



Corrective Measures Study (CMS)
Columbia Manufacturing Company (CMC) Restoration Project
Westfield, Massachusetts
Environmental Investigations and Studies



Previous Investigations

Numerous environmental investigations have been conducted at the site to address a variety of issues associated with management of solid waste and to satisfy the regulatory requirements under the United States Environmental Protection Agency (USEPA) Resource Conservation and Recovery Act (RCRA). Site investigations conducted between 1982 and 1989 primarily focused on identifying and characterizing releases from the former wastewater lagoons. Beginning in 1991, the scope of the investigations broadened to include other areas of the site where solid wastes were managed and the potential for releases to the environment were high. The following is a brief summary of the historic investigations conducted at the facility. Data obtained from these investigations was used to identify potential risks to human health and the environment and formed the basis for designing and prioritizing interim corrective measures. Significant findings associated with these investigations and studies are provided in the subsections of this report entitled [Soil Site Restoration Activities](#) and [Groundwater Site Restoration Activities](#).

Wastewater Lagoon Investigations

1. **Preliminary Investigative Report** (Water Management; February 1982)
Due to changes in both federal and state laws, CMC and MTD Products Inc. (MTD) contracted Water Management to assess alternate methods for disposal of metal hydroxide sludges generated from the plant's plating operations. Sludge from the lagoons was sampled and found to be nonhazardous via the EP Toxicity method. The Water Management report recommended closure of the lagoons, filing of a delisting application for the sludges, installation of sludge dewatering equipment, and off-site disposal of filter cake.
2. **Interim Progress Report on Remedial Investigation** (Tighe and Bond Consulting Engineers Environmental Specialist [T&B]; May 1986)
This investigation included sampling of lagoon sludge, soil, and groundwater in the vicinity of the lagoons. The work was conducted under a Consent Order issued by the MA DEQE (now Massachusetts Department of Environmental Protection [MA DEP]). Volumes of soil impacted by cyanide were developed. Volatile organic compounds (VOCs) were observed in groundwater samples collected from monitoring wells installed around the lagoons.
3. **Phase I – Limited Site Investigation** (HMM Associates, Inc.; May 1989)
From March 30 to May 5, 1989, HMM Associates, Inc., on behalf of MA DEP, performed a Preliminary Site Assessment/Phase I Limited Site Investigation to determine if the site was a disposal site and, if so, its classification as a priority or non-priority site based on the regulations at the time. No samples were collected as part of this investigation. Based on review of existing site files, the facility was found to be in compliance with applicable treatment, storage, and disposal (TSD) regulations and was classified as non-priority disposal site. However, groundwater analytical data from 16 existing monitoring wells suggested potential migration of VOCs, chromium, and cyanide toward the tobacco farms south of the facility. Characterization of the extent of affected groundwater was recommended.



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Site Investigations under RCRA

4. ***RFA Report*** (A.T. Kearney, Inc. [A.T. Kearney]; May 1989)
At the request of USEPA, A.T. Kearney conducted a Preliminary Review/Visual Site Inspection (PR/VSI) for the facility. Additional sampling was not conducted. The PR/VSI identified 46 solid waste management units (SWMUs) and one area of concern (AOC) and made recommendations for additional investigations. Three areas were identified as having a high potential for release: the former lagoons, the storage yard runoff area, and the rim room (Building 4).
5. ***USEPA Investigation*** (November 1991)
In November 1991, USEPA collected samples of groundwater, soil, and residual oil from the identified SWMUs and AOC. Sampling results confirmed the presence of cyanide, VOCs, and metals in soil in the vicinity of the former lagoons. These data were used to supplement the proposal for Phase I sampling and analysis.
6. ***RFI Revised Phase I Interim Report*** (T&B; September 1994)
The Phase I RFI included collection and analysis of surface and subsurface soil, sediment, and/or groundwater samples from 27 AOCs. Fifteen additional monitoring wells were installed to assess on-site and off-site groundwater quality conditions. The RCRA Facility Investigation (RFI) identified releases to soil and/or groundwater in the vicinity of the plating operations, the wastewater treatment operations, the former lagoons, the waste storage yard, and the former reflecting pond. Based on the results of the Phase I activities, a Phase II scope of work was proposed.
7. ***Phase I RFI Data Summary and Revised Phase II Scope of Work*** (O'Brien & Gere Engineers, Inc. [O'Brien & Gere]; December 1995)
The results of the Phase I were reviewed with USEPA in a meeting held in early 1996. Based on the outcome of that meeting, the results of the Phase I RFI were re-evaluated and a revised Phase II scope of work was proposed. Phase II activities were divided into two phases designated Phase IIA and Phase IIB.
8. ***Phase IIA Summary Report*** (O'Brien and Gere; January 1997)
Forty-one additional monitoring wells were installed as part of the Phase IIA RFI. Elevated concentrations of VOCs and metals related to facility operations were identified in various areas of the site in both groundwater and soil. Two distinct VOC groundwater plumes were identified; one on the north side and one on the south side of the site, presumed at the time to be associated with the maintenance area (Building 1) and the waste storage yard, respectively. Off-site migration of these plumes was confirmed. In addition, free phase hydrocarbon was observed in the southern portion of the site, near the fuel aboveground storage tanks (ASTs) and the rim room (Building 4).
9. ***Phase IIB Summary Report*** (O'Brien and Gere; March 1998)
Sixteen additional groundwater monitoring wells were installed and sampled as part of the Phase IIB RFI. The Phase IIB summary report concluded that the



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extent of the northern and southern VOC plumes in groundwater were characterized, and the extent of free phase hydrocarbon near the rim room and the AST farm was characterized.

Beginning in September 2001, the focus of data gathering activities shifted away from site characterization and on to site restoration. RMT Inc. (RMT), on behalf of MTD, initiated remedial investigations at the site to obtain the information necessary to begin corrective measures. Investigations conducted in September 2001 and May 2002 were used to design and refine a groundwater migration control system and a light nonaqueous-phase liquids (LNAPL) recovery system currently in place at the facility. The following is a brief summary of the investigations performed to support the remedial design (RD):

10. [Summary of Groundwater Screening Investigation and Site-wide Groundwater Monitoring](#) (RMT; December 2001)

In September 2001, a groundwater screening investigation was conducted to obtain additional information pertaining to hydrogeochemical conditions beneath the site and to refine the conceptual site hydrogeologic model. During this investigation, groundwater samples were collected from 50 existing monitoring wells. Groundwater samples were analyzed for metals, VOCs and semivolatile organic compounds (SVOCs). An additional 34 discrete-interval groundwater samples collected using direct-push techniques on the site from the northern portion of the facility and analyzed for VOCs. During this investigation, an area of LNAPL-affected groundwater was also identified. Additionally, 49 passive Emflux® soil gas probes were installed in the grassy areas on the north side of the facility, adjacent to Cycle Street. Data from this groundwater investigation was used to further define the extent of VOCs in the northern plume and aid in the design of the groundwater migration control system.

11. [Interim Corrective Measures Workplan and Design Report](#) (RMT; August 2002)

A supplemental soil and groundwater investigation was conducted in May 2002 to characterize the extent of the LNAPL found during previous investigations conducted at the site to evaluate the potential for residual VOC source material to be present in soils beneath the portions of Building 1 and the former degreasing room. Nineteen temporary well points were installed across the water table in various areas of the site to determine if petroleum-impacted soils and/or free phase product were present. Data from this investigation was used to refine the extent of LNAPL-affected soils and aided in the design of a dual-phase extraction (DPE) system. Additionally, 10 soil samples were collected at varying depths beneath different portions of Building 1 and the former vapor degreasing room. Groundwater samples were also collected at two depths within the water table aquifer to assess the vertical distribution of VOCs in these areas.

12. [2003 System Performance Report](#) (RMT; July 2004)

During August 2003, a relatively large influx of free-phase product was recovered by the DPE system. As a result, modifications were made to the system and a groundwater and soil investigation was conducted to assess the potential for a continuing source of LNAPL to exist under the Building 1. A technical memorandum summarizing the investigation findings and conclusions is contained in the above-referenced report as Appendix C. During this investigation, 18 temporary well points were installed to assess the thickness and extent of LNAPL beneath Building 1.