

# Michigan Department of Transportation - M•DOT

# Mates



Issue No. 65

July 1992

## PRELIMINARY SITE INVESTIGATIONS FOR POLLUTION

By now, the phrase 'polluter pays' is familiar to anyone involved with project development and right-of-way acquisition for the Department. What is not so well known is the effort that goes into protecting MDOT against having to pay for pollution caused by a previous or adjacent land owner. Public Act 307 of 1982--the Michigan Environmental Response Act, nicknamed the 'Polluter Pays Act'--contains specific language which allows the Department to establish a defense against this environmental liability: "...a state or local unit of government can knowingly purchase contaminated property without liability if they undertake certain activities." One of these activities is the Preliminary Site Investigation (PSI). Within MDOT the responsibility for conducting PSIs lies with the Materials and Technology Division's Geoenvironmental Services Unit. In 1991, the unit conducted PSIs on over 75 projects. So far this year we have conducted PSIs on over 35 projects involving more than 100 individual parcels.

While Act 307 requires that new right-of-way be investigated prior to purchase, the PSI is a useful tool in the project planning and design process even when there is no new right-of-way involved. On Federal Aid projects the Federal Highway Administration has agreed to participate in the cost incurred when soil or water contamination is present on a project, if those costs are included up-front in the Engineer's Estimate. For all projects, it is extremely important to conduct a PSI on all questionable right-of-way involving disturbance of the soil in order to avoid costly delays and overruns once the project is underway.

The Department uses a phased approach to review existing or proposed right-of-way for environmental problems. Project staff in Lansing or the MDOT District offices conduct the first phase, an initial site assessment, by reviewing a project for potentially contaminated sites. The initial site assessment consists of determining the current and past land uses adjacent to the roadway or along new alignments.

The most predominant feature which necessitates a PSI is an underground storage tank on the property. In the case of an active gas station, their presence is obvious, but sometimes the architecture of a dentist's office, the vent pipes running up the side of a party store, the placement and shape of planters, or the pattern of joints and cracks in parking lots indicate the presence of inactive tanks. As widening and intersection improvement projects increase, it is not unusual to find that there is or was a gas station on each quadrant, any one of which could have had an impact on the soil or water under our existing or proposed new roadway. In addition to commercial properties, farm and residential properties often have tanks for fuel or heating oil and require PSIs.

Once the request for a PSI is received by the Geoenvironmental Services Unit, there is a certain amount of office preparation which can be done before heading out with sampling and detection equipment to look for tanks, bore test holes, and collect samples for chemical analysis. The plans are studied to determine the extent of work involved (utility trenching or cut sections); the right-of-way requirements are established (grading permits or total takes); and the accessibility of each parcel is noted (paved areas or overhead lines). Sometimes a field review is necessary

to determine the best sample locations. Regulatory agencies and local government officials are contacted and may be able to provide information on registered tanks, accidentally released hazardous or polluting materials, and investigations or remedial work performed by others at the site. This information is used to develop a preliminary sampling plan.

In the preliminary plan, the Geoenvironmental Services Unit project manager estimates the number of test holes, monitor wells, and samples required. This information is used to estimate the cost of the PSI, determine the type of equipment that will be necessary, and allows the project manager to advise the laboratory on what analytical work will be needed. Even the best preliminary plans are revised in the field as unforeseen site conditions require additional samples or the relocation of test holes and monitor wells.

Once the preliminary sampling plan has been developed, the project manager can schedule the field work. While some sampling is done using hand-operated equipment, a drill rig is usually required. District soils crews as well as the statewide boring crews of the Geotechnical Unit at the Materials and Technology Division are called upon for help on PSIs depending on our needs and their availability. In general, if undisturbed samples or installation of monitor wells are required, we rely on the statewide crews. Using hollow-stem augers they have the ability to pull continuous 5-ft split spoon samples and to set ground water monitor wells. District crews with solid-stem auger equipment are able to assist on investigations where a more qualitative approach is acceptable, such as when the objective is to determine the approximate limits and relative levels of soil contamination.

Each PSI must be detailed enough to determine if and to what extent the soil or water has been affected and what this will do to the market value of the property or the cost of the project. However, considering the man-hours and equipment involved with putting a drilling crew and sampling team in the field, and the number of requests for PSIs the unit receives, investigations must be conducted so as to extract as much information as possible from each day in the field.

Field operated detection and analytical equipment are used to minimize the number of test holes and samples necessary to evaluate the nature and extent of environmental impact. A magnetometer to detect buried metal objects, a photoionization detector which measures hydrocarbons volatilizing from exposed soil, and a soil gas probe which draws vapors from the soil for field analysis are often used to help the sampling team locate possible sources such as buried tanks and to screen samples for contamination in the field. One of the most important applications of these field screening techniques is the placement of so-called 'smart wells.' Smart wells are test wells which are located horizontally and vertically in areas of suspected contamination to gain the maximum amount of information on ground water conditions under a site. Installing, developing, and sampling test wells is a time consuming operation; however, field screening or placement of such wells and collection of soil samples is time well spent.

For a project on existing right-of-way where contamination is likely (in front of a gas station, for example) soil samples

## Materials and Technology Engineering and Science

MATES is a news bulletin authorized by the transportation director to disseminate technical information to MDOT personnel, and is published by the Materials & Technology Division. The cost of publishing 800 issues at \$0.05 per issue is \$40.00 and it is printed in accordance with Executive Directive 1991-6.



are collected to a depth of about 2 to 5 ft below the maximum depth of excavation. If ground water is encountered within the anticipated excavation depth, then water samples are also collected. These samples are analyzed to determine the proper method of disposal for all material which must be removed. Enough test holes are augered to approximate the extent of contamination and allow the designer to estimate quantities of contaminated water and soil which will have to be removed and disposed of. The anticipated limits of contamination are shown on the plans and pay quantities are included in the Engineer's Estimate.

Where new right-of-way is being purchased, the PSI becomes part of a legal defense under Act 307 and serves to document that the Department has shown "due diligence" in investigating the property prior to acquisition. In this instance, a more thorough investigation is usually called for since the results will often be used in establishing the fair market value of the property and to limit liability for cleaning up existing contamination which may be discovered later. When an investigation may affect a property's value and determine liability, field work can become complicated by an attorney's involvement.

While waiting for analytical results, which can take up to a month to get back from the environmental testing lab, the project manager begins writing the PSI report. Field sampling techniques, analytical procedures and a discussion of the regulatory limits for contaminant level against which specific results will be compared are incorporated. A general description of the project, local geology, site plans showing sample locations, boring logs and cross-sections can all be developed while waiting for lab results. Finally, the analytical results are evaluated to determine what action will be appropriate. Recommendations are developed and cost estimates are prepared with input from project design staff and often from the Michigan Department of Natural Resources. In some cases, the recommendation may be to change the alignment in order to avoid purchasing a contaminated parcel or to use easements and grading permits instead of buying the property. The PSI report for the new right-of-way is reviewed by the Real Estate Division and becomes a part of the environmental clearance document.

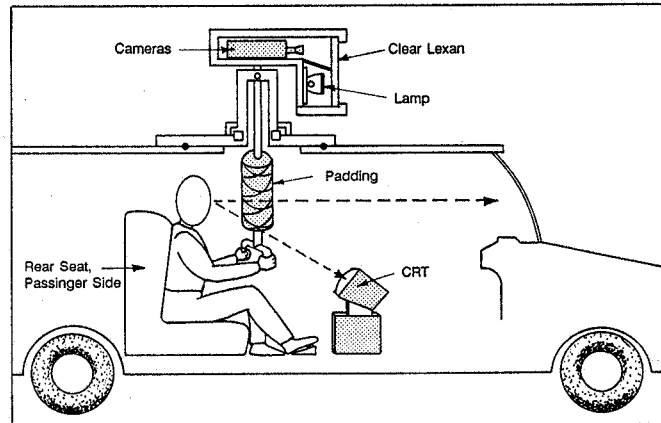
Whether to establish a defence against environmental liability or to determine quantities for cost estimates, the PSI has become a routine part of project planning and design for MDOT. In order to keep up with the requests for investigations, new field equipment and computer applications are being studied. When projects involving a large number of parcels arrive, the PSI work may be contracted, with oversight from a member of the Unit. Newly hired engineers in the Department's orientation program (Engineering Development Program) are being encouraged to spend time with the Geoenvironmental Unit to become familiar with how our environmental work will affect the eventual design and construction of projects.

Since these procedures are rather recent developments, our goal is to catch up with all the projects which have been in the design stage for years. We are in the process of doing so now, and by the time projects approach the construction stage, initial site assessments and PSI findings will be included. The importance of these studies from both the economic and environmental standpoints cannot be ignored, and the Materials and Technology Division's involvement in this area will continue to play an important role.

-Judy Ruskowski

## DAYTIME SIGN REFLECTIVITY MEASUREMENTS

Field measurement of sign reflectance (See MATES No. 35) has always been a time-consuming process; requiring a crew to stop at each sign after dark, provide artificial lighting, and measure its reflectivity with a reflectometer. Under a \$250,000 contract, the Federal Highway Administration (FHWA) has developed a Mobile Retroreflectivity Measurement System. Contained in a van, it is capable of evaluating traffic sign reflectivity during the day at speeds up to 45 mph. The system was loaned to the Materials and Technology Division for evaluation and calibration verification, and was used extensively by our Photometry Unit.



Conceptual design of MSMRTS mobile prototype.

The system uses a strobelight for sign illumination, two cameras for aiming and reflectivity evaluation, and a laser range finder for distance determination. It documents each sign with a 'nighttime' picture of the sign and assigns a reflectivity value for both the legend and the background.

MDOT has recently received federal approval to construct a unit of our own, patterned after the FHWA model. A mobile, daytime system will be an essential tool for the implementation of the proposed FHWA minimum retroreflectivity standards for traffic signs. As we develop the unit and do further work with the system, a future MATES article will describe it in detail.

-Bob Nordlund

## OUR-FACE-IS-RED DEPT.

When we acknowledged our recent retirees in the last issue of MATES, we must have nodded, as we neglected to include a dedicated MDOT worker who also joined the ranks of the retired. **Henry Royster**, one of our Traveling Bituminous Mixture Specialists, retired after 38 years of service. As well as being a diligent technician, Henry was also the Division's unofficial television cameraman, and would act in that capacity at Division social functions. Henry, our apologies for not including you last time, and our thanks for your years of service to the Division.

**AN HISTORICAL NOTE...**The first pavement centerline to separate traffic moving in opposite directions was the brainchild of Edward N. Hines of the Wayne County Road Commission in 1911. It has been called the most important traffic safety device ever conceived. The first centerline on a state highway was applied by the Department to the Marquette to Negaunee road in 1917.

This document is disseminated as an element of MDOT's technical transfer program. It is intended primarily as a means for timely transfer of technical information to those MDOT technologists engaged in transportation design, construction, maintenance, operation, and program development. Suggestions or questions from district or central office technologists concerning MATES subjects are invited and should be directed to M&T's Technology Transfer Unit.

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