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Energy, Emissions, and Air Quality

Air Quality

Environmental Review, Permitting, and Stakeholder Coordination for the Addition of a Third Main Track Through Cajon Pass in Southern California

Robert Brendza - BNSF Railway
Jeffrey Rice - URS Corporation

Environmental permitting is an integral step in any change in railroad alignment. Even with proper planning, multiple agencies, stakeholders, standards, and procedures often leads to significant delays in obtaining permits, thereby increasing costs and postponing construction. The environmental planning and permitting for a new third main track through Cajon Pass in southern California introduces a number of permitting and approval challenges. Based on the Cajon Pass’ proximity to the San Bernardino National Forest, the habitat for sensitive plant and animal species, and the attention of multiple resources agencies, the potential for schedule delays was immense. This paper discusses the procedures used by the Burlington Northern Santa Fe Railway/BNSF Railway Company (BNSF) to add nearly 16 miles of third main track through the Cajon Pass, California. In this instance, the BNSF proposed add a third main track adjacent to their existing main tracks to alleviate a bottleneck to goods movement. The addition of the third main track involved obtaining permits for grading encroachments outside the right-of-way on land owned and managed for public benefit by the United States Forest Service; and a permit from the United State Army Corps of Engineers for 73 impacts to jurisdictional waters. As a result, an Environmental Impact Statement was required to be prepared.

The addition of the third main track offers several advantages to train operations including increased train capacity, reducing train delays, which has the potential of increasing goods movement by truck, reducing idling time for trains waiting to traverse the Pass, and increasing operational flexibility. This paper specifically addresses:

1) The BNSF’s successful streamlined approach and diligence in responding to the complexities of multi-agency/multi-management coordination under the National Environmental Policy Act;
2) A methodical and integrated approach to engineering and environmental analysis;
3) Methods for facilitating the acquisition of major permits;
4) Restoration along the project footprint of wetlands, and contaminated lands; and
5) Other ancillary permit and approval prerequisites to initiating construction.

Metropolitan planning organizations (MPOs) see traffic congestion and transportation demand in response to rising population in the region as being inevitable. MPOs are engaged in planning activities to develop adequate solutions to better develop and manage the transportation infrastructure. The project should be viewed as providing one possible option to address the freight movement requirements in the region and is consistent with the objectives of these planning organizations. The projected demand for capacity through the Cajon, via train or track will be increasing regardless of capacity increases.

With no project, the BNSF would not be able to meet projected demand for freight movement. The existing rail system capacity would be at its limit and trains would continue to stack up increasing idling time and delaying goods movement. Freight movement by truck would become more desirable increasing the number of truck trips through the Cajon Pass. The combination of increased idling time for trains in combination with increased truck traffic would increase the degradation of air quality in the study area.

Development of Diesel Particulate Filter for Diesel Locomotive in Korea

In-Gweon Lim - Myong-ji University, Korea
Youngmin Cho - Korea Railroad Research Institute

The emission from diesel locomotives has become a serious environmental problem especially in urban area. In Seoul, the local government keeps watching the emissions from diesel locomotives in metropolitan area because the air pollution from the diesel locomotives is no more ignorable. However, the air pollution from the diesel locomotives has been out of control because there has not been any satisfactory technology. In this study, a diesel particulate filter for diesel locomotives was developed and applied to a 1,500 horsepower diesel locomotive in Korea. The filter was a ceramic chip made of silicon carbide because it is known to be efficient for the adsorption of diesel particulate matters. The emitted particulate matters were diluted and analyzed by using a scanning mobility particle sizer and a dust spectrometer. As a result, it was observed that the particulate matters could be successfully removed from the emission gases by using this filter. For the regeneration of the used filter, a soot burning system was also designed, and the field test is under going.
Fugitive Dust Control for Railroads
Lorraine Pack - BNSF Railway
Julia Manfredi and Stephen Ochs - AMEC Earth & Environmental, Inc.

Due to not meeting the particulate matter (PM10) standard, Maricopa County, Arizona, and the Maricopa Association of Governments adopted a Five Percent Plan for the region as required under the Clean Air Act, and strengthened several fugitive dust control rules. In support of the Five Percent Plan, the Arizona Legislature revised Arizona Senate Bill 1552 to help strengthen air quality regulations addressing PM10 by mandating that certain cities adopt ordinances to control ozone and particulate matter from vehicle operations and other operations. Noncontiguous sites, including those owned by railroads, are required to reduce their fugitive dust emissions and meet more stringent stabilization and opacity requirements. Maricopa County Rules require that railroads and other noncontiguous sites be covered under a Dust Control Block Permit for dust generating activities and that control measures be addressed and implemented through an approved Dust Control Plan.

A Dust Control Plan and Block Permit have been developed for BNSF properties in Maricopa County. Under the permit and plan, appropriate control measures must be implemented to reduce dust generation and meet requirements. Site conditions, feasibility of implementation, and cost effectiveness were key considerations in choosing the proper controls to implement. This presentation will address areas of PM10 nonattainment and the development and implementation of the Dust Control Plan, including the control measures that have been implemented thus far and their effectiveness.

Locomotive Exhaust Temperatures During High Altitude Tunnel Operation in Donner Pass
Joseph McDonald, Brian Nelson, and Brian Olson - U.S. Environmental Protection Agency
Steve Fritz and Randell Horne - Southwest Research Institute
Mike Iden - Union Pacific

Locomotives in heavy-haul operation at high elevation and within unventilated tunnels function some under some of the most extreme conditions encountered in the U.S with regards to high ambient temperatures and high locomotive exhaust temperatures. Consideration of such conditions is crucial to the design of future catalytic emission control systems for locomotives. Field testing was conducted with two locomotives certified to U.S Federal Tier 2 Locomotive Emissions Standards that were operating as part of a four-locomotive consist pulling a heavy-freight train west-bound through the Donner Pass Region in late August. The highest post-turbine exhaust temperatures observed over the entire test route occurred within Union Pacific tunnel #41, which is an approximately two-mile-long unventilated tunnel located near Norden, California. Engine protection systems of both locomotives limited the peak exhaust temperatures encountered during the tests to below 560 °C.

Railroad Diesel Emissions Aren’t Just for Locomotives
Mel Burda - BNSF Railway

With all of the emphasis on air pollutants, green house gases and the on going debate about global warming all emission sources are being scrutinized. This is especially true for any equipment powered by diesel engines. The various State environmental agencies and USEPA along with many citizen environmental and special interest groups are pushing for greater and greater reductions in the criteria pollutants and green house gases.

This movement has moved beyond diesel locomotives. It is now addressing any “on” or “off” road equipment with 50 horsepower or greater diesel engines. This includes most “on” track rail work equipment like tampers, ballast regulators, high rail work trucks, welders, etc.

This presentation is intended to bring you up to date on these developing air regulations and give a broad overview of where low emitting diesel engines have to be employed.

California's Locomotive Railyard Emission Control and Incentive Funding Programs
Harold Holmes - California Air Resources Board
Lanny Schmid - Union Pacific

In spite of federal preemptions, the California Air Resources Board (ARB) has historically worked cooperatively with the Union Pacific Railroad (UP) and BNSF Railway (BNSF) railroads over the past decade to develop and implement two voluntary railroad agreements. California's railroad agreements reduce both oxides of nitrogen (NOx) and particulate matter (PM) locomotive emissions beyond those provided under existing U.S. EPA locomotive regulations.

In my presentation I will provide some background on the: 1) 1998 Locomotive NOx Fleet Average Agreement for the South Coast Air Basin, 2) 2005 Statewide Railyard Agreement, and 3) 2007 CARB Diesel Fuel Regulation Extended to Intrastate Locomotives. I will also provide an overview of California's position on the 2008 U.S. EPA locomotive rulemaking and an estimate of the potential California locomotive NOx and PM emission reductions. In addition, I will discuss the ARB
regulations for railyard non-locomotive emissions such as: 1) heavy-duty diesel drayage trucks, 2) cargo handling equipment, 3) transport refrigeration units (TRUs), and 4) offroad and stationary equipment.

The ARB recently completed 18 railyard health risk assessments which identified significant diesel PM related excess cancer risks in and around the railyards, with some of the largest yards excess cancer risks within a range of 500 to 2,500 in a million. I will provide an estimate of the 2005 diesel PM emissions and excess cancer risks from all of the 18 major California railyards. In addition, I will discuss the proposed UP and BNSF railyard mitigation plans and the estimated emissions reductions the plans will provide from 2005 to 2020.

Other topics I will cover include a discussion of ARB's research efforts, in cooperation with the UP and BNSF, to develop aftertreatment applications for existing locomotives. Also, the ongoing research conducted for California's locomotive remote sensing pilot program. Finally, I will provide an update on the Carl Moyer and Proposition 1B incentive programs that are being used to fund a number of advanced technology switch and line haul locomotives in California.

Pollution Prevention

Air Flow Around Freight Trains
Chris Baker - University of Birmingham, United Kingdom

This paper considers aspects of the aerodynamic behaviour of freight trains. It does not specifically address the many aerodynamic problems associated with such vehicles, but rather attempts to describe, in fundamental terms, the nature of the flow field. The rationale for such an approach is that the flow fields that exist are the primary cause of the aerodynamic forces on the train and its components which result in a whole range of aerodynamic issues – such as the production of aerodynamic drag, the dispersion of pollutants into the atmosphere, the effects of train slipstreams on those at trackside, the cross wind stability of empty container stock etc. This paper thus draws on a range of model scale and full scale experimental and computational work and attempts to build up a comprehensive picture of the flow field. Attention is restricted to trains in the open air (i.e. tunnel flows will not be considered) for both still air conditions and crosswind conditions. For still air conditions the flow field will be described for a number of flow regions i.e.

- around the nose of the train;
- along the side, roof and underbody of the train;
- the wake of the train;

For crosswind conditions, the nature of the flow field around typical trains will be presented. Throughout comparisons will be drawn with the equivalent flows around passenger trains. Finally some remarks will be made as to the relevance of the data that has been presented to current issues in train aerodynamics.

TIETEK Plastic Composite Crossties
Henry Sullivan - TIETEK

TieTek has developed and commercialized plastic composite railroad ties that are used intermixed with treated hardwood ties in heavy freight and transit track.

The ties have been in use for more than 13 years and have carried more than 2 Billion Gross Tons of load on commercial track while holding gage and experiencing negligible rail seat abrasion. TieTek has produced and sold more than 1 Million crossties to date.

The TieTek™ tie is produced from recycled High Density Polyethylene combined with reinforcing fillers and fibers to provide required stiffness, compression strength, impact tolerance and fastener holding power. The ties resist attack by insects, water and molds and have a long service life, even in hostile environments. The proprietary manufacturing process utilizes blending, intensive mixing, extrusion and molding to produce consistent mechanical properties from a realistic range of polymer properties encountered in the recycling stream.

The TieTek™ composite tie has many environmental benefits. Each year, the production of 300,000 composite ties:

- Saves 75 thousand mature hardwood trees
- Recycles 50 million pounds HDPE
- Recycles one million tires
- Eliminates need for two million pounds of wood treatment chemicals

The ties can be recycled at the end of their useful life and used to make new ties. The composite tie is a sustainable, environmentally sound innovation.
Sustainability

Addressing the Climate Change Challenge...Developing a Practical Carbon Management Strategy in an Uncertain Regulatory Environment

Jeff Stovall and Kathy Blue - Trinity Consultants

Addressing climate change is becoming a key focus area for proactive organizations, due to the visibility of the climate change issue, the quickly morphing landscape in the United States, and the increasing energy costs that are impacting organizations. This session aims to provide recommendations on high level strategies as well as practical strategies for implementing climate change programs within organizations.

First, this session will provide a summary of the current regulatory developments surrounding climate change in the United States, including proposed federal greenhouse gas (GHG) legislation, ground-breaking state reporting & reduction requirements (including California’s AB32 initiative), the likely addition of CO2 as a New Source Review (NSR) regulated pollutant, and voluntary programs such as The Climate Registry. Each of these developments and programs will be discussed in detail so that attendees can quickly comprehend the current regulatory landscape and evaluate potential impacts.

As will be seen in the regulatory overview, the current pace of legislative and regulatory developments is rapid. Thus, it becomes not a question of “if” greenhouse gases will be regulated, but rather “when” greenhouse gases will be regulated and what organizations can do to prepare. In order to mitigate the emerging regulatory risk and develop a robust carbon management strategy, companies are well served to develop a strategy that employs the following steps. Each step will be discussed in detail during this presentation and examples will be provided.

Step 1. Understand the Landscape and Quantify Emissions
Step 2. Develop a Mitigation Evaluation
Step 3. Develop a Climate Change Management Plan
Step 4. Implement the Plan
Step 5. Refine Strategy

The session will also discuss best practices and strategies for managing data and conducting a base year GHG inventory

PANEL: The Strategy of Managing Climate Change Issues
Roy Deitchman - Amtrak
Dave Seep - BNSF Railway
Bob Fronczak - Association of American Railroads
Michael Walsh - Chicago Climate Exchange

Railroads are increasingly facing the complexity of managing climate change issues that are driven by a variety of factors. This panel will examine strategies that the industry is developing and applying to address these issues. The panel will be preceded by a presentation titled “Addressing the Climate Change Challenge...Developing a Practical Carbon Management Strategy in an Uncertain Regulatory Environment,” which will provide the conference members with an overview of the current regulatory landscape and developments in climate change, as well as in quantifying GHG emissions. The panel will then engage in a discussion based on a number of questions on the topic of climate change. The panel will consist of members from the freight and passenger rail industries, the Association of American Railroads, and the Chicago Climate Exchange (CCX).

Developing a Greenhouse Gas Emission Inventory and Inventory Management Plan Following the EPA Climate Leaders Program Protocol

Rick Nath - CSX Transportation
Ken Richardson - ARCADIS

A greenhouse gas (GHG) emissions inventory and Inventory Management Plan (IMP) document was prepared for a large eastern railroad company using the EPA Climate Leaders Program protocol. This protocol is based upon an existing corporate GHG protocol developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). The EPA Climate Leaders Program is a voluntary industry-government partnership intended to promote long-term comprehensive climate change strategies.

The first step in this process was to establish organizational and operational boundaries for this inventory work. Next, spreadsheets and databases were created for calculating fuel usage and GHG emissions associated with rail system operations. Client-specific activity data was obtained and used for calculating emissions using published emission factors. Following EPA Climate Leaders Program guidance, an IMP document was prepared to describe methods, data, and inventory processes and systems. The primary objective of the IMP was to ensure the credibility of the GHG emission inventory information. After establishing a base year GHG emission inventory, an emissions intensity goal was established...
Development of a Sustainability Screening Tool for CN's Site Remediation Planning

Stella Karnis - CN
Phil Middle, Robert Noel de Tilly, Karen Clarke-Whistler, and Helene Richer - Golder Associates

Golder Associates Ltd. was retained to develop a sustainability screening tool to assist in remedial project planning for Canadian National's (CN). Integrating the concept of sustainability into a more interactive decision-making process is anticipated to enhance the short and long-term viability of operations. The sustainability screening tool was to be pilot tested for the evaluation of remedial options for a plume of diesel-like product located in fractured bedrock under an operational rail yard in Ontario. Presently, monthly product extraction from interceptor sumps is being performed at the site. The remedial options under consideration include an interceptor trench with pumping for product recovery, a multi-phase extraction system, a well-based hydraulic barrier with pumping for product recovery, and injection of oxygenated water for plume containment and in situ bioremediation. The main concerns involve environmental liability with respect to potential plume migration outside of property limits or under existing infrastructure as well as potential impacts on groundwater receptors.

A pilot test was conducted on the implementation of the tool to demonstrate its effectiveness in identifying the most sustainable remedial option through the evaluation of environmental, social, and economic impacts. The tool (GolderSET-SR) contains indicators relevant to site remediation inspired by international standards and practical experience. The screening tool was customized to address client operations and concerns based on the consultation of corporate and industry resources. GolderSET-SR enables decision-makers to evaluate short and long-term overall impacts of potential projects in a simple, systematic way.

The pilot test identified two remedial options that performed well with respect to environmental, social, and economic issues; namely multi-phase extraction and injection of oxygenated water. The most sustainable options featured some technical uncertainty related to their anticipated effectiveness under site conditions. Recommendations were presented for additional site assessment and testing to reduce uncertainty related to technical performance. Monitoring of key environmental, social, and economic indicators should ensure a sustainable performance in the long term.

Sustainable Development in the Rail Industry

Norman Parker and Ava Coleman - Parker and Associates, Inc.

Selected rail entities are in the throes and woes of looking at themselves from the perspective of sustainable development. Unlike Responsible Care, which has to a certain degree been imposed on the industry by outside forces, the motivation for sustainable development has been spurred by internal forces. Boards of Directors and stockholders now speak and think in verdant tones and hues. Not unlike the leap of faith into Responsible Care, the call to Sustainable Development is steeped in uncertainty. There are several interpretations of what defines and constitute sustainable development, how it can be implemented, and what the benefits and costs are in doing so. The good news is that basic sustainable development principles are imbedded in the operations of most carriers. The bad news is that they are too distracted to acknowledge and leverage this advantage in short and long term strategic planning and in relationships with internal and external stakeholders.

The goals of this paper are to:
- Present a definition of sustainable development that is relevant to the rail community;
- To discuss the costs and benefits of doing so; and,
- To present a suitable implementation strategy.

The sustainable development concepts presented in this paper are based on over ten years of work with three major carriers in the US and in Canada to assess and improve environmental, health and safety management. The concepts are also based on lessons learned from sustainable development assessment efforts in other industries.

Noise and Vibration

Comparison of Community Noise Levels from Wayside Horns and Locomotive Mounted Horns

Lance Meister - Harris Miller Miller & Hanson Inc.

One of the provisions of the FRA’s locomotive horn rule allows for the use of wayside horns at grade crossings as a means of limiting community noise from train operations. Prior to the rule, it was standard procedure in the United States for trains to sound their horns starting 1/4 mile prior to all grade crossings, generating significant noise in the community near a crossing.
Wayside horns are mounted at the crossing and instead of the horns on the locomotive being sounded as the train approaches the crossing, the wayside horn is activated and sounded, but is directed at the traffic and pedestrians at the crossing. While a wayside horn is not “quiet” in that it does not eliminate the horn noise like a Quiet Zone, there is a substantial reduction in noise near grade crossings. Because wayside horns are mounted at the crossing, and are highly directive, the noise levels at locations not directly adjacent to the roadway are significantly lower with a wayside horn as compared with a locomotive mounted horn. This presentation reports on the results of a noise study conducted at a grade crossing with a wayside horn and compares the noise levels in the community for both a wayside horn and a locomotive mounted horn at the same crossing.

Compliance

Endangered Species Management on the BNSF Railway Trancon Capacity Improvement

*Douglas Dorsey - Hanson Professional Services, Inc.*

The BNSF Railway Company’s Southern Transcontinental main line freight railroad track, known as the “Transcon,” runs 2,200 miles between Southern California and Chicago and carries an average of 80 trains per day. BNSF has constructed a parallel second main line track in single-track locations to increase the number and velocity of trains on the Transcon.

The capacity improvement includes construction of bridges, culvert extensions, and track embankments, many of which are in regulated waterbodies or wetlands and require Section 404 permits from the U.S. Army Corps of Engineers. Federal law requires the Corps of Engineers to consider effects of the project on threatened and endangered species in determining whether to issue permit authorization. Between 2003 and 2007, construction activities in Kansas, Oklahoma, Texas, and New Mexico encountered protected habitat of several endangered species, including the Arkansas River shiner, Pecos blunt snout shiner, interior least tern, Streckers chorus frog, and the Eastern spotted skunk.

Agency consultations regarding endangered species lengthened the permitting process by as much as 6 to 12 months. The presence of endangered species or their habitat affected the capacity improvement projects by preventing construction in the water bodies during fish spawning, bird nesting, and frog breeding periods and required fish removal, frog relocation, and special habitat plantings. This paper will discuss the effects of these endangered species on the scheduling and construction of the projects, benefits of early coordination with the regulatory agencies, and technical elements of the biological assessments and mitigation measures.

Obtaining Environmental Clearance for the Norfolk Southern Keystone Buildout Project

*Marc Radell - URS Corporation*

The Norfolk Southern Keystone Buildout, the first new freight railroad route to be constructed in the Eastern United States in recent years, involved the $44.8 million construction of a railroad alignment in Indiana County, PA to establish a shorter, more efficient route for transporting coal to Reliant Energy’s Keystone Generating Station. The nearly seven-year environmental clearance process involved preparing a NEPA Environmental Assessment to screen impacts from three alternative rail corridors and conducting detailed environmental studies for the preferred alternative – rehabilitation of 11.2 miles of existing track, construction of a new 5.3-mile single-track alignment, and construction of a Y-connector. By the time construction was completed in August 2006, creating a level railbed in the mountainous topography had required the removal of 1.4 million cubic yards of soil and sedimentary rock and resulted in cut slopes as deep as 150 feet and fill slopes as high as 45 feet. The combination of this extensive earthwork and the presence of 30 wetlands, 73 streams, two archaeological sites, and a historic farmstead within the project corridor presented unique impact avoidance and minimization challenges and required extensive coordination with the Pennsylvania Department of Environmental Protection and U.S. Army Corps of Engineers. Mitigation for unavoidable impacts included a large-scale shotcrete slope protection system, 4.3 acres of replacement wetlands, 3,840 feet of created stream and drainage channels, wildlife passages, and recovery of archaeological artifacts. The project will eventually result in a diversion of freight transport from truck to rail of up to 1 million tons of coal, decreasing consumption of diesel fuel in the amount of 5,720 gallons per year, with related energy savings and air quality improvements. The project will also allow about 1 million more tons of coal with a higher BTU value to be delivered to the generating station, meaning that less coal will be burned per kilowatt of electrical energy generated.

The Keystone Buildout project has won many awards, including the American Railway Engineering and Maintenance-of-Way Association, Hay Award for Excellence, 2007; American Council of Engineering Companies, 2007 National Honors Award; ACEC/PA 2006 Diamond Honors Award – Transportation; and American Society of Consulting Engineers Pittsburgh Section 2006 Award of Merit.
Wednesday 5 November

Review of Environmental Issues Confronting the North 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 members include the railroads that operate 76 percent of the line-haul mileage, employ 93 percent of the workers, and account for 95 percent of the freight revenue 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. Regulatory activities include off-road diesel exhaust regulation, changes in the group multi-sector stormwater permit, creosote re-registration, and an effort by EPA to publish a risk assessment on naphthalene. EPA released a final rulemaking in March which will have significant impact on the locomotives the industry purchases and rebuilds and will be phased in, in the next 9 years. Environmental awareness activities include the John H. Chafee North American Railroad Employee Environmental Excellence Award, and the award for professional railroad employees. Voluntary programs include the SmartWay program designed to improve fuel efficiency and reduce emissions.

Environmental Challenges and Permitting of New Rail Construction in Central Florida

Keith Brinker - CSX Transportation
W. Troy Neisz - AMEC Earth & Environmental, Inc.

In late 2006, Preliminary Engineering was initiated for the construction of new rail projects within central Florida along a rail corridor commonly referred to as the S-line. The project portfolio consisted of 23 possible locations for new siding track construction and construction of universal crossovers within the existing right-of-way. The typical rail siding project consisted of 2-miles, at a minimum, of new rail construction. The initial site visits for each of the proposed locations consisted of representatives from engineering, signals, design engineering, real estate, grade crossings, and environmental.

At each site, the various environmental concerns or constraints were identified and discussed as a group. The identified concerns consisted of wetlands, stream/channel crossings, floodplain encroachment, significant archaeological locations, and threatened & endangered (T&E) plant/animal species. Once proposed project locations had been finalized, additional site visits were completed, as necessary, to fully define and delineate the environmental constraints associated with the project limits. The site reviews consisted of 1,000-feet on either end of the proposed construction limits as well as observing both sides of the existing rails for wetlands and other constraints. This allowed engineering to relocate the sidings, if necessary, to minimize the environmental impacts. Based on the delineations, an environmental constraints map was prepared detailing locations and acreage of the areas. Additional Preliminary Engineering meeting were conducted which included all team members for finalization of the project designs. Environmental was key during the Preliminary Engineering aspect of the projects to ensure that the construction plans contained the level of detail necessary to complete the required permit applications. The 23 possible projects were narrowed down to 14 definite to be built projects.

Because the Florida permitting process requires state approval of the Water Quality Certification (WQC) for the USACE-permits; each of the projects required an additional state required layer of permit procedures. Permit applications were completed for three of the Water Management Districts through which the S-Line is located. Pre-application meetings were held with the various offices of each of the water management districts that would be responsible for permit approval. This allowed the regulatory agency to provide input to the projects in the early stages to help address some of their concerns and also to promoted a sense of cooperation between the rail industry and the water management districts.

Because of the early involvement of environmental in the Preliminary Engineering to identify the constraints, the projects were sited at locations that minimized the environmental impacts. Only three of the 14 projects required an USACE Individual Permit (>0.5 acres of wetland impacts); five of the locations had <0.5 acres of wetland impacts and were permitted under the USACE Nationwide Permitting program; and the balance (six) had no impacts to the waters of the US. Likewise, environmental worked with the regulatory agency to offer mitigation for impacts to wetlands as well as several T&E species that were encountered at the project sites.

The various permit applications have been completed and submittal began in the spring of 2008 for agency review and approval. Construction is expected to commence with the projects in fall 2008.

Passenger Rail and Transit Environmental Topics

Ken McHale - Metro-North Railroad
Gary Rozmus - Gannett Fleming

Environmental challenges and solutions during the reconstruction of the Metro North Railroad Harmon shop complex.
The Metro-North Railroad, a subsidiary of New York's Metropolitan Transportation Authority, is the second-largest commuter railroad in the United States, providing 250,000 commuter trips each weekday and more than 73 million trips per year. With 284 route miles and 775 track miles, Metro-North serves 120 stations in New York and Connecticut. Its service territory covers approximately 2,700 square miles.

In the late 1990s, rebuilding the Metro-North Harmon Shop Complex rose to the top of its capital program priority list. This complex is Metro-North's primary equipment repair facility and is located at Croton-on-Hudson in New York's Westchester County. It is where Metro-North stores, services and maintains the majority of its fleet of both diesel and electric train sets. The existing turn-of-the-century facilities at Harmon Yard were not only inadequate to support the expanded fleet and future operations, but their ability to support the current operation was becoming questionable. One of the initial challenges was to determine how to modify and rebuild the existing Harmon complex yard and buildings while maintaining operations at the same time. The existing complex is fully occupied and in full service – 24 hours a day, seven days a week.

To complicate matters, a large community of upscale condominiums was rapidly developing adjacent to the site along the Hudson River. Increasingly, these new residents were complaining about noise from idling diesel locomotives. Metro-North knew that improvements should be made, but the question remained as to what needed to be done and how to accomplish it. Metro-North formed an internal task force to analyze its own long-term needs and requirements and retained consultants to document and analyze the existing facilities and operations, to study Metro-North’s 2020 Plan and then to prepare a sequenced plan of development to guide the future Harmon Shop Complex reconstruction. In 1998, a strategic plan for the complex redevelopment was created. The strategic development plan looked at many alternate site layout schemes. The selected scheme recommended a four-phase, 10-year improvement plan to redevelop the complex while maintaining all existing operations.

Phase 1: South diesel trainset storage and service yard reconstruction.
Phase 2: Maintenance of way and communications hub facilities construction.
Phase 3: New locomotive and coach shop construction, and.
Phase 4: Electric car shop and/or support shop reconstruction.

When completed, the overall cost of the project will be several hundred million dollars. Metro-North is now well into the implementation of its strategic development plan. Phase 1 has been completed. This initial and critical phase of the project included the following improvements:

- Expansion of the diesel trainset storage capacity in the yard.
- Addition of five locomotive fuel pad servicing stations.
- Addition of toilet sanitary capture flushing stations (along each yard storage track).
- Replacement of the signal system (connecting to the main line tracks to New York City).
- Addition of a new communication system, including a yard telephone/paging system.
- Significant reduction of the noise level at the condominium complex (due to the relocation of the idling diesel locomotives and installation of wayside outlets).
- Addition of an employee overpass (eliminating employees crossing one mainline and multiple yard tracks to report to work).

The Phase 2 portion of the renovation plan is essentially complete. This portion of the project addressed a number of key strategic plan elements:

- Maintenance of way storage facilities relocation.
- Communications hub building construction.
- Material distribution center expansion.

Most importantly, Phase 2 will clear the area where the new coach, locomotive and support shops will be constructed. In addition, a new wheel Truing Facility was constructed and Priority Repairs made in the interim to the Electric Car Shop. Phase 3 is currently underway. This includes construction of the following shop facilities:

Coach Shop: The 126,000-square foot facility will include two train maintenance tracks, one scheduled periodic inspection track and three unscheduled repair tracks, along with associated repair and storage areas, offices and employee facilities. The shop will be double-ended, run-through facility with the capacity to inspect or repair 28 push-pull coaches.

Locomotive Shop: The 85,000-square foot shop will be located next to the coach shop in the south yard. It will be configured as a double-ended, run-through facility. The shop will have the capacity to inspect or repair 14 locomotives simultaneously. The importance of Phase 3 is that it will separate the diesel and electric maintenance and repair operations that co-exist today. The engineering evaluation and design of Phase 4 of the strategic plan will closely follow Phase 3. Phase 4 will be critical to the overall success of this multi-phase project. It will focus on the replacement and/or rehabilitation of the existing, turn-of-the-century main shop building (which is presently used to maintain both the electric and diesel fleets), reconstruction of the north yard for storage of the electric trainsets and construction of a new train washer, a recycling center facility and possibly the Support shop. The new electric car shop will include two train maintenance tracks to handle a full-length electric train set for the first time. It will also include eight repair tracks, a parts storage area and the necessary support
Environmental Issues of Concern

A variety of environmental issues of concern had to be managed during the course of each Phase of the work. This approach was based on complying with regulatory requirements, meeting the mandates of the railroad’s environmental programs, minimizing impacts to construction schedules and managing the issues cost effectively and safely. This included an innovative approach to recycling contaminated soil on site which was approved by the state regulatory agency. The principal environmental issues of concern included:

- Asbestos Containing Materials (ACM) and Lead-Based Management;
- Soil and Waste Management including on-site recycling of contaminated soils;
- Dewatering Fluid Management;
- Stormwater Management;
- Wastewater Management;
- Air Permitting;
- Soil Vapor Intrusion;
- Tank System Designs, Permitting and Closures; and
- Health and Safety Plans (HASP).

The presentation will describe the facilities work conducted in the various Phases of the Harmon Yard Redevelopment program and how the environmental issues were and continue to be managed in a cost effective and well coordinated manner.

Electronic Waste - Byproduct of the Information Age

Michael M. Meloy - Manko, Gold, Katcher & Fox, LLP

With the explosive growth in the use of computers and other electronic equipment, businesses and regulators are confronting the challenges of managing large quantities of electronic waste. Electronic waste is one of the fastest growing waste streams in the country. Some types of electronic waste can qualify as hazardous waste, depending on how such waste is managed. In addition, there has been a sharp increase in the number of states that have taken action to regulate the manner in which electronic waste is handled. Businesses are also confronting long-term liability issues under the federal Superfund program and similar state programs arising out of the handling of electronic waste. This presentation provides an overview of key developments relating to the regulation of electronic waste at both the federal and states levels. It also offers suggestions on different strategies that regulated entities may wish to employ in addressing electronic waste issues.

Environmental Management Systems

Environmental Management Systems – The Next Logical Step Toward Sustainability

Mike Kinder - Marshall Miller and Associates

Marshall Miller & Associates, Inc. (MM&A) is developing management programs to manage EVERY environmental concern within an organization by assisting in developing EMS Programs for our clients.

History of EMS

The concept of strategic environmental management is nothing new. In the late 1980’s and early 1990’s, the concept of holistically managing the environmental considerations of an organization became a marketing strategy for many consulting firms, with varied success. As the International Organization for Standardization (ISO) got more involved in environmental issues (the ISO 19001:1994 and 2000 Quality Management standards), organizations that were pursuing ISO certification found a need for developing generic operational standards that could be implemented across an organization. ISO responded with standards specific to environmental (ISO14001: 1996, 2000, and 2004 Environmental Management Standards).

What is EMS?

Sustainability has many definitions, but the basic concept is to maintain our ecosystem at its present state or better for future generations. Achieving sustainability requires managing environmental concerns strategically and integrating environmental concerns into the overall management of the organization. That is the concept of EMS.

What’s the value of a successful EMS Program?

A successful EMS program will result in a concise management system that achieves environmental goals (a critical part of an EMS Program is the development of targets and objectives that are measurable and achievable). Benefits realized from such a program are as follows:

- Improved regulatory relationships,
- Reduced impact on the environment,
- Streamlined response to environmental issues,
- Cost savings from achieving energy efficiency targets and objectives,
- Cost savings from achieving waste minimization targets and objectives, and
- Improved procedures and training, protecting the company from environmental liability.
IRRIS, a Web-based Geospatial Portal for Environmental Data Sharing, Situational Awareness, HAZMAT Tracking, Incident Management, and Incident Response

Jon Pollack – GeoDecisions

There is a real need for a uniform, effective information management tool to provide government and private agencies with the ability to react quickly and effectively to any rail emergency. At the same time, a tool is needed to help ensure both the safe transport of hazardous materials via rail and the security of the railway industry’s infrastructure. This presentation will focus on a solution that can provide both governmental and non-governmental agencies with the ability to effectively coordinate an immediate response to any railway emergency and ensure smooth day-to-day operations of freight and passenger rail.

IRRIS is a secure, Web-based patented technology application that integrates data into one interface to enable users to perform a variety of functions, such as visualizing critical infrastructure data on intelligent maps, creating reports and charts to proactively manage and coordinate logistics and incident response, and tracking the movement of goods and assets.

Critical components of this technology tool:
• provide a common interface into a system for a “one stop shop” to all information needed in a crisis
• provide real-time information
• integrate all information into one common operating picture
• is flexible to handle the latest technological advancements
• is scalable to handle small local issues, as well as significant regional and national events
• can be accessed from any Internet-accessible location and through PDAs.

IRRIS was originally developed for the U.S. Military Surface Deployment and Distribution Command Transportation Engineering Agency (SDDCTEA) to assist in obtaining detailed, timely, and relevant information about road conditions, construction, incidents, and weather that might interfere with the movement of military cargo shipments. Today, portions of IRRIS have been DOD declassified, and the application has grown to support many diverse clients, including the railway industry, with transportation security, emergency response and mitigation, situational awareness, collaboration, and data sharing.

IRRIS was purposely designed to easily integrate data from many sources and connect to other systems and applications, making it possible to customize IRRIS for a variety of uses and clients. IRRIS integrates this information into one interface called a common operating picture (COP) so that different personnel from various locations, such as a remote command post, can view and share information at the same time. This shared data may include statistics on population/demographics, chemical databases, or the location of medical facilities. The data can be displayed both on intelligent maps or through charts, graphs, and other reports. In addition, data can be input to IRRIS in real time, such as air monitoring data, enabling the system to consistently remain up to date.

The presentation will begin with a brief background of IRRIS and will follow with a live demo.

Transformer Management Program: From Databases to Dollars

Jeffrey LaRock - AMEC Earth & Environmental, Inc.
Richard Nath - CSX Transportation

CSX Transportation currently has more than 3,500 transformers in service in over 130 yards and facilities in 22 states and 2 Canadian Provinces. Given the quantity and geographic distribution, the effective management of these transformers can be challenging without a centralized management system. In order to meet this challenge, AMEC, in association with CSXT, has created a web-based transformation information clearinghouse referred to as Web-TADS. The purpose of Web-TADS is to provide all users throughout the CSX System access to available specific information for active, stored and disposed transformers, including but not limited to: poly-chlorinated biphenyl (PCB) concentrations, KVA, primary and secondary volts, gallons of oil, and facility served.

Part of this program includes an ongoing effort to collect current PCB information on all transformers currently in the system. Web-TADS allows for quick access to PCB information in the event of a leak or a spill and provides users with backup reports and pictures for transformers that have been disposed of or are currently being stored on-site. In this manner Web-TADS can effectively assist yard level personnel during audits, environmental or HAZMAT personnel in the event of a spill, and facilities management personnel in efforts to identify replacement transformers that are currently in storage.

As part of this ongoing sampling effort, CSX, with AMEC’s assistance, has identified quality metal recyclers throughout the CSXT system that will pay market cost to CSXT for spent transformers with PCB concentrations below 50 ppm. This effort has yielded a cost savings to CSXT that partially covers the Transformer Management Program and in some instances has exceeded the costs for individual transformer sampling and disposal projects.
Unlocking the Power of Your Data Without Derailing Your Operation
Denise Anderson and Julie Lidstone - Conestoga-Rovers & Associates
Geoffrey Reeder - Union Pacific

Union Pacific Railroad Company (UPRR) and Conestoga-Rovers & Associates (CRA) will present a streamlined approach to managing and accessing environmental data. UPRR and CRA have developed and implemented a uniform data management process with one central repository for laboratory and field data, and tools allowing project teams to access the data directly from the database. Previously, UPRR's data were managed in an ad-hoc manner on a project-by-project and consultant-by-consultant basis. By centralizing the data management function, costs for data management, analysis, and reporting have been reduced and UPRR now has full access to all site data.

Amtrak Environmental Regulatory Compliance Management Program
Chris LoRusso - AMTRAK
Steve Rowley - Gannet Fleming

Environmental regulatory compliance is one of the primary objectives and fundamental components of an environmental management system. Amtrak has developed and implemented an organization-wide environmental compliance auditing process to facilitate compliance and continual improvement of our environmental performance. The audit program verifies and provides input regarding compliance with applicable regulations and company best management practices through the completion of independent first party and third party audits. Processes have also been developed to address audit findings by implementing corrective and preventive measures that are based on an analysis of root cause. Amtrak has also used self-disclosures to environmental regulatory agencies as part of the program.

The Amtrak audit process has been in place for the past 8 years and over that time it has transitioned and adapted to a continually changing company-wide organization and environmental regulatory structure. The program has been an effective means of verifying compliance, measuring performance and providing input necessary to continually improve our work practices. We have also tried to benchmark our program against other passenger railroads. Amtrak is always working toward improving the program to reduce the number of findings and especially the number of repeat findings.

The presentation will consist of an overview of the following:
- Overview and description of the environmental audit program
- Comparison and contrast of the independent first and third party audit process
- A general overview and statistical analysis of audit findings
- Overview of the corrective action process
- Repeat findings and continual improvement
- Self-disclosure

Storm Water and Waste Water

The Design and Construction of the Industrial Wastewater Sewer Segregation and Treatment System for CSX Transportation's Huntington, WV locomotive shops
John Calhoun - CSX Transportation
J. Gregory Menniti - Geosyntec Consultants, Inc.

CSX Transportation conducted an extensive review of the industrial wastewater generation sources and evaluated various treatment alternatives prior to designing and constructing a new wastewater treatment facility for their Huntington Locomotive Shops.

Industrial wastewater at the shops is generated from various area sumps and work pit catch basins; from used oil tank decants and from twenty-two (22) work pits in the High Bay area; at the wheel drop pit and at eight (8) Proceco washers. Flow rate and regulated constituents concentration data was collected for each industrial wastewater source and wastewater collection and treatment alternatives were evaluated.

The results of the evaluation concluded that the best collection and treatment alternative for the facility was to segregate the industrial wastewater in the Locomotive Shops from the storm water and sanitary sewerage and to provide TSS, free oil, and emulsified oil removal of the segregated wastewater prior to discharge to the City of Huntington sewer system.

The presentation will discuss the evaluation process as well as the collection, segregation and treatment challenges encountered during the design and construction of the industrial wastewater treatment system for the shops.
Utilization of Ground Freezing Technology to Reduce Dewatering and Soil Handling in a Rail Yard Construction Project

Mike Herzog - BNSF Railway
Glen Smith - Kennedy Jenks

Construction projects in rail yards that include excavations carry with them the possibility of encountering hydrocarbon-containing soils and water. Handling these types of soils and water can have a large impact on both the project budget and schedule. Special requirements for handling these materials can increase the contractor’s costs. Regulatory requirements can increase disposal costs. Finally, the presence of hydrocarbons can slow construction if the soil and water must be handled multiple times, if excavation becomes difficult, or if contractor resources are diverted to handling these materials.

A project at the BNSF Railway Yard in Richmond, California included construction of two casings across the intermodal yard adjacent to the mechanical facility. Monitoring wells in the area and previous geotechnical borings indicated a shallow water table. This was expected due to the yard’s proximity to the San Francisco Bay. Previous remediation activities near the fueling platform indicated that hydrocarbons might be present in the planned excavations. After bids were received to construct the project, it became clear that costs associated with handling hydrocarbon-containing soil and water would add significant costs to the project. A large dewatering effort in the area had the potential to transport hydrocarbons to unaffected areas of the site. Additionally, the site’s industrial wastewater treatment system had a restricted discharge flow rate and would not be able to handle large volumes of water generated by dewatering.

After considering the potential cost of dewatering and the associated risk due to unknown quantities, peripheral ground freezing was selected to provide complete groundwater cutoff in the excavation. This process consists of freezing the ground around the perimeter of the expected excavation with a brine circulating system. This allows for the excavation and construction work to be done in dry conditions. Ultimately this approach was successful for the excavations at the Richmond Yard because it eliminated the uncertainties associated with varying site conditions, quantified the cost and schedule to address dewatering, minimized the amount of water to be pumped and treated, minimized the amount of excess soil to be excavated by acting as the shoring system, and did not disturb groundwater in unaffected areas of the site.

PANEL: Selecting an Analytical Laboratory: “QC- What is it and what is it good for?”

John Williams - Pace Analytical Services, Inc.
Rock Vitale - Environmental Standards, Inc.
Ruth Forman - Environmental Standards, Inc.

In most instances, the railroad environmental project managers responsible for overseeing sample collection and analysis do not have an unlimited amount of time to devote to laboratory selection or analytical report evaluation. In addition, these same professionals, who typically are not analytical chemists, are bombarded with technical jargon and qualifier codes. This panel will present the process of properly selecting analytical laboratories, how to interpret laboratory reports including typically used laboratory qualifier codes, and how to appropriately filter out laboratory data that is not acceptable for the intended use.

Rock Vitale - Environmental Standards, Inc. (10 minutes)
- How to properly select a laboratory by systematically assessing service, quality and cost
John Williams - Pace Analytical (10 minutes)
- Understanding the key QC terms (MS, MSD, and data qualifier codes B, E, J, etc.)
Dan Lokey – Trace Analysis (10 minutes)
- The finer points of reading and understanding laboratory reports

Question & Answers (10 minutes)
Key questions that will be addressed for interested industrial parties:
What do I do when I get results that don’t make sense?
What do I do when I do not trust analytical results?
What do I do when laboratory reports do not answer all of my questions?

Overall comments:
This panel session will help educate railroad project managers and environmental professionals on how to select laboratories and how to better understand and use laboratory reports. An important concept to remember is not all laboratories are created equal. We have to continue to work towards high quality and cost effective environmental testing in order to properly control and reduce environmental liability.
Storm Water Discharge Management to Meet New NPDES Limits

Christopher Harvey - TRC
John Hasterlo - Union Pacific

Many railroad yards have industrial wastewater discharges. In most of these cases, the industrial wastewater is treated with an oil/water separator and discharged to storm water under a National Pollutants Discharge Elimination System (NPDES) Permit. In Wisconsin, this typical arrangement may not be enough. In 2007, the Wisconsin Department of Natural Resources (WDNR) changed their permit effluent limits to include total polynuclear aromatic hydrocarbons (PAHs) on the General Wisconsin Pollutants Discharge Elimination System (WPDES) Permit WI-0046531-04 for petroleum contaminated water. The total PAHs limit is 0.1 µg/L and is below standard detection limits. The revisions were effective July 1, 2007.

At a yard in Wisconsin, UPRR currently treats wastewater and storm water that potentially contacts petroleum products and discharges to an outfall that flows to a local creek. This outfall is regulated under the General WPDES Permit for petroleum contaminated water. The previous permit had an oil and grease (O&G) discharge limit of 15 mg/L. The previous permit required monitoring only for benzene, toluene, ethylbenzene, and xylene (total BTEX) and PAHs with no discharge limits. A critical change in the new WPDES is a discharge limit for total BTEX, total PAH and 5-day Biological Oxygen Demand (BOD5). Based on historical monitoring records, the storm water discharge would not meet the total PAH discharge limit of 0.1 µg/L. Because of this change, another treatment step may be necessary following the treatment with the OWS.

TRC completed a feasibility study to develop and evaluate several alternatives to manage industrial wastewater and storm water to meet the revised WPDES Permit limits. The presumptive alternative was to treat storm water after the OWS treatment using a standard technology, such as granular activated carbon (GAC). TRC developed five alternatives to manage the industrial wastewater and storm water discharge. Based on the available information and our evaluation, TRC recommended storm water collection, reuse as wash water, and discharge to the municipal sewer. TRC is designing the system.

Environmental Response

Initial Derailment Response: Integration of Environmental Chemistry, Laboratory Coordination, and Field Assessment

Paul Kurzanski - CSX Transportation
Eric Cherry, Jane Kennedy, and Bruce Rust - ARCADIS
Betsy Beauchamp - TestAmerica Laboratories, Inc.

The proper identification of chemicals of concern during a derailment is critical in providing appropriate levels of environmental protection, safety for emergency responders, and risk mitigation activities. While a review of manifests and Material Safety Data Sheets is the natural place to begin, it is essential to evaluate the more complex issues of chemical mixtures in order to meet initial response and long-term regulatory requirements. This presentation summarizes activities conducted during multiple derailments where the integration of key personnel from the railroad, environmental response teams, and the analytical laboratory in conjunction with human health and ecological risk assessment professionals enabled the project team to meet or exceed regulatory requirements and to provide rapid quantification of potential environmental risks.

Essential steps in this process are presented to illustrate effective implementation of response actions. These steps include the following: 1) identification of chemical constituents involved in the derailment; 2) identification of the chemical behavior and stability of chemical constituents in the environment, to include partitioning behavior; 3) determination of appropriate regulatory or risk-based exposure or compliance criteria; 4) coordination with the analytical laboratory to ensure proper selection of analytical methodologies, parameter lists, detection limits, and field sampling requirements; 5) development of new or modification of existing analytical procedures to ensure that appropriate and defensible data are acquired; 6) integration of field, laboratory, and data management personnel to ensure rapid dissemination of analytical and environmental monitoring data to railroad officials, regulators and other stakeholders; and 7) implementation of an effective and applicable field monitoring and sampling programs. These steps meet initial response requirements for health and safety, while ensuring that data quantity and quality will meet the long term requirements for regulatory closure and potential challenges during litigation. The case study provides specific examples of how effective team integration was used to optimize resources and maximize information content for presentation to regulators and the community.

Environmental Response: A Teamwork Approach

Paul Kurzanski - CSX Transportation
Hadley Stamm and Denis Balcer - ARCADIS
Lance Wilcox - SUNPRO

On October 10, 2007, at approximately 1200, 31 railcars derailed from a CSX Transportation Inc. (CSXT) train (Q38009) in Painesville, Ohio approximately 30 miles northeast of Cleveland. The 31st thru the 61st cars derailed involving 8 hazmat cars: 6 loads of alcohols, 1 load of elevated temperature liquid not otherwise specified (phthalic anhydride), 1 load of liquid...
petroleum gas (butanone), and 1 load of non-hazardous methyl esters (biodiesel). Four cars spilled and burned ethanol, one car spilled and burned a portion of phthalic anhydride, and one car spilled and burned biodiesel. Rail cars carrying loads of corn, plastic flake granules, corn starch, plywood, and wheat also spilled and burned. The incident and ensuing fire lasted 2.5 days. Environmental and hazardous assessments and remedial measures were immediately initiated.

Initially local emergency responders took command of the incident. CSXT's Haz-mat team, and their emergency response contractors, soon developed a rapport with the local responders- and the synergy and collaborative atmosphere that has been evident throughout the duration of this incident response began. Continued effort and this teamwork approach between all of the subcontractors and consultants lead to the efficient clean up and restoration of the incident.

After initial emergency response activities were completed, and the fire ceased, daily contractor meetings occurred. These meetings allowed all teams to understand their job duties, and provided accountability to the team to ensure duties were completed. For certain tasks workers from different firms worked together, and shared equipment when appropriate to efficiently carry-out the activities. The onsite synergy was marked by open communication, an aggressive plan of action and follow-through on promises.

The collaborative atmosphere resulted in clean-up and restoration activities being completed in less than two months following the incident.

Thursday 6 November

Risk Management

Amtrak's Environmental Liability Program
Craig Caldwell - AMTRAK

Much of the property owned by Amtrak is located in the heavily populated urban areas in the northeastern United States. Because of the amount of property Amtrak owns and its desirable locations near Stations and urban centers, many organizations are often interested in building new projects that may utilize Amtrak property. A common example of the building is a State DOT wanting to construct a new bridge across our right of way with foundations constructed on Amtrak property. Amtrak recognizes that every time excavation work is conducted, there is a chance that ground contamination requiring cleanup will be found, due to historic railroad operations, often before Amtrak was created. To address this potential liability, Amtrak developed an Environmental Liability Policy for projects being built by other entities on Amtrak property with no direct interest by our railroad.

The policy was approved in late 2006. A process to review these projects and sites was developed and key Amtrak personnel in real estate and operations received training on the process in early 2007. The process starts with an environmental risk review that considers previous documented spills, adjacent properties and railroad operations and then provides a ranking for the potential to encounter contamination. Then, the benefit to Amtrak is considered.

At this point, Amtrak begins negotiating access with the entity that will be constructing the project. Three options are presented to address the potential environmental liability. The first is for an indemnification by the entity constructing the project. The second is for the entity to obtain insurance to cover cleanup costs that is acceptable to Amtrak. The third option is to develop a risk fee paid by the entity to Amtrak to cover potential environmental liability that may be uncovered by the project. Using this third approach, Amtrak acts like an insurer and will keep the collected risk fee in reserve for any project that that encounters contamination requiring remediation.

The Use of Environmental Impacts Analyses to Support Private Public Partnership Benefits Studies
Kevin Keller - HDR Engineering, Inc.
Nate Asplund - BNSF Railway
Jerry Wilmoth - Union Pacific

Public benefit studies in support of Private Public Partnership (P3) grants are an increasingly popular mechanism that the rail industry is utilizing to supplement funding shortfalls for major capital projects. A critical component of the public benefit studies is the evaluation of potential environmental benefits based on the displacement of vehicular traffic with rail transportation. These types of studies, which are also supplemented by economic impact analyses (EIA) of construction, are used to identify the potential public benefits of a project, such as decreased emissions, decreased noise, and potentially decreased risk of hazardous material releases.

Most of the long-distance freight moving through North America can move either by rail or highway; it is not barred from one mode or the other for technical reasons. The choice of modes is made by the shipper, who seeks to optimize cost, total transit time, and transit time reliability, as well as values unique to each shipper such as location of facilities (not all shipper facilities are rail served), and economies or diseconomies of size of shipment. Another consideration in choice of shipping mode is environmental impacts. There is an obvious benefit to the shipper and to the general public when rail capacity is
improved such that delay times at rail crossings are decreased and that exposure times to emissions and noise are decreased as well.

The benefits of reduced emissions, reduced noise, and a reduced risk of a release of hazardous materials can be input into an economic impact analysis and translated to cost data. Cost data is then used to calculate the savings to the public on total transportation costs, which can be estimated through a comparison of the shipping rate (and emissions) per ton mile for train relative to vehicular. Several examples of this methodology will be presented.

Assessing the Risks Associated With Rail Fueling Activities
Norman Parker and Stephanie Morace - Parker and Associates, Inc.

During the past four years the authors conducted more than sixty fueling risk assessments in North America. The purpose of the assessments was to evaluate the barriers and controls upstream of potential release events associated with fixed and mobile fueling activities. The purpose of this paper is to share lessons learned from these assessments and to describe the unique approach and tools used in the assessment process.

The site assessment of each facility included:
• Inspections of fuel storage and handling installations;
• Inspections of fuel transfer and locomotive fueling installations with associated equipment and wastewater/stormwater management facilities;
• Observation of fueling activities;
• Photographs of facility issues;
• Personnel interviews; and
• Identification of significant fuel management related issues and best management practices.

Desktop activities included gathering background information on the sites, such as hydrogeology, regulatory climate, spill & remediation history, etc.; tabulation of statistical data from the site assessments; generation of Six Sigma Tables; and performing facility risk assessments using unique risk assessment tools. The results of the assessments were and continue to be used to allocate resources and to implement corrective action to improve both fixed and DTL operations. The lessons learned from the assessments provide valuable insight to the control of risks associated with fueling activities and the value of sound assessment tools.

System-Wide Water Well Inventory and Management Program
Tony Carmeli and Ken Rose - Cameron-Cole, LLC
Jeff McDermott - Union Pacific

Union Pacific Railroad (UPRR) has performed a system-wide water well inventory and implemented a water well management program. The inventory procedure included an extensive water well records search and a system-wide field-survey to verify water well assets. This Presentation outlines the risk management approach followed to address the potential liability posed by water wells. This risk involves risk of injury; environmental risk to drinking water supplies; and regulatory risk of non-compliance.

During the era of steam locomotives (circa 1860's to 1950's), railroads were dependant upon water to operate. Year-round sources of high-quality water were needed to service the boilers on the locomotives and for potable use. To meet the demand for water, railroads installed an extensive network of water wells and distribution infrastructure. By the early 1950's, UPRR had converted their fleet of locomotives to diesel-electric. By conversion to diesel locomotives, UPRR expanded the range of operation and reduced the dependence on local sources of water for operations of locomotives. As the demand for water was reduced, the infrastructure formerly used to supply water was no longer maintained.

The system-wide survey of water well assets was conducted using Cameron-Cole field inspection crews that visited locations across approximately 48,000 miles of track. Field inspection crews used electronic survey equipment for data collection, storage and transfer. The survey devices were pre-populated with known site information and enabled crews to verify current conditions and record precise latitude and longitude coordinates. While at each well, field inspection crews performed any necessary safety abatements to secure open wells, collected photographs and marked inactive water well locations. Following completion of the field survey, site data received a post-collection quality check and was uploaded to the UPRR Water Well Management Geographic Information System (GIS) Database.

Auditing in the Rail Industry – Lessons Learned
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For the past ten years, the authors audited environmental, health and safety, and management systems in the rail industry. Most of these efforts have included three Class I carriers. The geographic extent of these efforts has involved twenty six States
and six Provinces. Over six hundred audits were conducted during this time frame. The audits involved every type of rail facility and activity from large complex yards to isolated DTL sites.

The purpose of this paper is to share lessons learned from the efforts, both for the carriers and for auditors. The lessons learned are based on a statistical analysis of all findings and observations, an assessment of root causes, and feedback from auditors and clients. Of note, the lessons learned are presented in the context of corrective action and verification successes and weaknesses. The lessons learned are categorized by regulatory subject area, risk management, type of operations, and management system elements. The lessons learned confirm some expectations, but also offer surprises.

Remediation

Tomographic Investigation to Determine Extent of Free Product

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An historical release of No. 2 fuel oil (diesel fuel) resulted from the operation of two (2) former 2.5 million-gallon aboveground storage tanks. The selected investigation approach included a preliminary tomographic survey to map subsurface and underground structures to identify the location of features that would potentially influence preferential migration of the released fuel. The survey data supported the development of a more focused and efficient subsurface investigation to rapidly determine the aerial extent of the release.

Electrical resistivity tomography (ERT), also commonly referred to as Radar Tomography (RT), is a geophysical technique for imaging subsurface structures from electrical measurements made at the surface. It is closely related to the medical imaging technique electrical impedance tomography (EIT). Tomography evolved from techniques of electrical prospecting that predate digital computers, where layers or anomalies were sought rather than images. The tomographic survey conducted at Amtrak’s Chicago, Illinois facility, was divided into four (4) areas of concern and was able to locate conduits and anomalies such as: (1) sewers; (2) historical boundaries of trenches used for placement of sewers; (3) the lateral extent of free product released from the former tanks; and (4) other conduits such as old fuel lines.

The focused investigation used test pits and soil borings, and verified the tomography results. Soil borings were advanced in the area where free product was detected and in the area outside of the free-product boundary location. Test pits explored buried conduits and trench locations. The physical investigation demonstrated the conduits for conveyance of the released fuel were located in the areas where the tomographic survey showed anomalies to exist.

In conclusion, a tomography survey provides a detailed map of below-grade conditions and expedites the investigation process by allowing the investigation to focus on anomalies and not on extraneous data. Whatever lay in its field of vision, pipes, cable, and layers of different materials, leaks, and buried structures – all become “visible”. ERT is really the first practical, reliable and inexpensive tool to “see” underground. Therefore, ERT is beneficial in solving environmental problems and can image sources of pollution that lay six or more feet underground and guide the placement of soil borings to help find and understand the size and direction of pollutant movement.

Installation of Creek Liner to Prevent Migration of Separate-Phase Creosote into Clear Creek, Bloomington, Indiana

Steven Sharp - ARCADIS
Paul Kurzanski - CSX Transportation

A wood treating facility operated at the Bloomington site for nearly a century until 1976. The structures associated with the former creosoting operations have been razed; however there are residual impacts in the subsurface from the former operations to include separate-phase creosote in the fractured bedrock (limestone) water-bearing unit beneath the site. The site is bordered to the east by Clear Creek, which is comprised of a fractured bedrock base hydraulically connected to the area where former wood treating operations existed. During investigations at the site, separate-phase creosote was observed seeping up through the fractured bedrock creek bottom and into the creek when disturbed by walking along the creek base. Though only minor globules of creosote were observed, CSXT initiated an aggressive response to address the migration of creosote into Clear Creek.

To prevent migration of separate-phase creosote into Clear Creek, CSXT installed an approximate 200 foot long creek liner remediation system in the fall of 2007 along the base and banks of Clear Creek. The liner system consists of a gravel sub-base overlain by a geotextile fabric, then a composite geo-membrane liner (Seaman XR-5), then another layer of geotextile fabric, completed with ArmorFlex flexible, interlocking concrete revetment system placed over the liner for erosion purposes. A separate-phase creosote collection system was installed on the downstream edge of the liner consisting of an eight inch corrugated pipe trenched to a 5 foot diameter concrete collection sump on site.
Mechanisms for Phytoremediation of PAH Compounds at the Oneida, TN Tie Yard: A Long-Term Field Investigation

Rob Wallace - Norfolk Southern
M. Widdowson - Virginia Tech

An eight-year study was conducted to assess the effectiveness of hybrid poplar trees to remediate polycyclic aromatic hydrocarbon (PAH) compounds in soil and groundwater at a creosote contaminated site. A reduction in the areal extent of the PAH plume was observed in the upper half of the 2-m thick saturated zone beginning with the third and fourth growing seasons, which coincided with the propagation of the tree roots to the water table region. Remediation was limited to naphthalene and several 3-ring PAHs (acenaphthene and acenapthene). PAH concentration in soil samples also declined over time; however levels of four-ring PAHs persisted at the lower depths during the study period. The naphthalene to total PAH concentration ratio in the most contaminated groundwater decreased from > 0.90 at the beginning of the second growing season to approximately 0.70 at the end of the study. Aerobic push-pull tests were performed to assess the contribution of hybrid poplar trees to the remediation of PAHs. Maximum first-order aerobic respiration rates (1.25 hr⁻¹) occurred in the late summer, corresponding with peak naphthalene aqueous concentrations and the minimum saturated zone thickness. Results showed that overall naphthalene mass flux due to volatilization at the water table was enhanced by vadose zone biodegradation and was significant relative to plant uptake. Surface volatilization of naphthalene was measured in August of the eight growing season in the most contaminated area when the saturated thickness and soil moisture were at minimums. These latter remediation mechanisms were enhanced by transpiration and canopy interception resulting from the phytoremediation system at this site.

Integrated Remediation of Soil to Facilitate Development of an Intermodal Facility

Stewart Emhof - ERM
Matt Graham - BNSF Railway

The former BNSF rail yard in San Bernardino, California is approximately 60 miles east of Los Angeles and lies within the central portion of the Upper Santa Ana Watershed of the Santa Ana River Basin. The site formerly contained facilities for the remanufacturing, heavy repair and maintenance of locomotives and rail cars. Operations associated with those activities ceased in 1992 under plans to redevelop the site as a major intermodal facility. Based on previous inspections conducted by the California Regional Water Quality Control Board (RWQCB), a Cleanup and Abatement Order was issued for the site in 1988. Approximately twenty subsurface soil and/or groundwater investigations were conducted through 2006 to characterize the vertical and lateral extent of contaminants of concern, including total petroleum hydrocarbons (TPH) and chlorinated solvents.

To accommodate the aggressive redevelopment schedule for the site, and to take advantage of earth-moving plans designed for the intermodal facility, ex situ remediation was selected for soils impacted by non-chlorinated contaminants. A total of approximately 188,000 cubic yards (CY) of subsurface soils impacted by TPH, metals, and/or brine, were excavated from approximately ten areas on the site. During construction activities, approximately 119,000 CY of TPH- and TPH/Lead-impacted soil were excavated, blended with an asphalt emulsion and recycled as high-strength base material over approximately 60 acres planned for pavement. Another 52,000 CY of soil impacted by TPH and brine were approved for recycling at off-site locations. Less then ten percent of the excavated soil (approximately 17,000 CY) was disposed of at off-site Class 1 facilities. The RWQCB granted a No Further Action status for all areas of ex situ remedial activities on the site.

In conjunction with intermodal facility construction activities, a vapor extraction system (VES) was designed and installed at the former locomotive maintenance area to treat soil impacted by a mixture of TPH and chlorinated solvents. A total of 139 vapor extraction wells were utilized between 1998 and 2005 to remove approximately 93,000 pounds of volatile organic compounds (primarily tetrachloroethene). A series of rebound tests in 2006 showed that asymptotic conditions had been
reached except for one area. Subsequently, BNSF conducted monthly extraction (pulsing) activities in that area for a period of one year. Based on the results, the RWQCB issued a No Further Action related to soil vapor for the site.

On a portion of the site which was sold for development as a cargo transfer facility, BNSF installed nine bioventing wells, as part of its sale agreement, to provide in situ treatment of TPH soils (impacted primarily by diesel-fuel and motor-oil petroleum products resulting from former tenant operations). Results of confirmation sampling supported a No Further Action status from the RWQCB for that area. The details and results for the various remedial efforts that were used to obtain the No Further Action status will be discussed.

**Use of Real-time Screening Tool for LNAPL Delineation**

**Geoffrey Reeder - Union Pacific**

**Brian Hanks - The Forrester Group Inc.**

Historical diesel fuel storage activities associated with two, 2-million gallon above ground storage tanks (ASTs) and associated diesel releases during an approximately fifty year operational period at a railroad property in Arkansas resulted in an LNAPL layer on the water table. LNAPL thickness greater than 10 feet had been measured in monitoring wells at the site but it was suspected the measured thickness was not representative of actual thickness in the aquifer. The complete extent of LNAPL presence had not been delineated; however, LNAPL migration off site was suspected.

A rapid optical screening tool (ROST) using laser induced fluorescence (LIF) technology was deployed for subsurface LNAPL detection. Cone penetration testing (CPT) was simultaneously utilized for lithologic logging. LNAPL presence was detected using ROST technology by measuring fluorescent response to UV laser pulses as the tooling was advanced into the subsurface. Diesel fuel emits a characteristic waveform allowing it to be specifically identified. CPT was performed according to the American Society for Testing and Materials Standard D-5778-2000 and determined soil type by measuring the friction and resistance on the probe sensors as the tooling was advanced into the subsurface. The CPT/ROST data were available to field personnel in real-time.

Use of this investigation technique allowed for the extent of LNAPL at on site and off site locations to be delineated and confirmed that the primary hydrocarbon of concern was diesel. Real-time data allowed for additional investigation locations to be identified in the field for a more complete investigation during a single mobilization. Continuous vertical ROST data allowed for the identification of probable release locations as indicated by impact in the vadose zone as opposed to other locations which indicated LNAPL impact and migration along the water table. The CPT data also provided detailed lithological profiles indicating that soil type was important to LNAPL extent and potential recoverability especially at and near the water table. A follow-up direct push investigation provided confirmation and refinement of the results of the CPT/ROST investigation.

**Using “Contained-in Determinations” to Speed Clean-Ups and Reduce Costs of Hazardous Material Spill Response — A Practical Guide and Case Histories**

**Dave Polter - ARCADIS**

**Paul Kurzanski - CSX Transportation**

According to federal and state hazardous waste rules, environmental media impacted by listed hazardous wastes must be managed as a hazardous waste as long as the media is deemed to contain listed hazardous waste or exhibits a hazardous characteristic. The corollary to this “contained-in policy” is that the EPA or an authorized state may determine, or establish procedures for generators to determine, that impacted environmental media or debris need not be considered a hazardous waste where the impacted environmental media or debris does not exhibit a characteristic of hazardous waste, and concentrations of hazardous constituents in the media or debris are below health-based levels.

Although the “contained-in determination” concept has been around for more than 20-years, both EPA and the states have been historically reluctant to apply the approach without well-established health-based risk standards to rely on. Now that risk-assessment methodologies have become more common, EPA and the states are now increasingly receptive and inclined to make contained-in determinations. While securing a contained-in determination can save millions of dollars in clean up costs, the manner and processes involved to achieve this result remain largely obscured in informal and unpublished state agency policies and procedures. The absence of clear regulations or documented policies slows agency decision-making and frequently requires the regulated community to carefully craft and then shepherd these requests through the agency bureaucracy. This presentation will provide a regulatory overview of the subject, a survey of state policies and procedures, and include multiple case histories describing successful approaches and lessons learned when seeking contained-in determinations.