

TECHNOLOGIES FOR REMEDIAL ACTION

AT

UNCONTROLLED HAZARDOUS WASTE SITES

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The Fourth National Conference on Waste Management in Canada was co-sponsored by:

- The Canadian Public Works Council (APWA)
- The City of Calgary
- Environment Canada
- Governmental Refuse Collection and Disposal Association (GRCDA): Canadian Prairie Chapter
- The National Solid Wastes Management Association
- The Province of Alberta

Conference management in Calgary and Lake Louise was provided by Bissell & Associates Ltd., Calgary, Alberta.

This publication is a collection of the available panelists' outlines prepared before the conference.

10/7/82

The first step in seeking environmental solutions is research and development to define the problem, measure its impact, and project possible remedies. Those who support the philosophy that existing construction techniques, analytical methods, and environmental action experiences of the past and present are adequate to meet the needs for a national program to remedy the problems of uncontrolled hazardous waste sites are ignoring historical fact. The costs of remedial actions along with the severity of the problem itself, have prompted the USEPA to initiate research into state-of-the-art and advanced techniques for the purpose of facilitating remedial actions efforts at hazardous waste sites. One of these efforts has been the development of the "Handbook for Remedial Actions at Uncontrolled Hazardous Waste Sites".⁽¹⁾ The Handbook explains the nature of contamination at waste disposal sites and describes some of the remedial actions that can be applied for the cleanup of each contaminated medium. Remedial actions are designed to control, contain, treat, or remove contaminants from uncontrolled hazardous waste sites. Remedial actions are divided into surface controls, groundwater controls, leachate controls, direct treatment methods, gas migration controls, techniques for contaminated water and sewer lines, and methods for contaminated sediment removal. Its availability has been noted in the publication of the National Contingency Plan in July 1982.⁽²⁾ An additional effort that was completed in January 1982 is entitled "Remedial Actions at Hazardous Waste Sites: Survey and Case Studies", EPA 430/9-81-05.⁽³⁾ Remedial measures encountered during this survey were usually confined to containment and/or removal of the hazardous wastes with a primary goal being the prevention of further contamination of the environment rather than complete cleanup. Complete environmental cleanup of groundwater or surface water generally requires sophisticated technology, additional resources, and additional time. Based on survey case studies reported in (3), the state-of-the-practice in remedial action does not look favorable when one considers that 46 percent of the time the applied remedial action was ineffective and only a portion of all uncontrolled sites have received some form of remedial action. In addition, remedial action applied at a site experiencing problems was found to be totally effective only 16 percent of the time.

It should be emphasized that the numbers presented in this section are based on assumptions by the persons performing the survey and the opinions of those interviewed.

Two case studies of remedial actions that were reported on (4) by the author include the Windham, Connecticut and the La Bounty Site in Charles City, Iowa. The conclusions from these two investigations were that a synthetic capping remedial action at Windham, under rather ideal hydrological conditions lead to an overall 94.0 percent reduction of the mass loadings between March 1979 and March 1982. In a complex hydrologic situation such as the La Bounty site, six months of post remedial action monitoring was inadequate to determine the effectiveness of a two foot clay cap.

The Solid and Hazardous Waste Research Division has several completed and ongoing efforts in the area of cost of remedial actions. The first of these is "Cost of Remedial Actions at Uncontrolled Hazardous Waste Sites."⁽⁵⁾ The objective of this study was to conceptually design cost data to provide a methodology for various remedial actions into complete scenarios of site cleanup. The second effort is "Cost Analysis and Case Studies of Remedial Responses". Up to 19 sites, where remedial action has already been completed, were being investigated to determine actual as opposed to conceptual costs of implemented remedial actions. Several other cost related projects are being pursued, but they are not advanced enough to report on at this time.

OUTLINE

I. Available Remedial Action Technologies

1. Containment technologies
 - a. Surface water control
 - b. Groundwater control
 - c. Leachate controls
2. Destruction technologies
 - a. Thermal
 - b. Biological
 - c. Chemical
 - d. Encapsulation
3. Concentration technologies
 - a. Liquids
 - b. Solids/semi-solids
 - c. Gases
4. Removal technologies
 - a. Pumping
 - b. Excavation

II. Survey Study of Remedial actions

1. Project description
2. Survey findings
3. Case study findings
4. Summary and conclusions

III. Case Studies of Remedial Actions

- 1. Windham, Connecticut site**
 - a. Situation prior to remedial action
 - b. Implementation of remedial action
 - c. Post closure monitoring
 - d. Conclusions and results
- 2. La Bounty, Charles City, Iowa Site**
 - a. Situation prior to remedial action
 - b. Implementation of remedial action
 - c. Post remedial action monitoring
 - d. Conclusions and results

IV. Cost Studies of Remedial Action Technologies

- 1. Cost of remedial actions, conceptual**
 - a. Objectives
 - b. Approach
 - c. Unit operations
 - d. Remedial action scenarios
 - e. Conclusions and recommendations
- 2. Cost Analysis and Case Studies of Remedial Responses**
 - a. Summary of cost information for selected sites
 - b. Detail unit operations of remedial action scenarios
 - c. Effectiveness of remedial actions

REFERENCES

1. United States Environmental Protection Agency, Municipal Environmental Research Laboratory. EPA 625/6-82-006.
2. Federal Register/Vol. 47, No. 137, Friday, July 16, 1982. 40 CFR Part 300 "National Oil and Hazardous Substances Contingency Plan," Pg. 31182, paragraph 300.68 (c).
3. Neeley, N.D., Gillespie, F., Schauf, and J. Walsh, 1982, "Remedial Actions at Hazardous Waste Sites: Survey and Case Studies," U.S. Environmental Protection Agency. EPA 430/9-81-05.
4. Sanning, D.E., "Surface Sealing to Minimize Leachate Generation at Uncontrolled Hazardous Waste Sites," 1981 National Conference on Management of Uncontrolled Hazardous Waste Sites.
5. Rishel, H., T. Boston, C. and Schmidt, "Costs of Remedial Response Actions at Uncontrolled Hazardous Waste Sites." Publication Pending.