

Five-Year Review Report


**First Five-Year Review Report
for
Stoughton City Landfill Superfund Site
Stoughton, Dane County, Wisconsin**

April 2003

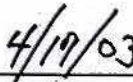
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Date:



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4/19/03

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Executive Summary

The remedy for the Stoughton City Landfill site in Stoughton, Dane County, Wisconsin, according to the September 1991 Record of Decision and the February 1996 Explanation of Significant Differences, included: excavation of wastes outside the area of main waste disposal and placement of these materials under the cap; placement of a solid waste landfill cover (cap) system over the waste disposal area; placement of a fence around the cap, or slightly within the edges of the cap; land use restrictions to prevent the installation of drinking water wells within 1200 feet of the property boundary and to prevent residential development of the property; and long-term groundwater monitoring to confirm the effectiveness of the other components of the selected remedy. The Record of Decision also included a requirement for the extraction and treatment of contaminated groundwater unless additional investigations indicated that this might not be required; further investigation of the groundwater during the remedial design indicated that it was not necessary to implement this at the time of the construction of the cap. The site achieved construction completion with the signing of the Preliminary Close Out Report on December 15, 1998. The trigger for this review was the reported start of on-site construction on April 10, 1998.

The assessment of this five-year review found that the remedy was constructed in accordance with the Record of Decision and the Explanation of Significant Differences. The remedy is functioning as anticipated. Because the remedial actions are protective, the remedy at the site is protective of human health and the environment in the short term. However, the institutional controls (deed restrictions) that are part of the remedy have not yet been implemented. Until these are, the remedy is not protective in the long term.

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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name (from <i>WasteLAN</i>): Stoughton City Landfill		
EPA ID (from <i>WasteLAN</i>): WID980901219		
Region: 5	State: WI	City/County: Stoughton/Dane County
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify) _____		
Remediation status (choose all that apply): <input type="checkbox"/> Under construction <input checked="" type="checkbox"/> Operating <input type="checkbox"/> Complete		
Multiple OUs?* <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Construction completion date: <u>12/15/98</u>
Has site been put into reuse? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
REVIEW STATUS		
Lead Agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
Author name: Bernard J. Schorle		
Author title: Support Agency Coordinator		Author affiliation: USEPA, Region 5
Review period: * <u>10/02/02</u> to <u>4/10/03</u>		
Date(s) of site inspection: <u>4/03/03</u>		
Type of review: <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA		
<input type="checkbox"/> Non-NPL remedial action site <input type="checkbox"/> NPL State/Tribe-lead		
<input type="checkbox"/> Regional discretion <input type="checkbox"/> NPL-removal only		
Review number: <input checked="" type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
Triggering action:		
<input checked="" type="checkbox"/> Actual RA on-site construction at OU # <u>1</u> <input type="checkbox"/> Actual RA start at OU # _____		
<input type="checkbox"/> Construction completion <input type="checkbox"/> Previous five-year review report		
<input type="checkbox"/> Other (specify) _____		
Triggering action date (from <i>WasteLAN</i>): <u>4/10/98</u>		Due date: <u>4/10/03</u>

*--"OU" refers to operable unit.

**--Review period should correspond to the actual start and end dates of the five-year review in *WasteLAN*.

Issues:

- The groundwater monitoring program does not include the reporting of groundwater elevations.
- Water is flowing from some wells and discharging on the ground.
- The institutional controls specified in the 1997 Consent Decree have apparently not been recorded with the authorities.

Recommendations and Follow-up Actions:

- USEPA will work with the state to have the required changes in the monitoring program implemented.
- USEPA will consult with the state to emphasize the necessity for paying special attention to the flowing wells, and USEPA will be following the concentrations in these wells. If the concentrations of contaminants exceed acceptable levels then steps will be taken to prevent contact with the contaminated water.
- USEPA will oversee the placement of the institutional controls that have been agreed upon.

Protectiveness Statement(s):

The remedy is protective of human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are being controlled and monitored. The remedy is not protective of human health and the environment in the long term since the institutional controls that are needed to prevent future exposure to, or ingestion of, contaminated groundwater and exposure to the contents of the waste disposal area have not been implemented. Threats at the site have been addressed through capping, venting of the landfill, maintenance of the site, and monitoring of the groundwater and vent gases.

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**Stoughton City Landfill Superfund Site
Stoughton, Dane County, Wisconsin
First Five-Year Review Report**

I. Introduction

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in a five-year review report. In addition, the five-year review report identifies issues found during the review, if any, and identifies recommendations to address them.

The Agency is preparing this five-year review report pursuant to §121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Part 300). CERCLA §121 states:

If the president selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section 104 or 106, the President shall take or require such action. The president shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

Region 5 of the United States Environmental Protection Agency (USEPA) has conducted the five-year review of the remedy implemented at the Stoughton City Landfill Superfund site in Stoughton, Wisconsin. This review was conducted for the entire site by the support agency coordinator through March 2003. This report documents the results of the review.

This is the first five-year review for the Stoughton City Landfill (SCL) site. The triggering action for this statutory review is the reported initiation of the remedial action on April 10, 1998; this was the date that mobilization of construction equipment and subcontractors began. The five year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use or unrestricted exposure.

II. Site Chronology

Event	Date
Landfill began operation (initially as an uncontrolled dump)	about September 1952
Operation as a state-licensed landfill began	1969
Wisconsin Department of Natural Resources required closure	1977
Closure completed following operation for landfilling of construction debris since 1978	1982
Site proposed for the National Priority List (NPL)	10/15/84
Placed as final on the NPL	6/10/86
Administrative Order by Consent for the remedial investigation (RI) and feasibility study (FS)	April 15, 1988 effective May 2, 1988
RI field work begins	March 1989
Proposed Plan released	7/12/91
Public meeting to discuss Proposed Plan and RI and FS reports	7/24/91
End of public comment period for the Proposed Plan	8/12/91
Record of Decision (ROD)	9/30/91
Fund lead remedial design (RD) began	9/28/92
Negotiations for RD and remedial action completed	9/28/92
Explanation of Significant Differences released	2/29/96
RD completed	1/30/97
Consent decree for cost settlement between City of Stoughton and United States and State of Wisconsin	lodged 6/5/97 entered 8/13/97
Fund lead RA began	9/27/97
On-site mobilization for RA began	4/10/98
Preliminary Close Out Report (construction completion under CERCLA)	12/15/98
Site inspection for the first five-year review	4/08/03

III. Background

Land and Resource Uses and Physical Characteristics

The Stoughton City Landfill site is located in the northeast portion of Stoughton, Dane County, Wisconsin. The property containing the landfill site encompasses approximately 27 acres and occupies a portion of section 4, township 5 north, range 11 east. Although the landfill property originally occupied approximately 40 acres, landfilling has occurred on only about 15 acres of the property. Since 1982, land exchanges between the city and the owner of an adjacent property have modified the original property boundaries.

A wetland area that existed in the southeast portion of the current property boundary was the initial area of waste disposal. Wetlands occur adjacent to the southeast portion of the site, in the north portion of the site, and west of the site along the Yahara River. The river comes within approximately 400 feet of the waste disposal area. Approximately 1/8 of the site (the northeastern section, which consists of wetlands) is situated within the 100-year flood plain. The nearest developed land occurs along Amundson Parkway, the site access road to the south, and Skogdalen Dr., a road off Amundson Parkway just south of the site, where residential homes have been built. An extensive residential area occurs approximately 1/4 mile south of the site, where

the city street grid pattern begins. The land immediately adjacent to the southern site boundary was undeveloped at the time of the remedial investigation. Then, as now, there was no developed land in the vicinity of the site to the west, north or east. The City of Stoughton now has a population of about 12,400. The residents of Stoughton are connected to city water.

Quaternary/glacial deposits, composed primarily of lacustrine plain and ice-contact stratified deposits, are approximately 200 feet thick at the site. Ice-contact stratified deposits generally include significant sand and gravel deposits and land forms such as kames and eskers. These deposits occupy higher ground within the landfill site and south of it. Lacustrine plain or glacial lake-bottom sediments are generally composed of fine-grained silt and clay. Some sand is present near former shorelines and stream inlets. These areas are often flat, poorly drained, and show evidence of peat accumulation. Lacustrine plain deposits occupy the southeast portion of the current property boundary, which was initially developed for waste disposal, and the low-lying ground adjacent to the east, north, and west portion of the site. Lacustrine plain sediments are generally overlain by younger marsh deposits. Under these deposits is reported to be Cambrian sandstone bedrock.

Regional groundwater flow is toward the Yahara River, which serves as a groundwater discharge. However, the groundwater flow in the surficial aquifer was radial beneath the site at the time of the remedial investigation. The surficial aquifer and the aquifer in the bedrock are hydraulically connected. Municipal well #3 is situated about 3000 ft west of the site and is set in the sandstone bedrock as an open pipe from roughly 210 ft below ground surface to 940 ft below ground surface.

History of Contamination and Initial Response

The City of Stoughton purchased the original 40-acre site in July 1952 and annexed it in September 1952 when landfill operation began. Between 1952 and 1969 the facility was operated as an uncontrolled dump site. Common municipal waste and both dry and liquid wastes were disposed of at the site. Some sludge materials containing 2-butanone, acetone, tetrahydrofuran, toluene, and xylene mixtures were disposed of at the site from 1954 until 1962. During this period, the liquid wastes were commonly poured over garbage and burned. It was also reported that some liquid wastes were poured down holes drilled to test auger drilling equipment in the west-central portion of the landfill. In 1969, the facility began operation as a state-licensed landfill. In 1977, the Wisconsin Department of Natural Resources (WDNR) required that the site be closed according to state regulations. Closure activities included construction of a trash transfer station, placement of cover material borrowed from the northwest portion of the site and from agricultural areas, application of topsoil also derived from an agricultural area, and seeding. From 1978 to 1982 only brick, rubble, and similar construction materials were accepted at the site while closure work was performed. The landfill was officially closed in 1982.

The site was placed on the National Priorities List (NPL) in June 1986. In March 1988, the two potentially responsible parties (PRPs) named for the site entered into an Administrative Order by Consent with USEPA and WDNR for the performance of a remedial investigation and feasibility study (RI/FS). Remedial investigation field activities began in March 1989. ERM-North Central was originally contracted by the PRPs to conduct the work related to the remedial investigation.

and feasibility study. ERM was replaced by ENSR Consulting and Engineering in 1990 to complete the remaining tasks of the remedial investigation and feasibility study. The Final Remedial Investigation Report, dated January 17, 1991, was submitted by the Stoughton City Landfill Steering Committee. The Final Feasibility Study Report was dated June 20, 1991. A report on a preliminary ecological site assessment was issued by USEPA in July 1991.

A Proposed Plan for remedial action was released for public comment on July 12, 1991, with a 30-day comment period ending August 12, 1991. A public meeting was held on July 24, 1991 at which the Proposed Plan and the findings of the remedial investigation and the feasibility study were discussed and oral comments were taken. A Record of Decision, in which the remedy selected for the site was described, was signed September 30, 1991. An Explanation of Significant Differences, in which a change in the remedy selected was described, was issued on February 29, 1996.

One of the PRPs who had performed the RI and FS filed for bankruptcy and the other PRP said that it could not pay for implementing the entire remedy. The latter PRP settled with the United States and the State of Wisconsin through a Consent Decree entered in August 1997; this Consent Decree required this PRP to pay some monies to the United States and to the State of Wisconsin for their response costs. Eventually USEPA received some money from the former PRP in the bankruptcy proceedings. The remedial design, remedial action, and operation and maintenance were and have been implemented using these monies and Fund money.

Extent of Contamination

Results of the remedial investigation indicated that groundwater to the west of the site was contaminated with tetrahydrofuran (THF) in concentrations which exceeded the Wisconsin enforcement standard (ES) by more than one order of magnitude (660 µg/l versus 50 µg/l). Limited sampling and analyses were conducted of the wastes themselves, and the results indicated the presence of polynuclear aromatic hydrocarbons (PAHs) and phthalates. Bis(2-ethylhexyl)-phthalate was detected in waste in concentrations as high as 600,000 µg/kg. Sediments in the eastern wetlands were found to contain elevated levels of aluminum, calcium, and magnesium. PAHs, phthalates, benzoic acid, cadmium, and lead were found in low concentrations in sediment samples taken from the wetlands southeast of the site.

THF was measured at MW-3D at concentrations above the ES during all three sampling rounds performed during the remedial investigation. THF was also measured in one sampling round at MW-4D and MW-5S above the Wisconsin preventive action limit (PAL) (10 µg/l). There were no federal drinking water standards for THF at the time of the remedial investigation and there are still none. (NR 140.10 of the Wisc. Adm. Code (Wisconsin Administrative Code) says, "For all substances that have carcinogenic, mutagenic or teratogenic properties or interactive effects, the preventive action limit is 10% of the enforcement standard. The preventive action limit is 20% of the enforcement standard for all other substances that are of public health concern.")

Trichlorofluoromethane was measured in MW-5S and MW-5D during all sampling rounds at concentrations below the Wisconsin PAL (698 µg/l). Dichlorodifluoromethane was detected in MW-3D, MW-5S, and MW-5D in concentrations from 16 µg/l to 240 µg/l during some sampling

rounds. No federal groundwater standards existed for dichlorodifluoromethane but the state had an interim recommended PAL of 300 µg/l at the time of the remedial investigation.

Elevated concentrations of metals were detected in various shallow and deep monitoring wells located in all directions away from the waste disposal area except to the northeast. The concentration of arsenic (5.2 µg/l) was slightly above the PAL of 5 µg/l in MW-2S in one duplicate sample. The highest concentration of barium in MW-2S (293 µg/l) was above the PAL of 200 µg/l. The concentration of barium was above the PAL at MW-1S; however, this concentration was not significantly above background. Selenium was detected above the PAL in upgradient well MW-1S. Chromium was measured in MW-4D below the limit of quantification but above the PAL. Concentrations of the following constituents were above the Wisconsin groundwater quality standards: iron (in MW-2S, MW-3S, MW-4D, and MW-5D) and manganese (in all wells, including the background well). Iron was also above the standard in the private well sampled for background purposes. The public welfare standards for these two substances are not health related, but rather are for aesthetics (e.g., color and fixture staining).

Site Risks

A baseline risk assessment was performed for the Record of Decision. The original assessment had to be modified when it was found that an incorrect ingestion reference dose was used for THF (the corrected reference dose at the time was 0.002 mg/kg-d, which was obtained from USEPA's Environmental Criteria and Assessment Office (ECAO) (April 15, 1991), and the one originally used was 0.068 mg/kg-d). Based on the risk assumptions and routes of exposure considered (ingestion of the waste, direct skin contact and ingestion of contaminants in the surface water and sediment, direct skin contact with and ingestion of contaminated soil, drinking contaminated groundwater at the landfill, and breathing air at the landfill), the contaminants at the Stoughton City Landfill could result in unacceptable non-carcinogenic risks such as impaired organ function in both adults and children. The maximum cumulative non-carcinogenic risk was determined by USEPA to be 9.5 for ingestion of water from well MW-3D, using a THF concentration in this well of 660 µg/l. This is the adult hazard index (HI), with 1.0 being the acceptable upper value. About 99% of this hazard index was due to the presence of THF. Adding contributions from dermal contact and inhalation, the HI was 10. These risks were based on future residential land use scenarios within close proximity to the site and on future groundwater use at the site.

The maximum carcinogenic risks from the site (considered for both the single, worst-case well approach and reasonable maximum risk associated with the 95 percent upper confidence level [UCL]) were within the agency's allowable risk range. The highest total site risk for the worst well approach was 9.7×10^{-5} . USEPA considers risks at Superfund sites that exceed 1×10^{-4} to be unacceptable.

Basis for Taking Action

Actual or threatened releases of hazardous substances from this site, if not addressed by implementation of the response action selected in the Record of Decision, might present an imminent and substantial endangerment to public health, welfare, or the environment. This determination

was based on the findings in the remedial investigation and the baseline risk assessment.

IV. Remedial Action

Remedy Selected

The primary purpose of the remedy selected for this site was to restrict the release of contamination, in particular, the release of contamination into groundwater. Briefly, the remedy selected in the September 30, 1991 Record of Decision was:

- excavation of wastes in contact with groundwater to the southeast and northeast and placement of these materials under the cap;
- placement of a solid waste landfill cover (cap) system over the waste disposal area;
- extraction and treatment of contaminated groundwater unless additional investigations indicated that this might not be required;
- placement of a fence around the cap, or slightly within the edges of the cap;
- land use restrictions to prevent the installation of drinking water wells within 1200 feet of the property boundary and to prevent residential development of the property; and
- long-term groundwater monitoring to confirm the effectiveness of the other components of the selected remedy.

A February 29, 1996 Explanation of Significant Differences reduced the amount of wastes that were to be relocated under the cap. Further investigation of the groundwater during the remedial design indicated that it was not necessary to implement the extraction and treatment of the groundwater at the time of the construction of the cap and the other parts of the remedy.

Remedy Implementation

The closure of the Stoughton City Landfill site involved the excavation and relocation of saturated waste deposited in wetlands, construction of a multilayer soil cover system, installation of a passive gas venting system, and construction of an access road and a perimeter security fence. Construction took place between April and December 1998. The site after construction is shown in Figure 1.

The closure included the following:

- construction of temporary facilities and security fencing;
- construction of a decontamination pad and development of a water management plan for water resulting from decontamination and dewatering;
- clearing, grubbing, and stripping of existing topsoil within the limits of the cap;
- installation of soil erosion control measures, including a temporary flood control berm along the edge of the existing wetlands;
- demolition and onsite consolidation of existing on-site facilities and debris, including a water line and picnic shelter;
- abandonment of some existing monitoring wells on the site;
- removal and onsite disposal and consolidation of drummed wastes from remedial investigation activities;
- test pit investigations to determine the limits of the wastes;

- excavation, dewatering, and on-site consolidation of saturated wastes, including the construction of a dewatering pad;
- construction of the multilayer soil cover system (cap) after completion of a clay test pad;
- installation of a passive landfill gas vent system;
- construction of a permanent access road;
- installation of a permanent perimeter fence and gates; and
- final grading and restoration, including construction of a storm water and erosion system.

Additional wastes were encountered during the abandonment of the existing water line and, consequently, additional test pits were excavated in areas outside the originally defined waste relocation areas. It was found that wastes to the south extended to within a few feet of Skogdalen Drive. Due to the additional wastes discovered outside the original limits and some waste found to be at a greater depth than was anticipated, the actual amount of wastes relocated was nearly 25,000 cubic yards. This resulted in the cover being raised about two feet at the high point.

According to the Remedial Action Report prepared by USEPA's contractor, Roy F. Weston, Inc., the total anticipated cost for construction of the landfill cap, based on the Final Design Report, February 7, 1997, was \$4,286,500. The original bid amount for the work was about \$1,852,000 and change orders brought this to \$2,084,000.

Construction completion for the site was deemed to have been achieved with the issuance of the Preliminary Close Out Report on December 15, 1998.

One of the elements of the deed restrictions that were to be placed on the two parcels of property at the site states, "No water wells, other than monitoring wells, shall be located on the property." The Record of Decision calls for the prohibition of wells within 1200 feet of the property boundary. This ROD requirement is being met by the requirement of NR 504.04 of the Wisc. Adm. Code that a landfill not be located within 1200 feet of any public or private water supply well.

Operation and Maintenance

Wisconsin Department of Natural Resources is providing the operation and maintenance required under the state's regulations for a closed landfill and the monitoring required by the ROD. Mostly this consists of groundwater and vent gas monitoring and cap inspection and maintenance.

V. Progress Since the Last Five-Year Review

This is the first five-year review.

VI. Five-Year Review Process

Administrative Components

The WDNR remedial project manager was notified of the upcoming five year review in a message dated October 2, 2002. The review consisted of: a perusal of past documents, including those documents that provided the history of the site; an examination of the monitoring reports

prepared since construction was completed and the data that they presented; notification of the community that the review was to take place; site inspection; and report preparation and review.

Community Notification and Involvement

An advertisement was placed in the Stoughton Courier Hub in January 2003 to inform the public of the upcoming review. A mailing list was developed and a notice about the review was mailed to the parties on this list January 16, 2003. In the advertisement and the notice the public was told that comments concerning the site could be submitted through February 21, 2003. These also reminded the public of the remedy selected and where the repositories were located. One comment was received.

A notice will be sent out informing the public of the completion of the review and the availability of the report once the report is signed.

Document Review

For this review, the support agency coordinator has gone over the periodic reports on the monitoring and has consulted with the remedial project manager. The ROD and some of the other past documents that have been submitted were also reviewed.

Data Review

The main objectives of the groundwater monitoring are to track the concentrations of tetrahydrofuran (THF) and dichlorodifluoromethane (DCDFM), which were identified during the earlier studies as the two substances that were of most concern, and to more extensively check the groundwater quality about every five years. In the semi-annual sampling, THF and DCDFM are being analyzed for in about 28 monitoring wells. In those wells where PALs were exceeded for a volatile organic compound (VOC) during the August 2000 sampling event, the groundwater is being analyzed for the list of VOCs at each semi-annual event. Several field parameters are also being measured at these events, but the water elevations are not being reported; measuring water elevations is a standard element of groundwater sampling. For the five year sampling events, additional analyses will be performed, including analyses for inorganics.

The results for DCDFM and THF are summarized in Table 1. Well nests MW-13 (near the river), MW-9, MW-11 (at the northwest waste boundary), MW-5 (near the waste boundary), MW-14, MW-10 (near the river), MW-4, MW-8, MW-7 (near the river), MW-3 (near the waste boundary), MW-15, and MW-1 (near the southwest toe of the waste boundary) are along the western side of the site, proceeding southward.

A baseline sampling event was performed in April 1998, at the time the on-site remedial work was beginning. This occurred before the capping of the landfill began. THF (ES = 50 µg/l and PAL = 10 µg/l) was measured at concentrations above its PAL in five wells, with the highest concentration being found in well MW-3D (310D µg/l, where D indicates that the analytical result was obtained using a diluted sample). The THF concentration was also above the ES in well EW-01 (58 µg/l); this well is no longer being sampled. The DCDFM concentration was at

its PAL in well MW-9S (200D $\mu\text{g/l}$); it was not above the PAL in any wells. Another substance that was of special interest at that time was trichlorofluoromethane (TCFM) (PAL = 698 $\mu\text{g/l}$ and ES = 3490 $\mu\text{g/l}$); its concentrations did not exceed the PAL in any wells.

Other concentrations measured in April 1998 that are of interest were: 2J $\mu\text{g/l}$ of trichloroethene (TCE) (PAL = 0.5 $\mu\text{g/l}$) and 3J $\mu\text{g/l}$ of tetrachloroethene (PCE) (PAL = 0.5 $\mu\text{g/l}$) in well MW-10I; 7J $\mu\text{g/l}$ of TCE and 5J $\mu\text{g/l}$ of PCE in well MW-14I; 8J $\mu\text{g/l}$ of PCE in well MW-14S. The lead concentrations exceeded the ES (15 $\mu\text{g/l}$) in the majority of the wells, including upgradient wells MW-12S, MW-12I, and MW-12D. There were numerous exceedences of the PALs for inorganics. Well MW-7S had exceedences of the ESs for chromium and nickel, but there was little water in this well so the results may be suspect.

It is to be noted that THF and DCDFM do not have federal maximum contaminate levels (MCLs). USEPA's Region 9 publishes a table of preliminary remediation goals (PRGs). In this table, concentrations in water are given that result from a specified scenario and correspond to a cancer risk of 10^{-6} for carcinogens or a hazard quotient of 1.0 for non-carcinogens (the sum of the hazard quotients (HQs), when there is more than one non-carcinogen, gives the hazard index; a HQ or HI of 1 is the maximum acceptable value); if a substance falls into both categories, then the lower concentration is presented in the table. For THF the PRG is 1.6 $\mu\text{g/l}$, considering this to be a carcinogen (it is 160 $\mu\text{g/l}$ for a cancer risk of 10^{-4}), and for DCDFM the PRG is 390 $\mu\text{g/l}$, considering this to be a non-carcinogen (it is 39 $\mu\text{g/l}$ for an HQ = 0.1). Using the non-carcinogen data for THF, the PRG would be 580 $\mu\text{g/l}$ (58 $\mu\text{g/l}$ for HQ = 0.1); this value is based on the use of 0.21 mg/kg-d for the oral reference dose, which reportedly came from USEPA's National Center for Environmental Assessment (NCEA), the successor to ECAO. As noted above, the oral reference dose used at the time of the ROD was 0.002 mg/kg-d, obtained from ECAO. At the time of the ROD, THF was not considered to be a carcinogen.

The April 2001 sampling event included a baseline analysis for metals. Concentrations of note during this sampling event were: 53 $\mu\text{g/l}$ of THF in well MW-3D and 22 $\mu\text{g/l}$ in well MW-13I; 5.1 $\mu\text{g/l}$ of PCE in well MW-14S; 1 $\mu\text{g/l}$ of vinyl chloride (ES = 0.2 $\mu\text{g/l}$, PAL = 0.02 $\mu\text{g/l}$, and MCL = 2 $\mu\text{g/l}$) in well MW-10I; 47 $\mu\text{g/l}$ of cobalt (PAL = 8 $\mu\text{g/l}$) and 58 $\mu\text{g/l}$ of vanadium (PAL = 6 $\mu\text{g/l}$) in well MW-13S. (It is to be noted that in the April 1998 sampling the detection limit for vinyl chloride was 10 $\mu\text{g/l}$ whereas for this event the detection limit varied from 0.25 $\mu\text{g/l}$ to 2.5 $\mu\text{g/l}$.)

The results for the sampling and analysis for the November 2002 event for THF and DCDFM are given in Table 1; the PAL for THF was exceeded in three wells, with one of these being above the ES. However, THF was found in the two field blanks at 2.6 and 4.4 $\mu\text{g/l}$, so concentrations below and near to this may not be correct. Other concentrations to be noted were: 2.3 $\mu\text{g/l}$ of PCE in well MW-10I, 6.2 $\mu\text{g/l}$ in well MW-14S, and 2.0 $\mu\text{g/l}$ in well MW-14I; 1.7 $\mu\text{g/l}$ of TCE in well MW-10I, 4.1 $\mu\text{g/l}$ in well MW-14S, and 3.7 $\mu\text{g/l}$ in well MW-14I; 0.71 $\mu\text{g/l}$ of vinyl chloride in well MW-10I. The detection limit for vinyl chloride was generally 0.25 $\mu\text{g/l}$.

As can be seen in Table 1 the quality of the groundwater appears to be improving when considering the two substances of major concern, THF and DCDFM.

Annually, some of the passive gas vent wells are sampled, with different vents being selected each year. In the January 2003 report of the sampling event of September 2002, when five wells were sampled, THF was found in all the samples, ranging from 640 to 1300 ppbv (parts per billion by volume). The only other substance found in all five wells was 2-propanol, ranging in concentration from 3900 to 26,000 ppbv. Freon 12 was found in four of the wells, ranging in concentration from 110 to 860 ppbv. In one of the wells concentrations of 13 VOCs were measured. The wells had been capped three days prior to sample collection; the sample came from the well, not from the air around it. The report states that very low to no flow was detectable at the passive gas vents at the time the samples were collected.

There are three gas monitoring probes outside the waste area. In the March 5, 2003 report on a facility inspection and gas monitoring probe results, the level of "methane" in the probes was very low (0.6 % of the lower explosive limit for methane and less) for all three months. The passive gas vent monitoring report also showed low levels of methane in the vents, except for vent GV-14 where the % LEL was reported to be 5.5, which is not high enough to be concerned about. In a couple of previous reports, the results for vent GV-14 were similar to most of the rest of the vents and it was vent GV-13 that had results that differed from the rest. There does not appear to be a gas problem associated with the landfill.

Site Inspection

The inspection of the site was conducted on April 8, 2003 by the support agency coordinator. Although a key was not available and, therefore, it was not possible to get inside the fence surrounding the capped area and although there was some snow on the ground from a late winter storm, an adequate inspection was carried out. The purpose of the inspection was to observe the site and check on those things that are not generally reported on.

The landfill cap itself appeared to be in good shape. There is a fairly wide path that passes between the waste disposal area, which is inside the fence, and the river, outside the trees opposite the southern part of the landfill. The path is partially blocked to prevent vehicles from normally going very far onto the site. The path probably is used for access to the wells and apparently is part of the trail system near the landfill. This path goes closer to the river at the northern end of the landfill.

The area around the outside of the fence was walked. The wells that were found, some of which are inside the fence, were all in good shape, except for well MW-13I. The concrete around the protective casing on one well of well nest MW-5 inside the fence was exposed. It appears that some of the wells near the river were not visited because they were not shown on the map being used. Several wells were noted to exist that are not presently being monitored. At well nest MW-13, wells 13S and 13D were normal but well 13I had water flowing from the juncture of the protective casing with the cap; the water extended out 6 to 12 in from the protective casing. The protective casing for this well is rusted extensively below the cap. The protective casings for this well and 13S extend approximately 30 in above the ground surface while that of 13D is shorter. The ground surface in this area, which is approximately 40 ft from the river, is an estimated 2 to 3 ft above the river level.

This was the only monitoring well that was found to be discharging water. However, the groundwater monitoring report for the November 2002 sampling event reported that wells MW-7B (but not well MW-7I), MW-10I, MW-10D, MW-13I, and MW-13D were all "self-purging"; probably well nests MW-7 and MW-10, being toward the river and beyond the tree line, were missed during the inspection. For the April 1998 sampling, well MW-7I (but not well MW-7D) and well MW-13I were listed as naturally flowing; neither well MW-10I or well MW-10D was listed as naturally flowing.

While at the site for the inspection the support agency coordinator checked at the Office of the Register of Deeds for Dane County in Madison, Wisconsin, for the deed restrictions that were to be placed on two parcels of property at the site as a result of the 1997 Consent Decree. No record that the deed restrictions had been placed was found.

Response to Comments

One written comment was received February 5, 2002. The commenter suggested that the trail system in the area be extended inside the gates at the site and that there be picnic tables available at the site. She also said that there were several monitoring wells that were discharging water and requested that they be repaired.

Extending the trail system inside the gate will be included in the upcoming considerations about what the site may be used for in the future. See the Interview section that follows.

The state's remedial project manager visited the site on March 5, 2003. He reported that all of the wells appeared to be in good shape, but that one of the wells at well nest MW-13 was flowing. The state's contractor reported (March 5, 2003) that during its inspection of February 10, 2003 it was discovered that the protective top for well MW-7B had shifted. The concrete ring at this well was replaced on February 19, 2003. During the site visit of April 8, 2003 one well at well nest MW-13 was observed to be flowing, but some of the wells that have been reported to be flowing in the past were probably missed. It will be a recommendation that the flowing wells be observed closely in the future and special emphasis will be placed on checking what the analyses of samples from these wells indicates. If it is found that there may be a hazard associated with these wells flowing, then some modification will be made. With at least well MW-13I, extending the well a greater distance above the ground would make sampling much more difficult.

Interviews

The support agency coordinator had talked with the mayor of Stoughton by phone before the site visit and during the site visit he met with the mayor in the morning. In the late afternoon he met with the mayor, a member of her staff, a representative from Municipal Utilities, a representative from Parks and Recreation, and some representatives from Stoughton Leadership who have been looking at possible uses of the site. The main topic of discussion with the mayor and in the meeting was the possibility of using the site in the future. Primarily the reuse under discussion is for the part of the site inside the fence, which approximately surrounds the landfill cover. (It is to be noted that the deed restrictions that were to be placed on the property at the site include the re-

quirement, "No recreational use within the fence installed pursuant to the ROD." Apparently this reference to the ROD is related to the fence. With regard to the deed restrictions and future use, the ROD merely says that the restrictions are to control future land use or that the restrictions are to prevent residential development of the site.) The results of the discussion were that the support agency coordinator said that he would work with the people representing the City of Stoughton to try to remove any obstacles to using the site. As a first step, he is to be provided with some suggestions regarding what the local citizens would like to see done with the site. The support agency coordinator also made the people at the meeting aware of the USEPA report, *Reusing Superfund Sites: Recreational Use of Land Above Hazardous Waste Containment Areas*, OSWER 9230.0-93, March 2001.

VII. Technical Assessment

Question A. Is the remedy functioning as intended by the decision documents?

The review of the available information indicates that the remedy is functioning as it was intended. The early indications are that the contaminant levels are decreasing.

USEPA has no information on the costs of operation and maintenance at this time. The state has the lead for operation and maintenance.

Question B. Are the exposure assumptions, toxicity data, clean-up levels, and remedial action objectives used at the time of the remedy selection still valid?

There have been no major changes in the physical conditions of the site that would affect the protectiveness of the remedy. The site is being used as anticipated (that is, the waste disposal area is not being used). Therefore, new exposure assumptions are not needed at this time.

The primary applicable or relevant and appropriate requirements (ARARs) that the site has to meet fall into two general categories of regulations: landfill and groundwater. Most of the landfill requirements have been met through the construction that has taken place. Of primary concern now is the attainment of the standards for the groundwater. One substance that will have to be watched is the main contaminant of concern, tetrahydrofuran. Its toxic properties are still being evaluated. It may be that the state's enforcement standard and preventive action limit for this substance will be changed in the future.

Question C. Has any other information come to light that could call into question the protectiveness of the remedy?

There has been no new information that would suggest that the selected remedy is not protective. Although the tetrahydrofuran concentrations in the water in well MW-13I, which is the flowing well, and well MW-10I, which has been reported to be self-purging in the past, do exceed Wisconsin's preventive action limit, they have not exceeded Wisconsin's enforcement standard. The concentrations in all of the wells that have been flowing will have to be monitored closely.

Technical Assessment Summary

According to the data reviewed, the site inspection, and discussions with the state, the remedy is functioning as intended by the Record of Decision. There have been no changes in the physical conditions at the site that would affect the protectiveness of the remedy.

VIII. Issues

The issues identified during this review were:

- The groundwater monitoring program does not include the reporting of groundwater elevations. These are needed to be able to determine the direction of groundwater flow and to obtain a better understanding of what is happening underground. This does not affect the current protectiveness and it should not impact future protectiveness of the remedy.
- Water is flowing from some wells and discharging on the ground. This is not affecting current protectiveness since the concentrations of contaminants in the water in these wells is not above levels acceptable for short term exposure and it will not impact future protectiveness of the remedy.
- The institutional controls specified in the 1997 Consent Decree have apparently not been recorded with the authorities. This does not affect current protectiveness but it does impact future protectiveness of the remedy.

IX. Recommendations and Follow-Up Actions

Groundwater monitoring. USEPA will work with the state to have the required changes in the monitoring program implemented. It is expected that this can be accomplished during 2003.

Flowing wells. USEPA will consult with the state to emphasize the necessity for paying special attention to the flowing wells, and USEPA will be following the concentrations in these wells. If the concentrations of contaminants exceed acceptable levels then steps will be taken to prevent contact with the contaminated water. The process for addressing this can be set up within the next six months.

Institutional controls. USEPA will oversee the placement of the institutional controls that have been agreed upon. It is expected that this can be accomplished within the next three months.

X. Protectiveness Statement

The remedy is protective of human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are being controlled and monitored. The remedy is not protective of human health and the environment in the long term since the institutional controls that are needed to prevent future exposure to, or ingestion of, contaminated groundwater and exposure to the contents of the waste disposal area have not been implemented. Threats at the site have been addressed through capping, venting of the landfill, maintenance of the site, and

monitoring of the groundwater and vent gases.

XI. Next Review

The next five-year review for the Stoughton City Landfill site is required in April 2008, five years from the date of this review.

Table 1. DCDFM and THF Concentrations

Shallow Monitoring Wells, Concentration ($\mu\text{g/l}$)						
Well	November 2002		Historical Range		April 1998 (Baseline)	
	DCDFM	THF	DCDFM	THF	DCDFM	THF
MW-3S	0.25U	2.1	ND	ND	10U	10U
MW-4S	0.25U	1.8	ND	ND--0.84	10U	10U
MW-5S	0.66	1.9	0.47--5.2	ND	10U	10U
MW-7S	0.25U	2.1	ND	0.87	10U	10U
MW-8S	0.25U	2.2	ND	ND	10U	10U
MW-9S	100	4.4	91--400	4.4--22	200D	14
MW-10S	18	3.5	ND--20	ND--20	1.9J	10U
MW-13S	0.27	4.0	ND	ND	10U	10U
MW-14S	160	2.8	18--710	ND--50	120D	50UD
MW-15S	3.3	3.3	ND	ND--0.76	NR	NR

Intermediate and Deep Monitoring Wells, Concentration ($\mu\text{g/l}$)						
Well	November 2002		Historical Range		April 1998 (Baseline)	
	DCDFM	THF	DCDFM	THF	DCDFM	THF
MW-3D	0.25U	61	ND	53--310	10U	310D
MW-3B	0.25U	1.9	ND	ND--1.9	10U	1.4J
MW-4D	0.25U	2.3	ND	ND--1.5	10U	10U
MW-5D	5.1	3.5	3.3--10	2.6--4.0	7.7J	10U
MW-7I	0.25U	3.4	ND	ND--1.6	10U	10U
MW-7B	0.25U	2.3	ND	ND--1.7	10UJ (in 7D)	10UJ (in 7D)
MW-8I	0.25U	3.7	ND	3.5--20	10U	20
MW-8B	0.25U	0.97	ND	ND	10U	1J
MW-9I	130	8.2	67--340	5.3-12	120	3.2J
MW-9B	5.7	2.2	4.9--6.5	ND	NS (damaged)	NS (damaged)
MW-10I	130	11	110--280	5.1--21	110D	21
MW-10D	0.25U	3.1	ND	ND	10U	10U
MW-13I	1.9	16	ND--2.0	9.9-22	1.8J	22
MW-13D	0.32	1.4	ND--0.61	ND-9.3	10U	10U
MW-14I	86	3.5	96--590	ND-2.4	160D	5.5J
MW-14D	0.25U	3.7	ND--1.5	ND-0.47	10U	2.5J
MW-15I	0.25U	3.6	ND	ND	NR	NR
MW-15D	0.25U	3.0	ND	ND	NR	NR

Notes. DCDFM = dichlorodifluoromethane (enforcement standard (ES) = 1000 $\mu\text{g/l}$ and preventive action limit (PAL) = 200 $\mu\text{g/l}$). THF = tetrahydrofuran (ES = 50 $\mu\text{g/l}$ and PAL = 10 $\mu\text{g/l}$). Bold numbers are the concentrations that exceed the PAL. The November 2002 data was taken from Table 1 of the January 14, 2003 BT Squared, Inc. (the state's contractor) groundwater monitoring report. The Historical Range data was taken from Table 3 of this report and includes the BT Squared sampling of 8/00, 4/01, 11/01, and 4/02 and the Roy F. Weston sampling of 4/98 and 4/99; it was put together by BT Squared and it contains some inconsistencies. Baseline data was taken from the Roy F. Weston, Inc. September 1998 groundwater sampling memorandum. In the November 2002 sampling THF was found in the two field blanks at 2.6 and 4.4 $\mu\text{g/l}$, so concentrations below and near to this may not be correct; this was not noted in the report. ND = non-detect and U means a non-detect at the stated detection limit. J = estimated value. D means the sample was diluted for analysis. NR means the results were not reported. NS means the well was not sampled.

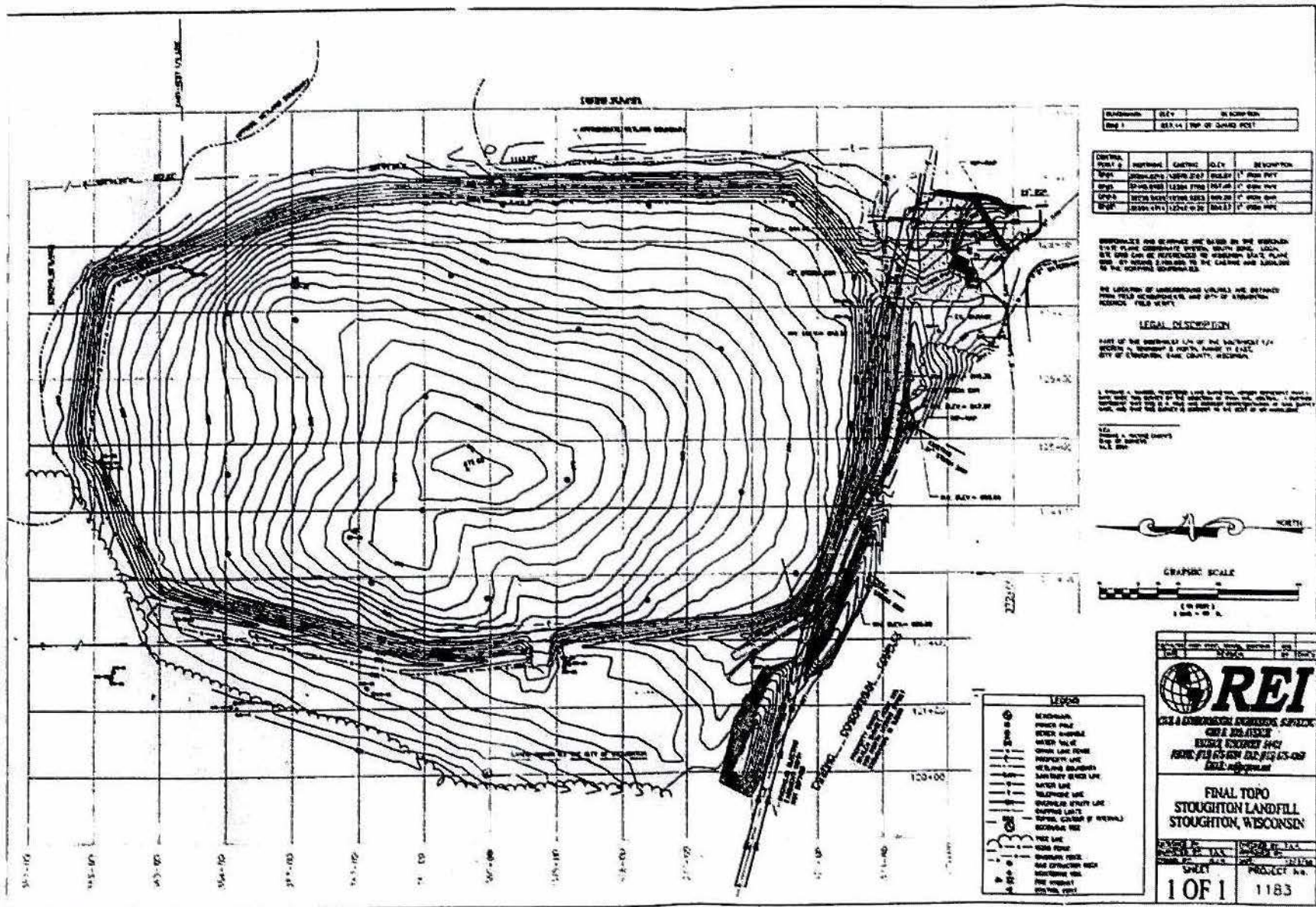


Figure 1. Stoughton City Landfill Site
 (Drawing from Roy F. Weston Remedial Action Report, February 1999)