

SUPERFUND PRELIMINARY CLOSE-OUT REPORT
(Long Term Response Action)

ONALASKA MUNICIPAL LANDFILL SITE
LA CROSSE COUNTY, WISCONSIN

I. INTRODUCTION

This Preliminary Close-Out Report documents that all construction activity has been completed at the Onalaska Municipal Landfill Superfund site (Onalaska) in accordance with OSWER Directive 9320.2-3C. The remedy constructed at the Onalaska site includes a landfill cap, a groundwater extraction and treatment system, and an in-situ bioremediation system. In accordance with OSWER Directive 9320.2-06, construction completion for sites with long-term groundwater restoration is declared when the treatment system has been constructed and is operating according to design. For in-situ bioremediation, construction completion is declared when the treatment system has been constructed, is operating according to design, and studies show that the technology will reach cleanup goals. The Onalaska site meets these criteria for a construction completion.

II. SUMMARY OF SITE CONDITIONS

Background

The Onalaska site is located in the Township of Onalaska (Town), approximately 10 miles north of the City of La Crosse, Wisconsin. The 11-acre site, which includes a 7-acre landfill, is situated 400 feet east of the Black River, near the confluence of the Mississippi and Black Rivers. The Black River is located within the Upper Mississippi River Wildlife and Fish Refuge, a wetlands area which supports numerous migrating species of birds and is also used for hiking, fishing, hunting, and other recreational purposes by area residents and visitors.

The area surrounding the site is generally rural, although several residences are located within 500 feet to the north and to the south of the landfill. A subdivision of about 50 homes is located about 1.25 miles southeast of the site. Agricultural lands are located south of the landfill, and intermittent woods and grasslands border the site to the east.

The Onalaska site was mined as a sand and gravel quarry in the early 1960's. After quarry operations ceased in the mid-1960's, the Town began to use the site as a landfill. Once the Wisconsin Department of Natural Resources (WDNR) received authority to regulate landfills in 1969, the Town was granted a license to use the former quarry as a municipal landfill. However, for a time both municipal and chemical wastes were disposed of in the landfill. In 1978, after determining that the landfill operation did not meet State solid waste codes, the WDNR ordered the Town

to close the landfill by September 1980, at which time disposal operations ceased. A landfill cap was placed on the landfill in June 1982.

In September 1982, the WDNR sampled four landfill monitor wells and several nearby residential wells for compliance with drinking-water standards. The investigation documented that the sand and gravel aquifer beneath the landfill serves as the primary source of drinking water for area residents and that groundwater contamination had occurred within and around the site. One residential well, located southwest of the landfill, was found to exceed the Federal drinking water standard for barium (1.0 mg/L). The well sample also contained five organic compounds at concentrations above background levels. A landfill monitor-well sample was found to be contaminated with toluene at a concentration of 14.7 mg/L, which is well above the State groundwater quality Enforcement Standard (0.343 mg/L) and the federal drinking-water (2.0 mg/L) standard. The Town replaced the contaminated residential well with a deep, uncontaminated well in January 1983.

Remedial Planning Activities

Pursuant to CERCLA, U.S. EPA inspected the Onalaska site in 1983. Subsequent to the submittal of the Site Inspection report in May 1983, the U.S. EPA placed the site on the National Priorities List (NPL) in September 1984.

U.S. EPA, in consultation with the WDNR, commenced the conduct of a Remedial Investigation and Feasibility Study (RI/FS) at Onalaska in April 1988. The final RI report was released in December 1989. The major findings include:

- The landfill has been, and continues to be, a source of groundwater contamination. A groundwater contaminant plume consisting of organic and inorganic compounds has migrated at least 800 feet from the southwestern edge of the site. The leading edge of the contaminant plume appears to discharge into nearby wetlands and the adjacent Black River.
- The upper groundwater aquifer consists primarily of sand and is approximately 135 feet thick. Local residences utilize this aquifer as a primary source of drinking water.
- The predominant organic compounds of concern include toluene, xylene, 1,1-dichloroethane (1,1-DCA), and trichloroethene (TCE), based upon concentrations and potential impacts to human health and the environment.
- Site soils located above the water table and adjacent to the southwestern edge of the landfill are contaminated with naphtha solvents derived from the landfill. The contaminated soil zone occurs from 11 feet to 15 feet below ground surface and up to 150 feet from the landfill. The

naphtha was deposited in the soils by groundwater which carries the floating hydrocarbon layer with it as it flows off-site. Natural seasonal fluctuations of the groundwater table are reflected by the 11-foot to 15-foot zone; as the water table rises and falls, the oily contaminants floating on top of the water table also rise and fall and tend to sorb onto the soil and remain behind as a continual source of groundwater contamination. Soil samples obtained from soil borings placed close to the landfill indicated that contaminant levels of up to 550 mg/kg are present.

- The original landfill cap had deteriorated and did not meet the landfill closure regulations in effect at the time the landfill closed. The cap was originally to be composed of 2 feet of compacted clay, but the RI showed that the cap is composed of sandy soils in certain portions and that it is only 1-foot thick in other portions.
- Several crushed and empty 55-gallon drums were found in the landfill during excavation of test pits. Magnetometer anomalies, as well as site records, suggested that up to 1000 drums were likely to be in the landfill. Solvent wastes were reportedly transported to the landfill in 55-gallon drums, which were either emptied for reuse, or buried if damaged or leaking. However, the RI could not ascertain whether the drums are concentrated in any one area, although it may be likely that many of the drums are in the same condition as the drums that were found in the test pits.
- The average depth to the water table and the depth of waste disposal is 15 feet. As a result, it is likely that refuse is periodically in direct contact with groundwater. Soil below the water table does not appear to be greatly affected by landfill contaminants, in that the hazardous substances found in the groundwater are soluble. Soluble contaminants would tend to remain dissolved in the groundwater rather than sorbing onto sand particles.
- Potential long-term exposure to low levels of VOCs through the use of private wells in contaminated groundwater and plausible adverse discharges of contaminants to the wetlands and Black River downgradient of the landfill were identified as the principle threats to human health and the environment.

Based on the findings of the RI, U.S. EPA completed a feasibility study (FS) that evaluated remedial alternatives to address migration of the groundwater contaminant plume. U.S. EPA completed the FS in December 1989. U.S. EPA then issued a Record of Decision (ROD) in August 1990 that called for the following actions to mitigate the areas of concern:

- Installation of a landfill cap in accordance with federal and State requirements;
- Installation of a groundwater extraction and treatment system to capture and treatment contaminants in the groundwater immediately downgradient of the landfill;
- Installation of an air injection system within the area of soils contamination to enhance the bioremediation of organic contaminants; and
- Implementation of a groundwater, surface water, and sediment monitoring program to ensure the adequacy of the cleanup.

The selected remedy establishes a containment and treatment system to eliminate the principle threat posed to human health and the environment by isolating the source of groundwater contaminants in the landfill and eliminating those in the adjacent soils, preventing the further migration of VOCs in groundwater, and by treating extracted groundwater to acceptable discharge limits.

The selected remedy established cleanup standards for groundwater based on Safe Drinking Water Act Maximum Contaminant Levels (MCLs) and Wisconsin Administrative Rule Chapter NR 140 Enforcement Standards (ESs) and Preventive Action Limits (PALs) for groundwater protection. The selected remedy established an estimated cleanup goal of 80 to 95 percent degradation of the organic compounds in the soils adjacent to the landfill.

U.S. EPA and WDNR entered into Consent Decree negotiations with the Town and other potentially responsible parties (PRPs) following the issuance of the ROD. The PRPs declined to perform the remedial action and U.S. EPA immediately began to implement the Remedial Design (RD) and Remedial Action (RA). The State of Wisconsin then entered into a Superfund State Contract which provided that the State would fund 50% of the remedial action.

Remedial Design

The RD for the landfill cap was completed in July 1992 while the RD for the groundwater extraction and treatment and the bioremediation systems was completed in September 1992.

A Wisconsin Pollution Discharge Elimination System (WPDES) "permit" was issued by the WDNR for the discharge of treated groundwater to the Black River. WDNR determined that air stripping and iron precipitation were acceptable Best Available Technology (BAT) for treatment.

A 3-month treatability study was conducted in the laboratory to determine the ability of the organic contaminants to degrade and

to attempt to determine plausible cleanup goals, optimal air injection conditions, and losses of VOCs due to air stripping or volatilization. Testing showed that:

- the RI underestimated the amounts of contamination in some of the soils by 10X (up to 11,000 mg/kg was measured)
- approximately 15% of the hydrocarbons were biodegraded during the 3-month test (under ideal conditions)
- the in-situ biodegradation rate (corrected for subsurface temperatures) is estimated at 2.5 mg/kg/day
- approximately 15% of the hydrocarbons were volatilized by the air flow
- approximately 5-6 years of air injection would be needed to reach the target cleanup goals

As a result, U.S. EPA recommended that a full-scale biotreatment system be installed, for the cost of performing a pilot study in the field would approach that of the full-scale treatment now ongoing.

Remedial Action

The landfill cap construction subcontract was awarded on March 25, 1993, and construction commenced on May 1, 1993. A multi-layer clay cap was installed over the landfill. The cap was completed in November 1993.

The groundwater and soils construction subcontract was awarded on June 11, 1993, and construction began on July 12, 1993. Five groundwater extraction wells were installed downgradient of the landfill and are designed to pump between 800 and 1000 gallons per minute. A treatment plant was constructed nearby, where the extracted groundwater will be subjected to aeration and pH adjustment (iron precipitation), clarification (iron removal), air stripping (VOC removal), and pH readjustment prior to discharge to the Black River. Temporary activated carbon units were placed in the treatment train prior to discharge as a back-up measure while the treatment plant components underwent a 3-month "shakedown" period. The groundwater treatment system was completed in June 1994.

Approximately 29 shallow air-injection wells were installed to bioremediate the organic compounds in the contaminated soils adjacent to the landfill. During start-up, the contractor turned the air injection system on to achieve steady-state conditions, and then off to measure oxygen uptake (respiration) rates in the wells. Results showed that biodegradation was occurring as oxygen levels began to fall rapidly. The air permeability of the

soil was measured and found to be as predicted, based on the laboratory study. Lastly, the system was balanced so that each well was injecting the proper amount of air into the soil. The biotreatment system was completed in June 1994.

A pre-final inspection was conducted by the project managers for U.S. EPA and WDNR on June 1, 1994. At that time, it was determined that the landfill cap, groundwater, and bioremediation systems were constructed as designed and that they were operational. A punch list of minor tasks (e.g., removal of construction debris) to be completed was developed and a schedule for completion of those items was given to both the landfill cap and the groundwater subcontractors by U.S. EPA's contractor.

III. DEMONSTRATION OF QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) FOR CLEAN-UP ACTIVITIES

Remedial design and remedial action construction management activities at the site were conducted by U.S. EPA's design contractor through the ARCS contracting program. The components of the remedial action were constructed by subcontractors and sub-subcontractors to U.S. EPA's contractor. All design plans and field activities were reviewed and approved by U.S. EPA, in consultation with WDNR, to ensure consistency with the ROD, the RD and RA work plans, and federal and State requirements.

The design and construction QA/QC program utilized throughout the RD/RA was in accordance with U.S. EPA protocols. Details of the analytical procedures used to ensure the quality of the work are contained in the approved Quality Assurance Project Plan (QAPP) for the pre-design studies and for construction of the landfill cap and the groundwater extraction and treatment and bioremediation systems (Construction Quality Assurance Plan (CQAP)). The construction QA/QC program utilized has been sufficient to allow U.S. EPA to make the determination that all reported materials specifications are adequate and construction methods used allowed remedy construction to be satisfactorily performed in accordance with the ROD.

The remaining groundwater, surface water, and sediment monitoring activities during the conduct of the Long Term Response Action (LTRA) and Operation and Maintenance (O&M) phases will be performed in accordance with an approved QAPP. The laboratories used for the analysis of groundwater quality will either have been approved by U.S. EPA or will be audited by U.S. EPA's (Region 5) Environmental Sciences Division to ensure that proper analytical protocols shall be employed.

IV. MONITORING PROGRAM

A monitoring program has been established for the LTRA and O&M phases of the cleanup. Groundwater, surface water and sediments,

and soils will be monitored on a periodic basis.

Quarterly groundwater monitoring will be performed to ensure that hydraulic capture of the plume is occurring and that chemical levels in the groundwater are decreasing. Analyses to be performed will include the chemicals of concern listed in the ROD and those parameters required under the WPDES discharge "permit" issued by WDNR. At a later date the monitoring will be performed semi-annually and then annually as necessary. U.S. EPA, in consultation with WDNR, will certify completion of groundwater remediation activities once it has been determined that clean-up levels have been attained and maintained for all chemicals of concern listed in the ROD.

Surface water and sediments will be monitored by WDNR to ensure that neither the groundwater contaminant plume or the treated water that is discharged to the Black River have an adverse impact on aquatic environments.

Both soil gas and soils will be sampled periodically to ensure that bioremediation of the organic compounds in the sandy soils is occurring. U.S. EPA, in consultation with WDNR, will certify completion of soil remediation activity once it is demonstrated that the bioremediation system no longer contributes to the cleanup of the contaminated soils.

V. ACTIVITIES AND SCHEDULE FOR SITE COMPLETION

As stated above, groundwater extraction, treatment, and monitoring will be required until it has been demonstrated that groundwater clean-up levels have been attained. The ROD estimated that the groundwater extraction and treatment system would need to operate for between 5 and 30 years to achieve required cleanup levels. However, after 5 years of operation, and thereafter in increments of 5 years, groundwater quality will be evaluated to determine if the remedial action objectives have been met. If, after the groundwater extraction and treatment system has been operating for a minimum of 5 years, it becomes apparent that it is not technically or economically feasible to achieve clean-up levels, then a (Wisconsin) alternative concentration limit (WACL) may be established for the target compounds. Except where the background concentration of a compound exceeds an ES, the WACL established may not exceed the ES for that compound. Once the standards are met, whether they are the standards set in the ROD or WACLs, the groundwater cleanup program will have been completed.

The ROD estimated that bioremediation would destroy a minimum of 80% and a maximum of 95% of the organic compounds in the soils. No estimate was given regarding time to achieve the clean-up goal. The bioremediation system will be operated until it is shown that no further biodegradation is occurring. When the

cleanup goal of 80% to 95% degradation has occurred, or when bioremediation no longer is occurring whether or not an 80% or greater degradation level was reached, the soil cleanup program will have been completed.

The landfill cap will be inspected periodically by the Town of Onalaska, under the auspices of a Consent Decree reached with U.S. EPA. The Town will also perform required maintenance.

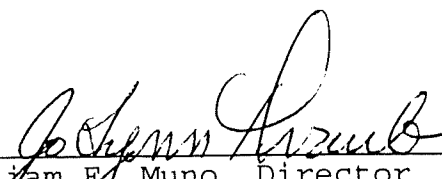
The following activities will be completed according to the schedule described below:

| <u>Task</u> | <u>Estimated Completion</u> | <u>Responsible Organization</u> |
|--|-----------------------------|---------------------------------|
| 1. Final RA Report | 12/31/94 | U.S. EPA |
| 2. Soils Clean-up Verification | 06/01/99 | U.S. EPA |
| 3. Verification of Groundwater Cleanup Levels* | 06/20/99 | U.S. EPA/WDNR |
| 4. Final Inspection/ Close-Out Report | 12/31/99** | U.S. EPA/WDNR |

Notes: * = Will occur every 5 years as needed.
** = Pending results of soil and groundwater verification efforts.

Five-Year Reviews

In accordance with Section 121 of CERCLA, a Five-Year Review will be conducted five years from the date that on-site construction of the remedial action began. Construction of the landfill cap began May 1, 1993; therefore, the first Five-Year Review will be completed on or before May 1, 1998. Subsequent Five-Year Reviews will be conducted as warranted pursuant to OSWER Directive 9355.7-02 ("Structure and Components of Five-Year Reviews") and/or other applicable requirements and guidance.



William E. Muno, Director
Waste Management Division

7/29/94
Date