

**Superfund Program
Proposed Plan**

Onalaska Municipal Landfill – Onalaska, Wisconsin

**Region 5
April 2012**

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the Preferred Amended Alternative for the Groundwater Operable Unit for the Onalaska Municipal Landfill (the Site) by permanently shutting down the groundwater extraction and treatment system that was operated to remediate volatile organic compounds (VOCs) at the Site, and instead allowing Monitored Natural Attenuation (MNA) to be the sole remedy to remediate the remaining low-level VOCs in the groundwater. This Plan provides the rationale for this preference. In addition, this Plan proposes to have the Wisconsin Preventive Action Limits (PALs) groundwater cleanup goals (as established in the original Record of Decision [ROD]) changed to general compliance with the Wisconsin Administrative Code NR 140, which also considers the Enforcement Standard (ES) an applicable groundwater cleanup level for human health and welfare. This Proposed Plan is being presented by both the United States Environmental Protection Agency (EPA) and the Wisconsin Department of Natural Resources (WDNR). EPA and WDNR will select an amended remedy for the Site after reviewing and considering all information submitted during the 30-day public comment period. EPA and WDNR may modify the Preferred Amended Alternative or select another response action presented in this Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives presented in this Proposed Plan.

Dates to remember:

PUBLIC COMMENT PERIOD:
April 23, 2012 through May 23, 2012

EPA and WDNR may host a public meeting to discuss this proposed remedy change. Please contact Susan Pastor (See page 15) by Friday, April 27th to request a public meeting.

For more information, see the information repositories at the following locations:

Holmen Area Library
103 State St.
Holmen, WI

Onalaska Public Library
741 South Oak Ave.
Onalaska, WI

An administrative record file has also been placed at the Holmen Area Library and at:

U.S. EPA Records Center
Region 5 (SRC-7J)
77 W. Jackson Blvd.
Chicago, IL 60604
(312) 353-1063
Mon-Fri - 8 am to 4 pm
Call for appointment

EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan summarizes information that can be found in greater detail in the numerous reports and other documents contained in the Administrative Record file for this site. EPA and the State encourage the public to review these documents to gain a more comprehensive understanding of the Site and Superfund activities that have been conducted at the Site to date.

SITE HISTORY

The Site was mined as a sand and gravel quarry in the early 1960's, after which the Town of Onalaska began to use the former quarry as a municipal landfill. For a time, both municipal and chemical wastes were disposed of at the landfill. In 1978, the WDNR determined that the landfill operation did not meet state solid waste codes and ordered the Town to close the landfill by September 1980. After disposal operations ceased, the Town capped the landfill in June 1982. In September 1982, the WDNR sampled four landfill monitoring 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. EPA placed the Site on the National Priorities List in September 1984.

SITE CHARACTERISTICS

The 11-acre site is situated 400 feet east of the Black River, near the confluence of the Mississippi and Black Rivers. The site is adjacent to the Upper Mississippi River Wildlife and Fish Refuge, which contains a wide variety of wildlife. The area is used for fishing, hiking, and other recreational purposes, and is a known nesting area for turtles, including several threatened species.

The area surrounding the Site is generally rural, although several residences are located within 500 feet to the north and south of the landfill. Agricultural lands are located south of the landfill, and intermittent woods and grasslands border the Site to the east. A railroad line runs west-northwest approximately 200 feet north of the northern extent of the waste and north of the rail line there is a state recreational bike trail developed on the old railroad bed.

The sand and gravel aquifer beneath the landfill serves as the primary source of drinking water for area residents. One residential well, located southwest of the landfill, was found to exceed the Federal drinking water standard for barium during the remedial investigation (RI), and was replaced with a deep, uncontaminated well in 1983. Two private wells located approximately 300 to 400 feet north of the landfill currently exceed a recently promulgated State ES for manganese and state PALs for arsenic.

GEOLOGY/HYDROGEOLOGY OF SITE

The Site consists of approximately 135 to 140 feet of unconsolidated glacio-fluvial and alluvial sand and gravels that were deposited as glacial outwash in an eroded bedrock valley. The underlying bedrock is sandstone.

Groundwater depth is approximately 15 feet below ground surface (bgs) and rises to approximately 11 feet bgs during periods of natural seasonal fluctuation. In-situ testing in several site monitoring wells determined that hydraulic conductivity at the Site averages 0.039 centimeters/second (cm/sec). The hydraulic gradient is approximately 0.0006 (unitless). Average groundwater flow velocity has been estimated to range between 55 and 110 feet per year, with an estimated average of approximately 70 feet per year.

Groundwater flow direction has been found to be predominantly to the south-southwest, with springtime periods of high river stage causing flow to the south-southeast. Recent groundwater flow maps, including data from two well nests

constructed in 2006, also show the potential for occasional flow to the west-northwest during periods of low river stage.

INVESTIGATION RESULTS

Beginning in 1988, EPA, in consultation with the WDNR, conducted a Remedial Investigation (RI). The major findings of the RI included:

- The landfill is the source of groundwater contamination. A groundwater contaminant plume consisting of organic and inorganic compounds had migrated at least 800 feet from the southwestern edge of the landfill. The leading edge of the contaminant plume appeared to be discharging 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 upper 10 feet to 20 feet of the aquifer contained the highest levels of contaminants, with lower concentrations found at depths of 50 feet to 70 feet.
- The predominant organic compounds of concern included 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 were contaminated with naphtha solvents derived from the landfill. The contaminated soil zone occurred from 11 feet to 15 feet below ground surface and up to 150 feet from the landfill. Soil samples indicated that naphtha-contaminant levels of up to 550 mg/kg were present and were a continual source of groundwater contamination.
- The original landfill cap had deteriorated and did not meet the landfill closure regulations in effect at the time

the landfill closed.

- Magnetometer anomalies, as well as site records, suggested that up to 1000 55-gallon drums were likely to have been disposed of in the landfill. Although several crushed and empty drums were found in the landfill during excavation of test pits, the RI could not ascertain whether the drums are concentrated in any one area, although it may be likely that many of the drums would be 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.
- 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 down-gradient of the landfill were identified as the principal threats to human health and the environment.

REMEDIAL ACTIVITIES

Based on the findings of the RI, EPA completed a feasibility study (FS) in 1989 that evaluated remedial alternatives to address migration of the groundwater contaminant plume. EPA then issued a ROD in 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 an air injection system within the area of soils contamination to enhance the bioremediation of organic contaminants (This can be seen in Figure 1 and was located within the area designated as the non-aqueous phase

contamination plume);

- Installation of a groundwater extraction and treatment system to capture and treat VOC contaminants in the groundwater immediately down-gradient of the landfill;
- Implementation of a groundwater, surface water, and sediment monitoring program to ensure the adequacy of the cleanup;
- Institutional controls (ICs) including deed restrictions limiting surface and groundwater use at the Site and State regulations governing ground water use within 1200 feet of landfills and the development of landfills.

Operation of the soil bioremediation and groundwater extraction and treatment systems commenced in 1994. The soil bioremediation system operated until February 1997 and was discontinued in 1998, after soil gas data showed that the system no longer contributed to the cleanup. Confirmation sampling was not required, given a very large initial range of concentrations over a very small area. A priority pollutant scan in 1999 detected groundwater contaminants for which analyses had not previously been conducted, most notably trimethylbenzenes (TMBs). WDNR conducted additional investigation in 2005, identifying residual VOC soil contamination that could be acting as an on-going source of impact to the groundwater. Soil gas sampling was conducted in 2006 from selected landfill gas monitoring wells and in one "air" well from the bioremediation system. Results were compared to indoor air vapor action levels and no exceedances were noted.

It was also found that the contaminated groundwater plume was not adversely affecting the Black River wetland area. A 2001 Natural Attenuation Plan was prepared that compared state water quality criteria to PALs and ESs. The report concluded that surface water monitoring would only be necessary at some future date if contaminants were detected in wells near the river and wetland area at

concentrations approaching the State of Wisconsin Water Quality Criteria. No VOCs approaching these criteria have been detected in these wells.

The groundwater extraction and treatment system was shut down on November 26, 2001, to study the effectiveness of MNA as a more cost-effective alternative remedy for VOC-contaminated groundwater. Although a statistical MNA evaluation completed in 2008 did not recommend the adoption of MNA as an alternative remedy at that time, continued monitoring and analysis since then demonstrates stable to decreasing trends for remaining VOCs.

SCOPE AND ROLE OF THE ACTION

The Original Remedy (per the 1990 ROD) included pumping and treating the contaminated groundwater plume for various VOCs immediately down-gradient of the landfill itself. An air injection system was installed to enhance the bioremediation of the VOCs and a landfill cap was installed in accordance with federal and state requirements. The development of the Original 1990 Remedy alternative was fully described in the 1990 ROD.

This Proposed ROD Amendment involves three significant changes to the 1990 ROD. New information has been obtained during full-scale remediation activities and during extensive data collection and evaluation conducted as part of the remedial design for the Groundwater Operable Unit of the Site. The groundwater monitoring program implemented in 1995 included quarterly collection of groundwater samples from monitoring wells, extraction wells, and nearby residential wells. The various wells listed above can be found on Figure 1; monitoring wells are designated with "MW", extraction wells are designated with "EW" and any residential wells listed on the figure are indicated by the homeowners name next to the well. From 1997 to 2004, sampling was conducted semi-annually, and from 2005 to the present, sampling has continued at various frequencies, depending upon well locations and results. Groundwater monitoring results and

rationales for changes to the groundwater monitoring program are documented in annual and semi-annual reports. New groundwater monitoring data and analyses show that:

1. The 1990 ROD and a September 2000 Explanation of Significant Differences (ESD) identified State of Wisconsin PALs as the groundwater cleanup goals outside the point of standards application. However, under current implementation of Wisconsin Administrative Code NR 140, the Wisconsin ES is also considered an applicable groundwater cleanup level for human health and welfare. The range of responses when an ES is exceeded includes the collection and evaluation of data to determine whether natural attenuation can be effective to restore groundwater quality within a reasonable period of time, as demonstrated by a stable or receding groundwater plume. The point of standards application is any point within the property boundaries beyond the three-dimensional design management zone (DMZ), as well as any point of present groundwater use beyond the property boundaries. This ROD Amendment documents general compliance with NR 140 as the groundwater cleanup objective for the Site.
2. Since a November 2001 ESD allowed for the temporary shutdown of the groundwater extraction and treatment system, the post-shutdown groundwater monitoring results support the permanent shutdown of the system and designation of MNA as a final remedy for VOCs in groundwater.
3. Two private water-supply wells in close proximity to the landfill have historically shown consistent concentrations of manganese far exceeding a newly-promulgated ES. It is appropriate to designate replacement

of these water-supply wells as a remedy for inorganics in groundwater at these two private wells.

DISCUSSION ON CLEANUP GOALS

The 1990 ROD and 2000 ESD required that groundwater contamination should be remediated to meet the federal maximum contaminant levels (MCLs) beyond the waste boundary in accordance with the NCP, and the more restrictive State of Wisconsin PALs beyond the DMZ boundary. However, NR 140 establishes a two-tiered system of groundwater quality standards that are to be followed, i.e. the PAL and the ES.

NR 140 provides that the PALs are to be used as an indicator of potential groundwater contamination problems and is an applicable groundwater cleanup standard unless it is shown that compliance is not technically and economically feasible.

NR 140 provides a range of responses that may be taken or required if a PAL is exceeded. This range of responses includes 'No Action'. A PAL exemption may be granted where it is shown that compliance with PALs is not technically or economically feasible.

The ES is an applicable groundwater compliance standard for substances of health or welfare concern in the groundwater beyond the boundaries of the DMZ. In this case, the ESs are numerically equivalent to the Federal MCLs, except that 1,1-dichloroethane does not have an MCL. NR 140 provides a range of responses that may be taken or required if an ES is exceeded. This range of responses does not include 'No Action'. One of the response options requires the collection and evaluation of data to determine whether natural attenuation can be effective to restore groundwater quality within a reasonable period of time, as demonstrated by a stable or receding groundwater plume.

Under current implementation of NR 140, cases involving contaminated soil and/or groundwater are routinely closed by the WDNR

Remediation and Redevelopment Program using the ES as the basis for closure. Section NR 140.22 specifies compliance with PALs only to the extent that this compliance is technically and economically feasible. WDNR has concluded since the mid-1990s that groundwater quality compliance with PALs at contaminant discharge sites in the State is in many cases not technically or economically feasible, as is the case with this site. Achieving PALs at the Site is not technically and economically feasible because landfill waste below the water table creates anoxic conditions under which TMBs are recalcitrant at the DMZ boundary.

Both PALs and ESs apply to the Site, in order to comply with Wisconsin groundwater quality standards. As stated above, the intent of the 1990 ROD was for the groundwater beyond the DMZ boundary to meet PALs. However, achievement of PALs for TMBs at the DMZ boundary is not technically and economically feasible under observed site conditions. In addition, the ES is an applicable standard for TMBs in the groundwater at and beyond the DMZ, under general compliance with NR 140.

The 1990 ROD also identified Wisconsin Alternative Concentration Limits (WACLs) as alternative groundwater cleanup goals:

“If, during the implementation of the remedy, it becomes apparent that it is technically impracticable to achieve the Ground-water Cleanup Standards, including any WACL established as discussed above, then the U.S. EPA, in consultation with the State, may then consider the use of alternate methods of controlling the ground-water contaminant plume or source to achieve the standards. If those alternate methods are found not to attain Ground-water Cleanup Standards (including any WACL established), then a CERCLA waiver may be considered.”

WACLs may be calculated where the background concentration of a substance in a well unaffected by the facility exceeds either a PAL or an ES. Calculation of WACLs for persistently elevated inorganic concentrations

was recommended in the 2008 Five-Year Review, based on the long-held assumption that the area north of the landfill is up-gradient with respect to groundwater flow and is therefore unaffected by the facility. Recent groundwater flow maps, however, including data from two well nests constructed in 2006, show the potential for flow to the west-northwest. The potential for a component of flow to the north weakens the assumptions that the area north of the landfill is consistently up-gradient and that the area adequately represents background conditions unaffected by the facility.

DISCUSSION ON MNA OF VOCS

A January 1990 federal EPA report entitled, “*Evaluation of Ground Water Extraction Remedies*” states:

“Limitations on the effectiveness of groundwater extraction generally occur in the source areas where contaminant concentrations in the saturated soil are high and/or non-aqueous phase liquids are present. In those areas where concentrations remain above cleanup goals and extraction has reached a point of limited effectiveness, enhancement methods such as biodegradation may be considered. Finally, containment and institutional controls should be implemented over those portions of the ground water that remain above levels that reflect the beneficial uses of the ground water.”

In the case of this site, non-aqueous phase naphtha solvents were observed floating on the water table in the area southwest of the landfill during the RI. The soil bioremediation system operated in that area until February 1997 and was discontinued in 1998, after soil gas data showed that the system no longer contributed to the cleanup. Those areas where concentrations now remain above cleanup goals are limited to recalcitrant TMBs in source areas near where non-aqueous phase naphtha liquids were observed. Figure 1 depicts these areas by the dashed line which outlines the “estimated extent of nonaqueous phase contamination. It is therefore apparent that the original pump-and-treat remedy, together with soil bioremediation,

has already achieved applicable groundwater cleanup standards for those chemicals of concern (COCs) which are amenable to such treatment under the reduction/oxidation (redox) conditions observed at the Site.

In November 2001, EPA issued a second ESD, based on results from Long-Term Remedial Action monitoring results which showed significantly reduced levels of contaminants and limited exposure pathways. The ESD allowed for the temporary shutdown of the groundwater extraction and treatment system, in order to evaluate the effectiveness of MNA as a more cost-effective remedy and to verify that the VOC plume would not expand. After six years of MNA monitoring, a statistical evaluation was completed in June 2008, which analyzed long-term groundwater monitoring data and assessed the effectiveness of MNA as a containment remedy at the Site. The results of the evaluation were discussed in a report entitled, *Evaluation of Monitored Natural Attenuation as a Containment Remedy for the Onalaska Municipal Landfill Site, Onalaska, Wisconsin (MNA Evaluation)*. The MNA Evaluation did not recommend MNA as a remedy at that time due to increasing concentrations of TMBs and naphthalene, as determined by EPA staff using an in-house statistical analysis software program.

Since the MNA Evaluation, three additional years of semi-annual groundwater monitoring have been conducted. Analysis of data followed EPA's 1999 MNA guidance, "*Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action and Underground Storage Tank Sites*" and followed the three-tiered approach to evaluate MNA as a remedy option at the Site. Generalizing, the three lines of evidence are 1) data showing a decreasing trend of contamination, 2) geologic and hydrogeologic data to demonstrate that indirect natural attenuation processes will reduce contaminants, and 3) data from field studies which directly demonstrate natural attenuation process are occurring. WDNR, in consultation with EPA, evaluated all three lines of evidence and determined that evidence is adequate to show

that MNA effectively works at the Site, as described below.

Support for First Tier -- The trend of decreasing contaminant mass and decreasing concentrations of contaminants over time at the Site are consistent with what would be expected due to natural attenuation processes. TMBs are now the only VOCs which persist above the ES, and overall TMB trends now appear stable to slightly decreasing (Figure 2). Although some concentrations of TMBs spike well above the ES on a seasonal basis, this appears to be due to river stages and only occurs in near-source wells at or within the boundaries of the DMZ in the area of non-aqueous phase contamination identified during the RI. Despite these seasonal spikes in near-source wells, overall TMB trends are stable and attenuate within short distances, as evidenced by concentrations below the PAL, and most below the detection limit, in all wells beyond the DMZ. According to calculations of mass flux through this area, as compared to estimates of total mass present, mass in the source area is degrading at a rate such that concentrations of TMBs at its down-gradient boundary should reach the ES within approximately 54 years.

TMB concentrations beyond the DMZ appear to attenuate to below the ES within a short distance from the DMZ boundary, based on concentrations below the PAL, and most below the detection limit, in all wells beyond the DMZ. Naphthalene concentrations in all site wells also appear stable at levels well below the ES (Figure 3). Of eight VOCs identified in the ROD as contaminants of concern (COCs), none have exceeded NR 140 ESs in any site wells since April 2004.

Support for Second and Third Tier -- Geologic and hydrogeologic data on redox parameters collected from the existing monitoring well network are influenced by the highly reducing conditions associated with the landfill. Consequently, the data are insufficient to demonstrate that indirect natural attenuation processes will reduce contaminants. However, field data directly demonstrates that natural

attenuation processes are likely occurring. The 2008 MNA Evaluation compared site data to major ion concentrations indicative of redox conditions elsewhere in the sand and gravel aquifer of the Black River watershed. The report states,

“Collectively, these data are consistent with a scenario in which all of the monitoring wells at the Site, with the exception of MW-1S, MW-1SR, and MW-1M, are influenced by the reducing redox conditions typically observed down-gradient of landfills. . . Both (TMBs and naphthalene) are more recalcitrant under reducing conditions, although their degradation under nitrate-reducing and sulfate-reducing conditions has been demonstrated. In fact, stability of the TMBs under reducing conditions is sufficient that they have been used as conservative tracers for other more degradable petroleum compounds.”

Despite the recalcitrant nature of TMBs and naphthalene under observed redox conditions, TMBs are now the only VOCs that persist above the ES, and overall TMB trends are either stable or slightly declining. As shown by groundwater monitoring conducted subsequent to the MNA Evaluation, the current monitoring well network is adequate to conclude that the entire VOC plume is stable or receding. Average groundwater flow velocity beneath the Site was estimated during the RI to range between 55 and 110 feet per year, with an estimated average of 70 feet per year. Down-gradient monitoring well nests MW-6 and MW-8 are well within 550 feet of respective up-gradient source areas, representing a distance over which contaminants at even the slowest rate of flow would be expected to travel in the ten years since cessation of groundwater extraction. Yet, no PAL exceedances for any VOCs (including TMBs and naphthalene) have been measured in either well nest since 2005.

It should also be noted that selected monitoring wells and private wells are routinely sampled for the full scan of VOCs. None of the breakdown products from total VOCs (e.g. benzene, cis-DCE) have been detected outside of

the DMZ in several years. This supports the conclusion that MNA is effectively occurring at the Site and that the VOC plume is completely degrading.

DISCUSSION OF PRIVATE WELLS

Based on analysis of long-term groundwater monitoring results, reducing conditions beneath the landfill appear to exacerbate the solubility and persistence of inorganic contamination in groundwater at the Site, as would be expected under the observed redox conditions. Barium exceeds PALs in many site wells and exceeds the ES in one mid-depth well beyond the boundary of the DMZ (MW-6M). Iron and manganese continue to exceed PALs and/or ESs in nearly all site wells, including private water-supply wells. Iron is a substance of public welfare concern, and although found at concentrations above the ES, it poses minimal health risks. However, recent changes to state groundwater standards for manganese indicate the need for replacement of two private water-supply wells in close proximity to the landfill. In January 2011, a number of changes were made to NR 140. One of these changes was the adoption of a new public health ES for manganese, which had previously been considered a public welfare parameter. This newly promulgated standard represents a new Applicable or Relevant and Appropriate Requirement (ARAR) that must be met. Wisconsin's new ES for manganese is 300 parts per billion (ppb), and the PAL is now 60 ppb. This ES has long been far exceeded in many site monitoring wells, as well as two private wells in the area of the waste mass. Sampling conducted since September 2004 shows elevated manganese concentrations in these two private wells above the current standard.

With respect to inorganics in groundwater, this proposed ROD Amendment addresses only the two private water-supply wells that exceed the health-based ES for manganese. Otherwise, metals contamination in groundwater is not addressed by this proposed ROD Amendment and will be addressed through additional

investigatory work and, if needed, in a future decision document.

Based on the information summarized above and included in the Administrative Record file for the Site, groundwater data continues to support permanent shutdown of the groundwater extraction and treatment system. The designation of MNA as a final remedy for VOCs in groundwater, together with replacement of two private water supply wells for persistent inorganics, will be comparably protective or more protective, be completed faster, reduce risks sooner, and be more cost effective than resumption of groundwater extraction and treatment under the original 1990 ROD Remedy.

CONTINGENCIES

One or more of the following observations could lead to reconsideration of the amended remedy described in this proposed plan, if confirmed by four or more rounds of sampling: (1) contaminant concentrations in groundwater show increasing trends, indicating that other sources may be present; or (2) the contaminant plume increases significantly in areal or vertical extent and/or volume.

If significant and unforeseeable changes in the pattern and distribution of VOCs occur during the implementation of this Amended Remedy which result in further ES exceedances outside the boundaries of the DMZ, WDNR and/or EPA may collect additional soil data in the area of naphtha solvent disposal southwest of the landfill (near well nest MW-16) to determine whether there is soil outside the delineated waste boundaries that may be acting as an on-going source of contamination to groundwater. If a source area in soil is found to exist, it will be evaluated for possible further remediation. Monitoring wells MW-6S, MW-6M, MW-8S, and MW-8M will be considered key sentinel wells for purposes of detecting plume expansion.

INSTITUTIONAL CONTROLS

Institutional controls are a component of the remedy called for in the 1990 ROD, which

implemented portions of the remedy for the Landfill Operable Unit. A Declaration of Restriction on Use of Real Property has been recorded at the office of the La Crosse County Register of Deeds, and it applies to three parcels west, south, and east of the landfill property. The Restriction prohibits use of groundwater underlying the three parcels, any activity that may interfere with the remedy, any construction not approved by EPA, and any residential use of the properties. As a requirement of this proposed ROD Amendment, a long-term IC document will also be recorded, declaring similar restrictions on the landfill property itself, which were required by a 1996 Partial Consent Decree with the Town of Onalaska. In addition, Wisconsin Administrative Code NR 506 regulates the development of landfills, and NR 812 prohibits construction of a water supply well within 1200 feet of the nearest area of waste disposal, although variances to this prohibition can be issued by WDNR.

PRINCIPAL THREAT WASTES

EPA defines principal threat wastes as those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. Wastes considered principal threats include the following:

- *Liquid source material* - waste contained in drums, lagoons or tanks, free product in the subsurface (i.e., non-aqueous phase liquids) containing contaminants of concern (generally excluding ground water).
- *Mobile source material* - surface soil or subsurface soil containing high concentrations of chemicals of concern that are (or potentially are) mobile due to wind entrainment, volatilization (e.g., VOCs), surface runoff, or subsurface transport.
- *Highly-toxic source material* - buried drummed non-liquid wastes, buried tanks containing non-liquid wastes, or

soils containing significant concentrations of highly toxic materials.

The remedial activities carried out under the requirements of the 1990 ROD eliminated any principal threats related to organic contaminants at the Site. What remains are residual VOCs, namely TMBs, which will eventually naturally attenuate to below state and federal standards within a reasonable amount of time. The inorganic contaminants remaining at the Site are not considered principal threat wastes.

REMEDIAL ACTION OBJECTIVES

EPA Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites and the NCP define Remedial Action Objectives (RAOs) as medium-specific or site-specific goals for protecting human health and the environment that are established on the basis of the nature and extent of the contamination, the resources that are currently and potentially threatened, and the potential for human and environmental exposure.

The ultimate RAO for the groundwater portion of this remedial action, and specifically for VOCs, is to restore contaminated groundwater to its beneficial uses. Based on information obtained during the RI and a careful analysis of all remedial alternatives, WDNR and EPA believe that the Amended Remedy will achieve compliance with NR 140 within a reasonable period of time, while protecting the continuing beneficial use of the deeper portion of the aquifer as a source of drinking water. As stated above, calculations of mass flux through the source area, as compared to estimates of total mass present, show that concentrations of TMBs in the source area should reach the ES within approximately 54 years. Note that this estimate pertains only to VOCs in the groundwater and does not pertain to the inorganics remaining on site; as noted above, metals in groundwater will be evaluated separately and addressed, if necessary, in a future decision document.

Because the highest levels of contaminants are limited to the upper 50 to 70 feet of this

aquifer, the historical and current use of the aquifer as a source of drinking water from deep wells can continue, provided that nearby private water-supply wells are optimally placed and regularly monitored. Cleanup levels for each groundwater COC are specified in NR 140, and the need for water from this aquifer for use as a source of drinking water is currently met by the Proposed Amended Remedy.

SUMMARY OF REMEDIAL ALTERNATIVES EVALUATION

Remedial alternatives are evaluated based on the nine criteria set forth in the NCP, 40 CFR § 300.430(e)(9)(iii). A remedial alternative is first judged in terms of the threshold criteria of protecting human health and the environment and complying with ARARs (Applicable or Relevant and Appropriate Requirements). If a proposed remedy meets these two threshold criteria, the remedial alternative is then evaluated under the balancing and modifying criteria, to arrive at a final recommended alternative.

The two alternatives being evaluated are (1) reactivating the original pump and treat system for the VOC-contaminated groundwater or (2) permanently shutting down the pump and treat system and allowing natural processes to reduce the VOC contamination in groundwater. Also being evaluated along with the two groundwater alternatives is the replacement of the two residential wells that have exceedances of the manganese ES by installing new drinking water wells deeper into the aquifer, since the inorganic contamination is found within the shallow groundwater. As noted earlier, inorganic contamination in groundwater is otherwise not being addressed as part of this proposed remedy change but will be addressed in a future decision document if necessary.

1. Overall Protection of Human Health and the Environment: Protectiveness is the primary requirement that remedial actions must meet under CERCLA. A remedy is protective if it adequately eliminates, reduces, or controls current and potential risks posed by the Site

through each exposure pathway. The assessment with respect to this criterion describes how the alternative achieves and maintains protection of human health and the environment.

The proposed amended alternative and the original alternative are both protective of human health and the environment, considering the compilation and analysis of groundwater monitoring data documented in annual and semi-annual groundwater monitoring reports, and including the data collected subsequent to the MNA Evaluation. No adverse effects to the water supply are anticipated. As stated above, the amended alternative includes groundwater quality monitoring, private well replacement, and contingencies through which additional remedies could be implemented, if water quality should deteriorate.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs): *Compliance with ARARs is one of the statutory requirements of remedy selection. ARARs are cleanup standards, standards of control, and other substantive environmental statutes or regulations that are either "applicable" or "relevant and appropriate" to the CERCLA cleanup action (42 United States Code 9621(d)(2)). Applicable requirements address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site. Relevant and appropriate requirements are those that while not applicable, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to environmental or technical factors at a particular site.*

The proposed amended alternative ensures compliance with NR 140 as the applicable Wisconsin groundwater quality ES. As did the original remedy, the amended alternative continues to include long-term monitoring to detect changes in site groundwater quality. With both alternatives, ARAR NR 140 would require additional action if results of the long-term

monitoring demonstrated further NR 140 ES exceedances outside the boundaries of the DMZ.

3. Long-term Effectiveness and Permanence: *This criterion reflects CERCLA's emphasis on implementing remedies that will ensure protection of human health and the environment in the long term. The assessment of alternatives with respect to this criterion evaluates the residual risks at a site after completing a remedial action or enacting a no-action alternative and includes evaluation of the adequacy and reliability of controls.*

A significant residual risk does not exist with either the proposed amended alternative or the original alternative. The amended alternative involves no residual risk at present, and it is unlikely that it will involve residual risk in the future, given the source control measures already instituted at the Site and the additional water quality and hydrogeologic data collected since shutdown of the remedial systems. If significant and unforeseeable changes in the pattern and distribution of contaminants occur, these would be detected by the long-term monitoring program, and appropriate actions, as stated in the contingency plan component of the amended alternative, could be taken.

4. Reduction of Toxicity, Mobility, or Volume (TMV) of Contaminants through Treatment: *This criterion addresses the statutory preference for remedies that employ treatment as a principal element. The assessment with respect to this criterion evaluates the anticipated performance of the specific treatment technologies an alternative may employ and is specific to evaluating how treatment reduces TMV.*

Long-term groundwater monitoring data has shown that a significant reduction in toxicity, mobility, and volume through treatment has already been achieved via operation of the groundwater extraction and treatment system under the original remedy. The proposed amended remedy does not employ treatment. However, additional reductions of VOCs via natural attenuation processes have been

observed since shutdown of the system and are expected to continue under the proposed amended alternative.

5. Short-term Effectiveness: This criterion addresses short-term impacts of the alternatives. The assessment with respect to this criterion examines the effectiveness of alternatives in protecting human health and the environment during the construction and implementation of a remedy until the response objectives have been met.

Resuming operation of the treatment system under the original remedy would pose some minimal short-term risk to workers during implementation, as the system has not been in operation since 2001 and a significant amount of equipment and facility maintenance would be necessary to resume operation. The proposed amended alternative would pose no short-term risks to workers, nearby residents, or the environment.

6. Implementability: The assessment with respect to this criterion evaluates the technical and administrative feasibility of the alternative and the availability of the goods and services needed to implement it.

Both alternatives are technically and administratively feasible. The goods and services needed to implement both alternatives are readily available.

The original alternative has already achieved applicable groundwater cleanup standards for those COCs which are amenable to such treatment under the redox conditions observed at the Site.

7. Cost: Cost encompasses all engineering, construction, and operation and maintenance costs incurred over the life of the project.

Costs of active groundwater restoration under the original remedy while groundwater extraction and treatment were ongoing exceeded \$120,000 per year. The major costs associated with the proposed amended alternative are for

groundwater sampling and analyses, estimated at approximately \$17,000 annually.

8. State Acceptance: This criterion evaluates whether the State, based on comments submitted after its review of the Proposed Plan, concurs, opposes, or has no comment on the preferred alternative.

The EPA and the State do not consider the original remedy to be cost-effective. Both the EPA and the State support the proposed amended alternative.

9. Community Acceptance: This criterion refers to the assessment of public comments received on the Proposed Plan.

This criterion will be fully evaluated following the public comment period. The residents whose private water-supply wells have been routinely sampled have been notified of the results of each sampling event. In March 2011, the homeowners at the two residences where concentrations exceed the public health ES for manganese were sent health advisories recommending that they use bottled water for human consumption. Replacement of private water supply wells under the proposed amended remedy is contingent upon homeowner approval.

OUTCOME OF NINE-CRITERIA EVALUATION AND SUMMARY OF REGULATORY AND STATUTORY REQUIREMENTS

Protection of Human Health and the Environment

The treatment actions already completed under the 1990 ROD have eliminated the threats posed by VOC-contaminated landfill wastes. The VOC waste was treated both by pumping and treating and by the air injection system. The current extent of the groundwater VOC plume is stable and evidence of the effectiveness of natural attenuation has been demonstrated by recent studies. The proposed MNA remedy will protect human health and the environment by natural attenuation processes that can effectively reduce VOC contamination in the groundwater

plume. Current human health concerns related to the inorganics found in the potable groundwater will be addressed by replacing the two impacted residential wells with new wells advanced into deeper, uncontaminated groundwater.

Compliance with ARARs

The proposed MNA remedy will comply with federal ARARs, and state ARARs where more stringent. The ARARs are described below.

Chemical/Medium-specific ARARs: Chemical/medium-specific ARARs regulate the release to the environment of specific substances having certain chemical characteristics.

Chemical/medium-specific ARARs typically determine the extent of cleanup at a site.

Federal ARARs for Groundwater: MCLs, the federal drinking water standards promulgated under the Safe Drinking Water Act, are ARARs since the groundwater is used as a source of drinking water.

State ARARs for Groundwater: Only state regulations that are more stringent than federal regulations are ARARs. The State ESs are generally equivalent to MCLs, except there is a State ES for 1,1-dichloroethane while there is no MCL for that constituent. Therefore, the State ESs for groundwater are ARARs for the Site.

Location-specific ARARs: Location-specific ARARs are requirements that relate to the geographical position of the site. State and federal laws and regulations that apply to the protection of wetlands, construction in floodplains, and protection of endangered species in streams or rivers are examples of location-specific ARARs. If the proposed remedy change is accepted there would be no location-specific federal or state ARARs. The previously identified location-specific ARARs in the 1990 ROD were related directly to the design of the pump and treat system.

Action-specific ARARs: Action-specific ARARs define acceptable treatment and disposal procedures for hazardous substances. Action-

specific ARARs regulate the specific type of action or technology under consideration, or the management of regulated materials. If the proposed remedy change is accepted there would be no action-specific federal or state ARARs. The previously identified action-specific ARARs in the 1990 ROD were related directly to the operation of the pump and treat system.

Cost-Effectiveness

In EPA's judgment, the MNA remedy is cost effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (NCP §300.430(f)(1)(ii)(D)).

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

WDNR and EPA have determined that the MNA remedy represents the maximum extent to which permanent solutions can be utilized in a practicable manner at the Site.

Outcome of Evaluation

Based on the evaluation of the amended alternative against the nine evaluation criteria and the data collection and analysis conducted subsequent to the groundwater extraction/treatment system shutdown, EPA and WDNR believe that the Amended Remedy as described in this document is the most appropriate remedy for the Onalaska Municipal Landfill Superfund Site.

When comparing both of the options – keeping the pumping and treatment system activated versus using an MNA remedy – both are protective of human health and the environment and comply with ARARs. However, WDNR and EPA have determined that the MNA remedy provides the best balance of trade-offs in terms of the five balancing criteria, since the pump and treat components of the Original Remedy are no longer cost effective

or necessary since the plume remains stable and MNA occurs naturally without the assistance of the system. The MNA remedy satisfies the criteria for long-term effectiveness by continuing to degrade VOCs by MNA over time so that there are no long-term risks to humans and the environment.

Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, statutory five-year reviews are required. Five-year reviews were conducted in 1998, 2003 and 2008 subsequent to the initiation of the remedial action in 1994. The next five-year review will occur in 2013.

SUMMARY OF THE PREFERRED ALTERNATIVE

The 1990 ROD and the September 2000 ESD identified State of Wisconsin PALs as the groundwater cleanup goals outside the point of standards application. However, under current implementation of Wisconsin Administrative Code NR 140, the Wisconsin ES is also considered an applicable groundwater cleanup level for human health and welfare. The range of responses when an ES is exceeded includes the collection and evaluation of data to determine whether natural attenuation can be effective to restore groundwater quality within a reasonable period of time, as demonstrated by a stable or receding groundwater plume. The point of standards application is any point within the property boundaries beyond the DMZ, as well as any point of present groundwater use beyond the property boundaries. The proposed amended remedy documents general compliance with NR 140 as the groundwater cleanup objective for the Site.

Since the November 2001 ESD allowed for the temporary shutdown of a groundwater extraction and treatment system, the post-shutdown groundwater monitoring results support the permanent shutdown of the system

and designation of MNA as a final remedy for VOCs in groundwater.

Additionally, two private water-supply wells in close proximity to the landfill have historically shown consistent concentrations of manganese far exceeding a newly-promulgated ES. It is appropriate to designate replacement of these water-supply wells as a remedy for inorganics in groundwater at these two private wells while EPA and WDNR consider whether additional response actions are needed for inorganics.

Based upon all of the above information, WDNR and EPA are proposing to modify the 1990 ROD remedy by selecting the Proposed Amended Remedy described in this Proposed Plan.

The Proposed Amended Remedy includes the following:

- Permanent shut down of the pump and treat system to allow for MNA of VOC-contaminated groundwater at the Site;
- Changing the compliance standard from PAL criteria to general compliance with NR 140;
- Replacement of two private drinking water wells that exceed the ES for manganese by installing new wells deeper into the aquifer where inorganics are not present above drinking water criteria;
- Continued monitoring and operation and maintenance for the monitoring wells at the Site;
- Ensuring that if any additional ICs are needed at the Site that they are put in place; and
- Decommissioning the treatment building from the original pump and treat system.

COMMUNITY PARTICIPATION

EPA and WDNR provide information to the public regarding the cleanup of the Onalaska Municipal Landfill Site through the web, the Administrative Record file for the Site, the Site Information Repositories maintained at the Holmen Area Library and the Onalaska Public Library, and announcements published in the LaCrosse Tribune. EPA and the State encourage the public to learn about the Site and the

Superfund activities that have been conducted there.

Public comments can be made via the web at www.epa.gov/region5/cleanup/Onalaska/pubcomment.html ; via fax to Susan Pastor at (312) 385-5344; or via postal mail to Susan at the address below. Comments must be postmarked by May 23rd.

For further information on the Onalaska Municipal Landfill Site, please contact:

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Figure 1

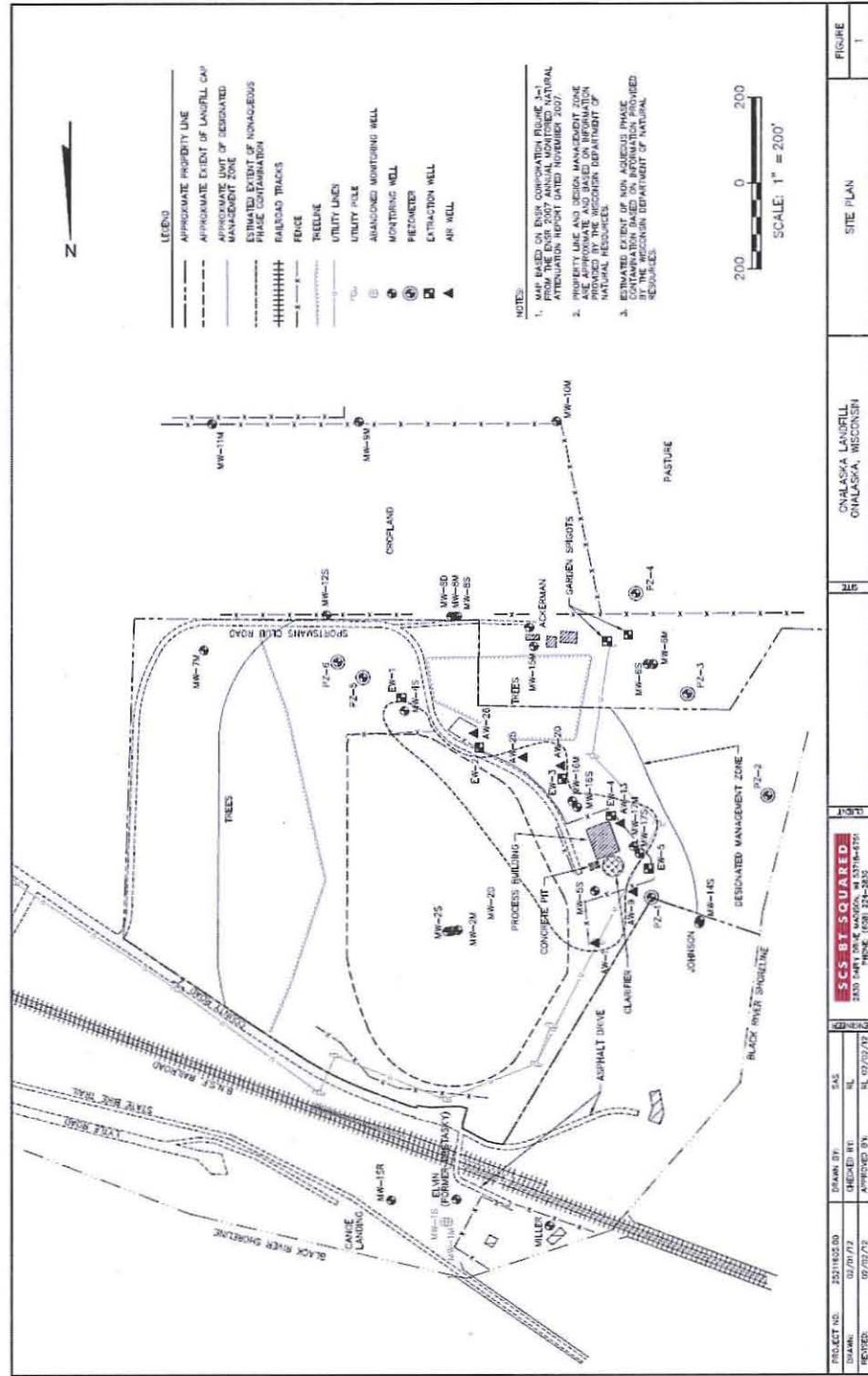


Figure 2

Total TMBs in Selected Shallow Wells (inside Design Mgmt Zone)

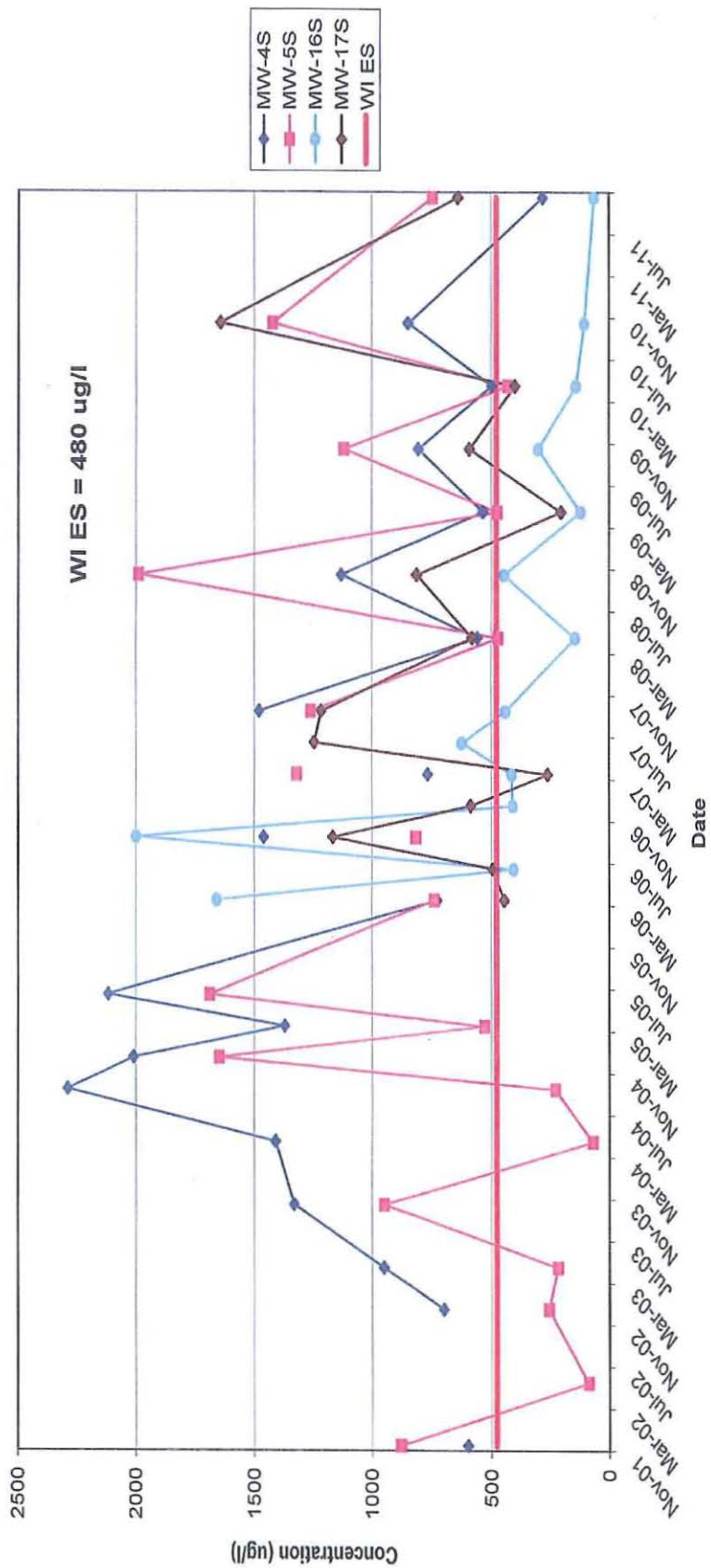


Figure 3

Naphthalene in Selected Shallow Wells (inside Design Mgmt Zone)

