EPA/ROD/R05-97/098
1997

EPA Superfund
Record of Decision:

TOMAH MUNICIPAL SANITARY LANDFILL
EPA ID: WID980610307
OU 01
TOMAH, WI
09/25/1997

<IMG SRC 97098>

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Tomah Municipal Sanitary Landfill, Tomah, Monroe County, Wisconsin

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for source control, operable unit 1, at the Tomah Municipal Sanitary Landfill (TMSL) site in Tomah, Monroe County, Wisconsin. The remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to the extent practicable. This decision is based upon the contents of the Administrative Record for the site.

It is anticipated that the State of Wisconsin will concur with this decision. A written confirmation is expected by September 30, 1997, and will be added to the administrative record upon receipt.

ASSESSMENT OF THE SELECTED REMEDY

Actual or threatened releases of hazardous substances from the site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This operable unit is the first of two that are planned for the site. The first operable unit addresses the source of contamination by containing on-site wastes and contaminated soils. The function of this operable unit is to seal off the TMSL site as a source of groundwater contamination and to reduce the risks associated with the exposure to the contaminated materials. While the remedy does address one of the principal threats at the site, the second operable unit will involve continued study and possible remediation of the downgradient contaminant plume.

The major components of the selected remedy include:

- Capping the approximately 18-acre landfill with a dual barrier cap that includes a geosynthetic clay liner, overlain by a low-permeability geomembrane, and covered with 3 feet of soil and vegetated with plants that have a root system less than 3 feet. This cap would meet the Wisconsin Administrative Code requirements for closed landfills and would provide a landfill cap in conformance with Wis. Admin. Code º NR 504.07 (1996);

- Expansion of an already existing active gas collection system; and
-
- Conducting environmental monitoring to ensure the effectiveness of the remedial action.

Institutional controls are not included as part of the selected remedy because deed restrictions on the TMSL property, enforceable by the State of Wisconsin, are already in place. U.S. EPA has concluded that no additional controls are necessary to prevent inappropriate use of the site.

DECLARATION STATEMENT

The selected is protective of human health and the environment; complies with Federal and state requirements that are legally applicable or relevant and appropriate to the remedial action except for groundwater cleanup

standards, where a waiver is justified; and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for the site. However, because treatment of the principal threats of the site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as aa principal element of the remedy. The size of the landfill and the fact that there are no on-site hot spots that represent the major sources of contamination preclude a remedy in which contaminants could be excavated and treated effectively.

Because substances hazardous will remain at the site, U.S. EPA will conduct a five-year review in accordance with Section 121 of CERCLA to assess whether any other response is necessary.

<IMG SRC 97098A>

U.S. EPA Superfund
Record of Decision

Tomah Municipal Sanitary Landfill Site

Toma, Monroe County, Wisconsin
September, 1997

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DECISION SUMMARY

I. Site Description

The Tomah Municipal Sanitary Landfill (TMSL) is located north of the City of Tomah, Monroe County, Wisconsin (Figure 1). The landfill occupies approximately 18 acres within the 40-acre site (Figure 2). The site is bordered on the north by Deer Creek and its associated wetlands, on the east by 24th Avenue and agricultural property, on the south by the Sunnyvale Subdivision, and on the west by agricultural fields and wetlands.

II. Site History and Enforcement Activities

The City of Tomah ("the City" or "Tomaah") operated the TMSL as a disposal site from 1959 to 1979, disposing of municipal and industrial wastes on 18 acres located on the southern portion of the site. Wastes were placed in shallow (3 to 8 feet) unlined trenches, which were excavated in the sandy subsoilss over the southern half of the site and covered with native soils.

In August, 1975, the Wisconsin Department of Natural Resources (WDNR) ordered the City to close the site because of potential degradation of local groundwater quality. The City closed the site in 1979, covered it with soil and topsoil, and planted grass and trees on the site.

In June, 1981, Union Camp Corporation submitted a Notification of Hazardous Waste Activity for a facility in Tomah. The company reported that from 1960 to 1977, it had disposed of 75,700 gallons of solvent waste from plastics and printing operations at the TMSL. These wastes contained volatile orgaanic compounds (VOCs) and heavy metals.

In December, 1983, representatives of the WDNR conducted a Potential Hazardous Waste Site Prelimiary Assessment for the TMSL. The WDNR's assessment indicated that the landfill represented a potential hazard to ground water and surface water, and that there could be other migration pathways.

In June, 1984, the WDNR and the consulting firm Ecology and Environment, under authorization from U.S. EPA, conducted a site inspection. A groundwater sample from a downgradient monitoring well contained organic contamination above levels of health concern. Based on these findings, WDNR nominated the site for inclusion on U.S. EPA's National Priorities List (NPL) on April 3, 1985. The site was subsequently added to the NPL on March 31, 1989.

In February, 1992, U.S. EPA's Technical Assistance Team (TAT) sampled nine residential wells in the Sunnyvale Subdivision adjacent to the TMSL. One residential well contained elevated levels of vinyl chloride.

In 1993, the City provided municipal water to homes in the Sunnyvale Subdivision, south of the site, to eliminate the potential hazard posed by the landfill for private drinking wells in the subdivision. The private wells were subsequently abandoned.

Research to identify parties responsible for conditions at the TMSL was completed early in 1993. U.S. EPA identified 3 potentially responsible parties (PRPs): the City of Tomaah as owner and operator of the landfill; and Union Camp Corporation and the Veterans Hospital as generators of hazardous substances disposed of aat the site. U.S. EPA sent a special notice letter to the PRPs in July, 1993, to conduct a remedial investigation/feasibility study (RI/FS) with oversight by U.S. EPA. On January 11, 1994, an Administrative Order on Consent (AOC) was entered into voluntarily by the PRPs to conduct the RI/FS at the TMSL site.

In April, 1994, U.S. EPA decided to take a presumptive remedy approach to the selection of a remedy for the site. After years of addressing contaminated landfills, U.S. EPA has found that the most practical way to deal with the large variety and volume of waste found in municipal landfills is containment. A containment remedy may include one or more of the following components: a landfill cap; a groundwater collection and treatment system; a landfill gas collection and treatment system; a leachate collection and treatment system; and future land use restrictions. In the early stages of the presumptive remedy analysis for site, U.S. EPA concluded that containment at the TMSL would involve placing a cap over the landfill to reduce the amount of water entering and migrating out of the landfill and installing and operating a landfill gas collection

system. Data collection efforts in the RI, risk assessment, and analysis of remedial alternatives in the FS were streamlined based upon application of the OSWER Directive No. 9355.0-49FS entitled "Presumptive Remedy for CERCLA Municipal Landfill Sites." Use of the presumptive remedy approach allows a focused effort on data collection to determine risk at the site, usually by examining groundwater conditions, and a subsequent streamlined evaluation of alternatives to contaminated waste in the landfill. Thus, the presumptive remedy allows for selection of an on-site source control remedy before all off-site long-term groundwater contamination issues are resolved. This ROD addresses only the containment of contaminants from the source area (i.e., the landfill).

In July, 1996, in response to indications that landfill gas was migrating off-site, the PRPs installed an active gas extraction system along the southern boundary of the landfill.

III. Highlights of Community Participation

In June, 1994, U.S. EPA hosted a "kick-off" public meeting at the Tomah City Hall Council Chambers. The purpose of the meeting was to inform local residents of the Superfund process, the presumptive remedy approach and the work to be performed under the RI. In addition, because there are two other Superfund sites in Tomah, numerous other public meetings and availability sessions have been conducted.

In 1993, U.S. EPA established an information repository at the Tomaah Public Library, 716 Superior Avenue, Tomah, Wisconsin. U.S. EPA maintains a copy of the administrative record for the site in the information repository. The RI and FS were released to the public in July, 1996, and April, 1997, respectively. A Proposed Plan was made available on August 7, 1997. A public meeting was held on August 18, 1997, to discuss the RI/FS and Proposed Plan. Advertisements were placed in local newspapers to announce the public meeting and comment period. A public comment period for the Proposed Plan was established from August 7, 1997 to September 5, 1997. The public generally supports the selected remedy. The responsiveness summary is contained in Appendix A.

The public participation requirement of sections 113(k)(2)(B) and 117 of CERCLA, 42 U.S.C.^{oo} 9613(k)(2)(B) and 9617, have been met in the remedy selection process. This decision document presents the selected remedy for the Tomah Municipal Sanitary Landfill Superfund site, chosen in accordance with CERCLA, as amended by SARA, and to the extent practicable, the NCP. The decision for this site is based on the Administrative Record.

IV. Scope and Role of Operable Unit

U.S. EPA has determined that installation of a low permeability geomembrane and a geosynthetic clay liner (GCL) over the landfill and the operation of the active gas collection system is necessary at the TMSL. This decision is based on an analysis of site risks, described in detail below. The decision relies on the indications that the landfill is the source of contamination to ground water which may be used by residents downgradient of the site and that landfill gas is migrating off-site.

This ROD addresses on-site source control. The source control remedy will be implemented and the site will be monitored to determine the effects of the source control on reducing the levels of off-site groundwater contamination. After a period of sufficient monitoring a second risk assessment and FS will be conducted for the off-site contamination, primarily in ground water. An additional Proposed Plan and ROD will then be issued to select a remedial alternative for the
off-site contamination.

Because hazardous substances will remain at the site, U.S. EPA will conduct a five-year review in accordance with Section 121 of CERCLA to assess whether any other source control response is necessary.

V. Site Characteristics

The Phase I and II RI involved sampling and anlysis of ground water, landfill gas, surface water and sediment to determine site conditions. Groundwater samples were collected from residential and monitoring wells around the site to determine the nature and extent of groundwater contamination. Gas samples were collected

from gas probes in and around the landfill and near residents south of the landfill to determine if landfill gases have migrated beyond the limits of the waste and the site boundary. Surface water and sediment samples were collected in Deer Creek and in the wetlands north of the landfill to evaluate if contaminants from the landfill were impacting Deer Creek. Test pit excavations were also conducted to determine the approximate boundaries of the landfilled area.

Based on the results of the RI, U.S. EPA examined the threats to human health and the environment through exposure by ingestion and/or direct contact with contaminants in ground water, and surface water and sediment. U.S. EPA did not quantify risks associated with contaminants in surface soil and landfill gas because EPA presumed that a landfill cap and an expanded gas collection system would be installed, thereby addressing the risks associated with surface soil and gas, whatever they may be.

Site Conditions

Physical Features

1. Geology

Data from soil borings indicate that the TMSL is underlain predominantly by residual sand materials, formed by the in-place weathering of sandstone bedrock, and alluvial unconsolidated sands overlying the sandstone bedrock. The unconsolidated material consists of silty sands to poorly graded fine- to medium-grained sand. The thickness of the unconsolidated deposits in the immediate vicinity of the landfill ranges from 1 to 19 feet and generally increases toward Deer Creek.

Underlying the unconsolidated sands is sandstone bedrock of Cambrian age. Two sandstone mounds are located in the southwest and southeast corners of the site. The bedrock surface slopes down from the sandstone mounds in all directions.

2. Hydrology

The TMSL site lies in the Deer Creek valley which is the primary drainage way near the site. Deer Creek flows northeast across the northwestern corner of the property, within 230 feet of the northwest corner of the landfilled area. The creek meanders through an extensive emergent wetland located on the northwest portion of the property and joins Lemonweir Creek about one mile east of the site. Deer Creek is classified as a cold water sport fishery (trout stream).

The moderately permeable site soils permit infiltration and restrict the volume of overland flow. Surface runoff across the landfill is generally north toward Deer Creek, with the exception of the low area along the southern property boundary where runoff drains to the south.

3. Hydrogeology

Ground water beneath the site was encountered within the unconsolidated deposits, the landfill waste, and the bedrock. The data collected indicates that the unconsolidated sand and the sandstone bedrock generally function as a single aquifer. The water level data indicate that the groundwater flow is northeast toward Deer Creek and the surrounding wetlands averaging velocities between 0.02 and 0.38 ft/day. The groundwater contribution to Deer Creek appears to be limited to the shallow portion of the aquifer. Deeper flow may occur beneath Deer Creek.

The majority of the landfill appears to be unsaturated. However, investigations showed up to 2 feet of saturated waste at the base of the landfill in some areas. The total thickness of the waste is approximately 10 - 12 feet. Using the highest water levels measured at the site, U.S. EPA estimates that 19,000 out of the 300,000 cubic yards in the landfill may be saturated. However, seasonal fluctuations in the water table make it difficult to estimate the volume of saturated wastes with any reliability.

The City and the majority of the private well owners obtain their water supply from the Cambrian age sandstone aquifers. The City provides municipal water for all residential properties within the City limits.

Residents living outside of the city limits obtain their water supply from private wells except for those persons living in the Sunnyvale Subdivision who are serviced by municipal water. Ten of the eleven private wells currently used within one-half mile of the site are located north and northeast of the site. Well logs from the current property owners indicate that several of the wells are screened in the sandstone at depths of 50 to 80 feet. One additional well is located approximately 500 feet east of the landfill. No well log could be located for this well.

4. Ecology

The TMSL site is zoned as conservancy. The areas to the north, east, and west are classified as vacant or agricultural. Deer Creek flows northeast across the northwestern corner of the site. The WDNP has designated Deer Creek as Class II trout waters, supporting primarily brook trout. Adjacent woodlands, wetlands, and fields add to the diversity of wildlife habitat in the area. Wildlife species found at the site would be typical of an urbanizing rural agricultural area or transients from adjacent habitats.

WDNR's Bureau of Endangered Resources reports no known occurrences of threatened, endangered, or special concern species; natural communities; or State Natural Areas that would be affected by remedial actions at the TMSL site. The U.S. Fish and Wildlife Service does report that two federally listed species occur in Monroe County. However, the U.S. Fish and Wildlife Service concluded that due to the nature and location of the proposed activities, the species identified would not be adversely affected.

5. Contamination

a) Surface Water and Sediment

Surface water and sediment samples were collected from four locations as part of the Phase I investigation (see Figure 2). Three of the four surface water/sediment samples were collected from Deer Creek. The fourth sample was collected in the emergent wetland adjacent to the Creek.

Volatile organic compounds (VOCs) and semivolatile organic compounds (SSVOCs) were not detected in the four surface water samples. 2-Butanone was detected in both the upstream and downstream sediment samples. Low levels (56 to 60 Ig/kg) of three polynuclear aromatichydrocarbons (PAHs) were detected in most downstream sediment sample location.

Comparable values for inorganic constituents were measured for surface water and sediment samples collected at upstream and downstream sample locations, as well as in the wetland. The data collected did not indicate that the surface water and sediment have been impacted by landfill-related contaminants.

b) Ground water

The nature and extent of groundwater contamination was evaluated based on the results from 12 groundwater monitoring wells sampled during Phase I, and 7 additional wells installed and sampled during the Phase II investigation. In addition, six private wells were sampled during Phase II (see Figure 2). A summary of contaminants detected in the Phase I and II groundwater sampling is presented in Table 1. Additional monitoring wells have been added and sampled since the completion of the Phase II RI and the risk assessment. The groundwater operable unit will include a complete evaluation of all data collected from the entire groundwater monitoring well network.

Seven chlorinated VOCs were detected in the samples collected from the monitoring wells. These VOCs include chloroethane, 1,1-dichloroethane, 1,2-dichloroethene (cis and trans), 1,2-dichloropropane, 1,2-dichloroethane, and vinyl chloride. Five aromatic VOCs were also detected including benzene, toluene, ethylbenzene, xylenes, and chlorobenzene. Vinyl chloride and benzene were detected most frequently and exhibited the highest concentrations. The vinyl chloride (0.7 to 1,200 Ig/L) and benzene (0.5 to 48 Ig/L) concentrations exceeded the WDNR's Chapter NR 140 Preventative Action Limit (PAL), Enforcement Standard (ES), and Federal Maximum Contaminant Level (MCL) in each sample in which they were detected. Vinyl chloride appears to be the most persistent and widespread VOC. The vinyl chloride concentrations decreased from 1,200 Ig/L adjacent to the landfill (in MW-7) to 36 Ig/L approximately 800 feet downgradient from the site (in

MW-9B). Analytical data from individual well nests indicated that concentrationss of both benzene and vinyl chloride were typically higher in samples collected at depth compared with those collected at the water table. VOCs were not detected in the upgradient or residential wells.

Several SVOCs were also detected in the groundwater samples. The only SVOC to exceed Ch. NR 140 ES and the MCL was bis(2-ethylhexyl) phthalate.

Various inorganic constituents were detected in groundwater samples. Twelve of the inorganic parameters were detected in groundwater samples at concentrations exceeding federal primary or secondary drinking-water standards. Inorganic constituents detected in downgradient ground water may have migrated from the landfill. Downgradient concentrations of aluminum, iron, and manganese were significantly higher than those concentrations found in upgradient wells. Thallium, cadmimum, and chromium concentrations measured downgradient of the landfill also exceeded the federal drinking-water standards.

Groundwater samples collected from the downgradient wells during the Phase I were also analyzed for pesticides, PCBs, dioxins, and furans. The results of these analyses indicate trace concentrations of octachloro-dibenzopara-dioxin (OCDD) in three of the samples. Three pesticides were also detected: endrin, 2,4,5-TP, and chlordane. No PCBs or furans were detected.

c) Landfill Gas

Data collected from the investigation indicate that landfill gas is being generated at the site. Methane concentrations, as measured in the gas probes and monitoring wells, ranged from 4 to 71 percent (by volume in air). Data collected from gas probes installed beyond the boundary of the landfill indicate that landfill gas is migrating offsite. The methane concentrations measured from zero to 37 percent by volume. The lower explosive limit (LEL) for methane is 5 percent by volume. Chapters NR 504 and NR 506 of the Wisconsin Administrative Code (WAC) require that all waste disposal facilities have an effective means for controlling landfill gas migration such that the concentration of explosive gases at or beyond the property boundary do not exceed the LEL.

Gas samples were also analyzed using a portable gas chromatograph. VOCs detected include vinyl chloride, 1,2-dichloroethene, 1,1,1-trichloroethane, trichloroethene, and toluene. In general, the highest (338.7 to 773.10 ppm) and most consistent contaminant measured was 1,1,1-trichloroethane.

VI. Summary of Site Risks

U.S. EPA used the data collected during the RI to assess human health and ecological risks. This assessment compared contamination levels at the site with U.S. EPA standards. In addition, further assessment of conditions at the site compared contamination levels at the site with Wis. Admin. Code Ch. NR 140 (1996), Groundwater Standards. The assessment considered ways in which people and wildlife could be exposed to site-related contaminants and whether such exposure could increase the incidence of cancer and noncarcinogenic (noncancer related) diseases above the levels that normally occur in the study area.

The screening assumed that people could be exposed to site-related contaminants by a number of different pathways (e.g., ingestion, inhalation, dermal contact). Exposure to surface water and sediment and ground water were evaluated under current and future land use conditions. The installation of a landfill cap and a gas collection system was presumed. As a result, risks from direct contact with contaminants in soil on the landfill surface or landfill gases were not evaluated.

Current land use and reasonable anticipated future use of the land at NPL sites are important considerations in determining current risks, future potential risks, and the appropriate extent of remediation. (See "Land Use in the CERCLA Remedy Selection Process," OSWER Directive No. 9355.7-04, May 25, 1995). Land use assumptions affect the exposure pathways that are evaluate in the risk assessment. The results of the risk assessment aid in determining the degree of remediation necessary to ensure current and long-term protection at the site at the site. The risk assessment considers present use of the site to determine current risks. It may restrict its analysis of future risks to the reasonably anticipated future land use.

In the case of the TMSL risk assessment. U.S. EPA assumed that the exposure to contaminants in the surface water and sediment would continue to be the recreational use of Deer Creek. U.S. EPA assumed the most conservative scenario for exposure to ground water in the future would be residential use downgradient of the site.

Potential risks to public health for cancer are expressed numerically, i.e., 1x10 -4 or 1x10 -6. Carcinogenic risk expressed as 1x10 -4 means that of 10,000 people exposed to contamination over a 70-year lifetime one individual could potentially develop cancer as a result of the exposure. A carcinogenic risk of 1x10 -6 means that of 1,000,000 people exposed over a 70-year lifetime one individual could potentially develop cancer as a result of the exposure. U.S. EPA has established a carcinogenic risk range from 1x10 -4 to 1x10 -6 in an attempt to set standards for remediation and protectiveness. The measure of noncarcinogenic risk is termed a hazard index (HI) and is also expressed numerically. When the HI exceeds 1, there is a potential for adverse health effects.

In general, the majority of the predicted potential health impacts were associated with exposure to contaminants detected in ground water. Dermal exposures to contaminants in the surface water and sediment resulted in excess lifetime cancer risks below 1x10 -6 and hazard indices below 1 for recreational receptors. Contaminants in ground water were evaluated for residential ingestion, inhalation, and dermal exposures. The total excess lifetime cancer risk for adult residents was 3x10 -2, while that for child residents was 1x10 -2. The adult resident's hazard index was 139 and the child's hazard index was estimated to be 325. Ingestion of groundwater contaminants (i.e., vinyl chloride) resulted in the majority of the estimated risk and hazard.

The total overall risk for adult residents using the groundwater and utilizing the wetlands for fishing or other recreational activities is 3x10 -2 while that for the child is 1x10 -2. The risk is primarily due to the presence of vinyl chloride in the ground water.

It should be noted that two exposure pathways were not evaluated quantitatively in the baseline human helath risk assessment. Because no soil samples were collected from the landfill itself and a source control action has been proposed, no assessment of risk to persons having contact with landfill soil and contents were estimated. However, hazardous substances are present in the landfill that could pose some level of hazard should exposure occur.

Sampling from gas probes has confirmed the presence of landfill gases including VOCs. These gases have been found to contain vinyl chloride, 1,2-dichloroethene, 1,1,1-trichloroethane, toluene, and trichloroethene. However, the lack of quality assurance/quality control (QA/QC) documentation preclude the use of gas samples taken to date in a quantitative risk assessment. Thus, no quantitative risk was estimated for nearby residents who may be exposed to ambient concentrations of these landfill gases. A review of the data indicates that the maximum vinyl chloride concentration in the landfill gas was approximately 20 parts per million (ppm), while that in ground water was 1,200 Ig/L or 1.22 ppm. Given that inhalation of vinyl chloride vapors from ground water was estimated to result in a risk of approximately 2x10 -4 and the landfill gas concentration is an order of magnitude higher than the groundwater concentration, the cancer risk due to inhalation of vinyl chloride in the landfill gas could potentially result in risks of the same magnitude. Additional cancer risk could also be contributed by the other carcinogenic compounds (such as trichloroethene) detected in the landfill gases.

The source control measures proposed in the FS call for the landfill gases to be collected with an active gas collection system and treated prior to release. The gas collection system and treatment will reduce explosion hazards and exposures to ambient concentrations inhaled by nearby residents.

An ecological risk assessment was conducted to estimate the risks to terrestrial and aquatic organisms at the site and qualitative measure impacts on areas surrounding the TMSL. Terrestrial organisms associated with the TMSL were not considered at risk based on literature-derived benchmark values. Exposure and risk to aquatic organisms was evaluated by directly comparing surface water and sediment exposure dose to National Ambient Water Quality Criteria, state standards, or other literature-based benchmark values. Based on this analysis, cobalt and manganese in surface water were the only metals found that would potentially pose a risk to aquatic organisms.

Actual damage to the aquatic and terrestrial ecosystem of Deer Creek and the adjacent wetlands was not observed. Based on this analysis, ecological effects from TMSL contaminants are considered insignificant at this time.

Based on the information collected to date on the site contamination and associated risks to human health and the environment, the installation of a low permeability cap to reduce the amount of contaminants leaching from the landfill wastes to the underlying ground water and continued collection of landfill gases is warranted. The need for remediation of the contaminated ground water will be determined after implementation of the source control remedial actions and after the investigation of the offsite ground water has been completed. The groundwater operable unit will be addressed in a separate RI/FS, proposed plan and ROD.

VII. Description of the Remedial Alternatives

Remedial Action Objectives

The source control remedial action objectives were developed for this site to address the landfill as a long-term source of contamination, to provide short- and long-term protection of human health and the environment, and to meet the applicable or relevant and appropriate requirements (ARARs).

Based on the analytical data collected to date and the associated risks, the media of concern include the landfill gas and ground water. The site specific remedial action objectives for this site include:

Landfill Gas Source Remedial Action Objectives

- Prevent landfill gas migration such that at no time shall the standard concentration of explosive gas in the soils outside the limits of waste, or air within 200 feet of or beyond the landfill property boundary exceed the lower explosive limit (LEL) for such gases, in accordance with Wis. Admin. Code Ch. NR 506 (1996), Landfill Operational Criteria. Chapter NR 506 (1996) of the Wis. Admin Code requires that all waste disposal facilities have an effective means for controlling landfill gas migration such that the concentration of explosive gases at or beyond the property boundary does not exceed the LEL.

- Prevent blower emission exceedances above standards for the interim and permanent landfill gas extraction system set forth in Wis. Admin. Code Ch. NR 445 (1996).

Groundwater Source Control Remedial Action Objectives

- Provide an effective means to reduce infiltration through the landfill waste.

- Eliminate contaminant migration pathways to the ground water, by providing a mechanism reduce VOC and metals contamination, thereby providing a potential means to meet State groundwater standards within the aquifer affected by contaminants associated with the landfill.

Development of Alternatives

The remedial alternatives for the FS are typically assembled from applicable remedial technology options. A wide range of technologies and remedial options are reduced by evaluating them with respect to technical implementability, effectiveness, and cost. However, U.S. EPA has found that the most practical way to deal with the large variety and volume of waste found in municipal landfills is containment. U.S. EPA's guidance on presumptive remedies for CERCLA municipal landfill sites indicates that components of the source containment may include:

- landfill capping to reduce the amount of water entering and migrating out of the landfill;

- extraction and treatment of contaminated ground water and leachate to control offsite migration

- construction of an active landfill gas collection and treatment system to prevent offsite migration

Based on site-specific conditions, the selection of response actions need only consider those components that are necessary. The lack of measureable leachate with the landfill indicates that a leachate collection system is not necessary as a general component of the presumptive remedy.

Even though the majority of the landfill appears to be unsaturated, reconsolidation was considered in the alternatives. Investigations showed up to 2 feet of saturated waste at the base of the landfill in some areas. As noted above, it is difficult to estimate the volume of saturated waste with any reliability, but U.S. EPA believes that at most, 19,000 out of a total of 300,000 cubic yards of waste in the entire landfill are saturated.

In addition to source containment, the NCP requires that a no-action alternative be considered for the site. The no-action alternative serves primarily as a point of comparison for other alternatives.

The approach to develop the containment alternatives was to provide general source response actions that address each medium of interest in order to satisfy the remedial action objectives:

Landfill Gas Response Actions

- No action
- Collection and treatment, if necessary, of landfill gas to prevent migration

Groundwater Source Response Actions

- No action
- Installation of a low permeability cap to reduce infiltration
- Removal of VOCs from the waste through landfill gas extraction
- Excavation to remove saturated wastes

The landfill gas source response actions are closely related. The installation of a low permeability cap will minimize the amount of water entering and migrating out of the landfill. The cap will also enhance the performance of the gas collection system by providing a seal over the landfill. The seal should increase the ability of the system to not only remove methane but also VOCs before they enter the ground water. The remedial alternatives developed combine the response actions for both the gas and groundwater source control.

Alternative Descriptions

A complete description of the various alternatives is provided in the Feasibility Study. A brief narrative description of each alternative is provided below. Note that there is no discussion of institutional controls as part of any alternative. This because institutional controls in the form of deed restrictions, enforceable by the State of Wisconsin, are already in place at the TMSL. U.S. EPA has concluded that no additional controls are necessary to prevent inappropriate use of the site.

Alternative 1: No action

The no action alternative is developed to act as a baseline to compare against all other alternatives. This alternative would not include the current (interim) gas collection system or monitoring of the gas probe or groundwater monitoring well network on and adjacent to the landfill. This alternative will not meet the landfill gas or groundwater source control remedial action objectives.

Alternative 2: Continued Operation and Monitoring of Existing Landfill Gas Extraction System and Continued Groundwater Monitoring

This alternative includes the operation of the existing landfill gas extraction system along the southern perimeter of the landfill and continued landfill gas and groundwater monitoring. Because gas extraction would be continued, there would be no change in risk to human health and the environment. However, the existing

gas collection system would not help to remove VOCs or methane from within the landfill wastes. Thus, the landfill gas source remedial action objective would not be fully addressed. Furthermore, since methane is still migrating beyond the boundaries of the landfill with the existing extraction system, this alternative would not achieve compliance with Wis. Admin. Code Chs. NR 504 and 506 (1996), Landfill Operational Criteria. Additionally, no groundwater source containment would be implemented. No capital costs are involved in this alternative.

Alternative 3: Installation of a Geomembrane Cap with Active Gas Extraction System

This alternative includes the installation of a multi-layered, single barrier cap consisting of a 6-inch upper vegetative layer, a 30-inch rooting zone/drainage layer, and a 40-mil low density polyethylene (LDPE) geomembrane layer. The basic benefit of the cap would be to reduce the amount of infiltration entering the landfill and subsequent release of contaminants to the ground water.

In addition, an active interior gas control system will be installed to extract gas over the entire landfill. The gas extraction system would include the current gas migration control system and additional perimeter and interior wells along the other boundaries of the landfill. Long-term maintenance and monitoring of the groundwater and landfill gas would be implemented upon completion of the actions and system startup.

This alternative sould meet both the landfill gas and groundwater source control objectives. However, this alternative does not include the clay component for the low permeability cap, and would therefore not comply Wis. Admin. Code Ch. NR 504(1996), Landfill Location, Perfomance, Design, and Construction Criteria. The minimum design and construction criteria for final cover systems set forth in Wis. Admin. Code º 504.07(1996) are relevant and appropriate requirements for designing and constructing a cap for the Tomah Municipal Sanitary Landfill. This is because the types of waste disposed of in the TMSL are similar to those found in waste disposal facilities regulated under Wis. Admin. Code Ch NR 504 (1996). A dual barrier, low permeability cap consisting of a 2-foot clay layer underlying a geomembrane is specified in Wis. Admin. Code º NR 504.07(1996). The clay layer is required to provide a back-up barrier system in the event the membrane fails, either during construction or at some time in the future.

Alternative 4: Installation of a Geomembrane and a GCL Cap with Active Gas Extraction System

This alternative provides the same benefits as Alternative 3, but will include the added back-up barrier protection of a geosynthetic clay liner (GCL). The GCL would be placed directly beneath the geomembrane. The GCL component provides a substitute material for the clay layer component specified in Wis. Admin. Code º NR 504.07 (1996) for final cover design. By incorporating the GCL material below the geomembrane cap, this cover system will provide an equivalent performance to the cap design specified in the Wisconsin regulations. The alternative would meet both the landfill gas and groundwater source control objectives.

Alternative 5: Installation of a Geomembrane Cap and 2 Feet of Clay with Active Gas Extraction System

This alternative provides both the geomembrane layer and the 2-foot clay layer specified for final landfill cover systems in Wis. Admin. Code º NR 504.07 (1996). The clay layer would meet the specifications set forth in Wis. Admin. º NR 504.06(2)(1996). However, due to site design restrictions, the clay would be discontinued along a line north of the existing gas extraction system. A GCL material would be substituted for the clay south of the existing gas system to reduce the encroachment on the adjacent residential properties, reduce drainage problems, and eliminate the need to reconstruct the existing landfill gas collection system. The alternative should meet both the landfill gas and groundwater source control objectives.

Alternative 6: Reconsolidation of Saturated Waste, Installation Geomembrane cap with Active Gas Extraction System

This alternative includes installation of a low permeability landfill cap and gas extraction system. As described in Alternative 3, the landfill cap would be a multi-layered, single barrier cover, consisting of a upper vegetative layer, a rooting zone/drainage layer and a geomembrane. The final cap design would be modified by excavation of the maximum saturated area of waste found along the northern portion of the

landfill. Approximately 174,000 cubic yards of waste from the north central portion of the landfill could be excavated and reconsolidated. Reconsolidation options include moving excavated wastes to a more upland (south side) of the landfill or backfilling the excavation with clean fill to water table and placing the wastes on top (i.e., effectively raising waste above high water levels). As with Alternative 3, this alternative would meet both the landfill gas and groundwater source control objectives but would not comply with Wis. Admin. Code Ch. NR 504 (1996), Landfill Location, Performance Design, and Construction Criteria.

Alternative 7: Reconsolidation of Saturated Waste, Installation Geomembrane and GCLL Cap with Active Gas Extraction System

This alternative includes all the components of Alternative 6 with the addition of the GCL layer below the geomembrane. This alternative would meet both the landfill gas and groundwater source control objectives.

Alternative 8: Reconsolidation of Saturated Waste, Installation Geomembrane and Clay Cap with Active Gas Extraction System

This alternative includes all the components of Alternative 6 with the additional of a 2-foot clay layer. This alternative would meet both the landfill gas and groundwater source control objectives.

VIII. Evaluation of Alternatives

Nine Evaluation Criteria

In the NCP, the U.S. EPA has established nine criteria that balance health, technical, and cost considerations to determine the most appropriate remedial alternative. The criteria are designed to select a remedy that will be protective of human health and the environment, attain Applicable or Relevant and Appropriate Requirements (ARARs), utilize permanent solutions and treatment technologies to the maximum extent practicable, and be cost effective. The relative performance of each of the remedial alternatives listed above has been evaluated using the nine criteria set forth in the NCP as the basis of comparison. These nine criteria are summarized below:

Threshold Criteria

The selected remedy must meet the following threshold criteria:

1. Overall Protection of Human Health and the Environment Addresses whether a remedy provides adequate protection and describes how risks are eliminated, reduced or controlled through treatment, engineering controls or institutional controls.

2. Compliance with Appliable or Relevant and Appropriate Requirements (ARARs) addresses whether a remedy will attain applicable or relevant and appropriate requirements under federal environmental laws and state environmental or facility siting laws or provide grounds for issuing a waiver.

Primary Balancing Criteria

The balancing criteria are used to compare the effectiveness of the remedies.

3. Long-term Effectiveness and Permanence refers to the amount of risk to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

4. Reduction of Toxicity, Mobility or Volume Through Treatment is the anticipated performance of treatment technologies that may be employed in a remedy to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

5. Short-term Effectiveness refers to the speed with which the remedy achieves protection, as

well as the remedy's potential to create adverse impacts on human health and the environment during the construction and implementation period.

6. Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

7. Cost addresses the estimated capital and operation and maintenance (O&M) costs, evaluated as the present worth cost. Present worth is the present value of the capital and future O&M costs of an alternative based on the time value of money.

Modifying Criteria

These criteria deal with support agency and community response to the alternatives.

8. State Acceptance indicates whether, based on its review of the FS and the Proposed Plan, the support agency (in this case, the WDNR) concurs with, opposes, or has no comment on the recommended alternative.

9. Community Acceptance is assesed in the Record of Decision based upon a review of the public comments received on the FS report and the Proposed Plan.

Evaluation of the Remedial Alternatives

As part of the FS all the remedial alternatives are evaluated against the nine criteria. Figure 4 contains a summary of this analysis.

Threshold Criteria

The threshold criteria are CERCLA statutory requirements that must be satisfied by any alternative in order for it to be eligible for selection as a CERCLA remedy. Alternatives that do not meet the threshold criteria are not carried through a comparison with the other alternatives.

1. Overall Protection of Human Health and the Environment

The no action alternative will not provide protection of human health and the environment. Alternative 2 will provide only limited reduction of risk to human health and the environment by collecting landfill gas along the southern perimeter of the landfill. The remaining alternatives that include a landfill cap and active gas extraction system provide the applicable components for a CERCLA presumptive remedy for source control at the TMSL. Risks to human health and the environment would be reduced due to the extraction and treatment of landfill gases and reduction or elimination of source pathways for additional groundwater contamination.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

ARARs for the alternatives considered are contained in Table 1 of the Feasibility Study for Source Control, dated April 14, 1997, as amended by U.S. EPA's letter of July 15, 1997. Note that, at this time, EPA cannot say whether any of the alternatives considered will restore ground water outside the landfill to federal and state drinking water standards. But under section 121(d)(4) of CERCLA, 42 U.S.C. º9621(d)(4), U.S. EPA may select a remedy that does not attain cleanup standards when the remedial action selected is only part of a total remedial action that will attain such level or standard of control when completed. That is the case here. Ground water conditions will be addressed in a second operable unit.

The no action alternative and Alternative 2 will not comply with the ARARs because they do not include the multi-layer cap required under Wis. Admin. Code º NR 504.06 (1996) for closed landfills. In addition, for Alternative 2, the existing gas extraction system does not achieve compliance with Wis. Admin. Code ºº NR 504 and 506 (1996) because some gas is continuing to migrate off-site. The cap proposed as part of Alternatives 3 and 6 does not provide the back-up component required by Wis. Admin. Code º NR 504.07 (1996). Alternatives 4, 5, 7, and 8 would meet the Wisconsin Administrative Code requirements for closed landfills and would

provide a landfill cap in conformance with Wis. Admin. Code º NR 504.07 (1996). Alternatives 4 and 7 would meet the Wisconsin requirement for a clay capping layer by substituting a geosynthetic clay liner that has an equivalent standard of performance, such that these alternatives qualify for a variance under Wis. Admin. Code º NR 500.08(4)(1996).

Primary Balancing Criteria

3. Long-term Effectiveness and Permanence

Installation of a presumptive remedy cap and gas extraction system have been proven to be reliable long-term containment technologies for municipal landfills. Alternatives 4, 5, 7 and 8 provide additional long-term effectiveness and permanence by including a back-up barrier to the geomembrane layer in the multi-layer cap.

Alternatives 6, 7, and 8 include reconsolidation of saturated waste which may provide an effective means to remedy groundwater within the waste. However, the majority of the landfill appears to be unsaturated. U.S. EPA estimates that only 19,000 out of the 300,000 cubic yards of waste estimated to be in the landfill are saturated. However, seasonal fluctuations in the water table make it difficult to estimate the volume of saturated wastes with any reliability. In addition, as has been shown at other landfill sites, water table elevations under the landfill may drop after installation of the cap, reducing the volume of saturated wastes. The combination of these factors makes it difficult to assess the contribution of saturated waste to groundwater contamination and the benefits, if any, of reconsolidation.

4. Reduction of Toxicity, Mobility or Volume Through Treatment

The no action alternative will not reduce toxicity, mobility or volume of contamination. The rest of the alternatives include a gas collection/extraction system that will treat VOCs if the levels are such that treatment is necessary to meet Wisconsin air standards.

5. Short-term Effectiveness

Alternatives 3, 4, 5, 6, 7 and 8 would provide a remedy for off-site landfill gas migration by installation of an interior active gas extraction system that would effectively reduce the health and saafety threat to landowners adjacent to the landfill. These alternatives would also result in relaatively little site disturbance. As a result, they will reduce public exposure to air emissions, odor, noise and traffic. Because no waste will be exposed, the installation of the landfill cap will not put workers or the public at risk from exposure.

6. Implementability

Required materials, services and equipment are available to implement each source control alternative. Operation and maintenance of the existing landfill gas collection system have already been implemented. Thus, Alternative 2 involves no construction and is the easiest to implement. All the Alternatives except 1 and 2 involve placement of the multi-layer cap and would require care in construction to minimize potential damage to the existing gas collection system.

7. Cost

The costs for the alternatives (including both capital expenditures and future operating costs that have been discounted at a 2 percent rate) range from $1.4 million to $7.2 million. The cost for each alternative is presented in Figure 4.

Costs associated with Alternatives 6, 7, and 8 are high due to a number of factors, including: the amount of unsaturated wastes that would need to be moved to get to the saturated wastes at the base of the fill, the small area available for excavation activities, a phased excavation approach, waste handling activities, uncertainty concerning the treatment of groundwater produced during excavation, and potential characterization of any portion of reconsolidated waste, contaminated soils, or contaminated ground water. Costs of these alternatives are almost double that of their counterpart with no reconsolidation.

Modifying Criteria

8. Support Agency Acceptance

U.S. EPA is the lead agency for this site and the author of this ROD. WDNR has been the support agency for the RI/FS and has reviewed this ROD. The State of Wisconsin has indicated a willingness to concur with this decision. A written confirmation is expected by September 30, 1997, and will be added to the administrative record upon receipt.

9. Community Acceptance

A Proposed Plan was prepared and released to the public on August 5, 1997. A 30-day public comment period was conducted between August 7, 1997, and September 5, 1997. A public meeting on the proposal was held on August 18, 1997. The public generally supports the proposed remedy. The comments U.S. EPA received, together with U.S. EPA's responses, are described in the Responsiveness Summary attached to this ROD.

Selected Alternative

U.S. EPA has determined that Alternative 4: Installation of a low permeability geomembrane and a geosynthetic clay liner (GCL) over the landfill and the operation of the active gas collection system is the best remedy for source control at the TMSL. Alternatives 4, 5, 7 and 8 fully meet all the NCP criteria. The only criterion that clearly revealed differences between the four acceptable alternatives was cost. All things being equal, U.S. EPA prefers to select the most cost-effective remedial alternative. Alternative 4 while meeting all threshold, balancing, and modifying criteria was also the least costly of the four acceptable alternatives.

The Remedial Action Objectives that the selected remedy must meet are described above in Section VII. The ARARs for the selected remedy are listed in Table 1 of the Feasibility Study for Source Control, dated April 14, 1997, as amended by U.S. EPA's letter of July 15, 1997. They include Wisconsin regulations concerning landfill performance and design set forth in Wis. Admin. Code Chs. NR 504 and 506, and air standards set forth in the Clean Air Act, 42 U.S.C.º 7401 et seq., and Wis. Admin. Code Ch. NR 439 (1996).

It should be mentioned that Alternative 4 only addresses on-site source control at the landfill and that a subsequent risk assessment, FS, proposed plan, and ROD will address off-site groundwater contamination.

IX. Statutory Determinations

U.S. EPA and the State of Wisconsin believe the selected remedy will protect human health and the environment; complies with ARARs, except for groundwater cleanup standards where a waiver is justified; is cost-effective; and utilizes permanent solutions and alternative treatment technologies or resource recover technologies to the maximum extent practicable. The selected remedy will not satisfy the preference for treatment as a principal element. The size of the landfill and the fact that there are no on-site hot spots that represent the major sources of contamination preclude a remedy in which contaminants could be excavated and treated effectively.

X. State Concurrence

The State of Wisconsin has indicated a willingness to concur with this decision. A written confirmation is expected by September 30, 1997 and will be added to the administrative record upon receipt.

FIGURES

<IMG SRC 97098B>
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Table 1
Summary of Contaminants
Detected in Groundwater

Parameter	Total Analyses	Positive Detections	Detection Frequency	Minimum Detected Value	Maximum Detected Value	Units
Volatile Organic Compounds						
1,1-Dichloroethane	8	4	50.0%	1	27	Ig/L
1,2-Dichloroethane	8	2	25.0%	3	4	Ig/L
1,2-Dichloropropane	8	2	25.0%	5	16	Ig/L
2-Hexanone	8	1	12.5%	86	86	Ig/L
Acetone	8	2	25.0%	2	320	Ig/L
Benzene	8	5	62.5%	5	48	Ig/L
Carbon Disulfide	8	3	37.5%	0	1	Ig/L
Chlorobenzene	8	5	62.5%	1	8	Ig/L
Chloroethane	8	5	62.5%	1	13	Ig/L
cis-1,2-dichloroethene	8	4	50.0%	1	210	Ig/L
Ethylbenzene	8	4	50.0%	1	48	Ig/L
2-Butanone (MEK)	8	1	12.5%	280	280	Ig/L
4-Methyl-2-pentanone (MIBK)	8	1	12.5%	32	32	Ig/L
Styrene	8	1	12.5%	3	3	Ig/L
Toluene	8	5	62.5%	1	550	Ig/L
1,2-Dichloroethene (total)	8	5	62.5%	1	200	Ig/L
trans-1,2-dichloroethene	8	1	12.5%	1	1	Ig/L
Vinyl Chloride	8	8	100.0%	3	1,200	Ig/L
Xylenes(total)	8	3	37.5%	59	180	Ig/L
Semivolatile Organic Compounds						
1,2-Dichlorobenzene	8	2	25.0%	1	1	Ig/L
1,4-Dichlorobenzene	8	5	62.5%	2	22	Ig/L
2,4-Dimethylphenol	8	2	25.0%	5	16	Ig/L
2-Methylnaphthalene	8	3	37.5%	2	5	Ig/L
2-Methylphenol (o-cresol)	8	1	12.5%	18	18	Ig/L
4-Chloro-3-methylphenol	8	2	25.0%	8	11	Ig/L
4-Methylphenol (p-cresol)	8	1	12.5%	1,100	1,100	Ig/L
bis(2-chloroethyl)ether	8	1	12.5%	7	7	Ig/L
bis(2-ethylhexyl)phthalate	8	1	12.5%	27	27	Ig/L
Di-n-butyl phthalate	8	1	12.5%	1	1	Ig/L
Diethyllphthalate	8	4	50.0%	4	110	Ig/L
N-Nitrosodiphenylamine	8	1	12.5%	2	2	Ig/L
Naphthalene	8	3	37.5%	5	16	Ig/L
Phenol	8	1	12.5%	54	54	Ig/L
Pesticides/TCDDs						
Endrin	3	1	33.3%	0	0	Ig/L
Gamma-Chlordane	3	1	33.3%	0	0	Ig/L
Octachlorodibenzo-p-dioxin	3	2	66.7%	63	380	pg/L
2,4,5-TP (Silvex)	3	1	33.3%	1	1	Ig/L

Table 1
Summary of Contaminants
Detected in Groundwater

Parameter	Total Analyses	Positive Detections	Detection Frequency	Minimum Detected Value	Maximum Detected Value	Units
Inorganics						
Aluminum	8	8	100.0%	515	186,000	Ig/L
Antimony	8	4	50.0%	2	53	Ig/L
Arsenic	8	7	87.5%	4	112	Ig/L
Barium	8	8	100.0%	117	1,730	Ig/L
Beryllium	8	4	50.0%	2	11	Ig/L
Cadmium	8	2	25.0%	8	12	Ig/L
Calcium	8	8	100.0%	4,960	150,000	Ig/L
Chromium, Total	8	7	87.5%	2	320	Ig/L
Cobalt	8	8	100.0%	6	103	Ig/L
Copper	8	6	75.0%	14	232	Ig/L
Iron	8	8	100.0%	825	353,000	Ig/L
Lead	8	8	100.0%	3	158	Ig/L
Magnesium	8	8	100.0%	1,020	114,000	Ig/L
Manganese	8	8	100.0%	811	19,000	Ig/L
Mercury	8	6	75.0%	0	3	Ig/L
Nickel	8	8	100.0%	8	143	Ig/L
Potassium	8	8	100.0%	1,360	114,000	Ig/L
Selenium	8	8	100.0%	3	24	Ig/L
Silver	8	3	37.5%	11	22	Ig/L
Sodium	8	8	100.0%	6,390	251,000	Ig/L
Thallium	8	5	62.5%	3	21	Ig/L
Vanadium	8	8	100.0%	1	233	Ig/L
Zinc	8	7	87.5%	52	439	Ig/L

APPENDIX A

RESPONSIVENESS SUMMARY

TOMAH MUNICIPAL SANITARY LANDFILL

TOMAH, MONROE COUNTY, WISCONSIN

PURPOSE

This responsiveness summary hass been prepared to meet the requirements of Sections 113(k)(2)(B)(iv) and 117(b) of Comprehensive Environmental Response, Compensation, and Liability Act of 1986 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), which requires the United States Environmental Protection Agency (U.S. EPA) to respond to each of the significant comments, criticisms, and new data submitted in written and oral presentations on a proposed plan for remedial action. The responsiveness summary provides a summary of citizen's comments and concerns identified and received during the public comment period, and U.S. EPA's responses to those comments and concerns. All comments received by U.S. EPA during the public comment period were considered in the selection of the remedial alternative for the TMSL. The responsiveness summary serves two purposes: it summarizes community preferences and concerns regarding the remedial alternatives, and it shows members of the community how their comments were incorporated into the decision-making process.

This document summarizes written and oral comments received during the public comment period of August 7, 1997 to September 5, 1997. The comments have been paraphrased to efficiently summarize them in this document. The public meeting was held at 6:00 p.m. on August 18, 1997 at the Tomah City Hall Council Chambers, Tomah, Wisconsin. A full transcript of the public meeting, as well as all site related documents, are available for review at the Information Repository, located at the Tomah Public Library, 716 Superior Avenue, Tomah, Wisconsin. Comments and question were received during the public meeting from several residents and/or city officials. Additionally, comments were mailed to U.S. EPA.

OVERVIEW

The proposed remedial alternative for the Tomah Municipal Sanitary Landfill was announced to the public just prior to the beginning of the public comment period. U.S. EPA proposed the installation of a low permeability geomembrane and a GCL over the landfill to reduce infiltration of water, with an active gas collection system.

Community Comments

1. Comment: One commenter was concerned about the efficacy of the landfill cap to alleviate groundwater contamination.

   Response: Groundwater conditions at the site will be monitored for approximately a year after implementation of the cap. At that time, or when the Agencies determine that sufficient time has passed to assess the impact of the cap, an evaluation will be made as to the ability of the cap as well as the gas extraction system to reduce levels of contamination in ground water. After this evaluation a risk assessment will be conducted to determine the risk posed by the levels of contamination in the ground water. If needed, a second feasibility study will be conducted to look at remedial alternatives for the ground water. A proposed plan and record of decision will be issued by the U.S. EPA proposing a groundwater clean-up alternative for the site.

2. Comment: This same commenter indicated that he had lived by the landfill property for almost fifty years and had seen landfilling in the northeastern portion of the property. This portion had not previously been identified as an area that accepted wastes.

Response: Based upon this comment and the lack of sufficient remedial investigation data from the area, U.S. EPA has determined that additional characterization is needed to determine if the landfill area extends into the northeastern portion of the property. The U.S. EPA recommends that additional characterization be conducted in this area during the remedial design. The design sampling will help determine if the recommended dual-barrier cap needs to be extended to cover the suspected area. The extent of design sampling will be determined during review of the remedial design project planning documents.

3. Comment: This same commenter, as well as other citizens who attended the public meeting, had concerns about surface water runoff from the new cap affecting their properties.

Response: As part of the design and implementation of the new landfill cap, engineering controls will be put in place to collect surface run-off and prevent it from impacting properties adjacent to the landfill. U.S. EPA will require operation and maintenance of the cap so as to ensure the integrity of the cap and associated engineering controls.

4. Comment: Another commenter had questions about the extent of sampling that occurred in the Sunnyvale subdivision. In particular, why was more sampling not performed?

Response: Groundwater and landfill gas monitoring were conducted south of the landfill in the Sunnvale subdivision. Groundwater monitoring involved private well sampling as well as the installation and sampling of a monitoring well. Data collected from ground water indicated that the potential effects of the landfill on ground water to the south of the site was unlikely. This coupled with the facts that ground water appeared to moving to the east/northeast away from the subdivision and that the City of Tomah had extended municipal water services to the area provided reasonable assurances that the impact of the landfill on ground water to the south of the landfill was minimal. U.S. EPA then made the determination that an extended investigation of ground water south of the landfill was not warranted. Migration of landfill gas south of the landfill into the subdivision was also monitored. Sampling efforts concentrated on homes and yards adjacent to the landfill, since these homes appeared to be those that would affected first, until the responsible parties installed an active gas extraction system to remove the gas from the landfill. The in-home gas sampling was eventually discontinued after the gas extraction system effectively reduced the amount of gas migrating beyond the southern border of the landfill to safe levels. This system will be expanded and monitoring will continue as part of the remedy for the landfill. Capping will also increase the effectiveness of the extraction system. As part of the presumptive remedy, soil sampling was not conducted since it is assumed that the site will be capped. Some sediment and surface water sampling was conducted in Deer Creek, and the landfill was found not to have impacted the creek.

5. Comment: One commenter was concerned about the affects of the Superfund clean-up on property values near the landfill.

Response: U.S. EPA believes that, in general, a Superfund clean-up will increase property values not only on the Superfund site itself, but in areas adjacent to the site.

6. Comment: One commenter wondered how long is there going to be a guarantee that the cap is going to stay effective without changes from the EPA?

Response: After construction of the landfill cap, an operation and maintenance plan will go into effect, the purpose of which will be to ensure that the remedy continues to be effective in preventing infiltration into the landfill and removing gas. Part of the operation and maintenance will be monitoring. Should conditions arise resulting in questions aabout the integrity of the remedy, U.S. EPA and the WDNR reserve the right to propose changes to address the new conditions and secure the integrity of the remedy.

Comment of the City of Tomah

1. Comment: The City requested that remedial Alternative 3, installation of a low permeability geomembrane cap over the landfill to minimize infiltration, and an active gas extraction system, as described in the Tomah Municipal Sanitary Landfill (TMSL) Feasibility Study (FS) for Source Control be selected in the Record of Decision.

   Response: The U.S. EPA and the WDNR have reviewed and analyzed all the remedial alternatives presented in the TMSL FS for Source Control and have selected remedial Alternative 4 as the most appropriate remedy based upon an analysis of U.S. EPA's nine health, technical, and cost criteria as described in the Proposed Plan issued on August 7, 1997 and the attached Record of Decision. Alternative 4 included installation of a low permeability geomembrane and a geosynthetic clay line over the landfill to minimize infiltration of water, and an active gas extraction system. Alternative 3 failed to meet the threshold criteria for compliance with applicable or relevant and appropriate requirements because it did not include a dual-barrier system and thus did not meet state requirements. The dual-barrier landfill cap provides a sufficient back-up system should one of the barrier layers fail.

Comments of Union Camp Corporation

Union Camp Corporation, one the Potentially Responsible Parties at the Tomah Municipal Sanitary Landfill, submitted comments on the remedy, on the risk analysis, and on the allocation of responsibility for paying for the cleanup. Union Camp included in its submission the detailed comments of one of its contractors, TRC Environmental Solutions Inc., on the choice of the landfill cover and on the risk assessment. Union Camp also included copies of comments it submitted to EPA Headquarters concerning the Agency's Municipal Solid Waste Settlement Proposal.

With respect to Union Camp's comments on allocation of costs for the cleanup and on the Municipal Solid Waste Settlement Proposal, EPA declines to respond at this time. The purpose of the public comment period on the Proposed Plan for the Tomah Municipal Sanitary Landfill was to solicit comments on the remedy the Agency had tentatively chosen for the site. EPA will respond to Union Camp in due course concerning allocation and liability issues. But EPA believes it is important to keep technical questions concerning the adequacy of the selected remedy and legal/policy questions concerning allocation of responsibility separate.

Union Camp, by contrast, seems to want to blend the analysis of the proposed remedy with arguments about allocation of responsibility. There is an implication in Union Camp's comments that remedial decisions could differ depending on the number of viable PRPs at a site. Where a great many viable PRPs are present, one kind of remedy might be chosen; for an identical site with only a few viable PRPs, a different, presumably cheaper, remedy should be selected. EPA rejects this way of proceeding as fundamentally inconsistent with the National Contingency Plan.

1. Comment: Union Camp and TRC advance various arguments why selection of a dual barrier is unwarranted at the TMSL. One argument is that the improvement in performance of a dual barrier cap over a single geomembrane is minimal, and not worth the additional $469,000 it would cost. A second argument is that the choice of a dual barrier cap is a "policy" decision, not a technical/engineering decision. Finally, Union Camp asserts that single membrane liners have been selected at other sites in Wisconsin, implying that the selection of dual membrane for the TMSL is an arbitrary decison

   Response: In 1996, the State of Wisconsin changed its regulations concerning the design of final cover systems for landfills to require two impermeable layers - a geomembrane and a clay layer - rather than one. The new requirement purposely built in a certain amount of redundancy in order to provide protection if the geomembrane layer failed. Hence, arguments about the minimal incremental reduction provided by a second layer are beside the point. Union Camp's technical arguments assume that the main geomembrane layer would never fail. But what if it does? The Wisconsin regulation was

not intended to reduce infiltration by another fraction of a percent, but rather, to provide basic impermeability if the geomembrane is breached. Union Camp does not explain how the system it favors offers any similar safeguard feature. It nowhere cites any figures regarding the reliability of single membrane covers. Rather, it terms a potential breach a "speculative" event and it implies that it should have to subsidize safeguards designed to address such things. Suffice it to say that if a breach of the geomembrane were a sure thing, U.S. EPA and WDNR would not select a remedy that included a geomembrane as a component.

As for Union Camp's argument that requiring dual barrier systems is a policy decision, U.S. EPA agrees, but questions why Union Camp finds fault with that. Most, if not all, environmental requirements - state and federal - are imposed as a result of policy decisions. We should be clear that by a "policy decision," we mean here that, in order to guard against the failure of landfill cover systems, Wisonsin chose to impose by regulation a requirement for a dual barrier system. This was not a policy decision in the sense of a guidance document or policy paper that might or might not be followed. Since 1996, dual barriers have been legally required in Wisconsin.

U.S. EPA is not aware of any instances since the 1996 regulations were adopted of WDNR's approving a single barrier cover for a landfill in Wisconsin. There may be instances prior to 1996, but the adoption of new standards makes those cases irrelevant.

2. Comment: Union Camp is concerned that because of the prospect "that the extreme nature of the risk assessment may precipitate unwarranted public concern, " the current risk assessment should not be published as a final administrative record document.

Response: U.S. EPA used the current risk assessment in selecting the source control remedy. It was therefore both proper and necessary for U.S. EPA to include the risk assessment in the administrative record. EPA made it available for public review together with the rest of the administrative record at the Tomah Public Library. To date, EPA has received no comments expressing unwarranted public concern about the risk assessment.

EPA disagrees with Union Camp that the risk assesment was extreme in nature. U.S. EPA's contractor used standard U.S. EPA guidance documents and standard policy in developing rasonably conservative assumptions. U.S. EPA and the WDNR reviewed and approved it. Of course, the risk assessment may be superseded by further analysis. But that is no reason to suppress the current risk assessment.

3. Comment: TRC states that in the risk assessment "the exposure scenario is not an appropriate representation of potential current risks, as the concentrations of constituents of concern (COCs) are from a well located immediately downgradient and adjacent to the landfill boundary and are not representative of current exposure point concentrations".

Response: Since the monitoring well network used to characterize impact to local groundwater conditions in the vicinity of the landfill contains only eight wells, a reasonable but conservative approach to assessing potential impacts to human health must take into account the possibility that parent chemicals and their products of degradation may exist at concentrations that are higher than what were observed. Ideally, the best way to provide a conservative estimate of a potential exposure is to provide the 95% upper confidence limit (UCL) of the mean concentration; however, this approach is a viable option only with a sample size large enough to provide a good estimate of the mean. This is suggested to be 10 samples at a miniumum, preferably twenty or more (EPA 1992). In cases where the sample populations are small or where the data exhibits considerable variability, guidance suggests that the highest measured or modeled concentrations be used as the exposure concentrations. Since only eight monitoring wells were available to characterize groundwater conditions, the highest values detected were used in the risk assessment, in accordance with guidance.

4. Comment: TRC states that in the risk assessment "the future risk scenario cannot be completed until there is a determination regarding institutional controls, which could or will be imposed, regarding future well drilling in the area."

Response: At the time the risk assessment was issued, institutional controls were not in place, and since the option still existed for not implementing this action, a reasonably conservative position of continuity with current conditions was taken. Due to the uncertainties associated with assessing future scenarios under these conditions, this position is still believed to be the most realistic and protective of human health since it covers what could occur in the event that no action is implemented and other conditions are allowed to remain the unchanged. In summary, a re-issue of the risk assessment based on alternative "future" scenarios is not warranted.

5. Comment: TRC states that in the risk assessment "the arithmetic mean is reported as 279 mg/L on page 2-18, when it should read 279 ug/L".

Response: Page 2-18 of the text does state that the mean concentration for vinyl chloride is reported in mg/L, when in reality, the units should have been reported as ug/L. Mean values were discussed in the uncertainty section and were not used for assessing potential risks, therefore this text error has no bearing on the calculations. As shown in the risk assessment tables, the highest downgradient concentration for vinyl chloride is 1200 ug/L.

6. Comment: TRC states that in the risk assessment "it is unclear how the 'volatilization factor' was used and how the dimensions of the risk calculation balance."

Response: The volatilization factor is a unitless number set at a default value of "0.0005 x 1000 L/m3" ("0.5" as presented in the assumptions). This default value is an integral part of equations 1 and 2 presented in RAGS Part B (EPA 1991) and is based on the relationship between the concetration of a contaminant in household water and the average concetration of the volatilized contaminant in air. In the derivation of this number, all uses of household water were considered and a default air exchange rate and dwelling size was assumed. For more information on the volatilization factor used in these equations, RAGS direct the reader to the paper by J.B. Andelman (1990).

U.S. EPA ADMINISTRATIVE RECORD **AR**

REMEDIAL ACTION

TOMAH SANITARY LANDFILL

TOMAH, WISCONSIN

ORIGINAL

08/30/95

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2	06/27/84	Nolan, C., Ecology and Environment, Inc.	U.S. EPA	Site Inspection Report	14
3	12/05/84	Nolan, C., Ecology and Environment, Inc.	File	Memorandum re: June 19, 1984 Site Inspection	3
4	03/26/92	Ecology and Environment, Inc.	U.S. EPA	Letter Report	113
5	09/00/93	U.S. EPA/OSWER	U.S. EPA	Quick Reference Fact Sheet: "Presumptive Remedies: Policy and Procedures" (OSWER Directive 9355.0-47FS; EPA 540-F-93 047; PB 93-963345)	8
6	09/00/93	U.S. EPA	U.S. EPA	Quick Reference Fact Sheet: "Presumptive Remedy for CERCLA Municipal Landfill Sites" (OSWER Directive 9355.0-49FS; EPA 540-F-93-035; PB 93-963339)	14
7	03/10/94	Dames & Moore	U.S. EPA	Work Plan (DRAFT): Volume 1 of 2 (Text and Attachments A-B)	265
8	03/10/94	Dames & Moore	U.S. EPA	Work Plan (DRAFT): Volume 2 of 2 (Attachments C-E)	342
9	06/18/94	Dames & Moore	U.S. EPA	Work Plan: Addendum I	154
10	07/13/94	Trainor, D. and Steiner, J., Dames & Moore	Mankowski, M., U.S EPA	Letter re: D&M's Responses to U.S. EPA's Quality Assurance Section Comments to Addendum I of the Work Plan	9
11	02/21/95	Dames & Moore	U.S. EPA	Remedial Investigation Report (DRAFT): Volume 1 of 2 (Text)	146
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ADMINISTRATIVE RECORD
FOR
TOMAH SANITARY LANDFILL SITE
TOMAH, MONROE COUNTY, WISCONSIN

UPDATE #1
JULY 25, 1997

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1	06/13/95	Dames & Moore	U.S. EPA	Work Plan for Phase II of the Remedial Investigation/Feasibility Study (RI/FS) at the Tomah Municipal Sanitary Landfill Site	242
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3	07/13/95	Mankowski, M., U.S. EPA	Patterson, K., City of Tomah	Letter re: U.S. EPA/WDNR Conditional Approval of the Phase II RI Work Plan for the Tomah Municipal Landfill Site w/Comments	9
4	12/20/95	Trainor, D., Dames & Moore	Mankowski, M., U.S. EPA	Letter: D&M's Responses to Conditional Approval of the RI Phase II Work Plan	24
5	04/00/96	Dames & Moore	U.S. EPA	LFG Migration Control Project Report for the Tomah Landfill Site	110

6	04/03/96	Kuhlman, W.; Boardman, Suhr, Curry & Field	Mankowski, M. and N. Zippay, U.S. EPA	Letter re: Outline of Measures Concerning the Methane Issue	5
7	04/24/96	Zippay, N. and M. Mankowski, U.S. EPA	Kuhlman, W.; Boardman, Suhr, Curry & Field	Letter re: U.S. EPA Approval of Proposed Short Term Measures as Outlined in the Design Specifications	2
8	06/12/96	Ch2M Hill	U.S. EPA	Final Risk Assessment for the Tomah Municipal Sanitary Landfill Site	177
9	06/13/96	Mankowski, M., U.S. EPA	Patterson, K., City of Tomah	Letter re: U.S. EPA/WDNR Conditional Approval of the Draft Final RI Report and the Responses to U.S. EPA Comments on the Draft Final RI Report	10
10	07/15/96	Dames & Moore	U.S. EPA	Remedial Investigation Report for Source Control: Volume I (Text, Tables and Figures) [FINAL]	284
11	07/15/96	Dames & Moore	U.S. EPA	Remedial Investigation Report for Source Control: Volume II (Appendices A-H) [FINAL]	1433

12	09/27/96	Dames & Moore	U.S. EPA	Response to U.S. EPA and WDNR Comments and Revised Future Activities Plan for the RI/FS of Groundwater and Source Control at the Tomah Municipal Sanitary Landfill Site	36
13	10/28/96	Mankowski, M., U.S. EPA	Patterson, K., City of Tomah	Letter re: U.S. EPA/ WDNR Discussion and Comments Concerning the Remaining Issues on the Response to U.S. EPA/WDNR Comments and Revised Future Activities Plan	6
14	04/14/97	Dames & Moore	U.S. EPA	Feasibility Study for Source Control: Final (Revised) Draft Report	120
15	07/15/97	Mankowski, M., U.S. EPA	Patterson, K., City of Tomah; et al.	Letter re: U.S. EPA/WSNR Approval w/Modifications of the Feasibility Study for Source Control, Final (Revised) Draft Report w/Attachments	16

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ADMINISTRATIVE RECORD
FOR
TOMAH MUNICIPAL SANITARY LANDFILL SITE
TOMAH, WISCONSIN

UPDATE #2
SEPTEMBER 12, 1997

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1	08/18/97	Southwest Reporters, Inc.	U.S. EPA	Transcript of Proceedings: August 18, 1997 U.S. EPA Public Meeting re: the Tomah Armory Landfill and Tomah Municipal Sanitary Landfill Sites	102
2	09/04/97	Johnson, W., City of Tomah	Bill, B., U.S. EPA	Letter re: City of Tomah's Comments on the Proposed Plan for the Tomah Municipal Sanitary Landfill Site	2
3	09/04/97	Marshall, D., Union Camp Corporation	Bill, B., U.S. EPA	Letter re: Union Camp's Comments on the Proposed Plan for the Tomah Municipal Sanitary Landfill Site	31
4	09/05/97	Tomah Residents	U.S. EPA	Three Public Comment Sheets re: Citizens' Comments on the Proposed Plan for the Tomah Municipal Sanitary Landfill Site (PORTIONS OF THIS DOCUMENT HAVE BEEN REDACTED)	3