

Environmental Impacts of Transportation: An Overlooked Factor for Imports

International trade is the exchange of capital, goods, and services across international borders. Records indicate Egyptians used camel trains to import spices and silk from the Far East as early as 2500 BC. King Herod enhanced world trade by building a seaport on Judea's Mediterranean coast at Caesarea, to intersect sea routes and predominant land routes. Indeed, international trade has occurred throughout recorded history, and the efficiency of transportation and the development and sophistication of transfer points (such as seaports) have advanced over time. Much has been made of the economic, social, and political issues associated with international trade. But what about the environmental issues associated with its transportation aspects, particularly for heavy manufactured goods?

Consider, for example, the U.S. cement industry. In April testimony before the Committee on Energy and Commerce, Aris Papadopoulos, CEO of Titan America and Chairman of the Board for the Portland Cement Association (PCA), stated that new environmental regulations — particularly the Portland Cement National Emission Standards for Hazardous Air Pollutants (NESHAP) — pose an immediate challenge to the domestic cement manufacturing industry and predicted that the NESHAP rule would result in the closure of 18 of the country's 100 cement plants over the next two years. When the market for domestic cement returns, he said, it would be met by cement imported from other countries. Further Mr. Papadopoulos projected that, by 2025, roughly 56 percent of the cement used in the U.S. will be imported.

Cement is imported by the U.S. from neighboring Canada and Mexico, as well as from locations all over the world, including Asia, Africa, South America, and Europe. The cement industry operates approximately 125 import terminals, located mainly along



U.S. coastlines. Ocean-going vessels (OGVs) which transport cement from foreign ports fire bunker fuel, a heavy oil very high in sulfur (upon entry into defined U.S. coastal waters, OGVs are required to switch to a lower sulfur fuel — see October 2009 *Zephyr Currents*). In addition to the emissions generated by OGVs from “cruising”, emissions occur during “maneuvering” and “hoteling” operations while the ship is in port unloading cargo. Ports also have a number of other sources of air emissions including harbor craft (e.g., tugboats) and cargo handling equipment. Finally, rail and heavy-duty trucks generate emissions in moving freight in and out of ports.

Because the importing of cement results in air pollution emissions, it's logical to question whether the increased replacement of domestic cement with imported cement will have a positive or negative environmental impact. For a number of reasons, there is no simple answer to this question; however, calculating emissions to the air from cement importing is a good starting point for addressing the issue.

To estimate the emissions associated with just the transportation of imported cement, consider the

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FROM THE TRENCHES

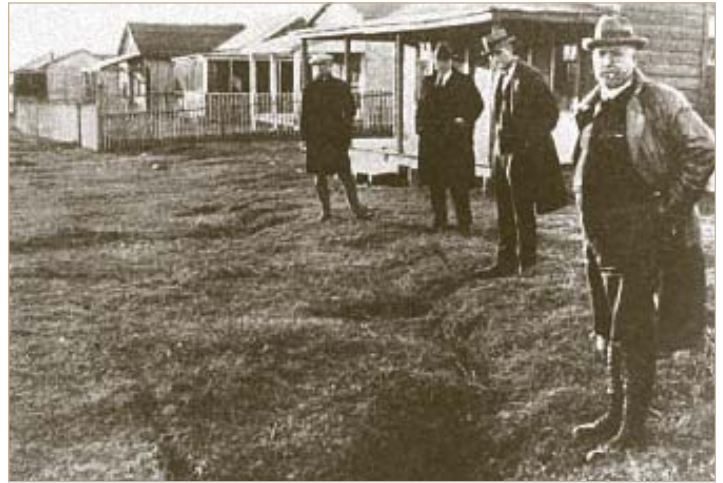
Wimberley Moore and the Scarp of Doom

“Scarp”: the topographic expression of faulting attributed to displacement of the land surface by movement along faults.

Pulling out tattered maps and crumbling manuscripts, the mild mannered geologist from Wimberley, Texas begins the hunt for the hidden active faults of the Gulf Coast of Texas. Zephyr had been engaged by its client to prepare a permit application for a proposed new hazardous waste management unit near Houston, and my assignment is to find the elusive evidence of any active faulting in the vicinity of the client’s site — a quest for the “Scarp of Doom” if you will.

Hurricanes? Of course. Floods? To be sure. But active faults along the Texas Gulf Coast? Though not as spectacular as the San Andreas Fault that spawned the devastating San Francisco earthquake of 1906 or the New Madrid fault that triggered a massive earthquake on America’s frontier in 1812, the Texas Gulf Coast has its own share of active faults. Although they rarely cause earthquakes, Gulf Coast fault activity can wreak havoc on roads, buildings, foundations, and underground utilities. For a company concerned with finding the right site for a hazardous waste storage unit, active faults cannot be ignored; they can breach landfill liners, crack pipelines, and compromise secondary containment structures, opening pathways for contaminants to enter the environment. The effects of active faulting along the Gulf Coast have been exacerbated by extensive groundwater pumping and oil and gas production, accelerating the rate of fault movement. In a dramatic example, the production of oil from the Goose Creek Oil Field near Baytown, Texas early in the last century created a fault scarp announcing its birth with up to a 16-inch shift in the ground surface, damage to roads and buildings, and a tremor that was felt in Houston (see photo).

Once the client showed me the potential location for the waste management unit, I dusted off the ancient (circa 1970s to early 1990s) writings and maps of such sages as Van Sicken, Norman, Elsbury, Verbeek, Ratzlaff, and Clanton which described the locations of known active faults in the area. In addition, I pored over a collection of maps created by the U.S. Geological Survey in the early 1900s — maps with a one-foot resolution capable of revealing features indicative of active faulting that more recent maps can miss. Finally, before grabbing my fedora and heading to the field, I studied aerial photographs of the surrounding site area to find surface features such as in-line depressions, linear discontinuities (“linears”), and other indicators of land surface warping that are only apparent from photos.



My study of these classic geologic sources revealed that the unit was, in fact, to be located in an area disrupted by active faulting. However, I did not see any geomorphic features, such as topographic scarps, on the particular 1920 topographic map — an outcome that was not entirely unexpected since movement along the fault planes likely became more pronounced later in the 20th century as groundwater and petroleum production increased. Examining aerial photographs, I discovered a linear not associated with any known mapped faults and which appeared to enter the site from the south. Since this photographic linear has a trend similar to known mapped faults of the area, I concluded that it is indicative of a possible surface fault.

Armed with my research, I traveled into the well-charted area of eastern Harris County to hunt down and locate physical evidence of land surface displacement due to fault activity. Stalking about near the southern boundary of the site, I encountered possible signs of fault activity: abrupt sags in the topography, lines of sags in the ground immediately south of the site, a wavy appearance to the top of the site’s fence, and a drop in the topography extending southward onto adjacent property. I could not find faulting within the site boundaries or to the north, since human activity had wiped out any such evidence.

Returning to my office and reviewing the desktop study and my field notes, I concluded that an active fault may enter the site from the south and terminate within the site. Reporting my findings to the client, I could only lay out two optional courses of action: 1) spend money on drilling, logging equipment, and my time to actu-

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The Sun Also Rises on Texas Natural Resources Agencies

'I hope we never have to go through what we had to this session again.'
—Sen. Robert Duncan, R-Lubbock.

Anyone who has lived through a “Sunset” session for a natural resources agency has probably felt something akin to Senator Duncan’s expression of pain about this past session. The “Sunset” process is the 12-year cycle on which certain groups of state agencies are reviewed by the Texas Legislature to determine whether they are operating efficiently and appropriately, whether their mission should remain, and whether they should be reauthorized for another 12-year cycle. The Sunset Commission is a body of five Senators, five Representatives, and two public members, one appointed by the Speaker of the House and one by the Lt. Governor. They, along with Commission staff, interview stakeholders, study the agencies, and prepare recommendations. Following prodigious public comment and two public hearings, the Sunset recommendations are adopted and transformed into legislation, which is then considered by the full Legislature. The 82nd Legislature, which completed its regular biennial session on May 30, considered the Sunset recommendations for the natural resources agencies, including the Texas Commission on Environmental Quality (TCEQ), the Railroad Commission (RRC), the Public Utility Commission (PUC), and the Water Development Board (TWDB). *Spoiler alert*—TCEQ and TWDB were reauthorized, but the RRC and PUC were placed into the “safety net” for full reconsideration again next session. This article will highlight some of the major changes provided by House Bill (HB) 2694, the TCEQ Sunset bill.

Compliance History: Perhaps one of the least popular provisions inserted into the last Sunset review of TCEQ was “compliance history”. As most know, developing and implementing the compliance history process was very expensive, it created a rigid “one-size-fits-all” approach, and the process never really achieved its purpose—clearly delineating the good and bad actors. Attempts at legislative corrections have occurred in the past, but HB 2694 was the first legislation to successfully change the process. Some of the most important changes include allowing notices of violations (NOVs) to have a “shelf life” of only one year, providing a clear explanation that NOVs are only allegations of a violation, taking into account the relative complexity of different types of regulated entities in evaluating and using compliance histories, and limiting penalty enhancements on the basis of compliance history to 100% of the base penalty amount (some penalty enhancements had been as much as 700% of a base penalty amount in the past).

Penalty Amounts: Penalty limits for most violations were raised from \$10,000/day/violation to \$25,000/day/violation.



Office of Public Interest Counsel (OPIC): The Sunset Commission highlighted the potential conflicts OPIC faces when trying to help an individual fight a permit application that would authorize a facility that actually serves the “public interest” (for instance, a wastewater treatment plant near the individual’s home). Additionally, OPIC’s focus on public education and outreach to individual members of the public was found to “dilute” OPIC’s representation of the broader public interest in hearings. Accordingly, HB 2694 refocuses OPIC by directing the Office to represent the “public interest” in matters before the Commission, and removes the requirement that OPIC “be responsive to environmental and citizens concerns including environmental quality and consumer protection.” HB 2694 also requires the Commission to adopt rules establishing factors OPIC must consider before deciding to represent the “public interest” as a party to a Commission proceeding.

Contested Case Hearings: While the final version of the legislation does not include House-added language shifting the burden of proof from a permit applicant to the protestant, it does repair some of the damage inflicted in the previous Sunset bill by reintroducing the requirement that the Executive Director (ED) participate as a party in all contested case hearings. This change appropriately places the responsibility for proving up a draft permit on the party who drafted it, rather than on the applicant who might actually seek different provisions than those the ED recommended. The law also prohibits other state agencies from contesting the issuance of a permit. For hearings at the State Office of Administrative Hearings using pre-filed testimony, the law requires all discovery to be completed prior to the deadline for submission of the testimony.

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News Briefs

national news

EPA Finalizes Cross-State Air Pollution Rule

On July 6, EPA issued its Cross-State Air Pollution Rule (CSAPR) — a replacement for the 2005 Clean Air Interstate Rule (CAIR) and EPA's new tool for addressing electric utility emissions of nitrogen oxides and sulfur oxides from upwind states in the Eastern U.S. that lead to elevated ozone and fine particle concentrations in downwind states. Under CSAPR, the 28 affected "upwind" states will be allocated budgets for power plant emissions of sulfur oxides and nitrogen oxides. The first phase of emissions reductions under CSAPR is scheduled to begin January 1, 2012. According to EPA, the almost \$1 billion it projects to be spent annually on this rule will be an affordable and effective approach to protecting public health. For more information, contact David Cabe at 512.879.6644 or dcabe@zephyrenv.com.

EPA Reconsiders, Stays Boiler Hazardous Air Pollutant Standards

On May 16, EPA announced its plan to reconsider the rule it finalized in February to reduce hazardous air pollutant (HAP) emissions from new and existing industrial, commercial, and institutional boilers and process heaters located at major sources of HAPs. EPA anticipated its reconsideration of the rule, commonly referred to as the "Boiler MACT," when it promulgated the rule to meet a court-ordered deadline, stating at that time that it would need to seek additional public review and comment on the final standards. As part of the reconsideration, EPA will issue a stay to postpone the effective date of the standards in the rule until either judicial review of the rule is completed or EPA completes its reconsideration of the rule, whichever is earlier. It should be noted that EPA is not reconsidering a similar rule that it promulgated in February for boilers located at minor sources of HAPs. For more information, contact Curtis Harder at 512.879.6643 or charder@zephyrenv.com.

Grandfathering of PM₁₀ as PM_{2.5} Surrogate Finally Dies

On May 18, EPA repealed the "grandfather" provision of its New Source Review rules that allowed for the quantification and evaluation of coarse particulate matter (PM₁₀) emissions in lieu of meeting the NSR requirements for fine particulate matter (PM_{2.5}). The

"grandfather" provision was applicable only to Prevention of Significant Deterioration (PSD) permit applications determined to be complete before July 15, 2008 which have not been issued. With this repeal of the "grandfather" provision, allowance of the use of the PM₁₀ Surrogate Policy for PM_{2.5} is fully ended as of July 18, 2011. Any pending and all future PSD permit applications must be reviewed against the PM_{2.5} requirements. For more information, contact Roger Brower at 410.312.7907 or rbrower@zephyrenv.com.

EPA Proposes Cooling Water Intake Structure Rules

On April 20, EPA proposed new rules in a second attempt to regulate the impacts of once-through cooling — fish and other organisms can die when trapped against the screens through which water enters a plant's once-through cooling system. Under the new rules, existing facilities that withdraw 2 to 125 million gallons per day (MGD) of surface water and that use at least 25% of that water for cooling purposes would be subject to an upper limit on fish mortality and impingement or alternatively could reduce their intake velocity to 0.5 feet per second. Existing facilities withdrawing 125 MGD or more would be required to conduct studies to help the permitting authority establish appropriate controls. New units that add electrical generation capacity at an existing facility would be required to add technology that can achieve a water flow reduction equivalent to that of closed-cycle cooling systems. For more information, contact David Sorrells at 512.879.6626 or dsorrells@zephyrenv.com.

EPA Extends GHG Best Available Monitoring Methods Deadlines for Oil and Gas

On April 20, EPA extended deadlines for using best available monitoring methods (BAMM) for monitoring of greenhouse gas emissions from oil and gas systems. BAMM is an alternative to more rigorous monitoring methods required by the mandatory greenhouse gas reporting rule. For well-related and certain other vented emissions, BAMM can now be used until September 30, 2011 without EPA approval, and until December 31, 2012 with EPA approval. For leak detection and repair, BAMM can now be used until December 31, 2012 with EPA approval. To obtain EPA approval, an application

for 2011 must be submitted by July 31, 2011, and an application for 2012 must be submitted by September 30, 2011. For more information, contact David Mahler at 410.312.7909 or dmahler@zephyrenv.com.

EPA to Reconsider Cement Hazardous Air Pollutant Standards

On May 17, EPA published a denial in part and a grant in part of petitions by industry and the environmental community to reconsider the National Emission Standards for Hazardous Air Pollutants and the New Source Performance Standards (NSPS) for the Portland cement industry. Ruling on which issues it considers valid and invalid, EPA has granted reconsideration of nine issues including issues related to clinker storage piles, coal mills, affirmative defense to civil penalties, alternative THC standard compliance, HCl limit of zero during startup of sources with no CEM, alternative PM limit, and monitoring for Hg and PM during periods of startup and shutdown. An administrative stay of the rule was also denied. For more information, contact Lynne Spector at 410.312.7906 or lspector@zephyrenv.com.

EPA Proposes HAP Standards for Polyvinyl Chloride and Copolymers Production

On May 20, EPA proposed emission standards for hazardous air pollutants (HAP) emitted from polyvinyl chloride (PVC) and copolymers production. The proposed rule would establish limits on the concentrations of vinyl chloride, total organic HAP, hydrogen chloride, and dioxins/furans for process vent streams and stripped resin. In addition it would require the use of wastewater treatment processes that meet limits established in the rule for vinyl chloride and HAP. The standards would apply to normal operations as well as to periods of startup, shutdown, and malfunctions and include continuous monitoring, recordkeeping, and reporting provisions. For more information, contact Ellen Ward at 512.879.6634 or eward@zephyrenv.com.

state news

EPA Issues Greenhouse Gas Permitting Plan for Texas

On May 3, EPA promulgated a final rule issuing a Federal Implementation Plan (FIP) for federal Prevention of Significant Deterioration (PSD) air permitting of greenhouse gas (GHG) sources in Texas. Because Texas has not taken measures to implement EPA's GHG permitting program via a state implementation plan (SIP) revision, EPA's new FIP officially establishes the EPA as the GHG permitting authority until the state submits a SIP revision that includes PSD permitting requirements for GHG emissions. Under the federal rules, PSD permits are required for sources that become major for GHGs alone (100,000 tons per year for new sources and 75,000 for modifications). For more information, contact Eric Quiat at 512.579.3823 or equiat@zephyrenv.com.

New Jersey to Withdraw from Regional Greenhouse Gas Initiative

New Jersey Governor Christie announced in May that he intends to pull the state from the multi-state greenhouse gas pact, known as RGGI, by year's end. Christie claimed that RGGI has had no impact on greenhouse gas emissions and is nothing more than a tax on carbon emissions. Available CO₂ allowances in New Jersey have significantly exceeded demand, which is falling due to other causes. Christie's announcement has drawn intense criticism from interests who are concerned that other states will feel increased pressure to drop out of RGGI and similar regional agreements. For more information, contact David Mahler at 410.312.7909 or dmahler@zephyrenv.com.

EPA Disapproves Texas Plan for Addressing Interstate Contributions to PM Levels

On April 13, EPA proposed to disapprove the "good neighbor" section of Texas' November 23, 2009 SIP submittal — the portion of the submittal addressing how the TCEQ will prevent Texas emissions from interfering with other states attaining and maintaining compliance with the 24-hour fine particle (PM_{2.5}) air quality standards as revised in 2006. According to EPA, the Texas SIP improperly relies on the 2005 Clean Air Interstate Rule (CAIR), which was promulgated prior to the PM_{2.5} NAAQS revision. In addition, CAIR has since been vacated, and emission reductions identified as resulting from CAIR will not remain permanently in force. Although EPA is proposing disapproval of Texas' "good neighbor" rules, EPA may decide to use the Cross-State Air Pollution Rule as a substitute for a FIP to address the Texas SIP issue. For more information, contact Kevin Ellis at 512.879.6647 or kellis@zephyrenv.com.

TCEQ Recommends SO₂ Area Designations for Texas Counties

On April 1, the TCEQ approved Texas area designation recommendations for the one-hour sulfur dioxide primary NAAQS that include a nonattainment designation for Jefferson County; attainment designations for Dallas, Ellis, Kaufman, El Paso, Galveston, Harris, Gregg, McLennan and Nueces counties; and an unclassifiable designation for all other Texas counties. These recommendations were sent to the governor for his consideration and submittal to the EPA. For more information, contact David Castro at 512.579.3820 or dcastro@zephyrenv.com.

Hydraulic Fracturing Disclosure Bill Signed into Law

On June 17, Texas Governor Rick Perry signed into law a bill that requires oil and gas operators to publicly disclose the specific chemicals used in the hydraulic fracturing process. Two categories of disclosure are identified, one for chemicals subject to OSHA's requirements for Material Safety Data Sheets (MSDS) and the

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other for non-MSDS chemical ingredients. The bill includes trade secret protections and provides a framework for trade secret challenges. A deadline of July 1, 2012 is set for the Railroad Commission to adopt regulations for the MSDS chemical disclosures. Regulations addressing the non-MSDS and trade secret aspects must be adopted by July 1, 2013. For more information, contact Dan Mueller at 512.579.3844 or dmueller@zephyrenv.com.

Harris County Pollution Control Department Formed

In March, the Harris County Commissioners Court formed the Harris County Pollution Control Department as a stand-alone agency. Previously part of the Harris County Health Department, the new agency was split off in an attempt to make Harris County more responsive to pollution enforcement issues. Since becoming part of the Health Department 13 years ago, the County's pollution control operations have been criticized by some for a decline in the prosecutions of polluters. For more information, contact Ed Fiesinger at 281.668.7353 or efiesinger@zephyrenv.com.

TCEQ Authorized for Twelve More Years

On June 17, Texas Governor Rick Perry signed into law a bill authorizing the continuation of the Texas Commission on Environmental Quality (TCEQ) until September 1, 2023. Key provisions of the bill include 1) adding standard Sunset provisions governing negotiated rulemaking and alternative dispute resolution, 2) transferring groundwater protections regarding oil and gas activities to the Railroad Commission, 3) establishing a program to provide assistance and education to the public with a focus on the duties of the Office of Public Interest Counsel, 4) amending current standards in evaluating compliance history, 5) requiring adoption of a general enforcement policy, 6) increasing administrative penalties for regulatory violations, and 7) increasing the TCEQ's authority in regulating petroleum storage tanks. For more information, contact Ed Fiesinger at 281.668.7353 or efiesinger@zephyrenv.com.

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ally confirm the existence of the fault, or 2) concede that the fault exists and locate the proposed structure at an appropriate distance from the projected fault surface (the recommended option). Not surprisingly, the client chose the latter option.

And so, Wimberley Moore, aka the Seeker of the Scarp of Doom, tosses his fedora in the corner, sips his black coffee, and closes another chapter in his life of adventure. Eat your heart out, Indiana Jones! ✨

Paul Moore, P.G. #138
Project Hydrogeologist

Oil and Gas MSS Emissions Authorization Process Postponed

On June 17, Texas Governor Rick Perry signed into law a bill that extends the deadline for authorizing oil and gas site maintenance, startup, and shutdown (MSS) emissions and retaining affirmative defense from enforcement from January 5, 2012 to January 5, 2014. This extension gives the TCEQ additional time to develop a new statewide oil and gas permit by rule and a standard permit that include explicit mechanisms for authorizing MSS activities. In February, the TCEQ had adopted a new Barnett Shale-specific permit by rule and standard permit that included provisions for authorizing MSS activities. For more information, contact Eric Quiat at 512.579.3823 or equiat@zephyrenv.com.

TCEQ Announces Changes to Management Team

On June 29, TCEQ Executive Director Mark Vickery announced changes to its top management team. With the retirement of John Sadlier, Deputy Director for the Office of Compliance and Enforcement, Richard Hyde, the current Deputy Director for the Office of Permitting and Registration (OPR) will fill Mr. Sadlier's position, and Steve Hagle, currently the Air Permits Division Director, will become the Deputy Director for OPR. Also, Mr. Vickery announced the creation of a new Office of Waste, with Brent Wade as its Deputy Director. The management changes will be effective August 1. For more information, contact David Cabe at 512.879.6644 or dcabe@zephyrenv.com.

TCEQ Flare Task Force Releases Results of Flare Study

On May 23, the TCEQ posted on its website the preliminary results of its 2010 study of flare emissions. The results of the study indicate that maximal flare destruction efficiency is achieved when flares are operated near their incipient smoke point and a bright orange flame is visible. The TCEQ also found that proper control of the assist gas ratio is critical to achieving proper destruction efficiency. For more information, contact Eric Quiat at 512.579.3823 or equiat@zephyrenv.com. ✨

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Drought Management: HB 2694 also authorizes the Executive Director to temporarily suspend a water right/allocate water between water rights holders in times of drought or other emergency shortages of water.

Governor Perry signed the bill on June 17, and TCEQ will be reauthorized to operate until 2023. ✨

Lisa K. Anderson
Attorney,

Governmental relations firm owner,
Practitioner before the Texas Legislature and State agencies

A Fractured Approach to Meeting our Energy Needs

American ingenuity is alive and well! Over the past few years, domestic oil and gas companies have applied innovative new hydraulic fracturing and directional drilling techniques, resulting in a new bonanza of domestic oil and gas production. Although hydraulic fracturing has been in the industry's repertoire for many years, it is being successfully applied in new ways, notably unlocking reserves in shale formations that were not economically feasible to develop in the past. From our vantage point as environmental consultants, it has been fascinating to see how, in just a half dozen years, Zephyr has gone from permitting offshore liquefied natural gas (LNG) terminals that would facilitate the importation of foreign LNG to assisting our oil and gas clients with environmental issues associated with hydraulic fracturing ("fracking").

Indeed, the American Gas Association (AGA) estimates that in the past ten years, U.S. natural gas reserves have increased by nearly 60 percent. Even more impressive, the U.S. Energy Information Administration (EIA) estimates that natural gas from shale formations, which was a de minimis percentage of the total production just five years ago, now makes up over 15 percent of domestic gas production and is projected to grow to 45 percent in the next 25 years.

Still, this new boom in production has a number of problematic aspects, particularly from an environmental perspective. First, hydraulic fracturing requires a significant amount of water to carry the fracking fluid into the down-hole formations. Our growing population requires an ever increasing amount of fresh water, and the current record drought that the American southwest is experiencing (including the oil-producing states of Texas, Oklahoma, New Mexico, and parts of Louisiana) make water supplies even scarcer. Our clients in the oil and gas industry have been asking for our assistance in the development of "Master Water Use Plans" to identify potential sources of water for fracking operations, including potential recycling/reuse of wastewater. The industry is very sensitive to the fact that there are numerous demands on fresh water.

There has also been public and regulatory concern about the potential for fracking operations to impact underground fresh



water reservoirs or to cause other impacts on public safety or aesthetics. A number of state regulatory agencies have been addressing these concerns — as an example, the Texas Legislature recently passed a bill (which has been signed into law) that requires that companies engaged in hydraulic fracturing to disclose the chemicals used in the fracking fluids. Several high profile cases of surface spills of fracking fluids, including a recent case in Pennsylvania last April, have generated lawsuits and increased regulatory scrutiny. Several states have placed a moratorium on fracking operations so that problematic aspects can be evaluated further.

Still, it is very much in our national interest that we resolve these environmental issues as quickly and thoroughly as possible. Securing our energy future, including minimizing our reliance on foreign sources of energy, has been an important national goal for generations. It appears that the new supplies of oil and gas that have been unlocked by the domestic oil and gas industry can be an important bridge toward our secure energy future. ✨

Joe Zupan
President

Zephyr is a full-service environmental, health, and safety firm offering consulting, training, and data systems services to clients worldwide. We specialize in air and water quality, waste management and cleanup issues, incident management, natural resources, and workplace and community safety.

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realistic scenario of an OGV delivering approximately 50,000 metric tons of cement from Asia to a port on the west coast of the U.S. First, the cement could travel by truck and/or rail from the manufacturing plant in Asia to the port of departure, and there, port equipment would be used to transfer the cement to the OGV. To reach the U.S., the vessel would travel a distance of about 7000 miles and be at sea about three weeks. It would then spend about one day traveling in a reduced-speed zone and maneuvering (when it is near each port), and would spend about three days at port in a “hoteling” mode while it is loaded and unloaded. Port harbor craft and cargo handling equipment would be used in the docking and cement unloading process.

The following table compares the total emissions of the primary transportation-related pollutants (nitrogen oxides, sulfur dioxide, and particulate matter) for the Asia-to-U.S. scenario to the emissions from the manufacturing of cement at U.S. plants complying with new source emission standard limits. In this comparison, total transportation emissions for moving cement from the point of manufacturing in Asia to the points of receipt in the U.S. were estimated. EPA-recommended emission methodology was used in the calculations, and emissions were normalized to units of “lb pollutant/ton of cement”. Surprisingly, the emissions per ton of cement just from transporting the cement from Asia are significantly greater than the emissions from manufacturing the cement at a modern U.S. facility.

Comparison of Emissions		
<i>Pollutant</i>	<i>Transportation (lb/ton cement)</i>	<i>U.S. Manufacturing (lb/ton cement)</i>
NO _x	2.9	1.4
SO ₂	3.4	0.4
PM	0.4	0.01

Finally, the greenhouse gas emissions from the transportation aspect of imported cement should not be overlooked; transportation of imported cement adds about 15 percent more CO₂ to the atmosphere than cement manufactured domestically.

From a global perspective, the magnitude of transportation-related air emissions (including greenhouse gas emissions) related to international trade is significant. Fortunately, the recently adopted fuel standards for ships operating within designated ECAs result in lower emissions and air quality improvements along U.S. coastlines. It remains to be seen whether the plant closures and increased cement imports predicted by PCA will come to fruition. However, when considering the overall environmental consequences of importing heavy manufactured goods, the transportation-related air emissions should not be overlooked. ✨

Jennifer Sharp Seinfeld, *Principal*
Lynne Spector, *Project Manager*