

**FINAL SITE CLOSE OUT REPORT**  
**MINOT LANDFILL SUPERFUND SITE**  
**Ward County, North Dakota**

**I. INTRODUCTION**

This Final Close Out Report documents that construction activities have been completed as required by the U.S. EPA at the Old Minot Landfill Superfund Site in accordance with *Close Out Procedures for National Priorities List Sites* (OSWER Directive 9320.2-09). (Note that the Site is known locally as the "Old Minot Landfill" and the newer currently used municipal landfill is called "Minot Landfill"). EPA and the North Dakota Department of Health (NDDH) conducted a preliminary final inspection on August 27, 1996. NDDH conducted the final inspection on September 18, 1996. EPA and NDDH concluded that the remedial action has been successfully implemented.

**II. SUMMARY OF SITE CONDITIONS**

**A. Background**

The Old Minot Landfill Site is a closed waste disposal facility located in Section 27, Township 155 North, Range 83 West, approximately one mile southwest of downtown Minot in Ward County, North Dakota. The Site is situated approximately 2000 feet south of the Souris River and is located to the east of the intersection of the Burdick Expressway and the combined U.S. Highways 2 and 52 Bypass. The area that received municipal and industrial waste covers 26.4 acres. Land use in the vicinity of the Site is light industrial and residential, with areas southwest of the Site used for agriculture.

The Site was used to dispose of municipal and industrial waste between 1961 and 1971. The Landfill was operated by the City of Minot. An estimated 75 tons/day of waste was placed in the landfill during its operation. The exact composition of the wastes disposed is not known. Discussions with past Landfill operators indicate that refuse was received from the City of Minot, other neighboring towns, farms, industries, and military sites. In addition, the Landfill likely contains arsenic-contaminated soil and residues, and solvents used in a variety of local industrial applications.

**Chemicals of Concern:** Benzene and Compounds - benzene, toluene. Halogenated Aliphatics - bromomethane, bromodichloromethane, t-1,2-dichloroethene, methylene chloride, tetrachloroethene, vinyl chloride. Inorganics - arsenic, barium, chromium, copper, cobalt, lead, nickel, vanadium, zinc. Phenol and Compounds - benzoic acid, bis(2-ethylhexyl)phthalate,

butylbenzylphthalate, di-n-butylphthalate, diethylphthalate, di-n-octylphthalate, 4-methylphenol, phenol. Polycyclic Aromatic Hydrocarbons - benz{a}anthracene, benzo{a}pyrene, ideno{1,2,3-cd}pyrene, 2-methylnaphthalene, naphthalene, phenanthrene. Solvents - Acetone. Others - aroclor 1254.

The Site was placed on the National Priorities List (NPL) in March 1989.

## **B. Early Actions Performed**

In 1989, a Removal Action was initiated by the City of Minot. The Removal Action consisted of the installation of a perimeter fence around the Landfill, construction of surface runoff/erosion control (including swales and storm sewer piping), and seeding of areas disturbed by construction and exposed slopes on the hills located along the southern edge of the Site. In 1990, additional work to repair drainage ditches and swales was performed to complete the Removal Action.

A Baseline Risk Assessment (BRA) was completed in 1992 to evaluate human health risks in the absence of any remedial action. The chemicals of concern were utilized in the BRA. Contaminated media that were quantitatively evaluated in the risk assessment were: groundwater (including leachate), surface water, soil, sediment, and landfill gases. Potentially exposed receptors who were evaluated in the BRA were adult residents and occupational workers who live or work at or in the vicinity of the Site plus active children between 3 and 12 years who live or play within the vicinity of the Site.

In summary, the evaluation performed in the BRA was based on a hypothetical exposure of both adults and children to groundwater, surface water, surface soil, sediment, and landfill gases. Under this scenario, the probability for an adult to develop cancer above the national average is about 1 in a 100. For a child, the excess cancer risk from landfill gases would be 1 in 5000.

Sampling and field studies were conducted by the City of Minot in order to characterize the contamination for the Site. The Remedial Investigation Report was completed in 1992. Once the contamination was characterized, an evaluation was made of the remedial measures that would be applicable to achieve cleanup goals. This evaluation and cleanup goals are contained in the Site Feasibility Study completed in 1992 by the City of Minot.

A geophysical survey investigation, a borrow source investigation, and aerial surveying were performed in April and May 1993. The geophysical investigation was completed to further define the horizontal and vertical extent of the wastes in the Landfill. The borrow source investigation was performed to

determine if the clay borrow area on the City of Minot property to the east of the Landfill was adequate to use for cap improvements. The aerial survey was performed to provide the topography for the Landfill after the 1989 and 1990 improvements were completed. These activities were performed by contractors for the City of Minot.

### **C. Remedial Investigation/Feasibility Study**

The Remedial Investigation (RI) report, as completed in 1992, identified and evaluated hydrogeologic conditions, primary contaminant sources, release mechanisms, migration pathways and receptors. The investigation was designed to find and evaluate the most likely flow path for the contaminants. The following conclusions were derived from the RI:

- ★ Contaminants were detected in leachate in the Landfill, in landfill gas, in soil at the location of a leachate seep and in one groundwater monitoring well located immediately adjacent to the Landfill.
- ★ Both the physical and chemical data indicate that there has been no significant migration of contaminants away from the Site within the groundwater system.
- ★ Uncontrolled release of contaminants at low levels does occur from leachate seeps and landfill gas release.
- ★ Leachate seeps and gas releases have been identified at the surface within the fill boundaries of the Landfill.
- ★ Site geologic conditions consisting of clay till and discontinuous sand lenses minimizes the potential for leachate migration to the surrounding groundwater system.
- ★ The leachate is in hydraulic contact with the groundwater flow system; therefore, measures to minimize the potential for future release and continued monitoring of groundwater should be considered in the Feasibility Study (FS).
- ★ The BRA states there is insignificant current risk to receptors. However, future risks could be outside of the EPA acceptable risk range if a remedy (land use controls at a minimum) is not implemented.
- ★ Sufficient data have been obtained to proceed with the FS.

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cleanup goals. This evaluation and the cleanup goals are contained in the Site Feasibility Study completed in 1992 by the City of Minot.

#### **D. ROD And ESD Findings**

The major components of the remedy as stated in the Record of Decision (ROD) dated June 21, 1993, include:

- ★ Institutional controls to prohibit construction on the Landfill or the use of water beneath or in the immediate vicinity of the Landfill for drinking water purposes.
- ★ Leachate extraction and treatment in the City of Minot waste water treatment facility.
- ★ Consolidation of contaminated soil in the vicinity of leachate seeps under the cap, and cap improvements to limit precipitation infiltration and control storm water runoff.
- ★ Groundwater monitoring to allow detection of future releases of contaminants to the groundwater.
- ★ Landfill gas collection using an active collection system and a tall stack for dispersion venting. EPA may modify the system design to accommodate site conditions, following installation of the leachate collection system.

The Explanation of Significant Differences (ESD) to the original ROD, dated May 2, 1996, contained the following modifications:

- ★ A passive gravity drain system will replace the proposed active leachate extraction system. The passive system will be more cost effective while achieving the same goal of managing leachate levels in the Landfill to prevent leachate seeps through the cap and to reduce the potential for leachate migration from the Landfill into the groundwater.
- ★ To clarify the cap design, the 3-foot clay cap specified in the ROD performance standard will actually be 18 inches of clay, 12 inches of root zone material, and 6 inches of topsoil.
- ★ Passive gas vents will replace the proposed active gas extraction system and tall stack. The gas vents will be more cost effective while achieving the same goal of controlling landfill gas to reduce pressures in the

Landfill that can damage the landfill cap and can increase the potential for leachate migration.

- ★ The limits of buried waste have been extended based on geophysical survey investigation information (May 1993).

#### **E. Design Criteria**

Alan Walter, Public Works Director for the City of Minot, provided the oversight of the RD/RA and managed the contract with Wenck Environmental Engineers, to prepare the RD, for the City of Minot.

Components of the Remedial Design (RD) include:

1. Institutional controls to prohibit construction on the Landfill, the use of water beneath the Landfill or in the immediate vicinity of the Landfill for drinking water purposes. The City of Minot is to pass restrictive covenants implementing the institutional controls.
2. Leachate extraction and treatment in the City of Minot's waste water treatment facility using a passive gravity drain system. Management of leachate levels in the Landfill, using this passive system, will prevent leachate seeps through the cap and reduce the potential for leachate migration from the Landfill in the groundwater.
3. Consolidation of waste and contaminated soil (both from the north end of the Landfill and in the vicinity of leachate seeps) under the cap, and cap improvements to limit precipitation infiltration and to control storm water runoff.
4. Groundwater monitoring to allow detection of future releases of contaminants to the groundwater (See Section V on Operation and Maintenance).
5. Passive landfill gas venting to control landfill gas, thereby reducing pressures in the Landfill that can damage the Landfill cap and can increase the potential for leachate migration.

#### **F. Cleanup Activities Performed**

As a result of the 1993 geophysical survey, waste was discovered outside of the existing fence along the southern boundary of the Landfill. Therefore, prior to the start of Remedial Action (RA), a one-day test pit investigation was performed in March 1996 to estimate the quantity of waste outside the existing fence in order to evaluate the protectiveness and

cost effectiveness of excavating the waste versus moving the fence. It was determined that moving the fence was the more cost-effective action while achieving the same level of protectiveness as moving the fence. In the southern area the fence was moved to enclose the waste.

The 1993 geophysical survey also indicated an area of waste on the north side of the Site, outside the fence. In July 1996, several test pits were excavated in order to verify the presence and determine the configuration of this waste. It was decided that removing the waste from the area outside the fence was the most cost-effective approach, while achieving the same level of protection as moving the fence. The waste was excavated from the North End Waste Removal Area and placed in a containment area within the landfill. The final location of the permanent fence completely encompasses the final waste limits.

The RA started on June 3, 1996, with the contract awarded to Excavating, Inc. Supplementary test pits dug during the RA work also demonstrated the inadequacy of the existing cap in the southernmost area where the additional waste was found outside the fence. The total area where the original cap was found to be inadequate was larger than estimated in the ROD. The existing cap was improved so that a uniform, minimum thickness of capping material existed everywhere over the Landfill. The full minimum layer of the designed cap consisted of, from bottom to top: 18 inches of clay, 12 inches of loosely placed root zone material, and a 6 inch layer of topsoil. This meets the substantive requirement of the North Dakota Solid Waste Management Act to prevent direct contact with Landfill contents.

The existing silt fence around catch basins was replaced by riprap. Additionally, erosion matting was installed in the swales between catchbasins, in the perimeter ditches, and in the cap improvement area in the swale adjacent to 18th Street. Silt fences will be removed after vegetation becomes established during Operations and Maintenance (O&M) activities.

Leachate within the Landfill is being drained by gravity into a drain pipe system located approximately eight feet below the surface of the Landfill. The slope of the drain system is from the south to the north, where the leachate discharges into a sanitary sewer system. From there the sanitary sewer system carries the leachate it to the City of Minot waste water treatment facility where it is ultimately treated. Riser pipes extending upward from the leachate drain serve as passive gas vents and clean-outs. Removable wind turbines, installed at the top of each of the riser pipes, help remove the gas from the Landfill by inducing a vacuum.

Seven groundwater monitoring wells and four piezometers have been constructed around the perimeter of the Landfill. Thirteen

wells that were no longer needed were abandoned in accordance with NDDH regulations. Leachate in the wells during abandonment was disposed into the municipal sanitary sewer system.

At the pre-final inspection on August 27, 1996, the City of Minot, NDDH and EPA agreed that adequate vegetative areas eliminated the need for additional topsoil placement. However, due to the random nature of these areas, it was also agreed that the entire Site would be seeded and fertilized in order to ensure that the entire Landfill surface would be adequately vegetated. By the time of the final inspection on September 18, 1996, this work was completed.

The City of Minot has implemented institutional controls. These controls are local land use ordinances which restrict activities that could damage the the clay and soil cap placed over the Landfill and that prohibit installation of ground-water supply wells within or in the immediate vicinity of the Landfill. The institutional controls were adopted by the Minot City Council on November 4, 1996 and will remain in place for at least the next 30 years.

**Chronology For Major Elements  
of Remedial Action Construction  
1996 Date(s)**

Mobilization - June 27, July 3, July 8

Fence Removal/Replacement - July 1-16, August 9

Well Abandonment - July 11-15

Clearing and Grubbing - July 9-11, August 28-30,  
September 11

Perimeter Ditch Construction - July 9-11, September 6-8

Containment Area Berms - July 11, July 16-22,  
August 23-26

North Area Overburden Soil Excavation and Municipal  
Solid Waste (MSW) Removal - July 16-18, July 23-25,  
July 29-August 12

North Area Storm Sewer Removal and Replacement -  
July 23-25, July 29-August 3

North Area Backfill - August 1-2, August 8-15,  
August 23-26

Leachate Pipe Outside Final Waste Limits - July 8-9,  
July 17, August 13-14

Leachate Drain/Gas Vents Inside Final Waste Limit -  
July 22, August 14-23

MSW Removal East of 18th Street - August 24-26

Contaminated Surface Soil Removals - August 23

Silt Fence Installation - July 10, September 13

Contaminated Soil and Waste Handling at Containment  
Area - July 11-12, July 23-25, July 29-August 12,  
August 23-28

Cap Improvements, Including Compost -  
August 24-September 12, September 25

Corrugated Metal Pipe and Riprap - September 12-14

North Landfill Catch Basin/Manhole Repair -  
August 28-30

Topsoil/Mulch/Compost/Seed/Fertilizer - September 6-12,  
September 13-15, September 25

Wenck Test Pit/Hand Auger Investigation - July 12-19,  
August 23, August 29

Equipment Decontamination and Demobilization -  
August 29, September 16, September 25

Monitoring, Operations, and Contingency Plan (MOCP), Old  
Minot Landfill Superfund Site, See Section IV - October

Implementation of Institutional Controls, Minot City  
Ordinance 3406 - November 4

Final Remedial Action Completion Report (RACR) - November 8

#### **G. Community Involvement Activities Performed**

EPA produced a fact sheet on the site in October 1989. The City of Minot held a public meeting on the Landfill in January 1990.

An EPA community involvement coordinator conducted interviews of Minot citizens during the week of September 25, 1990. EPA completed a Community Relations Plan for the Old Minot Landfill in November 1991. A mailing list of key contacts was developed.



EPA established an information repository at the Minot Public Library and placed a public notice announcing the repository's creation and location in the *Minot Daily News*.

A public notice was placed in the *Minot Daily News* announcing the availability of the RI/FS Work Plan. An information update concerning human health risks at the Site was placed in the *Minot Daily News* on July 17, 1992.

EPA issued a Proposed Plan for Site cleanup in December 1992, and placed a public notice announcing the availability of the Proposed Plan, the initiation of the public comment period and the date of a Public Hearing on the Proposed Plan in the *Minot Daily News*. EPA held a public comment period on the Proposed Plan from January 4, 1993 to March 4, 1993, and EPA conducted the public hearing on January 19, 1993 at the Minot City Hall.

The Record of Decision (ROD) was signed on June 21, 1993. A public notice announcing the issuance of the ROD was placed in the *Minot Daily News*. The ROD contains a Responsiveness Summary that addresses the public comments that were received.

The Community Relations Plan was updated in November 1994.

A public notice announcing changes in the cleanup and the availability of an Explanation of Significant Differences was placed in the *Minot Daily News* on May 15 and 19, 1996.

Alan Walter, Public Works Director for the City of Minot, appeared in the news media and provided information to the public both at the beginning and completion of the RA.

### **III. DEMONSTRATION OF QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) FROM CLEANUP ACTIVITIES**

Activities at the Site were consistent with the ROD, and all work plans for design and construction of the RA were approved by EPA prior to their implementation, including the sampling and analysis work plan. The RD Report, along with the Quality Assurance Project Plan (May 1996) and Monitoring Operations and Contingency Plan (MOCOP), incorporated all EPA and State of North Dakota quality assurance and quality control (QA/QC) procedures and protocols. EPA analytical methods were used for all validation and monitoring samples during RA activities. Sampling of soil and water followed EPA protocol *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods*, as detailed in Specifications for Construction Quality Assurance/Quality Control Plan section of the Remedial Design. The RACR contains documentation of sampling results.

The QA/QC program used throughout the RA was rigorous and in conformance with EPA and State standards; therefore, EPA and the State determined that all analytical results are accurate to the degree needed to assure satisfactory execution of the RA and are consistent with the ROD, ESD, and the RD plans and specifications.

#### IV. MONITORING RESULTS

Maintenance of the Landfill is detailed in the Monitoring Operations and Contingency Plan (MOCP). The objectives of the MOCP are to: 1) describe the groundwater monitoring program required by the ROD and ESD (Monitoring Plan); 2) describe the operations of the Remedial Action and act as an operations and maintenance (O&M) manual (Operations Plan); and 3) describe additional response actions (or contingencies) that may be necessary to meet the performance standards (Contingency Plan). Inspections and maintenance work, detailed in the MOCP, are the responsibility of the City of Minot.

Seven groundwater monitoring wells and four piezometers are located around the perimeter of the Landfill. The groundwater wells will be sampled quarterly for the first year after the RA Construction Completion and annually thereafter, in accordance with the ROD. The frequency of sampling is always subject to revision according to sampling results.

As a minimum the Site will be inspected for the following:

- ★ Uncontrolled vegetative growth.
- ★ Erosion on Landfill surface.
- ★ Vandalism.
- ★ Damage by or indication of presence of rodents or burrowing animals.
- ★ Well damage or improper functioning.
- ★ Stressed vegetation.
- ★ Excessive settlement of Landfill cap.
- ★ Blocking or improper functioning of stormwater drainage structures.
- ★ Blocking or improper functioning of gas vents.
- ★ Blocking or improper functioning of leachate drain.

- ★ Leachate seepage on or around the Landfill cap including well abandonment locations within the Landfill waste boundaries.
- ★ Integrity of fence and locking gates.

Inspections are proposed to occur quarterly or after major storm events for the first two years after the completion of the RA construction. Inspections are proposed to occur annually thereafter for the remainder of the post-closure period or until such time EPA notifies the City of Minot that such inspections are no longer required. Any proposal to discontinue inspections, in whole or in part, will be submitted to the EPA and NDDH to obtain approval prior to implementation.

#### V. SUMMARY OF OPERATION AND MAINTENANCE (O&M)

Leachate within the Landfill is being drained by gravity into drain pipe located approximately eight feet below the surface of the Landfill. The drain discharges the leachate to a sanitary sewer system which carries it to the City of Minot waste water treatment facility. Riser pipes extending upward from the leachate drain serve as passive gas vents and clean-outs. Removable wind turbines, installed on the riser pipes, help remove the gas from the Landfill. The Landfill cap limits the infiltration of precipitation, and prevents direct contact with the Landfill contents including solid waste, leachate and gas.

Surface water controls includes ditches and berms along the edges of the Landfill to control stormwater runoff/runoff. Diversion berms constructed within the Landfill will reduce the potential for stormwater to erode the cap. Most of the storm water from the Landfill is routed to catch basins, from which it flows off-site via storm sewers. Pertinent locations are ripped to reduce the potential for erosion.

A six feet high security fence, with locked gates, surrounds the Landfill. Seven monitoring wells and four piezometers are located around the perimeter of the Landfill to monitor for future release of contamination above performance standards to the surficial aquifer.

#### VI. PROTECTIVENESS

This Site meets all the site completion requirements as specified in *Close Out Procedures for National Priorities List Sites* (OSWER Directive 9320.2-09). Specifically, the confirmatory sampling verifies that the Site has achieved the cleanup objectives of the ROD and ESD and that all cleanup actions have been implemented. The only remaining activities are

monitoring and O&M, which will be performed by the City of Minot. A bibliography of all reports relevant to the completion of this site under the Superfund program is attached.

#### VII. FIVE-YEAR REVIEW

Hazardous substances will remain at the Minot Landfill Site above health-based levels after completion of the remedial action. Pursuant to CERCLA § 121(c), NCP § 300.400(f) (4) (ii); OSWER Directive 9355.7-02, *Structure and Components of Five-Year Reviews*, May 23, 1991; and OSWER Directive 9355.7-02A, *Supplemental Five-Year Review Guidance*, July 26, 1994, EPA Region VIII must conduct a statutory five-year review. The Five-Year Review Report will be completed prior to the end of the third quarter of 2001 (five years after RA On-Site Construction Mobilization).



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12/2/96  
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