for admission into the Illinois EPA's Site Remediation Program (SRP). Free product removal and monitoring activities continued following the site's acceptance into the SRP on October 11, 2005.

To move the project forward within the traditional framework of the SRP, in 2008, areas of concern (AOCs) were identified through a historical documents review and interviews with CSXT personnel. A Sampling and Analysis Plan (SAP) was developed and implemented in February 2009. The analytical data generated from this event was combined with historic soil data to develop a comprehensive view of the site's subsurface conditions. The subsequent model did not result in the delineation of the identified AOCs or residual subsurface free product but indicated that a number of historic and potentially overlapping AOCs were present at the site.

If CSXT continued to follow traditional SRP procedures, the individual AOCs would need to be delineated and remediated; therefore disrupting rail yard operations and increasing the project costs to CSXT significantly. Instead, CSXT chose to develop a holistic approach to address the impacts at this site by viewing the area within the SRP boundary as the AOC. The focus of the project was redirected from individual AOC definition to delineating impacts within the SRP perimeter site boundary. Soil delineation along the property boundary was performed along with the installation of perimeter groundwater wells. Through these perimeter soil and groundwater delineation and subsequent risk assessments, it was demonstrated that any potential impacts pose no environmental risk to off-site receptors. Additionally, a Technical Impracticability Report was submitted to the Illinois EPA documenting that on-site free product has been removed to the extent practicable and demonstrating the lack of product mobility within the site perimeter.

This new strategy assisted CSXT in support of the overall project closure strategy, which will allow residual on-site impacts and free product to be addressed by implementing institutional controls - such as deed restrictions and construction worker
Natural source zone depletion (NSZD) represents a combination of natural processes that reduce the mass of light non-aqueous phase liquid (LNAPL) in a source zone through chemical redistribution of NAPL constituents (i.e., dissolution, volatilization, and sorption) and through biodegradation by microbial and/or enzymatic activity. NSZD is increasingly being considered as an important component of NAPL plume management, as measurements of NSZD rates can serve as a benchmark for comparison to performance and relative benefit of active, engineered remedial alternatives (ITRC, 2009). Microbial degradation of LNAPL is an exothermic process resulting in transfer of heat to surrounding subsurface media and production of carbon dioxide (CO2). Measurement of temperature profiles in groundwater and CO2 flux from the subsurface across an area of known LNAPL impacts can be used to identify zones of biological activity where LNAPL losses are likely occurring, and to estimate associated LNAPL loss rates.

Common methods to quantify NSZD include the gradient method, which utilizes multi-level soil gas probes to estimate LNAPL losses in the vadose zone via diffusive gas transport processes (ITRC 2009), and by measurement of CO2 emissions from the subsurface attributable to biological degradation of LNAPL constituents. Two methods to measure CO2 flux involve deployment of near-surface equipment and include the use of a dynamic flux chamber, which measures changes in CO2 concentration over short periods of time using an infrared gas analyzer, and deployment of CO2 traps filled with adsorbent designed to capture CO2 over the duration of the deployment period. Both the gradient method and instantaneous readings from a dynamic flux chamber represent single snapshots in time of NSZD rates. CO2 traps are deployed over a period of weeks to months to produce an average flux over that time period, minimizing the potential impact of transient effects such as sudden changes in barometric pressure or precipitation events on CO2 flux and corresponding NSZD rates.

The study utilized a two-phase approach to identify areas and quantify the rates of NSZD. The first phase used two techniques to determine if NSZD was likely occurring across the site. Groundwater temperature profiles were measured and instantaneous CO2 flux using a dynamic flux chamber was measured to determine the relative distribution of NSZD rates. This data was evaluated to verify that NSZD is occurring, and to determine optimal locations to deploy CO2 traps to evaluate time-averaged NSZD rates.

The CSX Toledo Docks is an active railyard with historical releases of No. 2 fuel oil and transmission fluid with viscosities of over 150 times that of water. The majority of the LNAPL originated from activities that ceased in the 1940s. Although the release consists of older, heavier LNAPL, current NSZD rates still result in significant source removal rates. Considering this, the application of CO2 trapping as a method of enhancing LNAPL recovery is the focus of this study. The approach was designed to capture CO2 over the duration of the deployment period. Both the gradient method and instantaneous readings from a dynamic flux chamber represent single snapshots in time of NSZD rates. CO2 traps are deployed over a period of weeks to months to produce an average flux over that time period, minimizing the potential impact of transient effects such as sudden changes in barometric pressure or precipitation events on CO2 flux and corresponding NSZD rates.

Understanding the naturally occurring rate of LNAPL removal (through intrinsic biodegradation) has important implications with respect to management of LNAPL contamination, especially in regards to answering the following questions: Is installation of a free product recovery system warranted?; and, Once installed, how long should the recovery system operate in order to achieve the ‘maximum extent practicable’ requirement? 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.
the limited potential for hydraulic recovery and lack of risk associated with the LNAPL, NSZD may prove to be a beneficial remedial alternative.

In a Pig’s Eye: Correction and Beneficial Reuse of Railroad Property that was Formerly Part of a Municipal Dump (and is now a State Superfund Site)
Jonathan Murer - GEI Consultants
LeeAnn Thomas - Canadian Pacific

Railroad property is typically relatively old in terms of its spatial interaction with lease-holders or adjacent industrial activities. As such, certain railroad properties may have become environmentally impaired due to the historic activities of negligent lease holders or adjacent property owners. In certain cases, railroad property becomes impaired to such a degree that redevelopment becomes severely limited due to the economic burdens resulting from the subject impacts. Comprehensive and proactive environmental site management plans and actions can result in these types of impaired properties becoming available to the operations side of the railroad business in a relatively economical manner. Avoiding a piecemeal approach to remediation on such an environmentally complicated parcel ensures that the property redevelopment program desired by the railroad could proceed in a manner with fewer environmental encumbrances and where worker safety is greatly enhanced.

This presentation describes the environmental site management plans which were implemented at a large impaired, and undeveloped, property and the resulting reuse of the property to support critical railroad functions. The adjacent municipal dump property (i.e., the 300+ acre Pig’s Eye Dump), to which the subject impacts were related, is a state Superfund site and work on the impacted railroad property required the involvement of a number of regulatory and community stakeholders. The site management plans were developed such that the property could be beneficially reused within the framework of applicable regulatory requirements, while at the same time minimizing risks to workers involved in redevelopment activities and to railroad workers who would ultimately occupy the facilities on the property. The site management steps undertaken to move the property towards productive reuse are discussed and include: voluntary cleanup program compliant dump material assessment and remedial planning; regulatory negotiation and permit acquisition; dump material removal and management actions (including creative on-site reuse of certain dump materials coupled with management of materials on adjacent impacted city property); creating a multi-acre non-impacted horizon of imported granular materials which resulted in a construction-worker friendly soil zone; significant cost reduction through opportunistic use of backfill materials provided by the city of St. Paul; and new facility engineering design completed mindful of potential methane accumulation.

The information presented will demonstrate that the proactive nature of the subject environmental program resulted in the relatively economical creation of large parcel of shovel-ready land which was formerly available to the railroad on only a very limited basis.

The Story of a Drainage Ditch: From Iron Staining to PCBs to Mother Nature
Paul Kurzanski - CSX Transportation, Inc.
Bertisabel Custer and Todd McFarland - AMEC
Barrier Walls Design and Implementation – Lessons Learned from Life in the Trenches
Teresa Fischer and David Riotte - Geosyntec Consultants
Raghu Chatrathi - CSX Transportation, Inc.

The grading of a drainage ditch can be more than a short and simple project when working in areas with previous industrial operations.

The site is located within the CSXT Osborn Yard in Louisville, Kentucky. CSXT personnel observed reddish-orange seeps on the western embankment of a drainage ditch within the yard. Subsequent assessment identified the material as iron oxide. A review of historical information indicated foundry sands were used as fill material throughout the area, so the iron oxide was attributed to the foundry sands. Initial site activities included modification of the ditch gradient to improve flow. An underflow dam was also constructed in the ditch to prevent the impacted materials from flowing off site. Problem solved… not so fast.

Following a rain event, field personnel observed a suspected petroleum sheen in the drainage ditch and a tar-like substance near the underflow dam. AMEC completed a review of spills in the yard and identified a coal tar distillate release in 1992 and a diesel spill in 1997 near the drainage ditch. Review of soil analytical data collected near the ditch identified petroleum impacts in the foundry sand including diesel and oil range organics, which were attributed to the historic releases.

Prior to remedial activities, AMEC personnel observed increases in water levels in the drainage ditch, discharge culverts, and the drainage basin adjacent to the yard. What now? Following reconnaissance of the drainage area, AMEC observed two beaver dams down gradient of the impacted area. Following proper removal of the beaver dams, the drainage ditch returned to normal flow and AMEC resumed remedial activities at the Site.

AMEC proposed a cost effective and practical engineering control to minimize petroleum seepage at the Site. The engineering control included excavation of soil from the banks and bottom of the drainage ditch. A 12-inch layer of clay was
placed as backfill followed by a layer of AquaBlok®, a sodium bentonite material, to act as a barrier to prevent petroleum material from seeping into the ditch. AquaBlok® has a low permeability (approximately 10-9 centimeters per second) and can absorb various types of dissolved contaminants. The use of AquaBlok® with focused excavation provided a less intrusive and cost effective approach to address petroleum impacts in the drainage ditch. Because yard tracks are located to the west of the drainage ditch and foundry sand is present to approximately 10 feet below ground surface, excavation was limited to 15 feet from the nearest rail. This prevented removal of petroleum-impacted soils west of the drainage ditch. A review of historical spills at the site indicated petroleum impacts likely extend beneath the yard tracks west of the drainage ditch.

The story does not end there. During excavation activities of the drainage ditch, field personnel observed a seep on the eastern bank of the ditch. Review of fingerprinting analysis identified diesel and Aroclor 1254 as the primary constituents. Additional remedial activities at the site include excavation on the east bank to remove the diesel and Aroclor 1254 impacted soils.

Barrier Walls Design and Implementation – Lessons Learned from Life in the Trenches
Teresa Fischer and David Riotte - Geosyntec Consultants
Raghu Chatrathi - CSX Transportation, Inc.

Background: The CSX Transportation, Inc. (CSXT) Talleyrand Avenue Site in Jacksonville, Florida consists of approximately 9.5 acres of discontinuous parcels with a roadway and a creek separating the parcels. The area of concern addressed in this remedial action implementation consists of approximately 3.3 acres and once housed a creosote bulk storage facility with four aboveground storage tanks (ASTs) which operated from the 1917 until 1971. Remedial investigations were initiated in 1984 and a Consent Order was executed between CSXT and the Florida Department of Environmental Protection (FDEP) in 1998. The Consent Order required the completion of an assessment to delineate the lateral and vertical impact of contaminants of concern at the Site, and the implementation of remedial actions. Site impacts include adsorbed and dissolved polynuclear aromatic hydrocarbons and volatile organic compounds, as well as pockets of free-product and residual creosote.

Lessons Learned: So you want build a barrier wall?! This presentation is for railroad and consultant Project Managers and engineers and will use the Talleyrand Avenue Site as a case study to cover the life cycle of a barrier wall from concept to construction. The presentation will help answer such questions as: “What are the different types of barrier walls?”, “What questions should I ask my design engineer during the design phase?”, “How do I identify qualified contractors?”, “What is the best way to bid a slurry wall – lump sum or unit rate?”, “How do I manage construction and quality assurance?”, “What are typical design and construction milestones?”, and “What are the key health and safety considerations?”

The presentation will also cover design factors including geotechnical sampling approaches and minimum sampling requirements, slurry mix design, hydraulic head reduction under the cap, slurry and excessive waste material management, and capping requirements. Finally, the presentation will cover long-term maintenance considerations and property reuse.

A Review of State LNAPL Guidance – Changes are Coming
Trevre Andrews - AECOM
Stella Karnis - CN

Since the passage of storage tank regulations, sites containing LNAPL have been evaluated and subjected to various remediation efforts. Twenty years later, environmental engineers are still attempting to understand many of these sites and continue remediation to meet often vague cleanup standards which often include the least well defined word in the industry, “practicability”. Several standards require reducing LNAPL thickness in wells to a thickness below 0.01 feet and/or meet some type of time based recovery rate metric. Neither of these two standards adequately addresses LNAPL risk. Regulations often appear to tie the hands of the stakeholders involved, leading to either apathetic site cleanup or overly aggressive remediation efforts that often still fail to meet regulatory metrics. A consistent approach based on multiple face to face meetings which identify site LNAPL risks, focus on leading LNAPL guidance, and define practicable investigation and remediation are at the core of defining pathways to closure at sites containing LNAPL. Two key approaches to this strategy are the ITRC LNAPL guidance entitled Evaluating LNAPL Remedial Technologies for Achieving Project Goals and the recent ASTM standard entitled Standard Guide for Estimation of LNAPL Transmissivity. This presentation will provide a summary of current LNAPL regulations in more than a dozen states and provide recommendations for what more can be done to improve regulations and facilitate faster and smarter cleanups of LNAPL sites across the country.

Use of Above-Ground Resistivity Mapping to Identify NAPL Migration Pathways
Jeff Gentry and Donna Laudermilch - CH2M HILL
Jim Diel - Union Pacific Railroad

Union Pacific Railroad operates a rail yard on the banks of the Sacramento River in the Town of Dunsmuir in Northern California. The rail yard is constructed on fill overlying native bedrock. The fill is supported by a 20 foot retaining wall on the shore of the Sacramento River.

Southern Pacific Railroad constructed a NAPL recovery system at the site in 1992. The system included lining the existing retaining wall and constructing a recovery trench. Site observations made in 2010 indicated that the system was allowing in intermittent NAPL release to the Sacramento River.
After a review of the historic site information, it became apparent that the remedial system had affected site hydrologic gradients and the historic NAPL impacts needed to be updated. Because of the eleven acre size of the rail yard and possibility of preferential pathways caused by the heterogeneous fill placed at the site, UPRR elected to use an above-ground resistivity survey to identify NAPL impacts to target additional soil borings and monitoring wells.

CH2M HILL subcontracted to Aestus, LLC, to perform its GeoTrax Survey™ at the site. Aestus selected specific resistivity ranges to display the subsurface resistivity profiles. Fresh NAPL tends to produce a resistive signal where weathered NAPL produces a more conductive signal due to the microbial activity associated with NAPL weathering. Looking at the 3-D image of the select resistivity ranges allows areas with common resistivity signals to be visually connected to identify potential NAPL migration pathways.

Two potential pathways for NAPL migration to the river were identified. The first was a series of resistive signals that traveled along the collection wells of the 1992 remediation system. The second was a series of conductive signals from the location of the former fuel distribution systems that bypassed the 1992 recovery wells.

TPH fingerprinting was used to determine which pathway was the likely source of NAPL to the river. A sample of the NAPL collected near the river was used as a baseline. When compared to the TPH aromatic and aliphatic fractions behind the retaining wall, the correlation was 97 percent. When compared to the NAPL in the collection wells (along the resistive pathway) the correlation was 84 percent at a distance of 230 feet. When compared to a sample in the conductive pathway, 320 feet from the river, the correlation was 91 percent.

Based on these results, remedial options to prevent NAPL migration to the river can focus on the conductive pathway. In addition, since the current recovery system does not meet is objective to prevent NAPL migration to the river, UPRR is working with the Regional Water Quality Control Board to shut off the current system until a final remedy is implemented.

Vapor Intrusion Investigations – Best Practices for the Evaluation of Soil Gases at a Rail Yard Site
Michael Lawrence and Alex Hibbard - TRC Environmental Corporation
Gregory Jeffries - BNSF Railway

Vapor intrusion occurs when volatile contaminants migrate from contaminated groundwater or soil to the indoor air of a building. Vapor intrusion can degrade indoor air quality and is a significant issue to building occupants due to the risk to human health. At a typical railroad site with LNAPL contamination, vapor intrusion is ordinarily not a primary concern as rail yards don’t typically have many buildings where vapors could accumulate. At a BNSF Railway (BNSF) former refueling site in Illinois, BNSF investigated vapor migration to a commercial facility. Five soil gas probes were installed along the side of the facility facing the site to depths just below the building’s foundation. Active soil gas sampling is used to identify whether contaminants of concern are volatilizing from the water table and diffusing through the vadose zone. A helium leak tracer test ensures the quality of the soil gas probe's as well as the sample train leading to the passive sampling
canister. This innovative and effective tracer test is recommended by the EPA and is considered a best practice for soil gas sampling as probe and sample train integrity are confirmed by field and laboratory analysis of purge and sample streams for the helium tracer. Analytical results were compared to proposed TACO Tier 1 soil gas remediation objectives for the indoor inhalation exposure route via advection and diffusion. By comparing analytical results to the recommended exposure limits for industrial/commercial properties, the investigation found no risk to human health within the commercial building. Because a helium leak tracer test was used in the collection of soil gas samples at the site, the client is assured that the data is defensible. As environmental regulations concerning the vapor intrusion pathway continue to evolve, it is particularly important to adopt best practices from the outset to assure high quality data and minimize the risk of vapor intrusion.

A Case Study Example: No Further Action at a Tank Car Spill Site in Rural Michigan
Curtis Bartz - CN
Barry J. Harding, Brad Hoare, and Lori VanderKam - AECOM

A case study is presented where no risk and No Further Action (NFA) was demonstrated at a Grand Trunk Western Railroad accidental spill site with residual Light Non-Aqueous Phase Liquid (LNAPL). On January 18, 2005, during an accidental derailment approximately 4,000 gallons of PureDrill HT-40 (HT-40), a non-toxic drilling fluid blend of thermally altered (hydrocracked) mineral oil and synthetic paraffinic compounds were released in an agricultural setting near the rural community of Chamberlain, Michigan. HT-40 is used as an environmental-friendly drilling mud or lubricant in on-shore oil drilling applications. HT-40 behaves like an LNAPL in being an immiscible-phase liquid and having a density of approximately 0.8450 kg/L at 15°C and viscosity of 3.4 centi-stokes at 40°C. Cleanup requirements for HT-40 are not documented under the State of Michigan’s Part 201 and the Natural Resources and Environmental Protection Act 451 (NREPA 451). Because HT-40 behaves physically similar to LNAPL, CN treated response, investigation and remedial activities (HT-40 removal) similar to the requirement of a fuel oil release. Initial response activities included excavation and removal of approximately 160 cubic yards of HT-40 impacted soil, verification sampling, and installation of an 18-inch diameter LNAPL recovery sump and several water-table monitoring wells. Later, two additional recovery wells were installed at the site. HT-40 was recovered from the recovery wells on a regular monitoring schedule from January 2005 through March 2010, until the wells had reached an asymptotic state and LNAPL recovery was no longer economically feasible. During a 6-year period, groundwater monitoring was performed using low-flow minimum drawdown sampling technique and analysis of Volatile Organic Compounds (VOCs – EPA 8260) and Semi-Volatile Compounds (SVOCs – EPA 8270). Two focused investigations were performed in 2005 and later in 2011. A Limited Phase II Investigation was conducted in 2005 to document the magnitude of impact, evaluate site hydrogeology and to assess the occurrence and extent of HT-40 LNAPL. In 2011, a Supplemental Soil Investigation was performed to verify potential impact to direct contact exposure pathways and to identify extent of HT-40 LNAPL. The later investigation used direct-push macro-core sampling coupled with OilScreenSoil™ Sudan IV LNAPL screening kits to verify the presence and absence of HT-40. Site closure was attained through the following approach: Bulk removal of HT-40 impacted soils. Monitoring of groundwater at the Site for a minimum of five years. Removal of HT-40 for a minimum of five years. Demonstration that HT-40 is non-toxic and of no risk to human health and the environment. Demonstration that HT-40 was not mobile, based on LNAPL transmissivity, and modeled saturation and LNAPL entry pressure head. Meeting Michigan Part 201 Generic Part 201 Cleanup Criteria for soil and groundwater. Preparation of a Restrictive Covenant for the property. On December 10, 2012 a site status of NFA was granted by the Michigan Department of Environmental Quality – Remediation and Redevelopment Division (MDEQ-RRD).

Future Land Use and Sustainable Remediation at the Sydney Tar Ponds: A Case Study and Lessons Learned on Adaptive Remedial Design
Bruce Noble, David Wilson and John Ryan - AECOM
Donnie Burke - Sydney Tar Ponds Agency

The Sydney Tar Ponds Remediation Project is the result of nearly 100 years of steel production in Sydney, Nova Scotia, leaving a legacy of contaminated soils, sediments and groundwater, contaminated with PAHs, VOCs, PHCs, PCBs and heavy metals at two major sites: the Tar Ponds, a 34 hectare marine site; and, the Coke Ovens, a 68 hectare land based site. Given the urban setting, the remediation program presents an opportunity for sustainable remediation, reclaiming an industrial brownfield, and creating a unique solution to concerns and contaminants commonly encountered on many railroad-related projects. The vision for the remediation of these sites has its roots dating back over 30 years and has encompassed aspects of Green and Sustainable Remediation. Currently, remedial engineering design is complete with all twelve contracts in construction or operation and the reality of a sustainable community based solution for brownfield development at these sites is coming into focus. This reality, coupled with strong community support for successful remedial implementation to date, has created momentum with respect to this vision for urban renewal that extends beyond the remedial construction phase. The Project Proponent, the Sydney Tar Ponds Agency, has leveraged recommendations from the Environmental Assessment to develop a Future Land Use Plan for the sites. Supported by Community engagement the task of integrating the design and implementation of the remedial works with the Future Land Use Plan has begun. The Project’s, through implementation of the Future Land Use Plan will build upon sustainable remediation features in the remedial design and provide the necessary base foundation to enable future brownfield development to occur. The primary remedial solution for the Tar Ponds site is Solidification/Stabilization (S/S) of approximately 700,000 tonnes of coal tar contaminated sediment within the marine influenced site. The remedial solution features Green and Sustainable Remediation aspects supporting a recreational and park-type future land use. This has culminated in a Future Land Use Plan encompassing a Commons Area, walking trails, a look-out over Sydney Harbour, and passive recreational infrastructure that are coordinated with the remedial design and
Using LNAPL Transmissivity to Make Smart Decisions about LNAPL Recovery
Brad Koons, Kevin Peterburs and Martina Schlauch Jones - ARCADIS
Geoffrey Reeder - Union Pacific Railroad

The presence of free-phase petroleum is a common occurrence at sites where locomotive fueling operations are present or were present historically. Regulatory guidance on light nonaqueous phase liquids (LNAPLs) is typically influenced by federal law, which mandates LNAPL recovery to the “extent practicable” at leaking underground storage tank sites. This standard has generally been adopted by state agencies for all LNAPL-impacted sites. In situations where LNAPL recovery is a necessary component of site remediation, a science-based, quantitative definition of LNAPL recovery to the “extent practicable” can provide assurance to stakeholders that the recovery action is adequate and reasonably implementable. The transmissivity of LNAPL is the metric that has been put forth by the Interstate Technology and Regulatory Council (ITRC) as a quantitative representation of LNAPL recoverability. Transmissivity generally describes in mathematical terms how well an aquifer transmits fluids over a given vertical interval of the aquifer. For groundwater system impacted by LNAPL, the transmissivity integrates the physical conditions of the aquifer and LNAPL that affect LNAPL movement. Measurements of LNAPL transmissivity can be used to map the recoverability of LNAPL across a site. The Illinois Tiered Approach to Corrective Action (TACO) regulations require that LNAPL be removed to the maximum extent practicable. The conventional definition used by the Illinois Environmental Protection Agency (Illinois EPA) of practicable recovery is 1/8 inch or greater of light nonaqueous phase liquid (LNAPL) in a monitoring well. However, achieving this endpoint is typically impractical due to site conditions. LNAPL present at the Dupo Yard in Dupo, Illinois was demonstrated to be stable and not creating a human health risk. However, due to the geology of the Dupo area, large thicknesses of LNAPL were observed in wells, which drove Illinois EPA to request additional LNAPL recovery action at the site. An alternative end point to LNAPL recovery based on LNAPL transmissivity was proposed for the site. A comprehensive LNAPL recoverability assessment was conducted at the Dupo Yard in support of the proposed LNAPL transmissivity-based recovery endpoint. LNAPL baildown testing, manual skimming, and automated skimming were conducted in 2012 to evaluating LNAPL transmissivity and recoverability. The results of the field tests were incorporated into a technical training on the concepts and science behind LNAPL recoverability presented to the Illinois EPA. The field test demonstrated that LNAPL recovery was feasible in one of the three wells that were tested. Based on discussions with Illinois EPA, additional LNAPL removal from the well that demonstrated adequate recoverability and initiation of an LNAPL transmissivity monitoring program in other wells with LNAPL accumulation will be satisfactory to demonstrate that LNAPL recovery has been completed to the extent practicable in support of future site closure. The Illinois EPA Project and Section Managers have indicated that the evaluation will be suitable for review by the agencies’ Cleanup Objectives Review and Evaluation (CORE) Committee for final LNAPL completion determination.

Efficient and Cost-Effective Assessment and Remediation of a Former Wood Treatment Facility in an Active Rail Yard
Leroy Leonard and Duane Graves - Geosyntec
Paul Kurzanski - CSX Transportation, Inc.

Background: Geosyntec Consultants, Inc. (Geosyntec) was contracted by CSX Transportation, Inc. (CSX) to conduct a soil and groundwater assessment and remedial action at a former wood treatment facility located within the CSX Russell Yard in Russell, Kentucky. The Site is regulated by the Kentucky Department for Environmental Protection (KDEP), Division of Waste Management, Federal Superfund Section; however, the project was completed by CSX on a voluntary basis. CSX requested that the Site be evaluated in order to assess potential worker exposure in advance of the construction of a new rail yard. In order to meet the aggressive construction schedule for the welding plant, we were able to streamline the assessment and remediation process.

Notable Accomplishments and Lessons Learned: This project demonstrated that assessment and remediation of wood treatment sites can be cost effective and efficient. This presentation describes various accomplishments which include:
• initial identification of potential worker exposure hazards by CSX prior to construction and expedient initiation of the assessment process;
• a proactive approach to regulator involvement through all stages of the project;
• the crucial role communication played during the project that resulted in no worker-related injuries or project delays;
• the application of high-volume, low-cost, rapid assessment technologies to develop a technically robust remedial action plan;
• the balance of real-time semi-quantitative data versus quantitative data.
• pre-remediation waste characterization approval that provided a cost savings by eliminating the need to stockpile soil (double handling);
• demonstration that the waste was not listed as hazardous eliminating the need for more costly and time-consuming disposal;
• data evaluation and determination of the excavation extents and depths using GIS; and,
• the accurate estimation of disposal tonnages based on the high-precision delineation which eliminated disposal change orders.

The presentation will also include “lessons learned” with respect to managing the location of underground utilities at a complex, older rail yard. In particular, we will discuss the techniques used for underground utility

Poster presentations

Compliance and Permitting

1. Navigating the Permitting Arena - Implications on Schedule and Process for Demolition of a Large Railroad Ore Dock - Chequamegan Bay, Ashland, Wisconsin

Jay Diebold and Mark Bergeon - Golder Associates, Inc.
Devin Sprinkle, Brian Hayden, and Rick Verkler - CN

In 1916 Wisconsin Central LTD (WCL) constructed a 1,000 foot long Ore Dock structure on Chequamegon Bay in Ashland, Wisconsin. This structure was extended to 2,000 feet in length in 1925 and the dock remained in operation loading ore boats until the early 1960’s. During the 1990’s and early 2000’s several attempts were made to transfer this structure to other entities for preservation as a historic structure. Unfortunately these attempts proved unsuccessful and the structure deteriorated over time. Therefore, WCL obtained Surface Transportation Board (STB) approval in 2008 to abandon and demolish the structure. The STB imposed six environmental conditions on the abandonment.

CN’s engineering staff proceeded to obtain bids for the structures demolition with the intent of beginning demolition work in 2008. Following the receipt of bids and making an initial contractor selection determination, CN’s Environmental Department was asked to review the project documentation, including the six environmental conditions imposed by the STB. The Environmental Department commissioned a pre-demolition regulated materials survey, which identified several potential hazards including deteriorating lead-based paint coating over most of the exposed steel and asbestos containing materials within various electrical and mechanical components attached to the dock. Based on the results of this survey, pre-demolition and demolition phase hazard mitigation steps were developed.

In addition to the material hazards, several potential natural resource impacts were identified, including temporary wetland fill, discharges to surface waters, potential storm water impacts, air quality, and wastewater discharges. Additional project complicating factors included:

- The City of Ashland’s Public drinking water intake was located approximately 1,200 ft from the ore dock, triggering the need for additional mitigation measures, baseline testing, water quality monitoring, and local permitting concerns

- A pair of Peregrine falcons, a State Listed Threatened and Endangered Species and protected under the Federal Migratory Bird Act, began nesting on the dock in 2009, delaying the projects approval and triggering additional State and Federal permitting, as well as habitat conservation plan development. Attempts to deter nesting in 2010 were unsuccessful, ultimately necessitating that an incidental take permit be obtained.

Ultimately, the project start was delayed until late summer 2011, approximately three years after the planned original start date. This presentation will highlight the broad range of potential

2. Laser Beams and Historic Structures, Brooklyn Subdivision Bridge, Oregon

Lori Price - CH2M HILL
Steve Cheney - Union Pacific Railroad

State Historic Preservation Officers (SHPOs) throughout the country regulate effects on historic properties under Section 106 of the National Historic Preservation Act. This regulation frequently comes into play on railroad projects when a federal permit is needed, such as a US Army Corps of Engineers Section 404 permit, triggering compliance with Section 106. While Section 106 does not prohibit the alteration, removal, or demolition of a historic property, it does require a consultation process which generally results in some type of mitigation. This mitigation often takes the form of documentation of the historic property, which can be an expensive and time-consuming effort. For UPRR’s replacement of the bridge across the Willamette River on the Brooklyn subdivision in Oregon, UPRR implemented an innovative approach to Historic American Engineering Record documentation. The large size and remote location of the bridge, spanning a waterway, presented a challenge for completing required documentation. UPRR met this challenge by using a 3-D laser scanning (3DLS) process to capture the details and measurements of the bridge, which resulted in a focused field effort and streamlined documentation process. Benefits of this approach were no downtime for the active railroad facility while providing greater details than could be gained with more traditional documentation methods. The 3DLS remote-sensing technology captures real as-built information by sending and receiving millions of pulses of light. The scanner can collect points upwards of 500,000 points per second and can reach up to 300 meters away. These scans are then stitched together to create a comprehensive
3. Wetlands in the Desert Southwest, UPRR Salt Creek Bridge, Yuma Subdivision, Southern California

Janet Hill - CH2M HILL
Deb Schafer - Union Pacific Railroad

In the arid southwest, aquatic resources such as wetlands are scarce, and provide valuable habitat for aquatic and terrestrial species. The U.S. Army Corps of Engineers, Los Angeles District, recognizes the importance of these resources, and has outlined special requirements, called Regional Conditions, for Section 404 Clean Water Act permits in the Sonoran and Colorado Desert Region of the District. The Regional Conditions require that an Individual Permit be used, rather than a more streamlined Nationwide Permit, regardless of the amount of impact, for Section 404 permitted activities in wetlands in these desert regions. A portion of the Union Pacific Railroad’s Yuma Subdivision between the towns of Mecca and Niland, California, an approximate 40 mile track distance, is very near to the Salton Sea, storm flow from the Chocolate Mountains, and irrigation networks in Riverside and Imperial Counties. The relative abundance of water in the Imperial Valley from large supply canals, perpendicular supply laterals, and the associated drains creates a complex human-induced hydrology in the area that provides greater opportunities for wetlands to form and thrive in the desert. Union Pacific Railroad proposed to construct a second mainline bridge at Milepost 640.87 on the Yuma Subdivision at Salt Creek as part of an effort to expand capacity along its busy Sunset Route across Southern California, a primary route for cargo transport from Los Angeles eastward. However, the construction schedule would not allow a permitting timeline for 18 to 24 months that may be required to prepare, submit, and support an Individual Permit process. Instead, Union Pacific modified its project design to avoid the placement of fill regulated by Section 404. This presentation will discuss how UPRR successfully completed its bridge project yet still complied with applicable environmental laws even while avoiding the need for a Section 404 Clean Water Act permit in this very challenging desert southwest wetland environment.

4. Expediting Difficult Wetland Mitigation and Permitting with Early Agency Coordination

Michele Martzke - CB&I
Devin Sprinkle and Kari Harris - CN

After Canadian National Railway (CN) acquired the Elgin Joliet & Eastern Railway (EJ&E) in 2009, CN planned a large-scale modification of Kirk Yard, located in Gary, Indiana. The Kirk Yard Improvements Project involved significant modifications to the yard to improve efficiency of train building operations, including over seven miles of new track, additional bridges, and new buildings. A wetland delineation conducted in 2010 revealed that Kirk Yard hosted remnant dune-swale habitat, a rare ecosystem indigenous to the Great Lakes region under the jurisdiction of the U.S. Army Corps of Engineers (USACOE). Although many of the improvements could be constructed on existing track bed, some of the proposed structures directly impacted seven acres of federally regulated wetlands.

The acreage of wetland impact and the sensitive nature of the wetlands at Kirk Yard meant the project would require detailed Individual Section 404 and Section 401 permits. Additionally, the rarity of the wetland type and a high mitigation ratio precluded cost-effective mitigation by the purchase of mitigation bank credits. CN communicated with various environmental regulatory agencies and local stakeholder groups early in the planning stages. Considering the oversight, scrutiny and the globally unique (threatened) habitat in which CN was working, CN was presented with specific and rare opportunities to realize positive outcomes for all parties.

Building on the relationship formed during the procurement process, CB&I in cooperation with CN facilitated early coordination with USACOE, the Indiana Department of Environmental Management and local environmental stakeholder organizations to discuss alternative mitigation options. Numerous meetings and site visits provided a platform for the various interested parties to understand the need for the rail improvements, learn about each others’ land management priorities, and provide input on the mitigation options. Using the input from the interested parties, CB&I explored using land preservation, wildlife habitat enhancement, and natural areas studies as alternative mitigation methods.

CN and CB&I kept USACOE aware of the mitigation proposal throughout the planning process, enabling USACOE to release the public notice within 60 days. USACOE rapidly issued the final permit document only 10 months after the CN's permit application submission. The final mitigation plan included permanent preservation of over 40 acres of high quality dune-swale habitat, invasive species management in nearby sensitive habitat, and creation of sand prairie wetland on CN property near Lake Michigan.

Early and frequent communication with regulatory agencies and interested parties allowed CN and CB&I to develop a wetland mitigation plan that satisfied USACOE requirements for land preservation and wetland creation, and thereby expediting a typically difficult and lengthy Individual Permit in a timely manner.
Environmental Analytical Issues

5. Reduced Volume Technology: Ways to Save the Environment and Reduce the Stress of Organic Sample Collection and Analyses

Judith Morgan - ESC Lab Sciences

New methods in SW-846 and the flexibility of existing methods has allowed for technology that provides advancements that are reshaping the focus of the analytical industry. While there is no replacement for the extraction solvent (methylene chloride) that is required in the current suite of approved EPA methods, there are ways to reduce its use and with no sacrifice to quality. ESC has enhanced traditional organic sample preparation with validation of two new choices that result in reduced sample collection volume and subsequent decreased solvent volume. In order to preserve detection levels, Large Volume Injection technology on traditional GC and GC/MS instrumentation is necessary. Method 3511 brings the required volume of 180mLs solvent in traditional liquid-liquid extractions to a mere 2mLs, which is a 98.9% reduction in solvent. The enhanced version of Method 3510 reduces the solvent volume by 90%. The use of this technology results in a sample size that is reduced to 40mL for 3511 and 100mL for the enhanced 3510. The smaller container is easier to handle and pack, reduces breakage and bulkiness of field supplies, and is beneficial where a low purge wells exists.

6. Analytical Tools For Spill Characterizations

Kesavalu Bagawandoss - Intertek

Environmental characterization of spill Fate and Transport requires chemical fingerprinting analysis. All spill characterization efforts require sound sampling techniques to obtain representative samples and these samples must be processed by strictly following approved laboratory protocol. This technique is routinely used in non-aqueous phase liquid (NAPL) identifications in Groundwater plumes. Further, liability allocation based on the source contributions could be assessed. Fingerprinting analysis provides essential information required to identify the source or sources of contamination or spills and facilitate the evaluation of Environmental Risks, Natural Resources Damage Assessments (NRDA), and Litigation. Multiple lines of Evidence must be gathered to determine contamination. Chemical fingerprinting is complex in nature. Several analytes and methods are employed to identify and compare two sources to each other to determine if they are related or unrelated. This presentation will outline the laboratory methods involved in fingerprinting natural and anthropogenic sources. Complex Gas Chromatographic and Mass Spectrometric Single Ion Monitoring techniques are employed to determine if the sources are petrogenic, pyrogenic, diagenic, or biogenic in nature. Weathering patterns will be discussed. Key indicators and diagnostics will be outlined for each of the processes. Diagnostic ratios, histograms, and extracted ion current profiles (EICPs) for the various hydrocarbons, including isoprenoids, parent mono- and polycyclic aromatic hydrocarbons (MAHs & PAHs), alkyl substituted polycyclic aromatic hydrocarbons (alkyl PAHs), normal alkanes, alkyl substituted cyclohexanes, and petroleum biomarkers (hopanes, steranes, sesquiterpanes and terpanes) for the identifications will be presented. Comparisons will be presented for each of the classifications and groups.

Environmental Management Information Systems

7. CSX Transportation Curtis Bay Piers

Melissa Fagan - Geosyntec Consultants
John Calhoun and Karen Adams - CSX Transportation, Inc.

CSX has made a long term commitment to sustainability and facility improvements at Curtis Bay Piers in Baltimore Maryland. Recent projects completed at the facility include a storm water management system with a zero discharge goals, new dust suppression system improvements to mitigate the use of potable water, a storage pad expansion project, a new potable waterline installation project, a new wastewater treatment system, and a new geothermal cooling system. The storm water management system is an extensive plan that includes a revolutionary automated rainwater harvesting and, weather forecasting control system. The geothermal cooling system incorporates innovative green technology that utilizes an earth loop recirculating system to cool the control rooms at the coal dumping facility. This poster will discuss the improvements – completed, in construction, and planned – for the Curtis Bay Piers in Baltimore Maryland. The poster will also highlight the sustainability that has been a part of the overall facility improvement plan and there benefits to the environment.

Environmental Response

8. Benefits of Adaptive Design for Investigation with Expedited Remediation for Environmental Response in Active Rail Areas

Mark Klemmer, Jessica Gattenby, and Andrew McManus - ARCADIS
Raghu Chatrathi - CSX Transportation, Inc.

Adaptive design principles that focus on flexibility in design and materials being utilized during response and investigation activities can be employed in environmental response situations to decrease the cost and effort to implement remediation, expedite site closure and shorten timeframes necessary to achieve cleanup criteria. Adaptability in design is especially beneficial in active rail areas where access to impacted media is limited by operations and timely repair and rehabilitation of track is of the utmost importance. Upfront consideration of probable and practical treatment alternatives can reduce the need for continued disruption of service. A case study of the use of adaptive infrastructure in a response to a derailment in an active rail yard demonstrates the benefit of this design strategy. In 2012, a derailment occurred inside a classification yard,
resulting in the breach of a tank car and the release of 174,000 pounds (~24,000 gallons) of liquid crude sulfate turpentine to the soil, groundwater, and storm water ditch. Initial response to the derailment included soil excavation, installation of an interceptor trench near the internal yard storm water ditch, and evacuation of free flowing product from the soils into the open pit excavation. Rail repairs and reconstruction was necessary to provide business continuity at the yard. The reconstruction required the open pit excavations and the interceptor trench be filled before remediation was concluded. In the main excavation area, conduits of high permeability fill were installed during backfilling to create accessible accumulations of free flowing product and three recovery sumps were installed vertically into the drainage conduits. Additionally, 18 4-inch vertical access pipes were installed in the interceptor trench to provide multiple monitoring points for free product accumulation, increase the contact area of the trench with the surrounding soil, and provide durable access to the subsurface for potential fluid extraction, vapor extraction, multi-phase extraction, remedial fluid injection or air injection. Simple adaptive design during backfill activities provided a mechanism by which effective, long term dual-phase recovery could be accomplished without the need for costly business interruptions following rail reconstruction. The use of project planning methods that incorporate adaptive design and design build enabled the implementation of a flexible and effective strategy to the response, investigation and remediation of a release in an active rail yard and provided for more short and long term business continuity than traditional response methods would have provided.

9. Emergency Asbestos Abatement and Demolition of Fire Damaged Structure
Roy Stancil - CB&I
Rick Nath - CSX Transportation, Inc.

NY 810 was an abandoned CSX Transportation (CSXT) facility in Buffalo, New York that consisted of three attached buildings housing garage and office space, two covered loading docks, and a material yard for exterior storage of bulk items. Prior inspections by Shaw Environmental (Shaw), a CB&I company, found asbestos-containing materials (ACM) in the roofing, siding (transite exterior paneling), thermal system insulation (TSI), window glazing, and floor tile throughout the facility. NY 810 was scheduled for asbestos abatement starting in September 2012 and demolition was to follow the abatement. On July 3, 2012, a fire at NY 810 destroyed over half the facility. The fire and firefighting efforts resulted in damage to large sections of the transite exterior siding, collapsed roofing, melted windows and disintegrated flooring throughout the fire impacted portion the structure. In addition to the ACM in the fire damaged areas; large areas with asbestos floor tile and mastic, roofing tar, TSI, and intact transite panels remained in the sections of the building not damaged by fire. CSXT and Shaw coordinated the emergency response as soon the property was deemed safe to enter. Shaw and a crew from Environmental Products and Services of Vermont, Inc. (EPsv) mobilized to the site on July 5th to wet down the fire damaged sections. Shaw personnel collected bulk samples from the debris to determine if there were detectable concentrations of asbestos present within the ash. Air samples were also collected downwind of the fire damage and along the property borders. Based on the results of these efforts, it was determined that an asbestos fibers release was not posing a threat to the surrounding community. CSXT and Shaw developed a remediation plan to address the cleanup of the asbestos in a four phased approach conducted in concurrence with notification to all regulatory agencies, coordination with utility providers (gas and electric), bid solicitation, and coordination of contractors. Phase 1, conducted by Shaw and EPsv, consisted of the immediate response that kept the debris wet until it was determined that there would be no asbestos release from the debris. Phase 2, conducted by Shaw and Prism Response, was the initial exterior removal of damaged and scattered transite and floor tile from the access driveways and parking/staging areas, allowing safe access to the buildings. Phase 3, conducted by Shaw and Prism Response, was the removal of asbestos-containing floor tile, mastic, roofing, and TSI from the undamaged sections of the facility. Phase 4, conducted by Op-Tech, in concurrence with Phase 3, involved the wet demolition of the fire damaged sections of the building. During which all efforts were made to segregate and recycle steel building materials. Shaw personnel were on site during all phases as the Project Monitor responsible for contractor oversight, air monitoring, documentation and tracking of all waste going offsite, and final clearance for the asbestos abatements. After removal of ACM from the site and prior to final demolition of the remaining structures, Shaw conducted a universal hazards inspection of those structures and removed fluorescence lights and ballasts, thermostats with mercury switches, lead acid batteries, air conditioners and other HVAC wastes, and emergency lighting fixtures. On September 5, 2013 the site was cleared for final clean demolition. A number of challenges arose during the abatement and demolition efforts including: site security, conflicting needs of contractors working concurrently, and changes to the overall abatement plan and scheduling necessitated by unforeseen structural damage to the remaining sections of NY 810, not observable until the fire-debris was cleared during the wet demolition.

10. Incident Response – Working Toward Closure From Day One
Fred Payne and Terri Rubis - ARCADIS
Paul Kurzanski and Bill Parry - CSX Transportation, Inc.

Incident response that focuses only on removal of immediate threats can generate a chronic recovery problem that continues long after response activities have been completed. CSXT has found that significant life-cycle time and cost efficiencies can be gained by working toward closure early in the response and recovery process. There are several elements to the closure-focus strategy from Day 1, including: Conceptual Site Model – Assess the fate and transport potential for released materials and determine 1) what media need to be engaged (i.e. soil, groundwater, surface water), and 2) how to minimize migration. Capturing any released materials before migration occurs generates the most significant savings in the early-closure approach. Regulatory Environment – Determine and negotiate as quickly as possible the regulatory endpoints and the documentation that will be required to achieve closure. Stakeholder Engagement – During the early stages of incident
response, all stakeholders are typically engaged. Mapping out closure plans at this point can reduce transaction time and cost associated with conventional regulatory processes and early efforts toward closure can generate good will among the parties. Off-Site Support – The on-site response and recovery team must be supported by a strong off-site team. Database development, data evaluation and technology feasibility assessments all must be conducted in parallel with the on-site response. The CSX team will provide an overview of the closure-focused incident response strategy and will provide case study examples of the strategy at-work.

### Noise and Vibration

11. Hump Yards in Silence  
Brigita Altenbaher - Elpa d.o.o.

Today, hump yards are near cities, therefore the inhabitants are exposed to high frequency (squealing) noise whose level may exceed 130 dB. The aim of our research had been a development of complete technology which would significantly reduce a high frequency noise on it source and solves this world’s insoluble problem. We first developed a new composite material which does not change braking properties, is capable of taking extremely high pressure loads, reduce noise and is environmentally friendly. In next phase of our research we developed a new technology for applying developed material on the wheels. The applicators apply the composite material directly onto the part of the wagon wheel flank being in contact with the rail brake. Timely and precise measuring of applied material onto a wagon wheel creates an intermediate layer of material which is thermally decomposed in the braking process. The noise reduction results had been very good and had shown a decrease of the high frequency noise almost completely (for 99 %) at its source. With our technology we had also reduced general noise for more than 30 dBA, what is, in comparison to other noise solutions, a significant added value to noise mitigation on railways.

12. Shimlift To Improve Alignment  
Paul Kampfraath - Kampa International  
Jelte Bos -Movares

In order to improve the maintainability of track alignment and stability an innovative rail fixation for cross-ties has been developed. This patented rail fastening resolves a problem related to transitions and other locations where the track tends to face local settlements and causes unwanted vibrations. Examples are: level crossings, culverts, bridges, viaducts insulated rail joints and rail movement joints.

The ShimLift® rail fastening is a system that allows easy height adjustment of the rail relative to the cross-tie. It proves to be useful in those situations where local adjustment of the track alignment is required.

### Remediation

13. Design and Implementation of the Enhanced DNAPL Recovery System to Eliminate Risk to the Public and Field Personnel While Continuing to Collect Essential Data  
Matthew Griiles - ARCADIS  
Paul J Kurzanski - CSX Transportation, Inc.

The CSX Transportation and ARCADIS US, Inc. project team in Indianapolis, Indiana, has designed, constructed, tested, and implemented a portable recovery system for dense non-aqueous phase liquid (DNAPL) at the former wood treating facility located in Bloomington, Indiana (the Site). This remedial system significantly reduces the risk of exposure from the creosote and organic vapors to field staff and the public during recovery operations. The remedial system developed is essentially an enclosed process known as the Enhanced DNAPL Recovery System.

Prior to 2012, DNAPL at the Site had been recovered utilizing the manual bailing technique. Though the manual method limited the volume of water recovered during operations, it had also become increasingly difficult to balance time efficiency and effective DNAPL recovery with personal health and safety. Results from real-time air quality monitoring indicated that organic vapor concentrations during the removal process were below published action levels. However, in order to eliminate the risks associated with potential exposures to organic vapors, ARCADIS designed and implemented the Enhanced DNAPL Recovery System as a closed vapor collection system which uses activated carbon to automatically trap VOC emissions.

Furthermore, the Enhanced DNAPL Recovery System not only eliminates the risk to the public and field staff; it also allows for critical data to be collected during recovery operations. Free product recovery rates, migration and thickness are important data which evaluate when the remediation system at individual recovery wells can be halted. This uniquely designed system still allows for collection of that critical data but removes the risk associated with exposure. Through technology and innovation of engineered controls, this portable Enhanced DNAPL Recovery System has dramatically changed recovery operations at the site, as well as eliminating the risks associated with contaminant contact which is beneficial to the client, ARCADIS and the public.

14. The Vital Role of Comprehensive LNAPL Characterization in Developing an Appropriate Remedial Action Strategy  
Michael Lawrence - TRC Environmental Corporation  
Gregory Jeffries -BNSF Railway
The development of the most effective remedial action strategy at a site containing light non-aqueous phase liquid (LNAPL) demands a thorough characterization of the properties of the LNAPL including distribution, recoverability, mobility, and plume stability. A BNSF Railway (BNSF) site in Illinois has a history of LNAPL in a former locomotive refueling area. A former vacuum-enhanced product recovery system operated at the site in an attempt to recover LNAPL, but was shut down in 2011 due to system inefficiency. Since that time, a variety of methods have been utilized to fully characterize the LNAPL to facilitate the selection of the best remedial technology. In addition to traditional groundwater monitoring and soil analyses, characterization activities have included petro-physical analyses of soil cores as well as bail-down recovery tests to estimate LNAPL conductivity in the subsurface and the local transmissivity of the formation for LNAPL.

Improvements at the site were made through the implementation of an LNAPL characterization program that included monitoring MIP, laboratory analysis, and direct-push activities. The results of this program demonstrated that significant drawdown of the water table by as much as 6 feet has been achieved, exposing a greater vertical interval of the subsurface. Benzene concentrations in groundwater have been reduced to below the cleanup goals in all wells but one, and continued remediation is being focused on that portion of the site to achieve final closure. Dissolved constituent concentrations have been reduced by up to 92 percent. Constituent concentrations in groundwater exceeding regulatory action levels. A remedial approach of monitored natural attenuation was approved by the regulatory agency in 2000; however, four years of monitoring failed to show a trend of declining BTEX concentrations.

As a result of the characterization program, a modular DPE system was installed at the site with 4 extraction wells. The system has operated to facilitate the selection of the best remedial technology. In addition, significant cost savings is apparent from developing a conceptual site model as opposed to continuing to operate an inefficient LNAPL recovery system.

15. Improved Conceptual Site Model Facilitates Revised Remedial Approach for Effective Cleanup to Achieve Rapid Site Closure

D. Scott Pittenger - Norfolk Southern Corporation
Brooke Y. Bennett, J. Wesley Sterling, Jon C. Williams and Mark S. Westray - GEI Consultants, Inc.

Petroleum releases from underground storage tank (UST) systems and other sources on railroad-owned properties are a common and expensive problem. Advanced investigation techniques can provide critical information about subsurface conditions that determine the effectiveness of remedial approaches and can be economical even on very small sites. Releases of gasoline from a UST system at a railroad lease property in the North Carolina Piedmont resulted in several volatile organic compounds, predominantly benzene, toluene, ethylbenzene, and xylenes (BTEX), with concentrations in groundwater exceeding regulatory action levels. A remedial approach of monitored natural attenuation was approved by the regulatory agency in 2000; however, four years of monitoring failed to show a trend of declining BTEX concentrations.

More aggressive approaches consisting of amendment injections to promote contaminant oxidation and biodegradation were subsequently implemented; however, these additional remedial measures also failed to achieve cleanup goals. It became apparent that more thorough characterization of the site was necessary in order to develop an effective remedial approach. In 2011, additional investigations were conducted to better define subsurface stratigraphy and hydrocarbon distributions using membrane interface probe (MIP), electrical conductivity direct sensing methodologies, direct-push technology borings for physical logging, and collection of samples for laboratory analysis. This information was used to develop a more comprehensive conceptual site model to ensure that the relationship between site conditions and benefits and limitations of potential remedial strategies were understood.

The subsurface investigations revealed a gneissic saprolite with near-vertical foliations containing clay and silty-sand layers. The coarser-grained, weathered quartz intervals appeared to be primary conduits for hydrocarbon migration and, in the area of the former USTs, residual hydrocarbons at depths of up to 10 feet below the top of the saturated zone were identified by MIP and laboratory analysis. Given the generally low permeability of the saprolite and discontinuous nature of the foliations, amendment injections were unlikely to contact the impacted subsurface areas and achieve significant reductions in dissolved constituent concentrations. Consequently, this more complete understanding of subsurface conditions resulted in reconsideration of applicable remedial strategies. Dual-phase extraction (DPE) was identified as a promising technology due to certain site-specific conditions, notably:

- The primary contaminant, benzene, can be effectively removed from the subsurface by DPE due to its high volatility.
- Due to the low hydraulic conductivity of the geologic materials, DPE was expected to lower the water table and expose impacted areas that were previously water-saturated to negative pressure and increased air flow.

A short-term pilot test demonstrated that significant hydrocarbon mass removal could be accomplished using DPE. On the basis of these results, a modular DPE system was installed at the site with 4 extraction wells. The system has operated continuously since it was placed into operation in August 2012, with a few brief shut-downs due to power outages and a ruptured pipe that resulted when a power outage occurred during a period of prolonged sub-freezing weather. The rate of groundwater recovery has averaged about 0.4 gallons per minute, reflecting the low permeability of the saprolite; however, significant drawdown of the water table by as much as 6 feet has been achieved, exposing a greater vertical interval of the soils containing residual gasoline to vapor recovery. Analyses of vapor samples show that hydrocarbon recovery rates have ranged from 2.2 to 18.9 lbs/day, and benzene recovery rates have ranged from 0.04 to 0.31 lbs/day. As a result, more than 1,100 lbs of hydrocarbons (equivalent to nearly 400 gallons of gasoline) and 32 lbs of benzene have been recovered from the subsurface, and dissolved benzene concentrations have been reduced by up to 92 percent. Constituent concentrations in groundwater have been reduced to below the cleanup goals in all wells but one, and continued remediation is being focused on that portion of the site to achieve final closure.
16. A Tree Falls in the Forest: Statistical Evaluation of Forest Material at a Remediation Site
Currie Mixon - GEI Consultants, Inc.
C. Russell McDaniel - Norfolk Southern Corporation

At a large remediation site in the southeast, volunteer trees have grown within and adjacent to impacted soils. For a number of sustainability, logistical and geospatial reasons, the preference is for this tree material to be used for beneficial purposes rather than being disposed within an onsite disposal cell.

Proper management of risk and decision-making requires an appropriate evaluation of constituents of concern within the tree material. However, there is no known regulatory guidance on the usability of forest products at impacted sites.

This poster presents the straightforward evaluation methodology and results of tree samples collected throughout the site and analyzed by a laboratory. The statistical evaluation of the sampling data by groups (species, tissue type, and location) provide clear insights and answers to questions regarding the levels of impacts in potentially reusable forest material.

17. A Review of Risks Associated with Stationary Hazardous Materials Railroad Cars
Zahra Moghadasi, Moghadasi Zahra, and Bagheri Morteza
Iran University of Science and Technology

Railroad sidings are increasingly important areas in rail network; particularly, while storing Stationary Hazardous Materials (SHM) cars. Most regulations prevent staying any SHM cars for a long time. For instance, according to Railway Association of Canada (RAC), the SHM cars have to leave the rail station within five days. The low probability/ high consequence nature of SHM car accidents makes it possible to use risk analyses in the field. The objective of this paper is to gather, analyze and classify scientific literatures in the context of SHM cars’ risk. The main issues addressed in this paper are: a) defining and clarifying the risks associated with HSM cars, b) summarizing the previous investigations and c) identifying gaps and relations. Also, risk reduction plans and actions will be presented as a result of this critical review.

18. How to Save Money and Landfill Space Using Segregation of Target Organ Toxicity in Risk Assessments
Sara Mathews and Patrick Harrison - AMEC
Matthew Adkins - CSX Transportation, Inc.
Ann Holbrow-Verwiel - ToxStrategies, Inc
William Frez - OM Group, Inc.

In this presentation we will demonstrate how to save substantial money (remediation costs) and landfill space by using a U.S. EPA method for evaluating dose additivity during site-specific risk assessments. We will use a case example to show how: Use of a non-traditional application of Alabama risk guidance provided a 10-fold increase in groundwater cleanup goals; which, Resulted in a 100-fold increase in soil clean up goals; which, Allowed for focused soil source excavations and cost effective groundwater remediation; and Saved approximately $1,000,000 in remedial costs; as well as, Over 6,100 tons space in a commercial hazardous waste landfill. In 2007, a train derailment resulted in the release of two non-carcinogens: acetone and phenol. While emergency response activities recovered large quantities of these chemicals, calculation of appropriate risk-based cleanup goals was necessary in order to develop a corrective action plan using appropriate remedial goals, methods, and quantities. As a screening approach intended to ensure protection of potentially exposed receptors, the state regulatory agency expected use of default screening levels that are adjusted assuming the dose additivity of ten (10) simultaneously contributing non-carcinogenic chemicals. This screening approach does not account for situations involving fewer chemicals or chemicals that primarily affect different target organs. Use of the expected method would result in much lower cleanup goals at a resulting greater cost, with no quantifiable benefit to human health or the environment. Considering the target organs affected by multiple non-carcinogenic chemicals can significantly reduce the conservative nature of screening levels and provide significant cost savings in the application of remedial strategies at environmental sites. The segregation method saves substantial effort while providing equal protection for potential future receptors. Demonstrating that chemicals do not adversely affect the same target organ systems at screening level concentrations is not trivial. Commonly consulted information sources often qualitatively suggest that multiple and overlapping organ systems may potentially be affected. Quantitative data may also be available that addresses a variety of toxic effects on many organ systems over a wide dosage range. Thus, both qualitative and quantitative information should be evaluated carefully to assess whether common target organ systems may be affected at the screening level concentrations and whether further evaluation is recommended as practical or cost effective. We will present a project that adhered to the specific decision steps outlined by U.S. EPA for evaluating dose additivity, and will demonstrate how the results were used to establish clean up goals and focus remediation activities for a train derailment site.
19. Mitigation Construction and Minimizing Mitigation Liabilities – The BNSF Kansas City Intermodal Facility Case Study Update

Tim Fobes - HDR Inc.
David Flick - Terra Technologies

As part of the BNSF Railway Company’s Kansas City Intermodal Facility (KCIMF) development and CWA Section 404/401 Permit, a multipurpose onsite plan for mitigating stream, wetland, floodplain/floodway, water quality, upland habitat, critical snake habitat, and airport bird air strike hazard impacts was constructed during 2011 - 2012. In order to minimize risks to mitigation success and liabilities, BNSF obtained competitive bids from third party mitigation providers to contractually provide specialized mitigation construction, conservation land holdings, perpetual maintenance, and long-term monitoring. This project is an updated case study from a previous RREC presentation on the construction of multipurpose mitigation in a confined land area and the strategies employed to ensure success, through minimizing mitigation liabilities. A review of the design, completed construction, land transaction and third party mitigation contracting will be provided by BNSF’s engineering firm and third party mitigation contractor. The prominent mitigation feature was the relocation of 9,000 feet of perennial stream channel and seven acres of wetlands. All the impacts were mitigated along the relocated stream, using the following features: Rosgen-based stream classification/design, vegetated stream corridor (riparian) buffer, restored wetlands, created stormwater wetlands, a new floodway/floodplain, and targeted plantings/water management techniques, all in a 59 acre mitigation site termed the “Conservation Corridor”, located adjacent to the new KCIMF. The stream relocation using the full Rosgen-based approach is the largest ever undertaken in the state of Kansas and is considered a feature example project by regulatory agencies. The “Conservation Corridor” generated a surplus of mitigation credits, while also providing a much higher quality overall stream channel and riparian buffer, and protecting critical endangered snake habitat. This project helps protect water quality to an important downstream water supply source, Hillsdale Lake. A high level of commitment by BNSF and its contractors to mitigate environmental impacts and positive agency relationships were the keys to success for this large and complex mitigation effort.

20. The Use of Real-Time Weather Forecasting Integrated Controls To Improve Stormwater Capture and Reuse

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

CSX is committed to environmental stewardship and seeks applications where new cutting edge technologies can provide CSX has over a decade of experience applying innovative treatment technologies to replace traditional railroad industry wastewater treatment approaches. CSX is also committed to environmental stewardship and often seeks applications where cutting edge technologies can also provide an environmental benefit. One such project used walnut shells as a filtration media in the industrial wastewater treatment process. Although this technology has been used previously by the petro-chemical industry, CSX successfully adapted walnut shell filtration to general industry use. The walnut shell media filtration system was installed downstream of an oil/water separator, replacing a more conventional process such as dissolved air filtration (DAF). The system provides the level of treatment necessary to meet stringent NPDES discharge effluent requirements at their mainline locomotive fueling facility in Euclid, OH and avoided the use of any chemicals in the treatment process.

However, there are risks associated with the early adoption of innovative technologies or with non-traditional application of proven technologists. This presentation will discuss the lessons learned for addressing the risks associated with the application of innovative technologies in the railroad environment. These lessons learned include managing the responsibilities of the owner, designer, equipment supplier, contractor, and operations personnel and how to successfully mitigate risks at each step to generate a positive outcome.

21. Union Pacific Railroad, Pocatello Wastewater Treatment System Improvements

Paul Strickland - Garver
Mark Ross - Union Pacific Railroad

Union Pacific Railroad has constructed a new industrial wastewater treatment plant (WWTP) and made collection system improvements for the Pocatello, Idaho railroad yard. The goals of the project included updating the collection system and conveying wastewater to a new WWTP.

The new WWTP, which replaced an existing plant, will provide preliminary treatment before discharging to the City of Pocatello sanitary sewer system. The new WWTP includes: automatic trash screening, surge storage tanks, a 200 gallon per minute dissolved air floatation (DAF) unit as primary treatment process, recovered oil and sludge storage, and a state-of-the-art automation and control system. The control system is networkable and allows monitoring and control from any computer with a secure internet access.

The collection system improvements included: repair and replace gravity sections to convey wastewater from a diesel shop to the new treatment plant, plug and abandon remaining industrial gravity lines and manholes onsite and to existing WWTP,
abandon the existing WWTP, plug all existing roof drain connections to the industrial wastewater collection system and discharge as overland storm water flow.

22. Wastewater Treatment Plant Improvements at a Norfolk Southern Rail Yard – A More Efficient Sludge Drying Process
Arthur Newby and Robert Stolt - AECOM
David Warchol - Norfolk Southern Corporation

The Norfolk Southern Railway Company (Norfolk Southern) is re-examining traditional ways of doing business with a view toward sustainability.

The newly constructed replacement sludge drying beds and waste storage area at the Wastewater Treatment Plant (WWTP) of Norfolk Southern's DeButts Rail Yard in Chattanooga, Tennessee increases plant efficiency, lessens the impact on the environment, reduces energy, requires less maintenance and provides facilities that will outlast previous standard designs for this type of facility.

This project included the removal of existing clay bottom sludge drying beds and the design and construction of eight new sludge drying beds and a waste storage area for miscellaneous rail yard waste products. The project incorporates green building techniques by greatly reducing the probability of product release through the use of a concrete containment structure and a metal canopy roof that reduces sludge contact with stormwater thereby accelerating the sludge drying process.

The replacement drying beds included the use of a multi-layered drying bed media consisting of two different gradations of gravel as a support for a top filtration media consisting of a crushed slate product (Stalite) and the use of a Geoweb® product to confine the media. The Geoweb® provides support for skid steer loaders and prevents them from sinking into the media during media change outs and was installed as part of the top media layer to assist in even replacement of the top 2-3 inches of media when the dried sludge is removed by skid steer loaders. The metal canopy installed over the drying beds acts to speed drying time which resulted in a smaller drying bed footprint, thus saving valuable real-estate in the WWTP area.

The waste storage area consists of a long rectangular concrete slab to temporarily store yard wastes such as contaminated soil and vactor truck discharges. Trench drains are located on either side of the storage area to allow any liquids present in the waste products to drain away from the waste products for treatment in the WWTP. The waste storage area is also covered by a metal canopy roof to prevent waste contact with stormwater.

Stormwater drainage collected from the metal canopy roof is discharged to a new infiltration pond adjacent to the drying beds. The infiltration pond allows the rainwater from the metal canopy roof to infiltrate into the soil while providing stormwater retention to reduce or eliminate stormwater discharges to the adjacent stream. The pond also acts as a soil filter that will improve the quality of any stormwater discharge.

Evaluating the materials and methods of construction that were used on this project will help to establish cost-effective design approaches on future Norfolk Southern work. This facility will serve as a demonstration project as part of a broader push to bring such things as green building designs, recycling programs, and similar initiatives into the railroad’s sustainability business model.

This presentation will discuss the new WWTP facility with special emphasis to inform the audience on details of the design and unique construction materials that were incorporated into the project to greatly improve the efficiency and life of the sludge drying beds. Some of these materials are new to this type of project and have previously not been used on sludge drying beds.

23. Union Pacific Railroad, Cheyenne Railyard Industrial Wastewater and Stormwater System Improvements – Part 2
Oscar Sorensen - CH2M HILL
Mark Ross – Union Pacific Railroad

The wastewater treatment plant (WWTP) at Union Pacific Railroad’s (UPRR’s) Cheyenne Railyard (Yard) currently handles a combined waste stream consisting of wastewater generated at various facilities on the Yard in addition to infiltrating groundwater and stormwater. The combined influent is treated at UPRR's WWTP and discharged to the publically-owned treatment works (POTW). During periods of high stormwater runoff, the combined influent exceeds the capacity of the WWTP and wastewater is stored in a series of storage basins that ultimately overflow to an emergency outfall permitted under the State of Wyoming’s National Pollutant Discharge Eliminations System (NPDES) program. In 2007, UPRR began investigating the condition of the conveyance system on the Yard and began planning to either repair or replace the system. Approximately 80 percent of the existing lines were cleaned and inspected. Because the conveyance system on the Yard is old (over 100-years), deep (25-feet at its deepest), and in bad disrepair, UPRR decided to replace the existing combined system with two new systems, one specifically designed to handle industrial wastewater and the other for stormwater. The design for these new systems was completed in January of 2012 and construction is now underway with completion scheduled for May 2013. The industrial wastewater system will consist of forced mains with strategically-located pump stations. For stormwater, a new evaporation pond will be constructed with an increased capacity and an overflow tied into the exiting NPDES outfall. Part 1 of this project was presented at the 2012 RREC and included a number of complex challenges and unique conditions that were encountered in the initial phase of the project. Part 2 of this presentation will present the remainder of the project through construction completion and bringing the new systems online.