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Analysis of Low-Level Selenium in Coal Mine Tailings*

The identification of selenium (Se) as a contaminant of concern has prompted the development of strict regulatory levels for its concentration in coal mine discharges. The current West Virginia DEP water quality standard (WQS) for Se is 5 µg/L (47CSR2, Table 1) and it appears that US EPA will propose a new WQS for Se in early 2013. Fish and birds have proven to be sensitive to low-level exposure to Se. Importantly, Se has a very narrow range of what is beneficial and what is detrimental for biota. Aquatic organisms require 0.5 µg/g of Se in their diet, whereas concentrations of Se that are only an order of magnitude greater have been shown to be toxic. Se is found as a natural component of metal sulfide ores and coal and is a by-product of the coal mining process. Thus, given the narrow range between beneficial and toxic levels, the concentration of Se in mine water tailings and other industrial effluents must be accurately quantitated to demonstrate compliance with applicable regulatory criteria and to determine if remediation is needed to protect biota.

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ASTM Proposes Changes To "All Appropriate Inquiry" Standard 1527-05

After initial discussions and review of recent court interpretations involving Phase I ESAs, ASTM's All Appropriate Inquiry task group wanted to clarify the Phase I Environmental Assessment (Phase I ESA) process and strengthen the deliverable. The task group is coordinating these revision efforts with US EPA and anticipates completing the full ASTM balloting process no later than late 2012 to allow EPA time to complete its process necessary to reference the updated standard by the end of 2013.

Many of the proposed changes are clarifications. Some are intended to establish consistency in the process. Highlights of the suggested revisions include:

Historical Recognized Environmental Conditions (HRECs) – Over time, it has become clear that Environmental Professionals (EPs) are addressing HRECs with residual contamination differently. Changes to the standards will establish consistency in how these conditions are described and presented in the final report.

- User Responsibilities: The legal basis and purpose of the User Respon-

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The West Virginia WQS for Se is very close to the method detection limit (MDL) for most Se analytical methods (by 40CFR Part 136).[1] As a result, the analysis of low-level Se is influenced by a number of factors, and the accurate quantitation of low-level Se in mine water is dependent on carefully following strict sampling and analytical protocols.

The first important factor to consider in the analysis of a mining discharge permitted for Se is the possibility of contamination introduced during the sample collection process. In this context, "contamination" can be defined as the unintended addition of Se into a sample from sources other than the sampled discharge. Unclean sampling equipment, unclean sample bottles, soil, dust, unclean preservatives, and poor sampling technique are common sources of contamination. Uncontrolled contamination in the field (or in the laboratory) can cause a reported Se result to be higher than the actual level of Se present in the sample, resulting in discharge exceedences, fines, and construction and operation of potentially unnecessary and expensive treatment systems.

Once a sample has been collected and transferred to the laboratory, it must be satisfactorily analyzed to accurately determine the actual concentration of Se in the sample. The possibility of bias can lead to erroneous results, once again resulting in expensive treatment where none is required, or worse, inadvertent discharges of Se into surface waters that are undetected and untreated.

Sensitivity is also an important factor in choosing which analytical technique is best suited to the analysis of low-level Se. Commonly used techniques for the analysis of metals (such as ICP-AES and Flame Atomic Absorption) do not possess the required sensitivity (i.e., the methods are not capable of detecting Se at or below the 5 µg/L concentration level). Typical analytical techniques that are used to detect Se at the 5 µg/L level (such as ICP-MS, Graphite Furnace Atomic Absorption, and metal hydride generation) generally possess the required sensitivity, but each technique has specific challenges that must be addressed to ensure that the results are accurate.

The final consideration in the analysis of low-level Se is speciation, or which form Se takes in its natural state. Different molecular forms of Se [Se(IV), Se(VI), Se(0), etc.] can influence how well the analytical technique works for a given sample.[2] The true nature of the different Se species in the sample can have an effect on which digestion and analytical techniques may be appropriate for analysis and must be understood to determine the best approach for an analysis.

In conclusion, the analysis of Se in complex matrices often encountered in mine discharges can present numerous challenges. The additional consideration of a very low action level requires that strict sampling, analytical, and quality assurance protocols be followed to ensure accurate results are available for decision-making. Expensive and unnecessary remediation efforts, potential fines and liability, or the unintentional release of Se into the environment are real possibilities if the appropriate protocols are not followed. A thorough understanding of the chemistry of Se and strict attention to sample collection and analytical details is vital to the production of accurate analytical data to support an effective Se management program.

Environmental Standards can assist in complying with these stringent regulations by evaluating and providing training on field sampling programs. In addition, our chemists can write detailed analytical specifications and/or audit your existing laboratories to ensure that the data generated from your discharge of coal mine tailings are accurate, precise and legally defensible. Please contact Gerry Kirkpatrick at 610-935-5577 for further information.

Notes

* Article prepared with Assistance of M. Harris, PhD, ToxStrategies, Inc.

[1] West Virginia Se Study, May 2010.

[2] Russell Gerads, Se Speciation Analysis and its Role in Total Se Quantitation, National Environmental Monitoring Conference (NEMC), 2012. ■

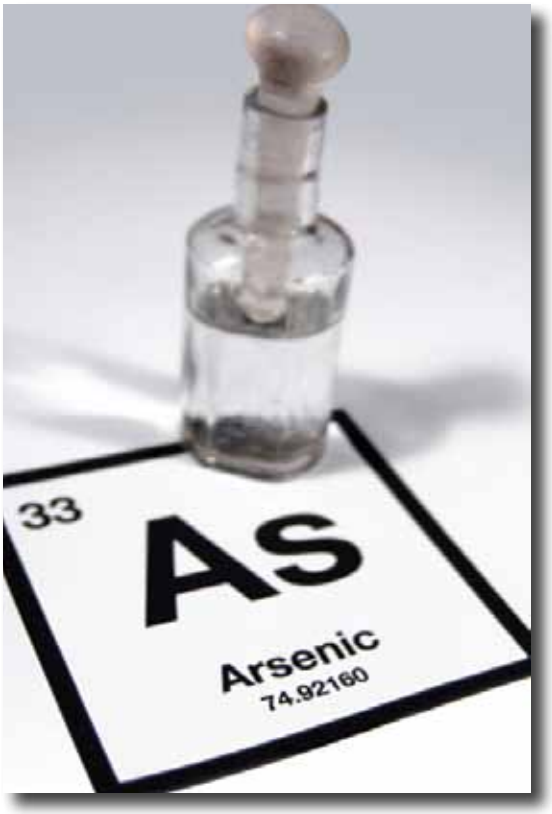
(AAI, Continued from Page 1)

sibilities were not clearly explained in the existing E1527. The task group revised the standard to explain that a user seeking liability protection or an EPA brownfield assessment grant has certain obligations, in accordance with the CERCLA statute and as specified in the EPA All Appropriate Inquiry rule.

- Regulatory Agency File Reviews: The task group generally agreed that a review of agency file records should be conducted if the property is identified on one of the standard record source databases. A new section has been added to emphasize the need to conduct agency file reviews, recognizing that this effort is subject to reasonable time and cost constraints. This has always been important, but is particularly important with the connection to continuing obligation requirements that must be met after property acquisition to maintaining lender liability protection.
- Proposed language establishing consistency in how HRECs are presented in the report.
- There is now a new section proposed in the standard that specifically states that recommendations are not required.
- There are proposed modifications regarding indoor air as tied to the revised legal appendix and the new Business Environmental Risk sections.
- Finally, the revised standards notes that Phase I ESA Appendices are non-binding and are typically provided only for information. The Legal Appendix and suggested Table of Contents appendix have been revamped, and the revisions support an effort to further develop a Business Environmental Risk appendix to provide some background and guidance on some of the more common issues listed in the non-scope considerations section of the proposed standard. ■

Arsenic Inhalation Risks and Ambient Air Concentrations Reassessed

Although chronic and acute health risks associated with arsenic inhalation have been well documented for over 30 years, quantification of the risk has been complex. Many of the studies upon which risk factors have been calculated were based upon historic exposure to relatively high concentrations of arsenic, near smelters and power plants, and emissions contained a variety of constituents of concern. Additionally, variations in people's reactions to exposure have been correlated with not just the dose received but also the age at exposure, smoking habits, and nutrition. Furthermore, different studies have assessed health risks of arsenic inhalation based upon a variety of physiologic response, including hearing loss, non-melanoma skin cancer, vascular diseases, and lung cancer.



In 1984, among the background of this complex and sometimes contradictory data, the US EPA published a conservative unit risk factor (URF) of 4.3 x 10^{-3} per µg/m^3. This URF was primarily based upon lung cancer mortality data from occupational exposure studies, primarily during the 1940s and 1950s, at two copper smelters - one in Washington and one in Montana. Since the 1984 publication of the URF by the US EPA, mortality data from these locations have been updated and additional studies have been published.

The Texas Commission on Environmental Quality (TCEQ) has reassessed the arsenic inhalation URF in light of these revised data and additional studies of occupational exposure and lung cancer mortality at a smelter in Sweden. The TCEQ weighted the individual URFs of these three study locations to calculate a final inhalation URF of 1.53 x 10^{-4} per µg/m^3. This risk factor is over an order of magnitude less severe than the EPA's URF value. The TCEQ also completed a sensitivity analysis and calculated a "no significant concentration" (NSC) level of 0.067 µg/m^3. The NSC level is the arsenic concentration at which a person would have a 1 in 100,000 increased chance of lung cancer mortality if exposed continuously over his or her lifetime.

The TCEQ NSC level is actually below some previously published ambient air concentrations published by the Agency of Toxic Substance and Disease Registry (ATSDR). ATSDR in 2007 reported that ambient levels of arsenic in rural portions of the US ranged from 1 to 3 ng/m^3 and from 20 to 100 ng/m^3 (0.020 to 0.100 µg/m^3) in urban areas. In 2012, TCEQ reported that the high values reported by ATSDR could not be verified in urban portions of Texas and that the highest values recorded in the state were 10.3 µg/m^3 from the Houston metropolitan area. The TCEQ reported that the ATSDR values were collected from highway and heavy traffic roadway monitoring and were not indicative of overall urban areas. ■

Ruth Forman Appointed to US EPA's ELAB

Principal Chemist Ruth L. Forman, CEAC, was selected in September to serve on the US EPA's Environmental Laboratory Advisory Board (ELAB). The ELAB was established to provide advice and counsel on scientific issues associated with measurement, monitoring, and laboratory science matters. Ms. Forman will serve a 2-year term ending in October 2014. ■

Laboratory News

New York State Department of Health ELAP Guidance Released For VOA Soil And Sediment Samples

The New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) recently released a guidance letter to all accredited laboratories on the collection and reporting of soil and sediment samples for Volatile Organic Analysis (VOA). In accordance with the ELAP announcement, soil/sediment volatile sample results must be qualified by the laboratory as "potentially biased low," in the event that samples have not been collected as outlined in Method 5035/5035A.

Although NYS Department of Environmental Conservation (NYS DEC) still allows results to be submitted for soil volatile testing from samples collected without preservation, laboratories performing their own sampling must use approved Method 5035/5035A containers and inform their clients when a sample does not meet acceptance criteria. ■

Safety Out In Front

In 1993, 38-year-old lawyer Garry Hoy died when he threw himself against a window on the 24th floor of the Toronto-Dominion Centre. He wanted to prove to visitors of the building that the glass was unbreakable, which it was. The window frame, however, was not designed for such an impact and popped out as Garry fell to his death.

Most accidents or injuries could be avoided if people just practiced common sense. As we have come to learn, common sense is not all that common.

A person being hurt, sometimes quite seriously, has become hugely entertaining over the past 20 years. Many network shows and movies that celebrate the misfortune or just outright stupidity of others have been produced. Of course, there is always the disclaimer that urges people "don't do this at home." Throw into this mix the monetary benefit of rewards or notoriety and how can the safety professionals compete?

In October, over 13,000 people gathered in Orlando for the National Safety Council's 100-year anniversary Congress and Expo. Safety professionals from around the globe were present for the dozens of seminars and learning opportunities. Workplace safety now has its place at the table; this has not always been the case. Today, industries must be proactive in safety.

The National Mining Association set out last year with a 5-year goal to implement its Core Safety program. Their three stage program begins with leadership and clear communications, accountability, and personnel development. Ultimately, management is responsible for the system to work. The second stage ensures that hazards and risks are minimized to the greatest extent possible. Stage three incorporates third-party verifications to assess the system so improvements can be made. The goal is zero fatalities and a 50% decrease in incidents/injuries within 5 years. Additionally, 50% of safety directors in both the mining and utilities industries are compensated in part based on the safety performance of the company.

Hazard Identification and Task Risk Assessment (HITRA) identifies BP's newest program in its safety arsenal. Jobs are broken down into specific tasks and those tasks are risk assessed by a core group to determine risk mitigation activities. This policy will not only apply to all BP facilities, but their contractors as well. There cannot be any greater commitment than one that starts at the top.

So, how can we compete with this unfortunate trend of common nonsense? Start at the top with senior management and keep safe performance in the forefront. There is more support for safety practitioners today than ever before. Whether the support is driven by the bottom line or the sincere concern for each other's safety, it cannot be overlooked. ■

Kentucky Wastewater Laboratory Certification

The state of Kentucky is in the process of finalizing certification standards that go into effect in 2013 for laboratories operating in the state. On June 8, 2011, Kentucky Revised Statutes Subchapter 10 Energy and Environment Cabinet Statute 224.10.670 was signed requiring wastewater laboratories to now function under regulation 401 KAR 5:320. This regulation will allow laboratories to obtain interim certification during the first year and then on-site audits will be performed by the state between the second and fifth year. Laboratories will be subject to proficiency testing studies at least once a year and on-site audits at least once every 5 years.

Several factors led to the decision to certify wastewater laboratories in Kentucky, but the decision was based primarily on the needs to comply with updated statutes and to collect and ensure quality data. The regulation is expected to be promulgated in 2012.

Environmental Standards can assist laboratories with preparing for the Kentucky Wastewater Laboratory Certification or any other certifications. For more information, please contact Shane Penn at 865-376-7590. ■

Optimization Key to Saving Precious Budget Dollars On Long-Term Projects

Reduce the cost of your current site remedy with Environmental Standards' Project Optimization process.

Over the past 2 years, Environmental Standards has launched an Environmental Project Optimization practice that has saved clients literally millions of dollars in environmental compliance and remediation costs. With a return on investment typically exceeding 20 percent, reducing compliance costs through the investment in long-term project and operational analyses is paying off for many of our Fortune clients.

Environmental Standards project optimization team consists of seasoned professionals, each with more than 20 years of environmental project management and remediation experience. The process is simple and has been demonstrated through direct experience to reduce costs, increase project efficiencies and in some cases, led to project closure considered to be "permanent" operating costs. In fact in the past year, Environmental Standards has participated in closing two RCRA Part B permits - *truly closed*.

Each step in our five-step process affords clear project direction and client-led decision points that result in reduction in costs, expedited site strategy development, and ultimately, site closure. Our process can be summarized as follows:

- Evaluate current project parameters.
- Review possible cost-saving strategies.
- Develop strategy and document compliance consistency.

(Continued on Page 7, see "Optimization")

Changes To EPA Draft Petroleum Vapor Guidance On Their Way

The US EPA has made changes to its draft Petroleum Vapor Intrusion (PVI) guidance that have doubled the amount of soil needed between petroleum hydrocarbons and buildings to ensure vapors will not enter indoor air.

US EPA's plan to increase the vertical separation distance above light non-aqueous phase liquids (LNAPL) to a receptor will have numerous consequences to future (and possibly past) cleanups. The change comes by way of a simple asterisk in a Guidance table in the June 14, 2012, PVI draft, which states that 15 feet of uncontaminated soil is required to biodegrade petroleum hydrocarbons. A special note following the asterisk suggests that US EPA will require sampling if LNAPL sources are between 15 and 30 feet of a building, which increases the obligation by orders of magnitude. Attenuation or the dissipation of petroleum hydrocarbons in soil, increases exponentially with distance, so doubling the separation distance adds roughly seven orders of magnitude, assuming average petroleum degradation rates.

Things might be worse if and when states develop their own guidance because the states very well could assume US EPA set minimum requirements, and then set even greater separation distances in state guidelines.

It appears that US EPA did not explain the reasoning behind its change in LNAPL separation distance from 15 feet to 30 feet. The June 14 draft includes a more extensive discussion of a 2011 study that showed methane, which can be found in ethanol-blended fuel, slows the biodegradation of other contaminants and can allow petroleum hydrocarbon vapors to be transported farther, possibly increasing the threat of PVI.

US EPA is working on a final version of the guidance, which will be publicly available, but people within the US EPA apparently have declined to discuss the document with beltway insiders. US EPA has reportedly said it plans to release the PVI guidance and a related guidance for vapor intrusion of volatile organic compounds, being developed by the Office of Solid Waste & Emergency Response, before the end of the year.

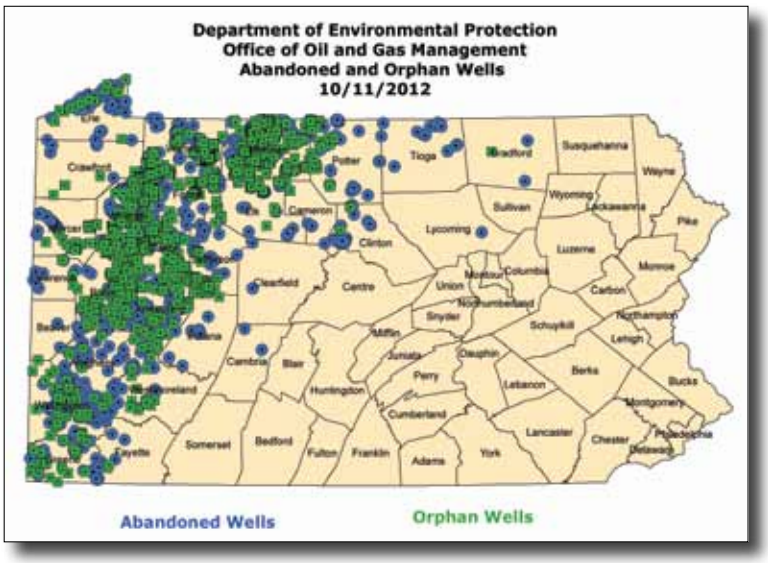
The PVI revision clearly identifies the uncertainty surrounding the issue of ethanol-blended fuels. In fact, the draft acknowledges that little is known about the effects of such releases, and that higher ethanol blends are expected to be more common in the future. While fuels, with blends ranging from 85 percent to 90 percent ethanol are on the market in some places, the source says, a risk assessor responding to a suspected release of those fuels would follow a different process and those rare cases should not affect the overall guidance.

In preparation for the PVI guidance, the US EPA Office of Underground Storage Tanks (OUST) contracted Golder Associates and RTI International to analyze a US EPA vapor intrusion database, which aims to assess biodegradation of petroleum hydrocarbons. A key aim of the analysis was "the identification and justification of exclusion distances between contamination and receptors that can be used to quickly assess PVI." Confirmed cases of vapor intrusion at petroleum sites are not common, the report says, but studying the biodegradation of vapors is important for evaluating risk.

An update on the new PVI guidance will be provided once it has been released and better evaluated by Environmental Standards. ■

PA DEP Facing Uphill Challenge On Orphaned Oil and Gas Wells

An article by Scott Detrow for *StateImpact Pennsylvania* (October 10, 2012) identified an alarming number of abandoned (orphaned) oil and gas wells in northern and western Pennsylvania. Oil and gas exploration in Pennsylvania began in 1859. It was not until 1955 that Pennsylvania passed a law requiring operators to document and report the locations of their wells. According to Detrow's article, it is estimated that there are approximately 200,000 wells that are unaccounted for in Pennsylvania. The status of these wells is unknown.



The biggest concern for these orphaned wells is that they provide a potential pathway for natural gas to migrate to the ground surface. In some instances, the gas may migrate to enclosed structures and cause an explosion hazard. Additionally, if active drilling is occurring near an orphaned well, there is a potential that the orphaned well can act as a conduit whereby natural gas is forcefully pushed to the ground surface creating unsafe conditions.

In 1984, Pennsylvania put into the law the first set of industry wide oil and gas drilling regulations. These regulations required drillers to register their wells and to plug inactive oil and gas wells with cement. The Pennsylvania Department of Environmental Protection has a division charged with locating and properly abandoning orphaned wells. Unfortunately, the division is underfunded and faced with the monumental task of dealing with these orphaned wells. ■

Environmental Standards Supports Eagle Scout Projects

Environmental Standards partnered with Valley Forge Trout Unlimited, Open Land Conservancy of Chester County and the Green Valleys Association to support a Boy Scout of America Eagle Project. The project was located on the Miller Preserve along Valley Creek in Chester County, Pennsylvania – just a few miles from Environmental Standards' headquarters in Valley Forge. Bryce Dupes of Troop 56, Honey Brook, Pennsylvania, coordinated, planned, and led a riparian buffer enhancement project for his Eagle project as part of a larger effort for protection and restoration of the local Valley Creek Watershed. Environmental Standards provided a grant, equipment, and manpower to assist in the project. Bryce's project involved installation of 600 linear feet of deer fencing, removal of invasive plant species, and planting of 150 native trees on the project site. Bryce is the son of Lester Dupes, Senior Quality Assurance Chemist in our Valley Forge, Pennsylvania, office. ■

Bryce Dupes (left) works to install deer fencing at Miller Preserve.

Ben Devan stands next to the new sign at Camp Cannon Hill.

Ben Devan, an Eagle Scout with Boy Scout Troop 367 in New Hanover, Pennsylvania, recently completed his Eagle Scout service project with the help of a donation from Environmental Standards. Ben's project benefited The Camp at Cannon Hill, a non-profit youth summer camp located in Boyertown, Pennsylvania, that provides a summer camping experience for youth from many area churches. Ben designed, built, and installed a new entrance sign for the camp and re-landscaped the area beneath the new sign with pavers, mulch, flower bulbs, and a decorative cross to provide a more appealing and welcoming entrance to the camp. The new sign replaced a deteriorated entrance sign that had outlived its usefulness. Ben is the son of Russ Devan, Senior Geoscientist in our Valley Forge, Pennsylvania, office. ■

TCE in Indoor Air Triggering New Remedial Responses

Regulators and responsible parties are taking action at sites contaminated with trichloroethylene (TCE) in indoor air at levels at or near US EPA's risk values, heightening concerns from industry and other critics who say it is inappropriate because the risk values do not allow for consideration of site-specific factors that could attenuate chemical hazards.

At two sites - one in Ohio and one in Missouri - environmental agencies have taken action to address indoor air contamination at or near US EPA's reference concentration (RfC), the amount of the substance US EPA anticipates can be inhaled daily over a lifetime without causing adverse health effects, of 2 micrograms per cubic meter, ($\mu g/m^3$). The Missouri and Ohio cases show vapor intrusion is drawing increased attention and that regulators will likely take second looks at more sites in the near future, especially after US EPA releases its long-awaited vapor intrusion guidance, once scheduled for release on November 30, though EPA officials have recently backed off that deadline.

US EPA set the RfC in its Integrated Risk Information System (IRIS) assessment, released last year, but since its release it has been the source of controversy as the regulated community says it is overly conservative and as a result, is inappropriate to use - as US EPA is proposing at a California site - to set protection levels for acute exposures and the agency has not yet issued guidance for how to use it to protect against chronic exposures.

But even before US EPA issues guidance, regulators and others are using the level as a threshold for action. At the Ohio site, the state Department of Transportation (ODOT) voluntarily offered to buy out home owners facing toxic indoor air vapors of TCE stemming from a nearby former asphalt and metals degreasing facility. State regulators had urged ODOT to conduct screenings at the homes because concentrations in two of them was estimated at or in excess of 2 $\mu g/m^3$ but transportation officials chose the additional action of offering to buy houses to tear them down to prevent any risk of vapor intrusion.

In Elmwood Park, Missouri, US EPA Region VII and the Missouri Department of Natural Resources (MDNR) are reportedly requiring a responsible party to install vapor mitigation systems in five resi-

(Continued on Page 7, see "TCE")

Natural Gas Industry A Cornerstone Of West Virginia (and National) Economy

According to the American Natural Gas Association (ANGA), natural gas is a critical component of America's energy supply, economic health, and national security. Integral to the West Virginia state economy, the safe and responsible development of natural gas not only delivers clean, abundant and affordable energy, but also provides good-paying jobs and hundreds of millions of dollars in revenue for communities nationwide.

West Virginia Statistics

A 2012 analysis by the consulting firm IHS Global Insight found that the unconventional gas industry in West Virginia is responsible for:

- 16,888 total jobs in 2010, projected to increase to 71,620 by 2035.
- $1.09 billion in total labor income in 2010, projected to increase to $4.69 billion for West Virginia workers by 2035.
- $2.23 billion in value-added economic output in 2010, projected to increase to $10.3 billion by 2035.

Other Unconventional Gas Development Statistics

Between 2010 and 2015, ANGA reports that the top 10 states projected to produce unconventional natural gas include (alphabetically) Arkansas, Colorado, Louisiana, Michigan, Ohio, Oklahoma, Pennsylvania, Texas, Utah, and Wyoming. These states will experience a compound annual job growth rate of nearly 8 percent. By relative comparison, economists predict that over this same time-period, total US employment is expected to grow at a significantly lower rate of 1.6 percent.

Among the IHS Global Insight other key findings:

Unconventional gas activity accounted for 53 percent of total US natural gas production in 2010 and is projected to rise to 79 percent of total US production by 2035.

By 2015, the annual contribution of unconventional gas activity to US gross domestic product is projected to reach nearly $197 billion, more than $22 billion of which will be from non-producing states. This shows that even in areas that do not produce natural gas, there are substantial jobs and economic benefits. In total, the annual contribution to US gross domestic product is expected to more than double by 2035 to almost $332 billion.

Beyond direct job creation, natural gas development affects a community through supply-chain industries and local revenue. This added revenue provides critical funding for state and local services, such as first responders and hospitals, as well as funding for municipalities and education services, including teachers, aides and support staff, and books. Economic expansion also benefits associated industries such as agriculture, hospitality and manufacturing, as well as Main Street businesses. In a companion study released in December, IHS estimated that the average American household will save $926 each year between 2012 and 2015 thanks to the abundance of natural gas. These savings are estimated to increase to more than $2,000 per household in 2035. ■

(Optimization, Continued from Page 4)

- Approach regulatory agencies at the right time.
- Test and prove savings strategies.

Confounding factors exist in each step of the process, but we believe, and have demonstrated that seasoned environmental professionals can navigate the pitfalls of long-term liability project management in ways that are both imaginative and cost-reducing.

"The most critical step in the process is to clearly define what the end of the project will look like," said Mr. Kirkpatrick, a Principal Geoscientist at the firm. "Not an end, but rather the end. No client wants to face spending money on a single project cleanup for the rest of their careers. This process is a way of robustly examining the realities of long-term environmental project management and finding a way out. Whether it is long-term compliance monitoring, pump and treat system operations, or another remedial strategy, there are meaningful savings to be found, and almost always a way out," he added. ■

(TCE, Continued from Page 6)

dences where indoor air contamination is above an "action level" of 2.1 µg/m^3.

US EPA Region III officials last summer cited the IRIS assessment as one factor for proposing government funded mitigation to prevent vapor intrusion in several homes above TCE-contaminated groundwater at the Crossley Farm Superfund site in Berks County, Pennsylvania. Mitigation was installed at several other homes at the site years before the IRIS assessment. A proposed plan says 10 homes at the site have TCE in indoor air with samples ranging from 0.43 µg/m^3 to 53 µg/m^3.

During an October 11 conference call hosted by an Alliance for Risk Assessment (ARA) panel that is working to provide guidance on how states should implement the TCE IRIS assessment, one panellist reportedly noted that IRIS risk values are not intended as action levels. "A reference dose is not a bright line," the panelist said, describing an issue the group plans to explore further. "We need to help people understand that." ■

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