

RCRA Consulting Services
for Hazardous Waste
Management Facilities

Ground Water Monitoring
Ground Water Protection
Closure and Post-Closure Plans

CCR 000040588

Dames & Moore





Protecting the Earth's Water Cycle from Hazardous Waste Contaminants

Controlling contaminants at hazardous waste disposal facilities is a critical issue facing industry. The ultimate goal is to protect public health and the environment by containing the wastes at their source and thus, prevent harmful elements in the wastes from infiltrating surface and ground water resources.

Dames & Moore, a leading earth sciences and environmental engineering consultant, is experienced in developing effective ground water monitoring networks and closure and post-closure plans for all types of hazardous waste management facilities. The firm's professional staff has extensive experience in providing consultation on how to meet the Resource Conservation and Recovery Act regulations and other federal, state and local requirements. With offices in key cities throughout the U.S., Dames & Moore provides personal, customized service at the lowest possible cost.

Ground Water Monitoring Networks

Tracing the course of ground water is the first step in preventing the transport and dispersion of contaminants. Dames & Moore's approach is to establish a ground

water monitoring network designed to accomplish three key goals:

- Detect the presence or absence of contaminants in ground water
- Determine the extent of contamination
- Develop remedial programs

Highly skilled in working with the hydro-geologic environment, the firm uses sophisticated field exploration techniques to optimize placement of ground water monitoring wells and thus, ensure accurate, representative water quality data is obtained. The firm also provides on-site technical supervision of well installation and extraction procedures to ensure that the construction materials used do not contribute to contamination. In developing remedial programs, Dames & Moore uses advanced waste management techniques to achieve regulatory compliance at a reasonable cost.

Closure and Post-Closure Plans

For inoperative hazardous waste management facilities, Dames & Moore provides comprehensive consulting services for the development of closure and post-closure plans to prevent the migration of harmful elements in the wastes into surface or ground water. The firm also develops detailed design specifications of impoundments, which will meet the regulatory criteria, and construction drawings for appropriate closures of inactive sites.

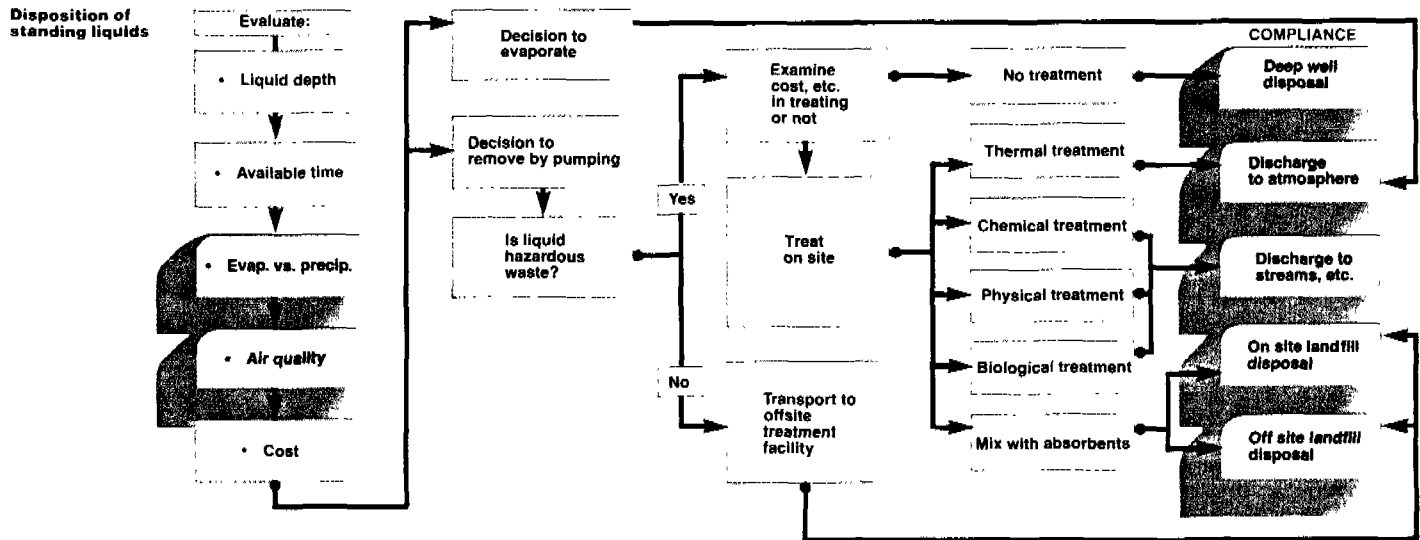
In accordance with Resource Conservation and Recovery Act regulations, Dames & Moore develops closure plans to provide for the diversion of run-on, collection of run-off and the prevention of wind erosion. Post-closure plans incorporate a ground water monitoring network for the required 30-year period of maintenance.

Dames & Moore specialists in the area of regulatory compliance investigate alternative options to achieve compliance. Sometimes the objectives of federal regulations can be met by using a less-stringent closure and post-closure plan. Dames & Moore provides consultation to help determine if an amended plan is appropriate.

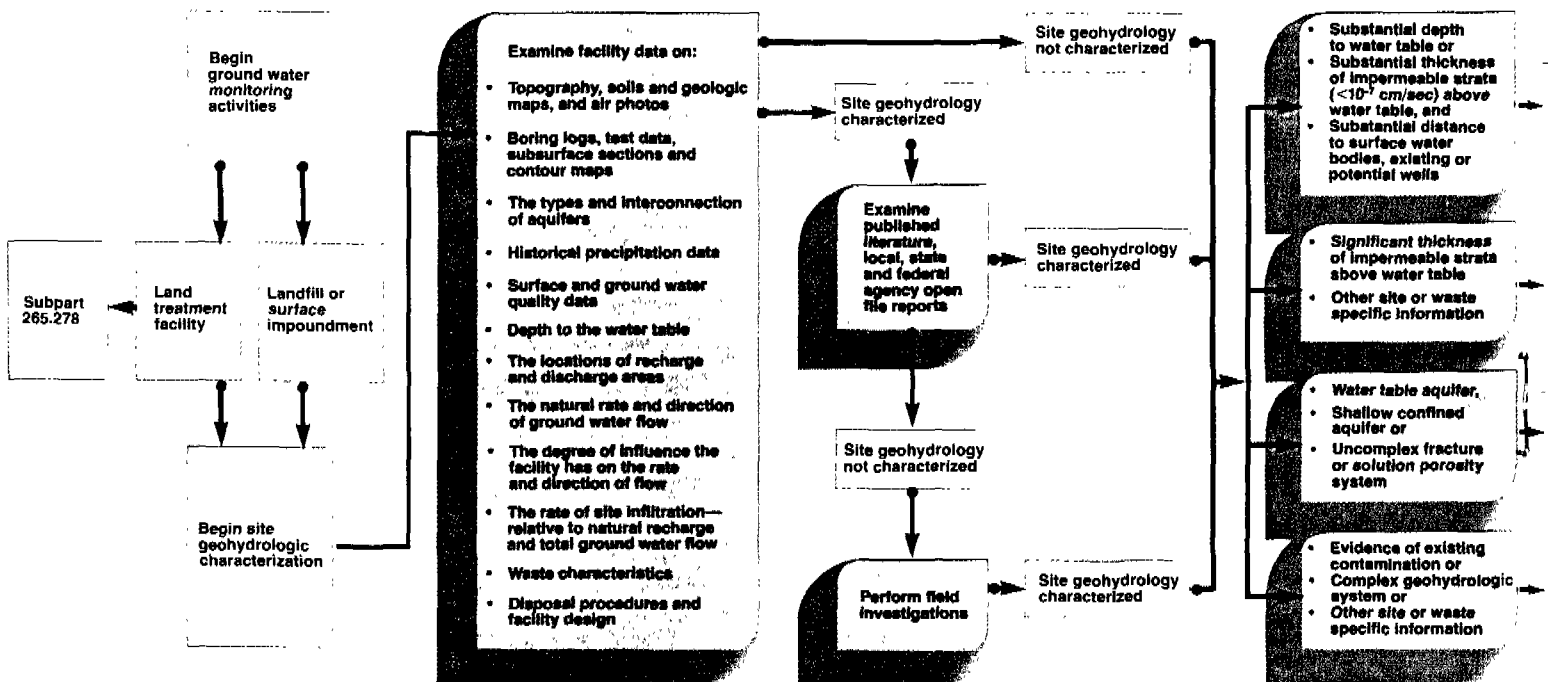


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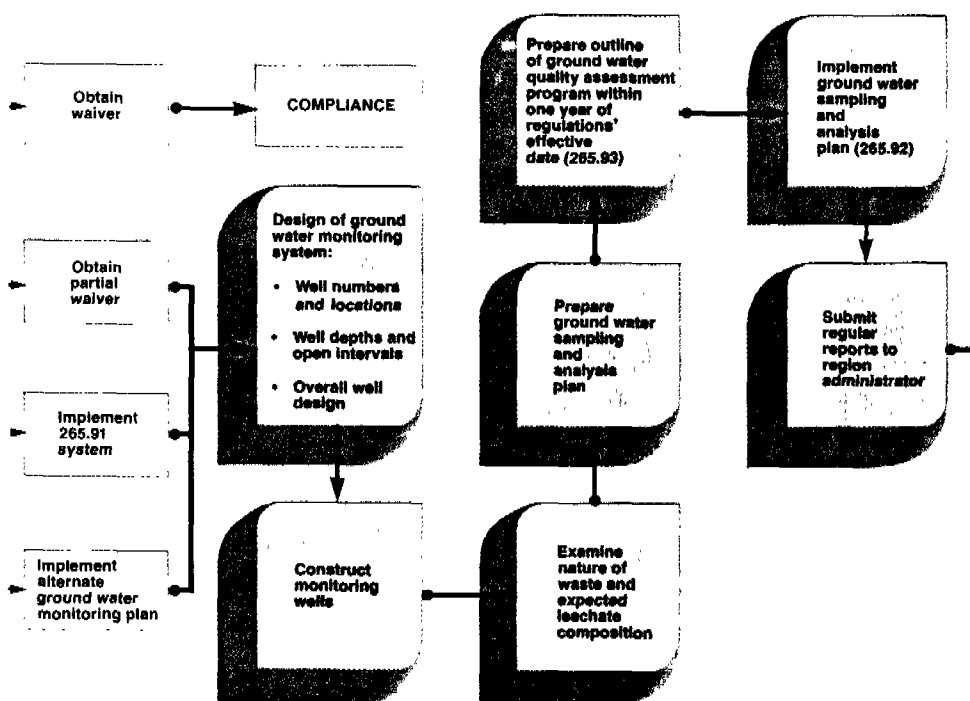
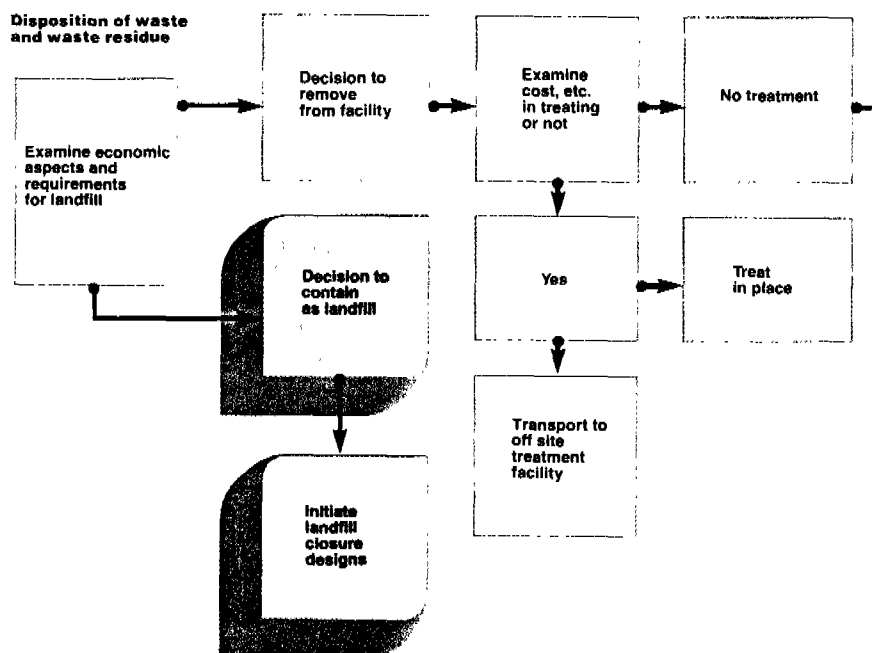
Surface Impoundment Closure



Facility Post Closure



Selected Clients— Ground Water Studies



Alyeska Pipeline Service Company
 Atlantic Richfield Company
 BASF Wyandotte Corporation
 Battelle Pacific Northwest Laboratories
 Bethlehem Steel Corp.
 Boise Cascade Corp.
 Chevron Chemical Company
 Chevron U.S.A.
 Collier Carbon and Chemical Corporation
 Consolidated Edison Co. of New York, Inc.
 Delmarva Power & Light Co.
 Department of Natural Resources,
 Commonwealth of Kentucky
 Dow Chemical Co.
 Eastman Kodak Co.
 Exxon Company, U.S.A.
 General Electric Co.
 General Motors Corp.
 Getty Refining & Marketing Co.
 International Business Machines Corp.
 Johnson & Johnson
 Kaiser Aluminum & Chemical Corp.
 Monroe Township, New Jersey
 Monsanto Company
 Spencer Kellogg
 Union Carbide Corp.
 Union Oil Co.
 U.S. Department of Energy
 U.S. Environmental Protection Agency
 U.S. Nuclear Regulatory Commission
 United States Steel Corp.
 Velsicol Chemical Corp.
 Westvaco Corporation

**Resource Conservation and
Recovery Act**

**Highlights from
Ground Water Monitoring
Part 265, Subpart F**

Introduction

Owners or operators of surface impoundments, landfills or land treatment facilities used to manage hazardous waste must implement by November 19, 1981, a ground water monitoring system capable of determining ground water quality in the uppermost aquifer underlying the hazardous waste facility (Section 1 265.90). This monitoring program must be carried out during the active life of the facility, and for disposal facilities, during the post-closure period as well.

All or part of these requirements can be waived if it can be demonstrated there is little potential for waste migration from the facility to water supply wells or to surface water. This documentation must be kept at the facility and requires certification by a qualified geologist or geotechnical engineer.

**Ground Water
Monitoring System**

The ground water monitoring system must consist of at least one monitoring well upgradient from the facility site for the purpose of obtaining background data, and at least three monitoring wells down-gradient from the facility site for the purpose of detecting significant amounts of waste migrating to the uppermost aquifer (Section 265.91).

**Sampling and
Assessment Procedures**

A ground water sampling and analysis plan must be developed, which includes procedures and techniques for sample collection, preservation, and shipment, along with analytical procedures and chain of custody control.

Testing for the various parameters indicating ground water quality and possible contamination must be carried out on a

prescribed schedule. In addition, the elevation of the ground water surface at each monitoring well must be determined at each sampling (Section 265.92).

Within one year after the effective date of the regulations (by November 19, 1981), an outline for a ground water quality assessment program must be prepared to describe methods to determine if hazardous waste constituents have entered the ground water, and if so, the rate and extent of migration and their concentration in the ground water (Section 265.93).

For each of the parameters in Section 265.92 (b) (3) (pH, specific conductance, total organic carbon, total organic halogen), the variance from initial background condition at each of the monitoring wells must be analyzed. If the results of this analysis indicate statistically significant changes in ground water quality from the background condition, the owner or operator must notify EPA within seven days. Within 15 days after the notification, a specific plan must be submitted to the Regional Administrator. The plan must include:

- The number, location, and depth of wells
- Sampling and analytical methods for those hazardous wastes in the facility
- Evaluation procedures
- Concentration of the hazardous waste in the ground water
- A schedule of implementation

The owner or operator must then implement this plan to determine the rate and extent of hazardous waste migration and its concentration in the ground water. This determination should be made as soon as possible, and a written report should be submitted to the Regional Administrator containing an assessment of the ground water quality.

If the assessment plan testing indicates no hazardous wastes have entered the ground water, then the owner or operator can reinstate the evaluation program cited in Section 265.92. If the assessment plan testing indicates that hazardous wastes from the facility have entered the ground water, the owner or operator must continue

eterminations in Section 265.93 on a quarterly basis until final closure of the facility.

Documentation

Records of the analysis required in Section 265.92 should be kept for the life of the facility and for disposal facilities, throughout the post-closure care period as well.

Concentrations or values for each of the parameters listed in Section 265.92 as well as the evaluations of these parameters should be reported to the Regional Administrator on an annual basis as part of the annual report required under Section 265.75.

If ground water is monitored to satisfy the requirements of Section 265.93, the owner or operator must keep records of the analysis throughout the active life of the facility, and for disposal facilities, throughout the post-closure care period as well. In addition, a report must be submitted annually to the Regional Administrator containing results of the ground water quality assessment program and calculated rates of migration of hazardous waste in the ground water during the reporting period (Section 265.94).

New Developments

In October 1980, EPA proposed additional rules on ground water protection which are applicable to all hazardous waste management facilities. The notice gives an outline of EPA's intended approach for preventing ground water contamination in order to protect human health and the environment.

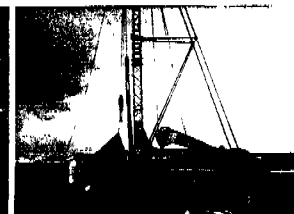
The approach EPA has chosen combines various aspects of several alternatives, including specific technical design requirements, non-degradation of ground water below established health and environmental performance standards, and non-numerical health and environmental standards. EPA intends to refine these standards over time as more information becomes available. The agency believes that this flexible approach will provide maximum protection to human health and the environment.

Dames & Moore provides a broad range of consulting services designed to help clients achieve compliance with Resource Conservation and Recovery Act (RCRA) regulations. RCRA requirements for ground water monitoring and closure and post-closure plans for hazardous waste management facilities are described in the attached brochure.

If you would like more detailed information on RCRA regulations or Dames & Moore's consulting services, we would be happy to assist you.

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The Firm

Dames & Moore provides a broad range of planning and economic, environmental, engineering and geotechnical services. Since its founding in 1938, the firm has grown to include some 1,400 employees and partners with offices in principal cities throughout the world. The firm has completed more than 44,000 projects for over 12,000 clients in over 100 countries.

The Staff

The firm's staff includes professionals trained in geohydrology, hydrology, geology and other areas of the applied earth and environmental sciences; civil and chemical engineering; and planning and economics.

Services

Site and route selection studies • Environmental baseline studies • Feasibility studies • Environmental reports • Safety analysis

reports • Advanced engineering analyses • Geotechnical and seismic risk investigations • Water quality analyses • Hazardous waste management services • Mineral resource evaluations • Slope stability analyses • Revegetation studies • Flood control studies • Construction management • Environmental and ecological monitoring programs • Meteorology and air quality analyses • Wind and wave analyses • Marine weather forecasting • Dredging plans • Undersea hazards surveys • Land use and economic planning • Fish and wildlife management programs • Acoustical surveys and impact analyses • Remote sensing and photogrammetry • Materials testing • Mathematical and physical modeling • Quality assurance/quality control • Licensing and permitting assistance • Expert testimony

For more information about Dames & Moore's RCRA-related consulting services contact:

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