CONNECTICUT DOT'S APPROACH TO ENVIRONMENTAL COMPLIANCE

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INTRODUCTION

If any of today's panelists were to consider the environmental impacts of a full range of organized human endeavors, he would be hard pressed to identify any enterprise having greater potential impact on our natural environment than the development and maintenance of a modern transportation system.

As society's primary means of connecting goods and services with people and opportunities, our transportation system has enjoyed continuous growth and enhancement in recognition of the positive role that transportation plays in contributing to our nation's social, economic and cultural goals. Among the greatest challenges facing transportation professionals in the 1990s, however, is the need to demonstrate that our transportation system can be developed and maintained in a manner consistent with our society's environmental values as well. This paper focuses on Connecticut's efforts to address a relatively new aspect of this environmental challenge and that is to control the environmental risks associated with hazardous wastes and other potential contaminants.

TYPES OF ENVIRONMENTAL RISK

While the risks of chemically-induced environmental impacts vary widely in scope and complexity, they can be grouped, for conceptual purposes, into two major categories. The first category pertains to project-related risks, and would include encounters with hazardous or contaminated materials in the highway right-of-way during construction activities. The second category would include operational risks that are typically associated with transportation support facilities such as airports, rail yards, and highway maintenance facilities.

The common area shared by both the major categories represents those risks that are not facility based or project related, but can be managed on a statewide basis, at a programmatic level. For example, leaded sandblast debris generated under a statewide bridge rehabilitation program might be addressed as a programmatic risk. The remainder of this paper will emphasis ConnDOT's efforts to control facility-based, operational risks.

NATURE OF ENVIRONMENTAL RISK

Within this context, the environmental risk associated with any DOT support facility will express itself through the interaction of the variables of Activities, Materials and Facilities. If the architectural characteristics of a highway maintenance facility fail to support effectively the activities carried out at that facility, or fail to control the potential contaminants used in support of such activities, then the facility itself represents a potential source of environmental contamination. Once released, contaminants will migrate from the source, along available pathways, and will eventually impact one or more sensitive receptors. While a cost effective compliance program should target a substantial share of the resources toward the control of the variables, a remedial program element, focused on the source-pathway-receptor relationship, also will be necessary where past releases have already occurred.

FUNCTIONAL APPROACH

Accordingly, ConnDOT's Division of Environmental Compliance has been organized along the functional lines. Because environmental compliance is considered an agency-wide function in Connecticut, the Division has been placed within the Office of Transportation Chief Engineer. The investigative services function is implemented under an on-call consultant agreement, under which a variety of pre-negotiated study tasks are executed on an as-needed basis. The remedial engineering elements are carried out by the consultant via pre-negotiated design and construction management tasks. In negotiating these tasks, an assumed level of effort for each type of service was used to derive a standard fee for each task when the Agreement was executed. At the time each assignment is authorized, however, an agreed upon level of effort factor is applied to each required task to accommodate more accurately actual field conditions. Compliance management efforts are largely carried out in-house with technical assistance from the Department's consultant.

COMPLIANCE PROGRAM

Based upon analytical data collected at approximately 125 ConnDOT facilities over the past several years, with continuing analysis of applicable Federal and state regulations, a comprehensive compliance program has been undertaken. The program consists of three major components. First is a source control component aimed at improving each facility's physical ability to support the

types of activities assigned to it, and to accommodate the potential contaminants employed in support of those activities. An environmental remediation program has been undertaken to improve site conditions at locations where past releases are known to have occurred. Third is a comprehensive Risk Management Program aimed at improving personnel operating practices, specially as they relate to material storage and handling, as well as waste management.

Operational Risks in Transportation

To illustrate the risks that the source control component is intended to address, consider a hypothetical high-risk maintenance facility designed and built in the 1950s. It has a salt storage structure with a capacity equal to roughly 25% of the facility's annual usage. It also has a salt/sand mix pile, which is typically covered during fair weather but must remain uncovered for loading and mixing operations during storm events. There is a fuel island served by underground steel storage tanks, which by 1990 would have surpassed their useful life, especially without cathodic protection. Also there are vehicle maintenance and repair facilities that would likely be served by floor drain systems routed directly to the soil, or perhaps to a neighboring watercourse.

Given the range of common maintenance functions and the variety of related contaminants used, it is clear that 1950s site technology is ill-suited for the highway maintenance demands of the 1990s. It also should be noted that, while many of the more toxic hydrocarbon-based contaminants can be cost-effectively removed from impacted groundwater, salt-laden groundwater is far more costly, if not impossible, to remediate.

In response to similar deficiencies identified at many of Connecticut's facilities, generic designs for salt storage sheds, fuel storage tanks and drainage improvements were developed.

Source Control Component

The risks associated with salt storage and handling operations are largely attributable to the limited capacity of the structures typically used for this purpose. An under-sized structure not only requires that salt be delivered more often, but also necessitates that delivery and mixing operations occur outside, under less than optimal weather conditions.

To offset this risk, state-of-the-art salt storage and handling systems are now being constructed in Connecticut. Each of the gambrel-styled structures features separate salt storage and mix storage areas, and a 25 foot high fabric door to facilitate delivery. The structures are sized to accommodate up to 65% of each facility's annual usage, and effectively contain delivery, storage and mixing operations within a single structure. The generic design for the 35 foot high facilities utilize laminated wooden arches that rest on concrete pilasters to support the superstructure.

The Department's aging underground fuel tanks also were found to represent a very substantial risk to the environment. Many of the tank systems were installed during the 1950s and were found in advanced stages of deterioration. Volume measurements were typically taken by periodically inserting a calibrated stick into the tank and comparing the measured fluid level to delivery and usage records. This approach generally did not detect leaks until relatively large volumes of fuel had escaped to the environment.

Under the source control component of its compliance program, ConnDOT has replaced most of the underground fuel storage tanks with new systems. These new systems not only conform to Federal and state regulatory requirements, but go one step further by incorporating computerized, temperature-corrected, level sensing systems. These units automatically transmit real-time volume measurements to the host facility on a periodic basis. While fiberglass tank systems have been installed at many ConnDOT facilities, especially sensitive locations have been fitted with cathodically protected, double-walled, steel tanks.

During earlier site investigations, it was learned that the floor drain systems serving many of ConnDOT's maintenance facilities were promoting the release of degreasing fluids, oils and vehicle detergent wastes to the environment. Further, it was found that pavement conditions at most of the facilities were generally poor. In anticipation of NPDES and TC regulations prohibiting such discharges, ConnDOT's source control program component was enhanced to include a full compliment of drainage controls under the program. Layers of impermeable, geotextile fabric are laid between courses of bituminous pavement where salt is handled. This fabric provides additional protection in the drainage area serving salt handling operations at ConnDOT's maintenance facilities.

Prior to discharge, all storm-water accumulating at ConnDOT facilities is collected and routed through a series of gross particle separators. These separators are sized to capture 90% of the sediments entrained in facility storm-waters.

Additionally, in accordance with the requirements of ConnDOT's general permit under EPA's National Pollutant Discharge Elimination Program, all floor drain

systems in non-sewered areas are being re-routed to underground holding tanks. These tanks are fitted with the same level sensing systems utilized under the Department's fuel tank replacement program. In areas served by sewers, the floor drain systems are being retro-fitted with oil/water separation units.

Site Remediation Component

Unfortunately, the site investigations conducted at ConnDOT's facilities found that soil, groundwater, and drinking water resources had been impacted by past operations. It was therefore necessary to undertake a program of remedial projects aimed at restoring environmental conditions in affected areas.

In the early stages of the remediation program, the Department relied heavily on land filling as its primary response to soil contamination, particularly at leaking underground tank sites. More recently, however, ConnDOT has been able to capitalize on a number emerging treatment technologies, such as vacuum extraction systems. This technology is particularly cost-effective in capturing volatile soil gases often encountered near fueling system failures.

The discovery of approximately one million gallons of PCB contaminated diesel fuel under the former New York/New Haven Rail yard has presented a formidable remedial challenge to the Department. To avoid interference with critical ongoing operations at this facility, ConnDOT will employ a combination of groundwater extraction and insitu bio-remediation technologies to restore subsurface conditions at this property. Genetically developed bacteria are particularly effective against PCB contamination. This project is currently approaching final design.

Since encounters with low-level hydrocarbon based soil contamination represent the most common impediment to ConnDOT's maintenance and construction activities, the Division of Environmental Compliance is seeking state regulatory approval to implement a low temperature soil treatment program. While Connecticut DEP has authorized the use of thermal units on a limited basis, ConnDOT hopes to address this ongoing risk on a more programmatic basis.

With respect to groundwater contamination, it is known that treatment technologies are more cost-effective when they can be implemented before the contaminants are permitted to migrate horizontally within the groundwater matrix and dissolve. Therefore, to reduce the time frame between the discovery of a release and the start of remediation, ConnDOT has purchased the first of six pre-packaged, mobile groundwater treatment units to be deployed throughout the state on an as-needed basis. A unit can be purchased at a cost equal to the amount it would cost to lease the required components separately for one year.

Risk Management Component

As noted earlier, the degree of environmental risk associated with a particular facility is also influenced by the operating procedures and material practices employed by facility personnel. Therefore, as an additional defense against the release of contaminants, ConnDOT has developed a comprehensive Risk Management Program component for all operational facilities.

The Risk Management Program consists of four major elements. The first is a statewide "Worker-Right-to-Know Plan," which was developed to conform with OSHA's Hazard Communication Standard, and provides basic storage, labeling, handling and safety data to all personnel working with any of the 850 OSHA regulated substances used by the Department. To conform with this important federal standard, it was necessary to develop detailed chemical inventories and provide training at all 125 ConnDOT facilities.

The second part of ConnDOT's Risk Management Program is a Hazardous Materials Management Plan, which focuses on those substances identified as 'hazardous' under the Resource Conservation and Recovery Act, the Toxic Substances Control Act, and related legislation. The plan and program manual sets forth specific procedures for the storage, handling and transport of all such materials, and describes the emergency preparedness procedures to be followed in the event of an uncontrolled release. This program element is supported also by a training program.

The Department's objective in developing its Risk Management Program is to provide 'cradle to grave' management of all regulated substances it uses. Therefore, the third element of the program focuses on the waste products resulting from the Department's operations. ConnDOT's "Waste Management Plan" describes the various waste streams associated with facility operations; identifies applicable 'generator' permit requirements; and sets specific procedures for proper container management, manifesting, shipping and disposal of all regulated substances. The plan also contains specific provisions for spill contingencies and training.

The fourth and final element of the Risk Management Program consists of site-specific "Environmental Operating Manuals," which are being prepared for each facility. Their purpose is to provide each facility manag-

er with a system of procedural management practices for his or her particular location, thereby linking personnel operating practices with the source control structures and systems in place at that location. Each manual provides a detailed layout of the facility and its neighboring environmental setting, identifies all high-risk activities performed, describes existing source controls in place, and sets forth detailed instructions for their use and maintenance. Each manual also incorporates applicable provisions of the three statewide program manuals described previously.

CONCLUSION: DAMAGE CONTROL VS. RISK CONTROL

The title of this paper is "Connecticut's Approach to Environmental Compliance." At this juncture, it would be neither prudent nor accurate to suggest that ConnDOT's approach represents the only means to achieve and maintain regulatory compliance. Connecticut's experience to date, however, does suggest that success or failure in your own efforts will depend largely on how you would answer the following question: Are hazardous and contaminated wastes and materials best approached as environmental problems or are they really parts of a larger management problem?

Environmental problems rarely express themselves while the proverbial cow is still in the barn. This tends to force project-level or site-based responses, which in our current regulatory environment must emphasize damage control rather than risk control. Under emergency conditions, remedial response options are few and are typically less cost effective than programmatic solutions. Moreover, emergency response actions must generally be carried out under greater regulatory supervision, within a legal framework accompanied by extensive liability.