MAINTENANCE SHOP RELATED REGULATIONS AND REGULATIONS IN THE 1990s

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Using New York State Department of Transportation's experiences with a state OSHA plan in place since 1980, it was my intention to create an awareness by the participants of the importance of occupational safety and health in the work environment, specifically in the equipment management setting. I discussed our efforts to meet "the letter of the law" compliance with OSHA standards, and roadblocks encountered in that endeavor. More important was the realization that our efforts were not succeeding, and subsequent identification of the changes necessary to meet our program objectives. They were:

- Developing better lines of communication among Department managers regarding OSHA full compliance;
- Hiring an Industrial Hygienist to identify exposures;
- More emphasis on engineering controls;
- More reasonable time tables for phasing compliance with other standards; and
- More precise interpretation of standards by the Labor Department, the enforcement agency.

As a result of these actions, our compliance efforts are "back on track."

In closing, I asked the audience to:

- Give safety their personal attention--get involved, be supportive;
- Think as if OSHA exists in their state, whether it does or not, use the standards as guide;
- Realize that all states will probably adopt OSHA by the year 2000;
- Develop safety standards voluntarily, before it becomes the law,this will make the transition easier;
- Be proactive, not reactive;
- Develop a safety program appropriate for their specific needs--no more, no less;
- Pay attention to safety in their own program area, before someone in their organization tries to do it for them;
- Get the employees involved in the process;
- Use engineering controls, when feasible; and
- Institutionalize safety into their operations--everyone benefits.

LEAKING UNDERGROUND FUEL TANK MANAGEMENT SYSTEM

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The North Carolina Department of Transportation (NCDOT) leaking underground storage tank (UST) management system was developed as a result of state regulations for underground storage tanks, which have been under development since 1985 when the General Assembly authorized the Environmental Management Commission to develop and adopt such regulations. These regulations have provided technical standards for construction and installation of new UST systems, for corrective action in cases of leaking systems, for closure of systems taken out of service, and for release and action of new and old systems.

The NCDOT is composed of 14 divisions in 100 counties with 108 refueling facilities. An active program of installing new fiberglass tank systems along with removing existing out of service tanks and piping was initiated in 1988. In 1989 an annual tank testing program was started for 24 year old tanks and older. Tank testing was eventually expanded to include the State Highway Patrol, Ferry Divisions, and Welcome Centers. Currently, 200 underground storage tanks are scheduled for testing in 1990.

Shortly after the program was initiated, several petroleum contaminated sites were discovered and it became apparent that an organized approach to deal with leaking UST sites was needed. A standard operating procedures manual was drafted and distributed throughout the NCDOT. This draft outlines procedures for initial response, remediation and sampling, should contamination be encountered, as well as, basic site closure steps for clean sites.

Detailed preliminary site investigations are being conducted by NCDOT personnel. These investigations explore the lateral, vertical and horizontal extent of petroleum releases. They include all aspects of regional hydrology, site hydrogeology, magnitude and direction of groundwater flow, delineation of contaminant plume, and proposed remedial action plans and systems. Re-

ports and permit applications are prepared and submitted to the local Environmental Health and Natural Resources office. The outline, shown in below, describes the minimum data/information requirements for review and evaluation of remedial action plans and supporting site characterizations in North Carolina. This outline provides a step-by-step approach for site investigations.

It is the intent of the NCDOT to utilize staff personnel for tank abandonments, environmental assessments, and soil and groundwater remedial activities. Outside consultants will be used, on an as needed basis, for environmental investigations and cleanup. They will also follow the state site characterization outline which should eliminate unnecessary work.

Outline for Evaluation of Site Characterization Data and Remedial Action Plans for Groundwater Restoration in North Carolina

1. Introduction--including a statement of objectives and a definition of the scope of the investigation.

2. General Locus Map (e.g., 7-1/2 min. topographic map where available; otherwise, segment of county highway map) showing location of contamination site.

3. Discussion of Regional Hydrogeology
   a. Delineation of the occurrence of geological units or formations including lithologic character and structural features (from published literature, files and personal knowledge);
   b. Reference to relevant geological features such as faulting, fracturing, dip of bedding planes, etc.;
   c. Information pertaining to local groundwater usage including type of use (public, industrial, private domestic, irrigation, etc.) and identification of aquifer; and
   d. Identification of all water supply wells within 1500 feet of the source of contamination including location and construction details, if available.

4. Base Map(s)* upon which the following information is exhibited:
   a. Location of source(s) of contamination;
   b. Locations of all sampling points, logged borings, and observation/monitoring wells;
   c. Locations of all points of potential exposure to contaminants (water supply wells, surface water bodies, underground utilities, etc.); and
   d. Locations of all relevant physical features (buildings, roads, etc.) and hydrogeological features (recharge and discharge areas) in the immediate area.

* Base map should be to scale (preferably 1" less than or equal to 100') and include all relevant physical features (buildings, roads, etc.) in the immediate area.

5. Description of Site Hydrogeology
   a. Stratigraphic logs of all boreholes using a standard classification system and/or borehole geophysical methods. Log should include identification of system or method used and (geophysical) and referenced to location on base map;
   b. Minimum of two cross sections (preferably intersecting at approximate right angles and extending across the contamination site) exhibiting major hydrogeologic units (bedrock, gravel, sand, silt and clay layers) as determined by the logs; and
   c. Evaluation of relevant aquifer parameters, including results of aquifer tests, if available.

6. Direction of Groundwater Flow
   a. Static water level measurements (referenced to a common datum) from a minimum of three (3) observation wells. Discretion should be used in selecting appropriate number and location of observation wells to ensure accurate representation of groundwater flow. Data should include depth to static water level, relative elevations of points from which depth is measured, and date of measurement;
   b. Description of methods used for water-level measurement--including time interval between well development and water level measurement;
   c. Well construction records for all observation wells showing total depth of well, depth of screened interval, date of construction, etc.;
   d. Identification of significant features or activities which may affect local groundwater flow patterns; and
   e. Flow net superimposed upon base map showing equipotential lines and selected flowlines which exhibit direction(s) of groundwater flow. Static water-level measurements used in flow net construction should be shown on the equipotential map.

7. Delineation of Contaminant Plume
   a. Identification of the contaminants responsible for violations of groundwater quality standards (i.e., qualitative characterization of the plume);
   b. Plan of contaminant plume superimposed upon base map, the distribution of selected parameters may be shown by isometric lines.
   c. Profile vertical component of plume geometry or contaminant profile referenced to hydrogeologic cross sections described in 5 (b);
   d. Analytical reports for all sampling activities including date of sample collection and references to sampling points shown on base map;
   e. Description of sampling methods used - flushing time, extraction volume, etc.; and
   f. Well construction records for all wells utilized as sampling points showing total depth of well, depth of screened interval, date of construction, etc. (may reference well construction records compiled under item 6(c)).

8. Objectives of the Remedial Action Plan (RAP)
   a. Statement of goals and expected accomplishments of the RAP (e.g., source control and/or removal, reduction in contaminant concentrations, removal of "free product," contaminant or retardation of plume migration, reduction in areal/vertical extent of contamination, protection of nearby water supplies, etc.); and
   b. Proposal for establishing target clean-up concentrations based on groundwater water quality standards.

9. Design and Operation of the Remedial Action System (RAS)
   a. Construction details (including design sketches) and facility layout (superimposed on base map) of all components of the RAS including recovery wells, interceptor trenches, infiltration galleries, groundwater treatment units, discharge facilities, etc.;
   b. Operational characteristics and performance standards of all system components (e.g., information on recovery wells should include duration of pumping, anticipated yield, and expected radius of influence. Data on treatment units should include influent concentrations, expected effluent concentrations, and flow rates). Discussion should address such factors as effectiveness, reliability, maintenance, and safety; and
   c. Consideration of all permits and approvals required for disposal of waste materials and/or discharge of effluent.

10. Follow-up Site Monitoring and Evaluation of RAS
   a. Plan for periodic monitoring to detect changes in groundwater movement, plume geometry, and qualitative characteristics of the plume and to assess site response to disposal of effluents; and
   b. Plan for continuing re-evaluation of the effectiveness of the RAS in accomplishing objectives established under item 8.

THE IMPACT OF ALTERNATIVE FUELS ON HAZARDS IN THE WORK PLACE

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Introduction

This paper takes an in-depth look at the work place hazards which arise with the growing use of alternative transportation fuels. This shift in emphasis toward alternative fuels has been predicted upon provisions of the 1990 U.S. Clean Air Act, as well as on some state-level initiatives, for instance in California. The Act establishes tailpipe emissions standards, which in most cases cannot be met by vehicles running on diesel fuel or gasoline. However, use of these fuels may be hazardous to maintenance and refueling personnel if proper precautions are not taken.

The Clean Air Act is still in conference committee, with the Senate Bill (S. 1630) differing from the House version (H.R. 3030). It is clear, however, that the regulated emissions levels for 1994 will include 1.3 g/bhp-hr of reactive hydrocarbons, and 15.5 g/bhp-hr of carbon monoxide. These standards were effective in 1987, and have by and large been met with current engine and fuel technology.

However, an 83% reduction in emissions of particulate matter over the period 1989-91 will be required for urban buses. The 1991 bus standard is 0.1 g/bhp-hr. Heavy duty trucks are subject to an interim standard of 0.25 g/bhp-hr for 1991. In 1994, the bus and trucks standards converge to 0.1 g/bhp-hr. Nitrogen oxide emissions are to be reduced by 53% over the period 1989-1991 from 10.7 g/bhp-hr to 5.0 g/bhp-hr. The fuels and engines which meet emissions standards and cost criteria in the transit industry will most likely be candidates for use in the trucking industry.

Discussion of Alternative Transportation Fuels

The alternative fuels in the study are methanol, ethanol, compressed natural gas (CNG), and liquefied petroleum gas (LPG). Some thirty fleets which currently utilize alternative fuels vehicles were identified and their experiences were analyzed. These fleets are primarily transit bus operations and utility company service fleets. Many fleets are conducting performance tests with engine manufacturers or fuel suppliers.

Comparisons of the delivered wholesale prices and energy density of each fuel are noted, relative to diesel fuel. Along with required engine modifications and additional vehicle fuel tank costs, the alternative fuels are not found to be cost effective when compared with diesel fuel vehicles. Aggregate demand for these alternative fuels is not large, and their distribution and supply is limited in many regions. However, several non-economic benefits have enticed transit bus operators and utility companies toward greater use of alternative transportation fuels.

The primary advantage for transit operators is that the alternative fuels offer the greatest promise of meeting the 1991 standard for urban bus emissions. In fact, methanol is the only fuel which has proven, in field demonstrations, that it can meet all 1991 tailpipe standards in a two-cycle heavy duty engine. With these environmental benefits come significant issues involving industrial hygiene and work place safety.

Hazards in the Work Place

Managers are well as maintenance shop workers must understand and take seriously the potential hazards inherent in the various alternative fuels.

The alternative fuels which are liquids pose a significant hazard if ingested. For methanol, studies suggest that permanent blindness may be caused by ingestion of two teaspoonfuls, with death occurring from ingestion of about four teaspoonfuls. Methanol toxicity through eye contact or prolonged skin exposure is also documented. Toxic inhalation levels for all four fuels are discussed, including the need for improved passive and mechanical ventilation.