

O.H. MATERIALS

**Innovative
Solutions to
Environmental
Problems**

O H M

THE ENVIRONMENTAL SERVICES COMPANY

The US EPA "...encourages the use of alternatives to land disposal of hazardous waste whenever feasible." Alternatives such as on-site treatment or incineration "...can be more protective of public health and the environment."

The OHM Approach

This statement by the EPA describes the unique OHM philosophy—reducing the volume of hazardous substances through on-site treatment.

Our approach provides technologically advanced on-site treatment alternatives and single-source project capabilities from strategic response centers located throughout North America. Since our inception in 1969, we have developed an unmatched scope of services which includes:

- **Groundwater Recovery and Treatment**
- **On-Site Treatment Equipment**
- **Facilities Decontamination**
- **Hazardous Waste Site Cleanup**
- **Biological Treatment**
- **Technical Advisory Services**
- **Laboratory Services**
- **Management of Underground Storage Tanks**
- **Emergency Response**
- **Surface Impoundment Restoration**
- **Explosives/Reactives Handling**

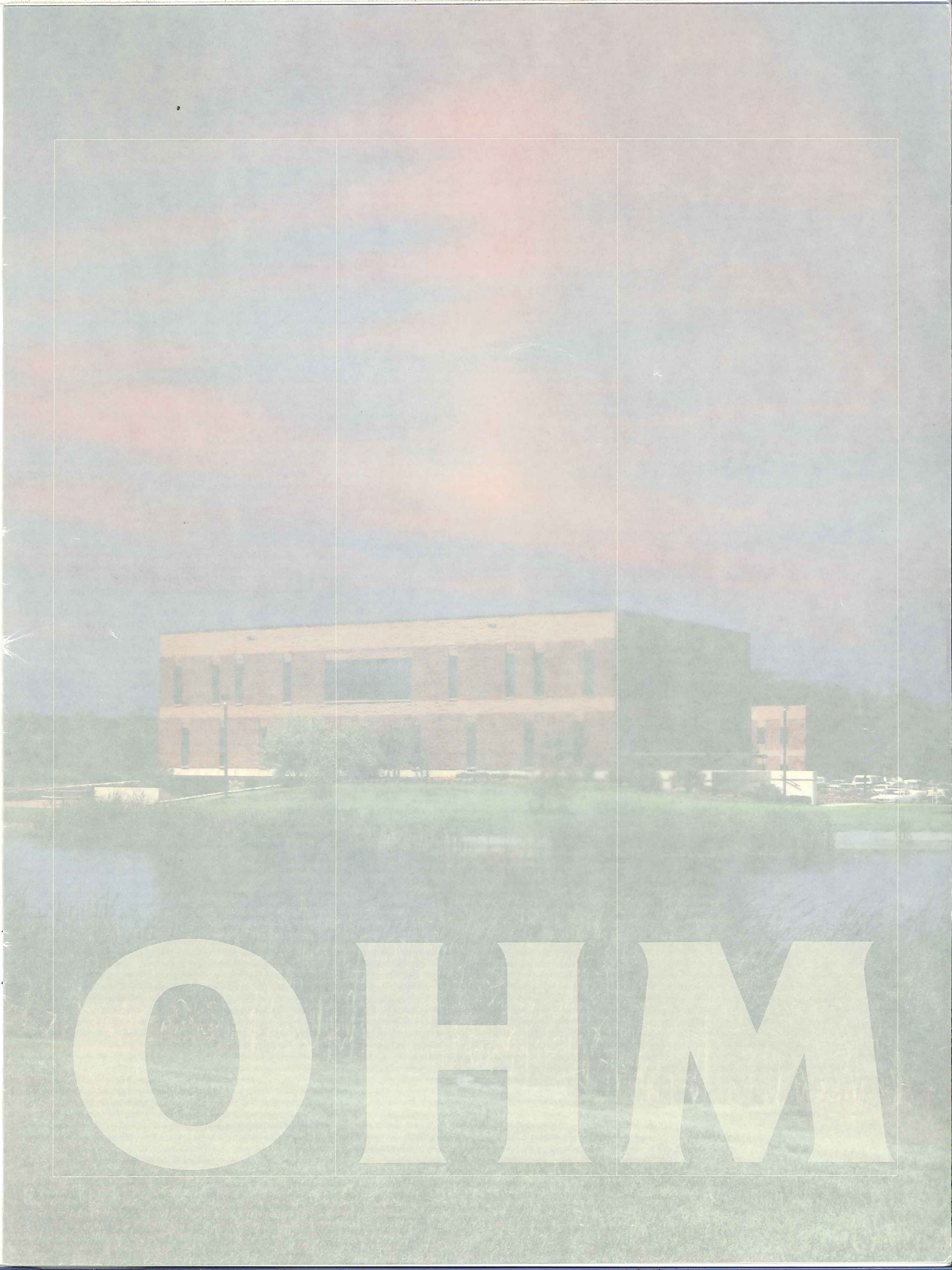
OHM has never owned or operated disposal sites or incineration facilities—for two very important reasons. First, on-site treatment provides the most cost-effective solutions. It reduces or eliminates the need for off-site disposal of hazardous substances, thereby minimizing our clients' future liabilities. Second, because we have no capital investment in off-site disposal facilities, we are not tied to any one treatment technique. Therefore, we can offer our clients the most objective remedial action alternatives.

Unlike other environmental service firms, OHM can provide total-responsibility project management and services that are always on the leading edge of technology. We do this with people—highly skilled, motivated people. In addition to experienced field crews, OHM has an extensive staff of degreed professionals, including:

- **Hydrogeologists**
- **Geotechnical Engineers**
- **Civil Engineers**
- **Chemical Engineers**
- **Chemists**
- **Environmental Engineers**
- **Microbiologists**
- **Mechanical Engineers**
- **Health and Safety Specialists**

Finally, OHM operates from strategically located response centers. We have successfully completed thousands of projects for private-sector clients and governmental agencies throughout the United States and Canada.

We invite you to review our total-scope of environmental services described in this brochure. We look forward to the opportunity of providing you unique OHM solutions for your environmental problems.



OHM

Groundwater Recovery and Treatment

OHM's services for the restoration of contaminated subsurface environments include:

- Recovery of phased liquids
- Recovery/treatment of contaminated groundwater
- Flushing of residuals
- Removal/treatment of soils

OHM has successfully used several recovery/removal and treatment technologies alone or in tandem on a variety of projects. Our extensive experience can provide proven expertise in selecting and implementing the most effective remedial actions.

OHM's techniques for subsurface restoration include:

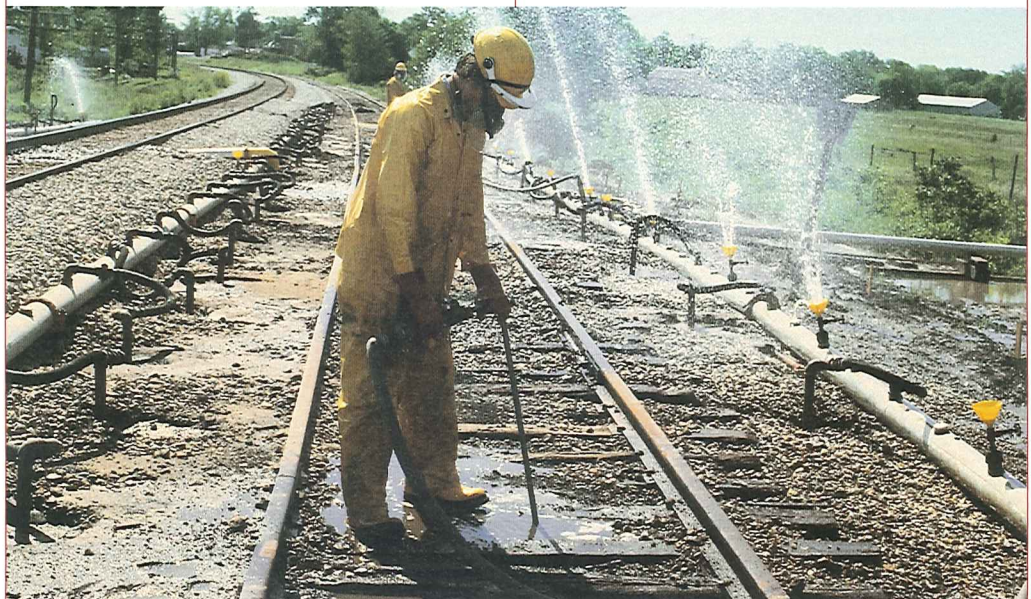
- Interceptor/recovery drains
- Interceptor/recovery wells
- Injection/recovery points
- Skimmer/scavenger wells
- Dynamic flushing systems
- Biologically enhanced flushing systems
- Containment walls/barriers

OHM has fully mobile equipment to treat the liquid and solid materials recovered:

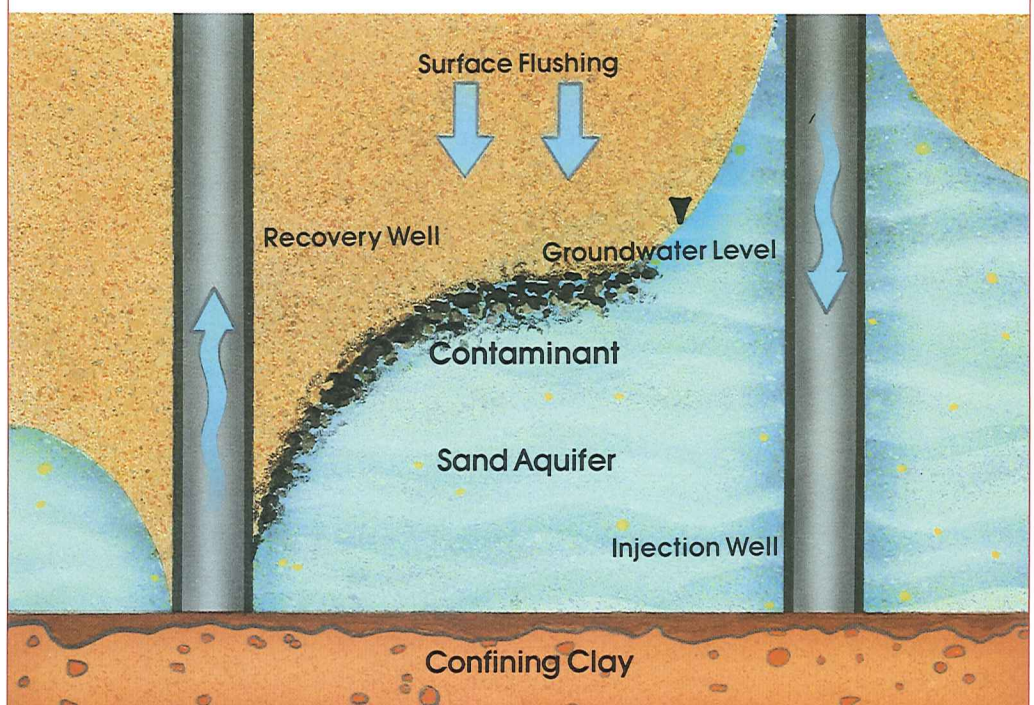
- Physical/chemical treatment
- Carbon adsorption filters
- Stripping towers
- Bio-reaction vessels
- Retention pools/vessels
- Solids dewatering systems
- Solidification equipment
- Mixing/transfer equipment
- Phase separators



Wells are drilled for both hydrogeological investigations and groundwater recovery



OHM's patented underground recovery and treatment system in operation following a transportation incident



Subsurface illustration of contaminant recovery



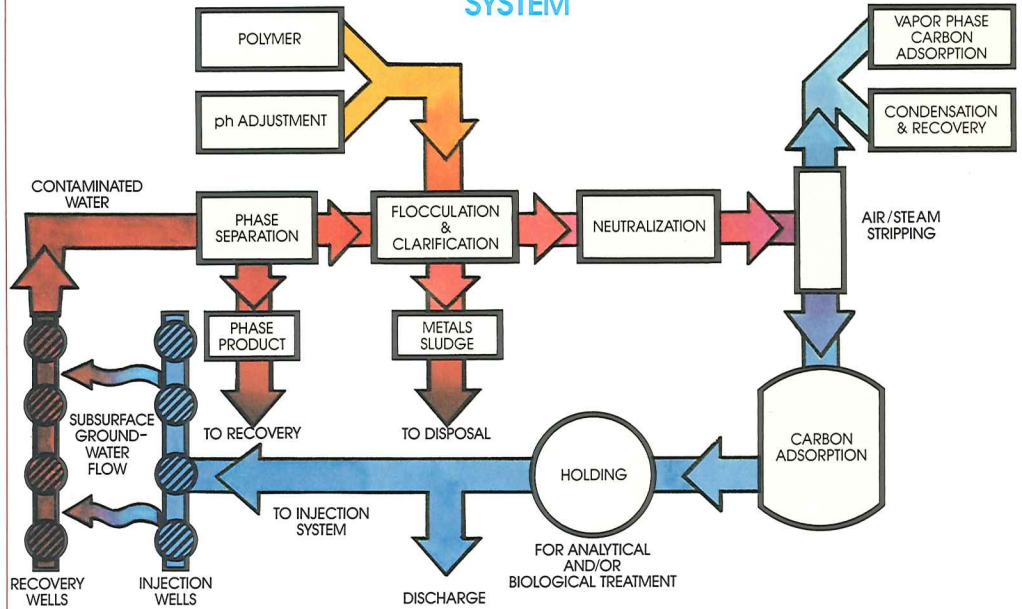
Winterized underground recovery and treatment system in place at former hazardous waste site

OHM's resources and expertise are best exemplified by our patented Underground Recovery and Treatment System. This system incorporates a pneumatic subsurface recovery and injection system coupled with a mobile, on-site treatment system for the removal of organic or inorganic contaminants. As a final polishing technique, bacteria may be injected along with appropriate nutrients to treat the residual contaminants remaining in the soil. This system was developed by OHM and has been utilized extensively at numerous sites. It provides a low-cost alternative to the treatment of shallow groundwater and contaminated soils.

Our ability to provide turnkey service for subsurface treatment projects is complemented by a technical staff experienced with the field execution of groundwater and subsurface cleanups. Our hydrogeologists and engineers can assist prior to the initiation of field activities to ensure that the selected remedial action plan is cost-effective. Technical services include:

- Site characterization
- Identification and evaluation of alternatives
- Preliminary and final cost estimates
- Ranking alternatives
- Pilot testing programs
- Detailed engineering/design
- Assistance with agency/client negotiations

PROCESS FLOW CHART FOR UNDERGROUND RECOVERY & TREATMENT SYSTEM



OHM has successfully performed groundwater recovery and treatment at hundreds of sites



Mobile treatment systems used to detoxify groundwater

On-Site Treatment Equipment... Design, Engineering, Fabrication and Installation

The effective resolution of environmental problems requires state-of-the-art technical expertise and equipment. OHM believes that these challenges can be best met through engineered construction techniques for on-site detoxification, destruction and/or volume reduction of contaminants. OHM has developed internal design, engineering, and equipment fabrication capabilities.

Our professional staff encompasses the following disciplines:

- Civil engineering
- Mechanical engineering
- Chemical/process engineering
- Geotechnology



OHM equipment fabrication facility

- Piping and instrumentation
- Industrial chemistry
- Environmental engineering
- Structural engineering
- Industrial hygiene

In keeping with our philosophy of on-site treatment, we have designed and fabricated an entire spectrum of mobile environmental treatment equipment. Modular design accommodates high process rates and long retention times. Units can also be linked in a unique treatment chain when multiple treatment technologies are required.



Custom designed air stripping tower removing TCE and other volatile organics from groundwater

These systems reduce cost by decreasing transportation and disposal requirements, and more importantly, reduce or eliminate the liability associated with off-site disposal. Mobile treatment equipment includes:

- Carbon adsorption filters
- Clarifiers and separators
- Multimedia prefilters
- Polymeric exchange adsorbers
- Equalization/aeration vessels
- Air and steam stripping units
- Mixing/transfer equipment
- Bio-reaction vessels
- Retention pools
- Solids dewatering systems

Unique environmental problems may require specialized on-site treatment systems. In these cases, OHM utilizes its resources to design, fabricate, test, and implement both pilot and full-scale systems for on-site applications.



Mobile treatment system — clarifier, retention pool and air stripper

Decontamination... Structures and Facilities

OHM's individualized restoration programs for unique and complex environmental problems have turned useless facilities into operations that are again available for production or resale. Solutions have been developed for facilities contaminated with:

- PCBs
- Dioxins
- Pesticides/Herbicides
- Cyanides
- Asbestos
- Mercury
- Radioactive materials
- Military agents
- Pharmaceuticals
- Other toxic materials

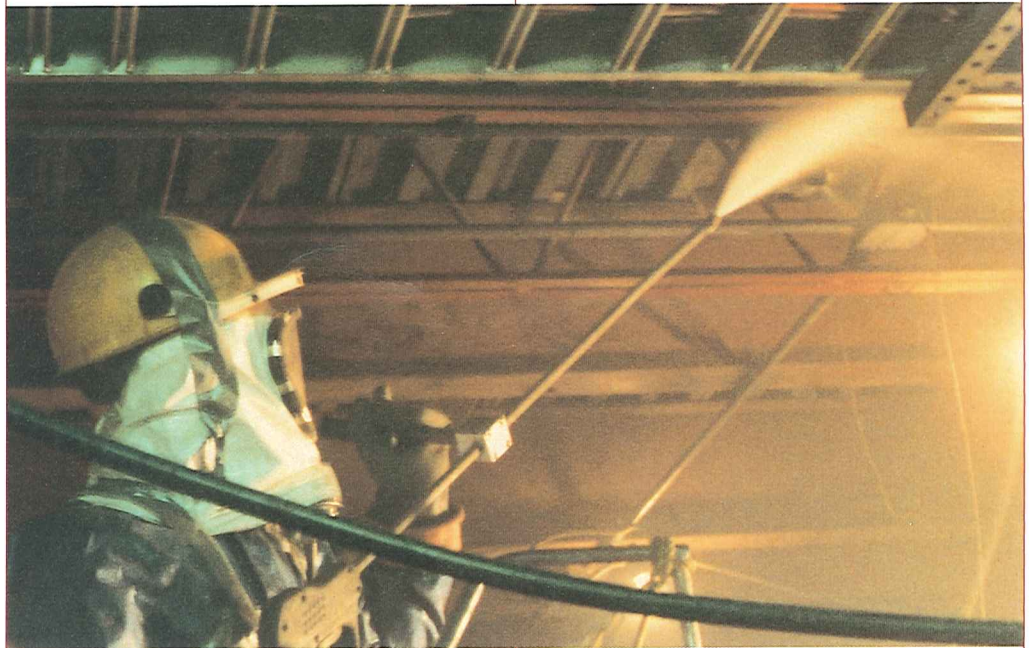
Our approach to these problems begins with a detailed site assessment and review of existing data. From this information, a complete technical approach and work plan is developed.

For complex problems, the decontamination plan may include bench testing of operational alternatives to verify the optimum decontamination methodology. The final plan will then be a scaled-up version of the most efficient methodology for the particular type of contaminated surface.

For projects at operating facilities, particular attention is placed upon minimizing disruptions. This is accomplished by segregating work areas and scheduling tasks during non-peak production hours.



Removing material contaminated with radioactive waste



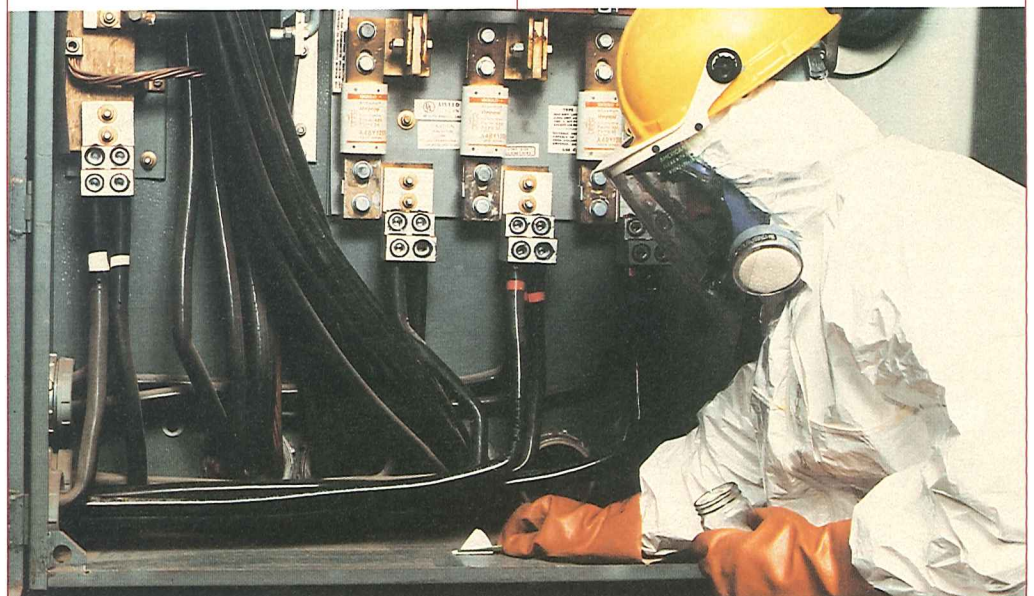
Building structure being decontaminated with high-pressure solvent spray

Successful decontamination techniques may include:

- Solvent application/
extraction
- High pressure surfactant
cleaning
- Hydroblasting
- Steam cleaning
- Sand blasting
- Various wet/dry abrasive
cleaning techniques

Some porous materials such as wood or concrete may have absorbed contamination. In these instances, a surface cleaning followed by application of special sealing materials may prove to be more cost-effective than removal and disposal.

On-site treatment equipment is frequently used. This results in significant cost savings through reduction of the volume of material requiring transportation to off-site disposal areas.



Sampling prior to decontamination of electrical substation equipment involving PCBs.

Hazardous Waste Site Cleanup... Mitigating the Liability

Following the completion of hundreds of remedial actions at previously uncontrolled hazardous waste sites, OHM is recognized as the industry leader. Our innovative approach to designing and executing planned remedial actions is the key to eliminating liabilities associated with:

- Buried/surface drums
- Surface impoundments
- Contaminated soil
- Contaminated groundwater
- Above and below ground storage tanks
- Contaminated facilities

Our unique approach involves using mechanical operations to increase production rates and decrease labor costs. Remote drum handling equipment and mobile drum shredders can safely



Temporary building erected for extensive lab pack operation at a hazardous waste site

accomplish in days what would take weeks by traditional methods.

Analytical and disposal costs are reduced through extensive sampling and analyses performed on-site in one of our mobile analytical units. Compatible materials are bulked following analyses and transported in volume to EPA-approved disposal facilities.



OHM technician sampling drums during a Superfund site cleanup

Contaminated surface water, groundwater, and many hazardous wastes can often be treated on-site using various configurations of treatment equipment, thereby eliminating or significantly reducing the amount of materials which need to be removed from the site for ultimate disposal.

From site assessment to final closure, OHM provides the complete scope of services. We also provide single source, total responsibility for management of the entire project, eliminating the need for clients to deal with a large number of sub-contractors.



Drum grapple lowers handling costs and increases safety of on-site personnel

Biological Treatment ...Enhancing Nature's Solution

No element of OHM's scope of services exemplifies on-site treatment more than the enhanced natural processing of organic contaminants by selected bacterial strains. Environmental treatment using biological techniques destroys contaminants on-site, eliminating costly excavation, transportation and disposal, and more importantly, future liability.

Included in the list of organic contaminants we have biologically treated successfully on-site are acrylonitrile, isopropanol, acetone, crude oil sludges, petroleum hydrocarbons, n-butylacrylate, methylene chloride, ethylene glycol, and various phenolics. Applications include:

- Land farming
- Lagoon treatment
- Subsurface inoculation

To determine if biological enhancement is a feasible approach, microbiologists perform bench-scale evaluations using representative samples collected from the site. In addition to assessing the treatment potential of contaminants, bench-scale studies help reduce cleanup costs by evaluating techniques to increase treatment rates in the field.

To ensure project success, pilot-scale studies are performed prior to full-scale treatment. During actual treatment, interpretation and



Land farming application of bacteria to treat soil contaminated with phenols



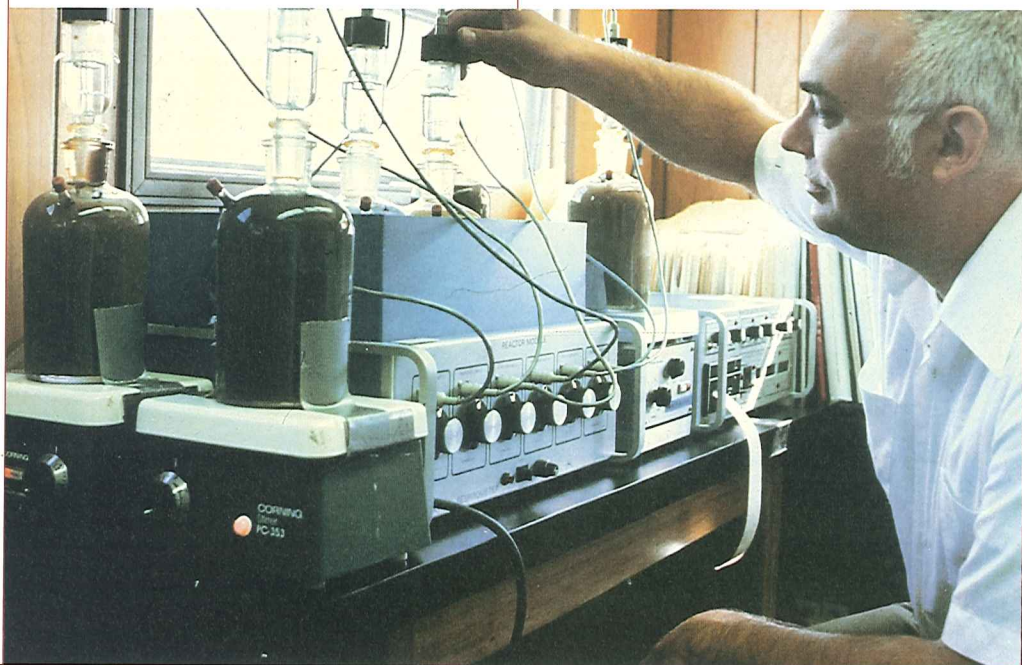
Benchscale testing of site samples in OHM's biological treatment laboratory

parameter modification based on results of on-site monitoring permit treatment to proceed at an optimum rate throughout the project.

Our approach uses only non-pathogenic bacteria approved by the USEPA. Extensive research, biofeasibility testing, and periodic monitoring ensure that the treatment process is working and poses no harm to the environment.



Biological treatment tower and associated treatment equipment.



Selection of appropriate bacteria through electrolytic respirometer analysis

Technical Advisory Services...Planning Through Execution

OHM's professional staff provides the foundation for our turnkey, total-scope approach. Our experienced scientists, engineers, and technicians are ready to assist you in the resolution of your environmental problems. Specific services include the formulation and implementation of:

- Remedial action master plan evaluations
- Hydrogeological investigations
- Site assessments
- Sampling/testing programs
- Process engineering/feasibility studies
- Environmental monitoring programs

The expertise of OHM's staff has been developed through the execution of remedial action programs in the field.



Site assessment and consultation

Our hands-on experience has allowed us to develop and offer OHM's Remedial Action and Technical Execution (RATE) advisory services. The RATE program analyzes remedial alternatives and assists clients with the selection of a remedial action plan and strategy for its resolution. RATE services include:

- Data evaluation/problem characterization
- Identification of alternatives
- Preparation of preliminary/final costs



Development of remedial action plan alternatives

- Ranking of desirable alternatives
- Assistance in client/agency negotiations

Through our RATE services, OHM can aid in early identification of a remedial action plan tailored to resolve your specific problem.



Data evaluation and problem characterization are enhanced through computer technology

Laboratory Services...Sampling And Analysis

OHM's technically advanced laboratories provide fast, accurate analyses that enable environmental problems to be identified and resolved quickly and efficiently. Our fixed laboratories and technical staff are dedicated to meeting the analytical needs for investigation, monitoring, and mitigation of hazardous and toxic substances.

Our fixed laboratories excel in all aspects of environmental and analytical chemistry. Equipped with the most advanced organic/inorganic analytical instrumentation, we routinely provide analyses on complex matrices. These capabilities, backed by an EPA QA/QC program, ensure accurate and reliable results. Typical analyses performed include:

Hazardous Waste/Product Analysis

- Trace contaminant identification
- Toxic/hazardous material analysis
- RCRA, TSCA testing

Water Analysis

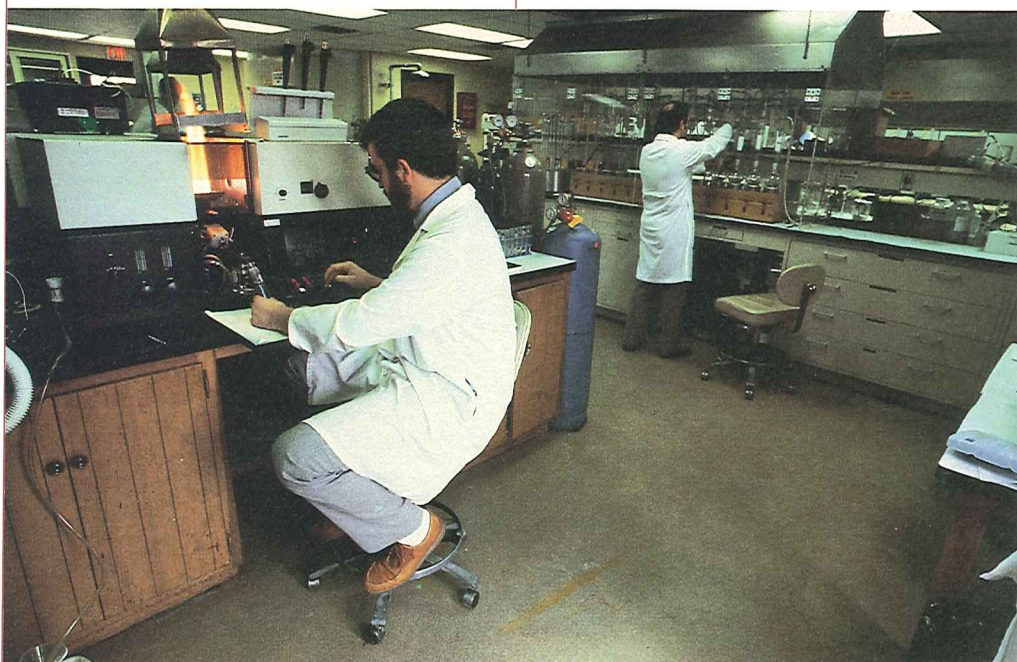
- Organic/Inorganic
- Pesticides
- Herbicides
- PCBs
- NPDES

Air

- Ambient air monitoring
- Particulates
- Plume analysis



OHM sampling technicians delivering samples to GC/MS equipped mobile lab



Fixed facility wet lab and heavy metals analysis

Extending OHM's analytical services is a fleet of specially designed, highly sophisticated field analytical units (FAUs). These FAUs can be located at or near a project site and are cost effective tools when rapid turnaround time and high sampling volumes are required. These units offer virtually all analytical processes available in our fixed laboratories, including AA, GC, GC/MS and other wet methods and instrument techniques.

FAUs provide rapid and accurate results that maximize the efficiency of cleanup efforts while monitoring the health and safety of on-site personnel and the local community. On-site analysis is subject to the same strict QA/QC program which governs our fixed laboratories.

OHM field analytical technicians and chemists experienced in sampling methods and site monitoring ensure that all samples are representative, safely collected, labeled and properly packaged for shipment or on-site analysis.



Hazardous waste analysis using GC and GC/MS



Fully equipped mobile lab for on-site analysis

OHM MUST PROGRAMSM

Management of Underground Storage Tanks

If you use underground tanks to store petroleum, chemicals or petrochemicals, you should be concerned about potential environmental impairment caused by leaks.

Based on extensive experience restoring sites contaminated by underground tank and distribution system leaks, OHM has developed a comprehensive tank management program—the OHM MUST PROGRAMSM. It provides early leak detection and on-going preventive maintenance. It can significantly reduce your liability due to leaks.

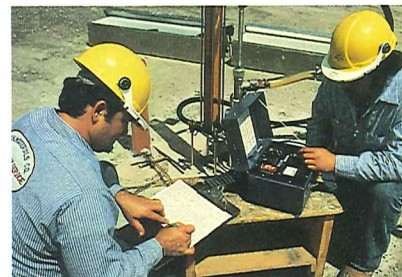
Ideal for industrial and fleet facilities, utilities, service stations, and convenience stores,

the OHM MUST PROGRAMSM allows you to:

- Detect and mitigate underground leaks
- Prevent or minimize groundwater pollution
- Assure product quality
- Assess facilities prior to purchase, sale, or closure
- Ensure regulatory compliance

Unlike other companies which offer only one service such as tank testing, OHM provides clients with a total scope of services from which an individualized tank management program can be developed. Components include:

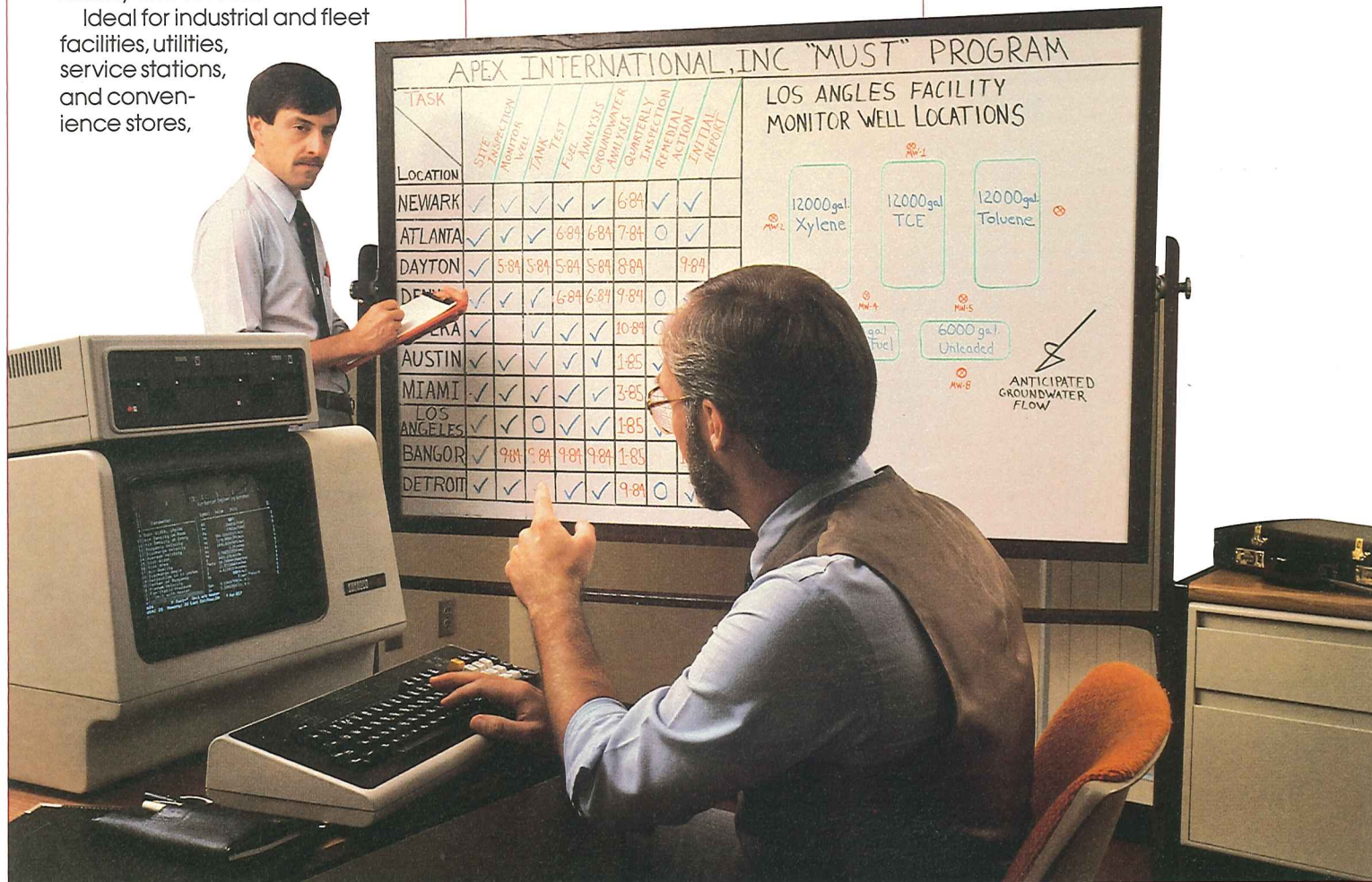
- Site investigation
- Leak testing
- Monitor well installation



Technicians perform leak test on an underground storage tank

- Fuel sampling/filtering
- Tank replacement
- Groundwater sampling and testing
- Remedial action
- Tank management programs

Whether you have one tank or thousands, the OHM MUST PROGRAMSM helps you avoid potential problems and associated cleanup and liability costs.



OHM develops individualized preventive maintenance programs to meet client's tank management requirements

Emergency Response... Incident Control

Emergency response to releases of petroleum products, hazardous substances/wastes, or other environmentally regulated materials is available on a 24-hour-a-day, 7-day-a-week basis. With over a decade of experience, we have the capability to respond to any incident, regardless of products involved or parameters of the situation.

Strategically located and specially equipped emergency response vehicles, mobile product recovery and treatment equipment, decontamination trailers, personnel protective equipment, and experienced technicians can be mobilized from any OHM location to immediately begin mitigation.

Emergency response activities include:

- Containment/control
- Identification of contaminant source
- Hazards assessment
- Product transfers
- Contaminant recovery
- Assessment of extent of contamination
- Site restoration

Environmental service agreements which outline all necessary contractual arrangements prior to an emergency incident are preferred by many of our clients such as transportation companies, chemical manufacturers, agricultural chemical distribution centers or general manufacturing concerns.



Drum exploding in a pesticide warehouse fire



Tank car patching prior to product transfer



Recovery technicians oxidizing tetraethyl lead spill

Surface Impoundments... Evaluation, Restoration and Closure

Whether your objective is to revitalize or close existing surface impoundments, OHM can provide a wide range of proven alternatives.

OHM understands the properties that make sludges difficult to handle and the additional problems created by basins leaking to the groundwater. Our site assessments define the problem in terms of possible remedial approaches and the desired results.

Remedial approaches include:

- Physical removal
- Solidification
- Dewatering
- Solidification/Encapsulation
- Isolation
- Treatment (physical, biological, chemical)

Additionally, OHM has proven capabilities in performing treatability studies on multi-phased materials containing various compounds. Often the solution entails design of a pre-treatment facility for the lagoon's influent or effluent.

OHM's approach leads to the identification and evaluation of all feasible options.



Mobile equipment for sludge dewatering

OHM has the treatment equipment and systems that address the most sophisticated waste streams. These include pressure filters and presses, flocculation vessels, and clarification chambers. These mobile systems can be brought on-site for short or long-term durations.

Often an on-site approach is the most cost-effective. For example, OHM has utilized enhancement techniques to biologically treat oil sludges from lagoons. Other approaches include stabilizing the sludge and encapsulating it to prevent leachate migration.

Whatever the situation, OHM can design and implement a cost-effective remedial approach for your surface impoundment problems.

Explosives/Reactives Handling

Shock sensitive, water and air reactive, and other unstable or explosive materials present real problems to many industrial research labs, hospitals, universities, and other manufacturing facilities. OHM's explosives/reactives handling services provide qualified, experienced professionals, plus the appropriate equipment to safely and effectively remove:

- Lab packs
- Lab chemicals
- Cylinders
- Military ordnance
- Shock sensitive materials



OHM designed and fabricated bomb trailer and EOD technicians removing explosives

Site assessment, sampling and analyses, repackaging, handling, and ultimate detoxification or detonation are coordinated and accomplished by an OHM team, providing our clients with an entire turnkey package.

Specialized OHM personnel have extensive experience in dealing with organic peroxides, picric acid, ethers, red fuming nitric acid, white phosphorus, nitroglycerin, methyl bromide, chloropicrin, and military ordnance.



Sludge removal following lagoon treatment

**Groundwater
Recovery and Treatment**

**On-Site Treatment
Equipment**

Facilities Decontamination

**Hazardous Waste
Site Cleanup**

Biological Treatment

**Technical Advisory
Services**

Laboratory Services

**Management of
Underground
Storage Tanks**

Emergency Response

**Surface Impoundment
Restoration**

**Explosives/Reactives
Handling**

**Response centers
throughout North
America**

**24-hour number:
419-423-3526**



THE ENVIRONMENTAL SERVICES COMPANY