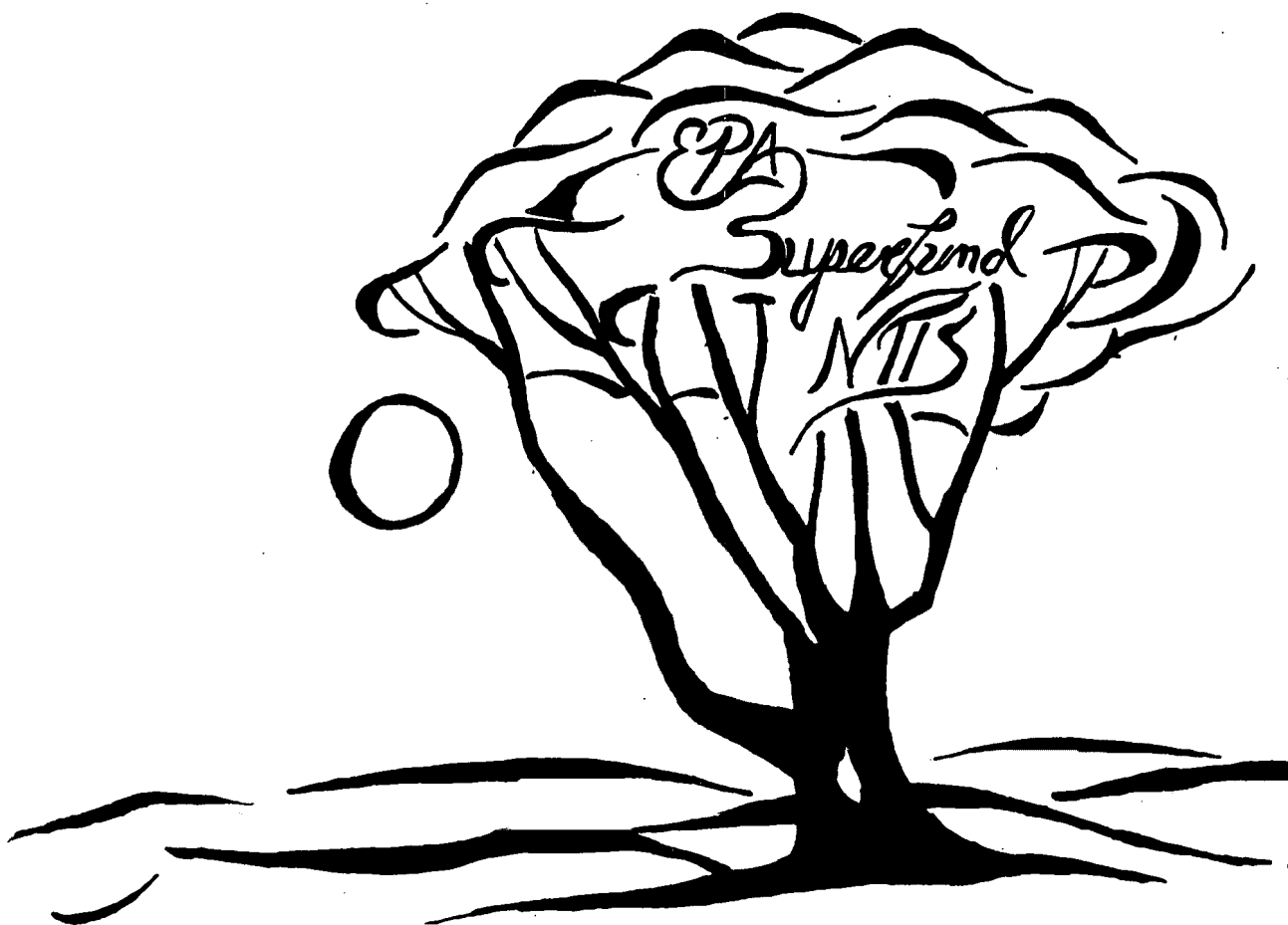


PB94-964127
EPA/ROD/R05-94/253
September 1994

EPA Superfund Record of Decision:

**Sauk County Landfill Site,
Excelsior, WI,
3/24/1994**



PROPOSED RECORD OF DECISION

REMEDIAL ACTION FOR THE SOURCE CONTROL OPERABLE UNIT

Site Name and Location

Sauk County Landfill

The Sauk County landfill is located in the in the Town of Excelsior, Sauk County, Wisconsin (approximately 6 miles east of the City of Reedsburg and approximately 9 miles west and north of the City of Baraboo), SE 1/4 of Section 15, Township 12 North, Range 5 East.

Statement of Basis and Purpose

This decision document represents the selected source control remedial action for the Sauk County Landfill in the Town of Excelsior, Sauk County, Wisconsin, developed in accordance with CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan. The attached Summary of Remedial Alternatives identifies the information contained in the administrative record for this site upon which the selection of the remedial action is based.

Assessment of the Site

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

Description of the Selected Source Control Remedy

The selected source control remedy is Alternative B, Construction of a Gas Extraction System, as listed in the Focused Feasibility Study. The selected remedy is an operable unit that meets the solid waste disposal requirements of NR 500 to 520, Wis. Adm. Code. The specific components of the source control remedy include:


- * continued monitoring of the groundwater at on-site groundwater monitoring wells and offsite private wells
- * regrading of the landfill surface to promote drainage off of the landfill cover
- * fencing the landfill
- * installation of a gas extraction system to efficiently collect and combust landfill gases
- * placing a deed restriction on the property to prohibit the disturbance of the surface of the landfill cap in the future
- * future maintenance of the landfill cap to prevent erosion and differential settlement
- * a contingency which requires a composite landfill cover system if groundwater quality preventive action limits are not achieved in the future

Statutory Determinations

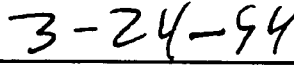
This source control remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate requirements ("ARARs") for this action, and is cost effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces the toxicity, mobility or volume as a principal element because it includes the collection and treatment of landfill gas. Because this remedy will result in hazardous substances remaining on site, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within 5 years after the commencement of this source control remedial action.

A review of the remedy and groundwater quality will be conducted every five years. This review shall concentrate on whether the remedy is continuing to prevent and abate groundwater quality standards, and whether the standards in NR 140, Wis. Adm. Code are being met. If the VOC concentrations on groundwater start to increase, then additional source control measures will be taken, including the installation of a composite landfill cover.

A second operable unit for groundwater will be issued after the remedial investigation and feasibility study have been completed. This source control operable unit will be consistent with the final groundwater operable unit ROD for the site.



George Meyer, Secretary
Wisconsin Department of Natural
Resources



Date

SUMMARY OF REMEDIAL ALTERNATIVES SELECTION

SOURCE CONTROL REMEDY

SAUK COUNTY LANDFILL

Findings of Fact

The following findings of fact summarize the information contained in the administrative record for the Sauk County Landfill site. The selected source control remedy is based upon the information contained in the site's administrative record.

The Wisconsin Department of Natural Resources ("WDNR") finds that:

I. SITE NAME, LOCATION AND DESCRIPTION

The Sauk County Landfill was listed on the National Priorities List (NPL) by the U.S. Environmental Protection Agency (EPA) in October of 1989. This site does not include the active Sauk County landfill which is located a few hundred feet north of the closed Sauk County Landfill.

The Sauk County Landfill is located in the northeastern part of the county between Reedsburg and Baraboo, south of Hwy 33. The landfill is 14 acres in size and is part of a 320 acre parcel containing both the closed and active landfills in the Southeast 1/4 of Section 15, Township 12 North, Range 5 East, Town of Excelsior, Sauk County, Wisconsin. The location is depicted on Map 1. The landfill is unfenced. Vehicle access is limited by a gate across the road entering the landfill property.

The Sauk County landfill accepted municipal and industrial waste from Sauk County between the years 1973 and 1983. The site was designed as a natural attenuation landfill. This means it has no liner or leachate collection system designed into modern landfills. It has a volume of about 750,000 cubic yards. The landfill accepted large quantities of foundry sand, municipal wastes and industrial wastes from homes and businesses located within the county.

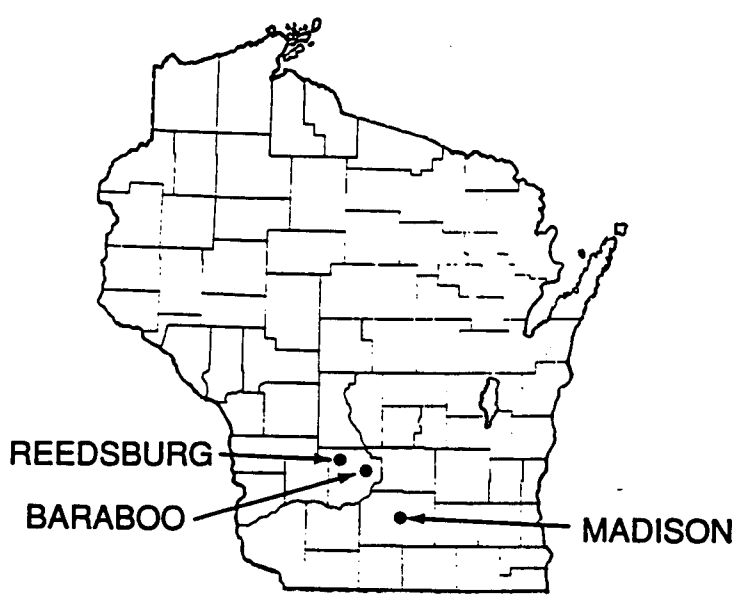
II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

Sauk County operated this landfill between 1973 and 1983. During operations, the site accepted municipal, commercial and industrial wastes, including over 200,000 tons of foundry sand. The foundry sand was used primarily in berms on the edge of the refuse. The site was closed in 1983 with a cover system consisting of 2' of clay on the landfill surface, 1' of clay on the sidewalls and 6" of topsoil over the entire site. The topsoil was vegetated. The site has been maintained by Sauk County since closure.

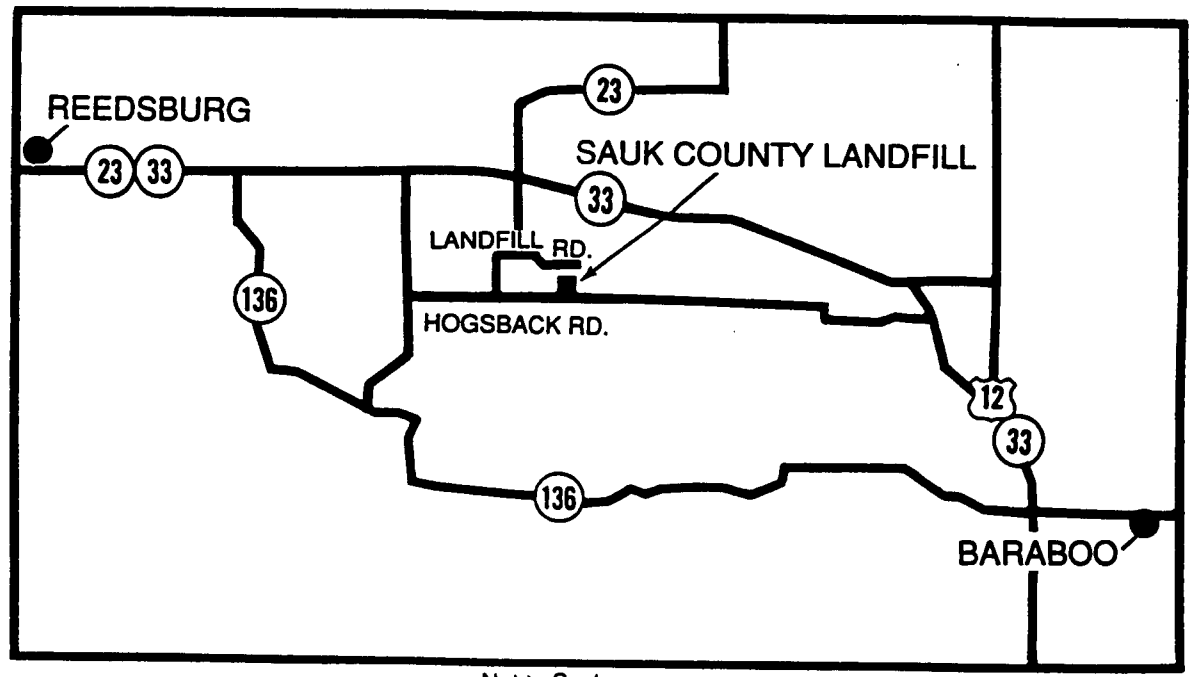
After reviewing groundwater quality data from this landfill, the WDNR recommended to EPA that the site be included on the National Priorities List (NPL). The site was listed on the NPL in 1989. In September, 1991, Sauk

Map 1

SAUK COUNTY LANDFILL



SITE LOCATION MAP



Not to Scale

County entered into a contract with WDNR to perform a remedial investigation and feasibility study ("RI/FS") pursuant to s. 144.442, Wisconsin Statutes and the Comprehensive Response, Compensation and Liability Act ("CERCLA). Under terms of the contract, Sauk County also agreed to complete a Source Control Operable Unit. Since that time, Sauk County has been completing the RI.

In December, 1992 WDNR and Sauk County agreed to move ahead with a source control operable unit while completing the RI. The goal was to speed up the process and implement a source control action prior to completing the full RI/FS. Sauk County submitted the Alternatives Array Document in April, 1993 and the Focused Feasibility Study of Source Control Alternatives in August, 1993.

The WDNR issued a proposed plan in September, 1993. The proposed plan selected Alternative E, Construction of a Composite Landfill Cover and Gas Extraction System as the source control remedy. Data submitted during the public comment period caused WDNR to reconsider the proposed plan. Based upon the additional data, WDNR now believes that a modified Alternative B, Construction of a Gas Extraction System with a contingency plan is the best source control remedy for the site. Factors considered by WDNR in making it's decision are listed in Section III, Highlights of Community Participation.

III. HIGHLIGHTS OF THE COMMUNITY PARTICIPATION

An information repository has been established at the Reedsburg Public Library, 345 Vine Street, Reedsburg, Wisconsin. The administrative record is made available to the public at the Baraboo Public Library, 230 Fourth Street, Baraboo, Wisconsin.

In September, 1992 WDNR issued a Superfund Fact Sheet which provided a summary of the site history, explained the Superfund process and delineated the approved RI work plan. On September 29, 1992 the WDNR and the Wisconsin Department of Health and Social Services (WDHSS) held a public informational meeting at 7:00 p.m. in the Rock Springs Community Center. The meeting was held to discuss the landfill and to explain the RI field work which was about to start. Approximately 30 residents attended the meeting.

Residents living near the landfill created the Evergreen Property Owners Association. On November 11, 1992 the Property Owners Association organized a meeting attended by WDNR, WDHSS and Simon Hydro-Search (consultant to Sauk County) to answer questions from residents living near the landfill. Approximately 100 persons attended this meeting.

In March, 1993 WDNR issued a Superfund Fact Sheet containing a summary of the RI data up to that point in time. This fact sheet contained information on:

- * groundwater quality from site monitoring wells
- * groundwater quality from houses surrounding the landfill
- * preliminary results from a vegetation survey designed to detect methane stress, and
- * a timeline for installing new monitoring wells at the site.

In May, 1993 the Evergreen Property Owners Association was awarded a Technical Assistance Grant from EPA. The purpose of the grant is to allow persons affected by Superfund sites to retain their own technical staff to explain the Superfund process and the data generated during the RI.

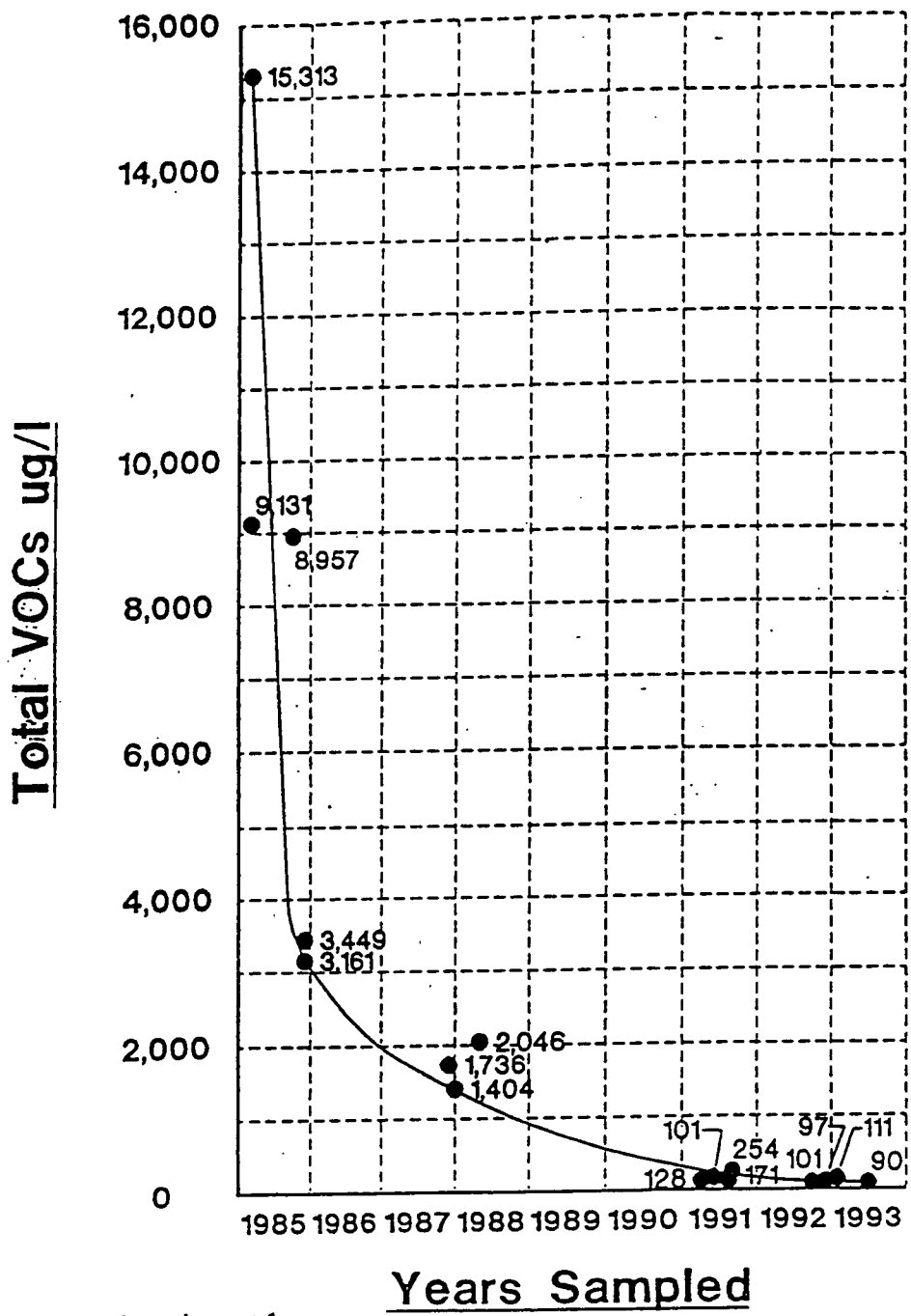
In September, 1993 the WDNR issued another Superfund Fact Sheet. This fact sheet also contained a summary of the RI data.

The Proposed Plan for the source control operable unit was made available for public comment on September 8, 1993. Notices announcing the availability of the proposed plan were published in the Reedsburg Time Press and the Wisconsin State Journal on September 2, 1993. A public meeting to explain the Proposed Plan, and to receive public comments was held on September 21, 1993. Approximately 40 persons attended the meeting. The public comment period was held between September 8, and November 9, 1992. Comments received from the public and WDNR's response to those comments are included in the attached Responsiveness Summary, which is part of this ROD.

In the Proposed Plan, WDNR had selected Alternative E, Construction of a Geosynthetic membrane as the preferred remedy. Based upon comments received during the public comment period, and information contained in Technical Memo #3, WDNR has changed it's decision as to the best source control remedy for the site. WDNR has selected and modified Alternative B, Construction of a Gas Extraction System with a contingency plan, as the best source control remedy. Reasons for this include:

1. Sauk County presented groundwater quality data from TW-25 and TW-26A. Both of these wells have historical VOC data dating back to 1985 and 1987 respectively. When the entire total VOC data set is graphed as concentration vs. time, both data sets indicate a strong downward trend in the VOC concentrations. Capping is the only remedial action that has taken place on the landfill since closure in 1983. Thus, the cap that is on the site is having beneficial effects towards stopping the further release of contaminants to groundwater. The data from TW-25 and TW-26A are depicted on Figures 1 and 2, respectively.
2. Sauk County commented that the decrease in total VOCs at TW-25 and TW-26A can be explained using the exponential decay equation. This equation assumes that the source decays at a constant rate. Decay rates are often measured in half-lives, or the amount of time necessary for the concentration to decay (or decrease) to one-half of it's original concentration. The analysis presented by Simon Hydro-Search indicates that:
 - * the half-life based upon data from TW-25 and TW-26A are the same and are approximately 1 year
 - * the semi-log graph of data vs time has a straight line for both wells. This indicates the decay rate is constant and that there is not additional input of VOCs from the landfill.
 - * a comparison of the two semi-log graphs shows that they have similar slopes. This indicates that the same process of releasing

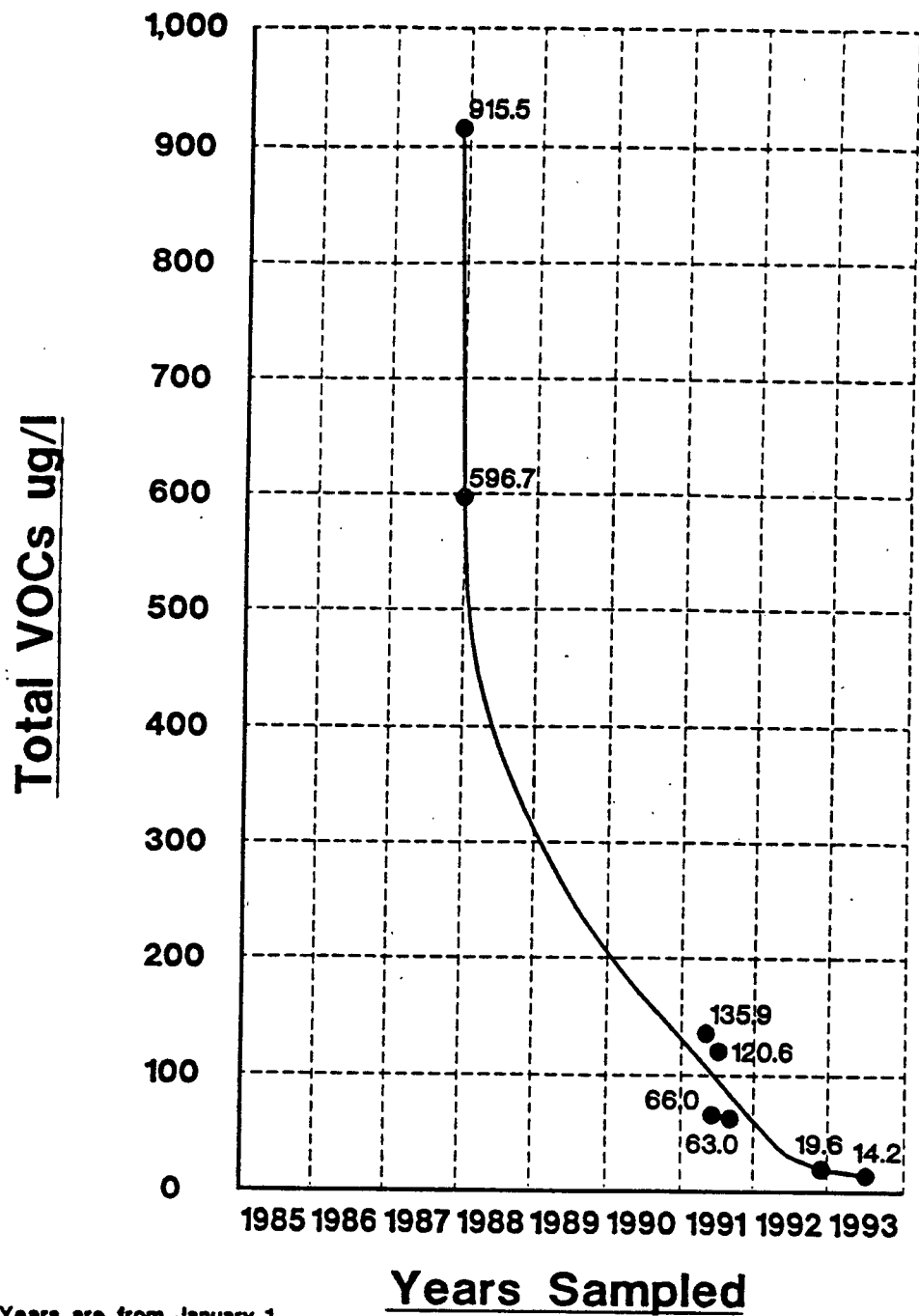
Fig. 1



Note : Years are from January 1 to December 31

SIMON HYDRO-SEARCH Brookfield Lakes Corporate Center XII 175 N. Corporate Drive, Suite 100 Brookfield, Wisconsin 53045			SAUK COUNTY LANDFILL SAUK COUNTY, WISCONSIN	
			TOTAL VOCs IN TW-25	
Dsgn. by: <i>ZAG</i>	Chk. by: <i>GCD</i>	Apprv. by:	DRAWING: 3037-a3	
PROJECT: 302073037			DATE: 09/20/93	FIGURE: 1

Fig. 2



Note : Years are from January 1,
to December 31

SIMON HYDRO-SEARCH
Brookfield Lakes Corporate Center XII
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045

SAUK COUNTY LANDFILL
SAUK COUNTY, WISCONSIN

**TOTAL VOCs IN
TW-26A**

Dsgn. by:	Chk. by:	Apprv. by:
PROJECT: 302073037 DATE: 11/10/93		

DRAWING: 3037-a6	FIGURE: 2
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VOCs from the aquifer matrix is occurring at both locations. See Figures 3 and 4.

- * should the decreasing trend in VOC concentrations continue, NR 140, Wis. Adm. Code preventive action limits should be met for all parameters within two years

WDNR agrees that VOC concentrations in groundwater are decreasing and exponential decay is probably playing a part in the decrease. However, other factors such as minimizing inputs to groundwater and dilution are also contributing to the decreasing VOC concentrations.

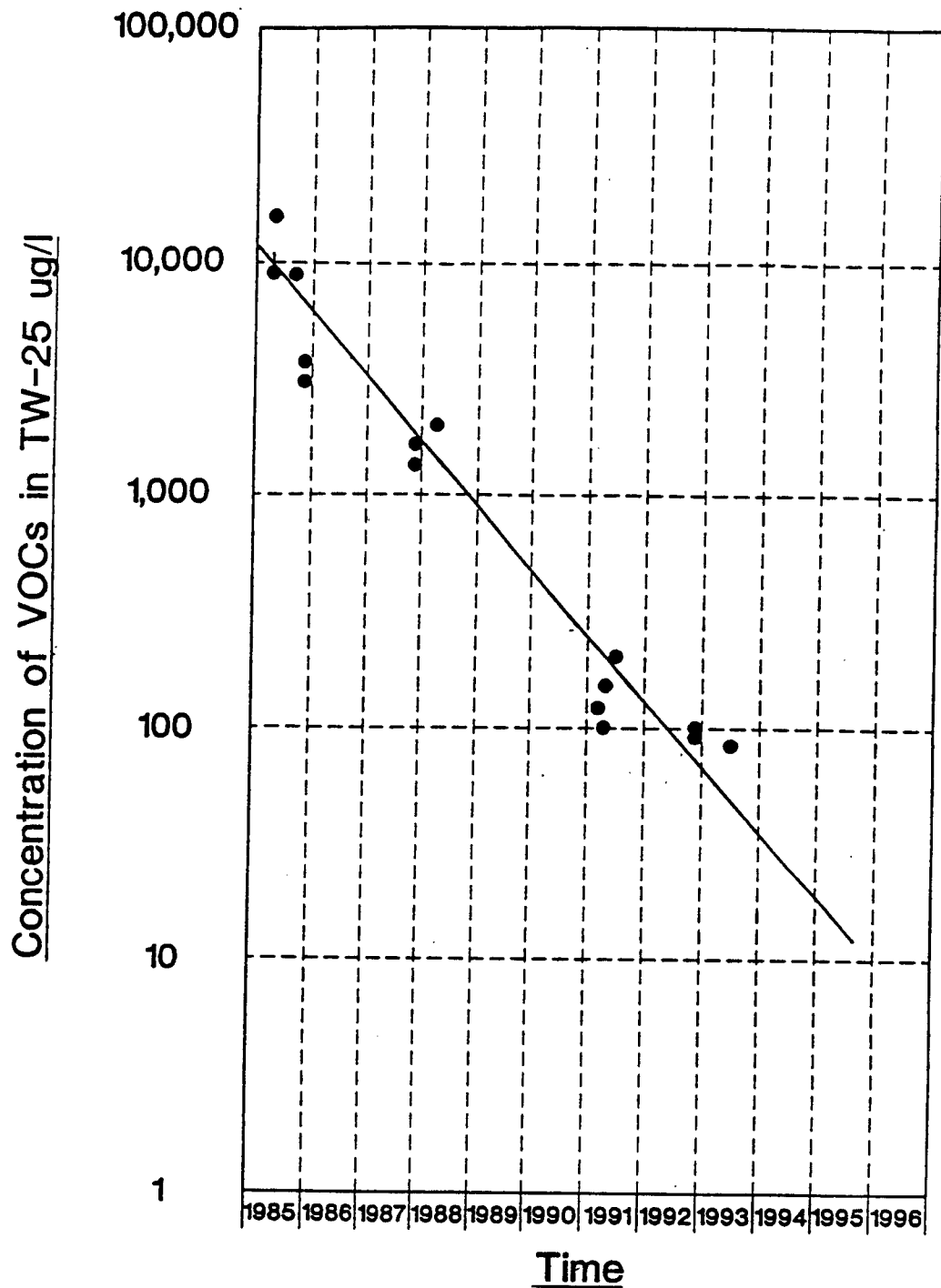
3. A graph comparing total VOC concentrations at TW-25 and the precipitation at Baraboo indicates that high precipitation years don't produce flushing events from the landfill. This means that the existing landfill cap has been successful in reducing percolation of water into the landfill. See Figure 5.
4. An analysis of the groundwater data indicates that the existing landfill cover is decreasing the amount of contamination entering groundwater. Since 1985, VOC concentrations have been declining. Installing the cap and maintaining it are the only actions that have taken place on the landfill since it closed. The existing cap must be helping to improve groundwater quality by reducing the amount of contamination entering groundwater.
5. Groundwater quality data from monitoring wells located next to the landfill show improving groundwater quality at this time. To address possible future releases from the site, the remedy includes a contingency plan which requires that if preventive action limits are not achieved in the future, a composite landfill cover must be placed on the landfill.
6. Residents living near the landfill utilize a sandstone formation beneath the area as their water supply source. VOC monitoring of homes in the area has detected VOCs in one home at concentrations far below drinking water standards. To address residential concerns about their water supply, the remedy includes monitoring of private homes for VOCs.

WDNR originally selected Alternative E, a composite cap as the best source control remedy for this landfill. However, based on the improving groundwater quality, WDNR has decided that the additional reduction of water into the landfill provided by the composite cap over the existing landfill cover is not necessary at this time. Should the results of future groundwater monitoring indicate that groundwater quality starts to degrade, other source control actions will be taken at that time.

These were the primary factors used by WDNR to select Alternative B, Construction of a Gas Extraction System as the source control remedy for this site.

The public participation requirements of s. 144.442(6)(f), Wisconsin Statutes, and the community relations requirements in the National Contingency

Fig. 3



SIMON HYDRO-SEARCH
 Brookfield Lakes Corporate Center XII
 175 N. Corporate Drive, Suite 100
 Brookfield, Wisconsin 53045

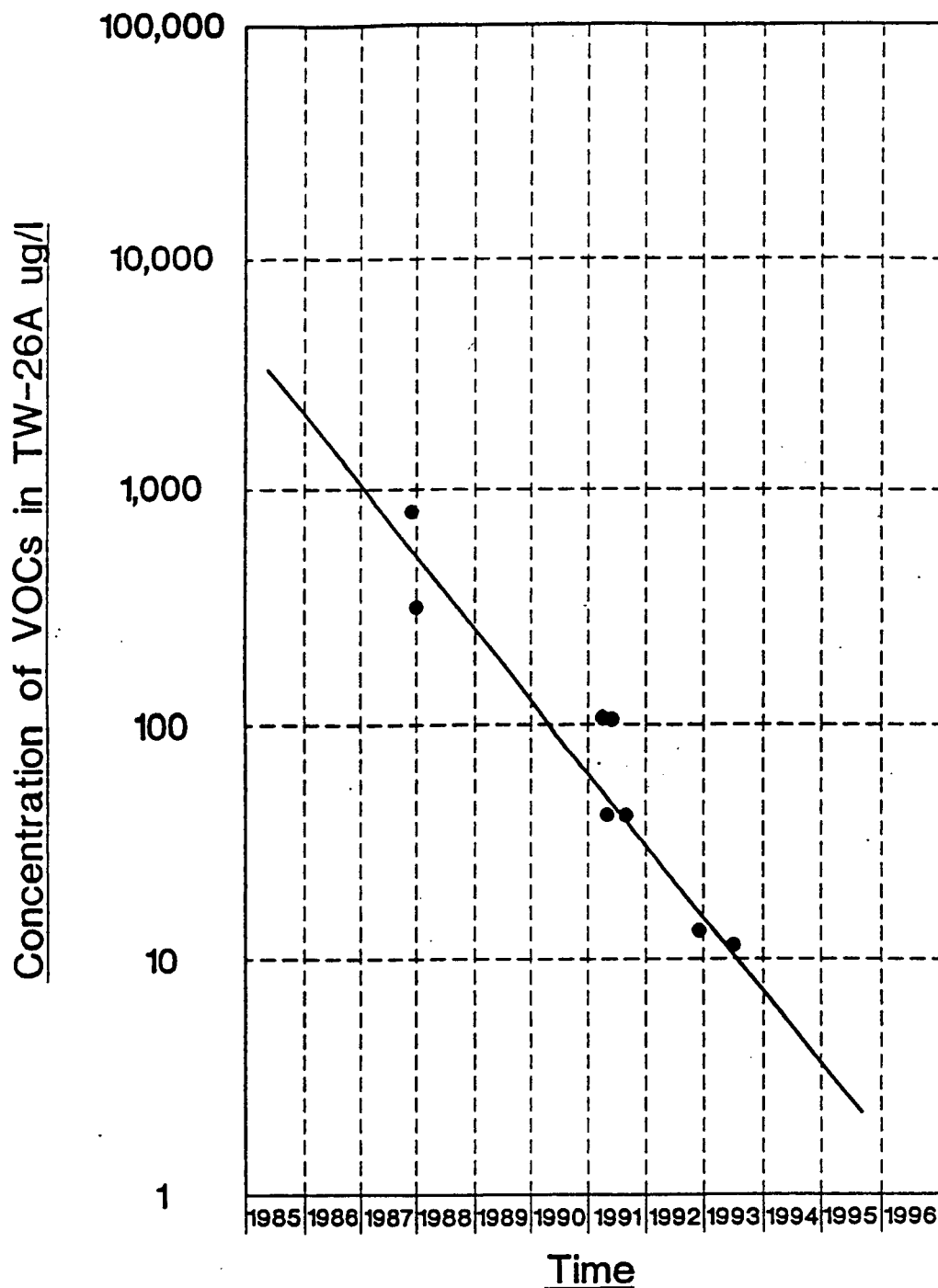
SAUK COUNTY LANDFILL
 SAUK COUNTY, WISCONSIN

**SEMI-LOGARITHMIC
 PLOT OF
 TOTAL VOCs IN TW-25**

Dsgn. by: Chk. by: Apprv. by:
 PROJECT: 302073037 DATE: 10/06/93

DRAWING: 3037-a4 FIGURE: 1

Fig. 4



SIMON HYDRO-SEARCH

Brookfield Lakes Corporate Center XII
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045

Dsgn. by:

Chk. by:

Apprv. by:

PROJECT: 302073037

DATE: 11/10/93

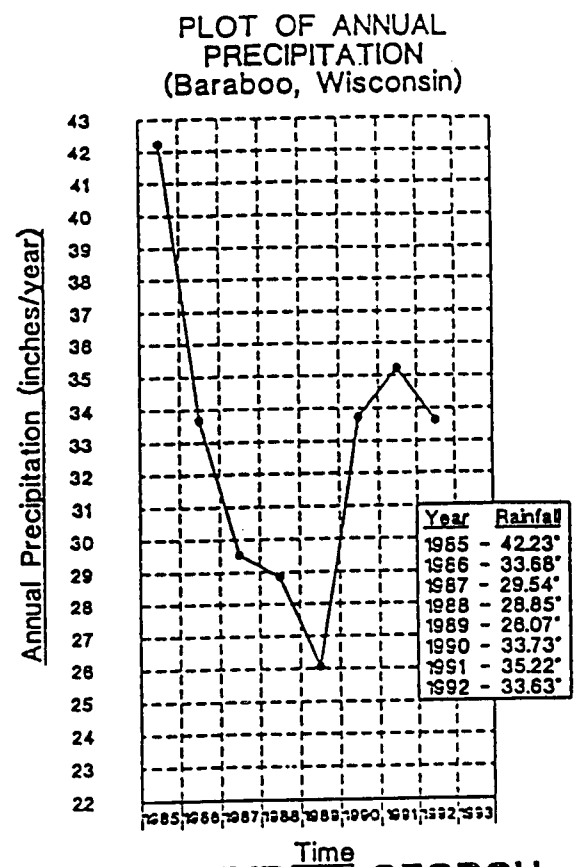
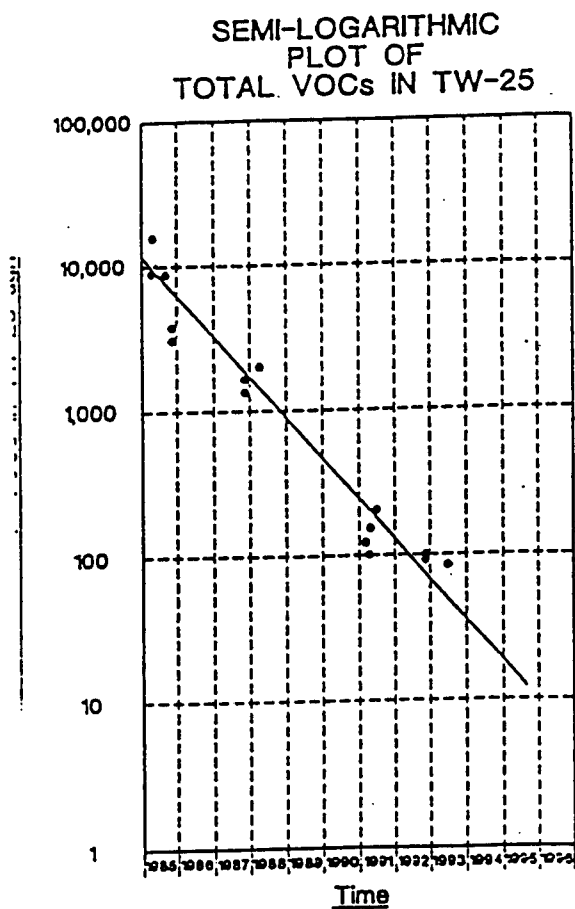
SAUK COUNTY LANDFILL
SAUK COUNTY, WISCONSIN

SEMI-LOGARITHMIC
PLOT OF
TOTAL VOCs IN TW-26A

DRAWING: 3037-a7

FIGURE: 3

Fig. 5



Plan at 40 CFR s. 300.430(f)(3) have been met in this source control remedy selection process.

IV. SCOPE OF THE SOURCE CONTROL REMEDY

As with many Superfund sites, the hydrogeologic conditions at the landfill are complex. Because of this, and a desire to speed up the process, WDNR and Sauk County chose to complete work on the source control remedy while also completing the RI. Remedial actions at the site have been divided into two activities or "operable units". The first operable unit, or source control operable unit involves remedial actions taken to control the source of contamination to groundwater. For landfills, source control options primarily involve landfill caps or cover systems. This ROD addresses source control actions. The second, or groundwater operable unit involves remedial actions necessary to clean up groundwater and achieve compliance with established groundwater quality standards.

Because this is a source control operable unit, Sauk County has continued to work on the RI/FS work plan, in order to develop and evaluate final groundwater remedial alternatives for the site. WDNR has determined that this source control remedy will be consistent with the groundwater operable unit remedy for the site.

An expedited source control remedy is desirable from a public health standpoint. Taking action now rather than waiting for completion of the RI has shortened the time required to eliminate the potential for the public to be exposed to methane and volatile organic compounds which may have migrated from the site through soil or air. Direct contact with the waste is not possible because the site is capped with a soil cover. Gas migration will be controlled through a gas extraction and flaring system. Fencing the site will also reduce exposure by keeping trespassers off the landfill and away from the gas extraction system. In addition, adding soil to promote drainage off of the landfill cap will help to reduce the infiltration of rain and snow into the waste, reducing the potential for leachate generation. Maintaining the vegetative cover will continue to reduce infiltration through transpiration.

V. SUMMARY OF SITE CHARACTERISTICS

A. Topography

The Sauk County landfill is located along the eastern margin of the unglaciated area. Topography in the site vicinity is gently sloping to somewhat hilly. The landfill is located in an east-west trending valley bounded to the north and south by sandstone bedrock ridges. Elevations on the ridges are approximately 1200 feet above mean sea level. The valley is gently sloping to the west with elevations near the fill ranging from 1010 to 960 msl.

B. Geology/Hydrogeology

The geology near the landfill consists of approximately 50 feet of unconsolidated material, primarily sand with some silt and gravel layers

present. The color of the sand is predominantly brownish yellow. Below the unconsolidated material three different bedrock units were identified.

The top of the bedrock is a poorly lithified weathered sandstone. This is the Mazomanie Formation. It is medium grained and brown to yellow in color. It ranges in thickness from approximately 40' east of the landfill to only 5' at the western edge of the County property.

The next bedrock unit is the Lone Rock Formation. This unit consists of siltstone, shale and very fine grained sandstone. It ranges in thickness from 30' to over 50'. This unit acts as a semi-confining unit between the sandstone units above and below.

Below the Lone Rock Formation is the Wonewoc Formation. It is a medium grained sandstone that is brown, reddish brown to yellow in color. The entire thickness of the Wonewoc was not penetrated by monitoring wells, but it is at least 65' thick near the landfill. The Wonewoc Formation acts as a water supply aquifer for homes located to the west of the landfill.

Within the unconsolidated deposits, shallow groundwater at or near the water table flows west, southwest towards the Baraboo River. This upper flow system has an average horizontal gradient of 0.015 ft/ft west of the landfill. Near the base of the unconsolidated deposits and within the weathered sandstone (Mazomanie Fm) groundwater also flows west, southwest with a horizontal gradient ranging from 0.010 to 0.013 ft/ft. These groundwater flow directions are a result of the natural slope of the upper bedrock surface.

Directly beneath the siltstone and shale semi-confining layer (Lone Rock Fm), groundwater flows southeast with a gradient of 0.006 to 0.007 ft/ft. Deeper within the Wonewoc Formation groundwater flows to the east. This is consistent with the regional flow towards the Wisconsin River. The horizontal gradient in the deeper Wonewoc is approximately 0.0012 ft/ft.

All vertical gradients were downward and ranged from 0.02 to 0.76 ft/ft. The highest vertical gradient was noted to the east of the landfill where the semi-confining layer is thickest. Thickness of the confining layer as well as the lithology and competence of the Lone Rock Formation are likely to affect vertical gradients.

C. Groundwater Contamination

Based upon data collected as part of the RI, a total of 18 volatile organic compounds (VOCs) were detected in groundwater monitoring wells. The most common VOCs detected are 1,1-DCA which was found in 13 wells and 1,1,1-TCA which was found in 8 wells. Of the 18 VOCs detected, only two exceeded enforcement standards found in NR 140, Wis. Adm. Code during sampling events in 1993. Tetrachloroethylene (PCE) and vinyl chloride were detected in concentrations attaining or exceeding enforcement standards. Five additional VOCs exceeded NR 140, Wis. Adm. Code preventive action limits.

A total of 18 private wells surrounding the landfill have been tested for VOCs. A home located approximately 3000 feet west-southwest of the landfill

has detected VOCs. 1,1-dichloroethane (1,1-DCA) has been detected on two occasions and 1,1,1-trichloroethane (1,1,1-TCA) has been detected three times. These samples were taken in 1992, 1993 and 1994. In all three sampling events, the concentrations of these two compounds was far below their respective drinking water standards. A second home had detections of 1,1-DCA and 1,1,1-TCA the first time it was sampled. These detections were also far below the drinking water standards. Subsequent sampling of the well has failed to detect any VOCs. None of the other 16 wells tested have had VOCs detected.

D. Landfill Gas

Three of the gas probes and one well located within the waste had landfill gas samples collected and analyzed for VOCs. Nineteen VOCs were detected with the highest concentration of total VOCs occurring in the gas probe on the east side of the landfill. The VOCs with the highest concentration (at any sampling point) are methyl ethyl ketone, toluene, vinyl chloride, total xylenes and 1,1-DCA.

In addition, the gas probes, two wells screened within the waste, and a background location were measured for methane, oxygen and carbon dioxide. The background sample was not a soil gas sample, but was an ambient air sample near the access gate to the landfill. It can only be used for comparative purposes. All methane measurements except the background location and the gas probe on the southern edge of the landfill indicated combustible concentrations of methane.

VI. SUMMARY OF SITE RISKS

A qualitative risk assessment was completed for the Sauk County landfill Superfund site. The purpose of the assessment was to identify human health hazards posed by environmental contamination from the site. The qualitative risk assessment evaluates current as well as future potential exposures to site related contamination. Sample results from the remedial investigation were used to evaluate all environmental pathways with potential human exposure routes.

The reasons that a qualitative, rather than a quantitative risk assessment was completed include:

- * state standards for air and water quality are protective of human health and the environment
- * the remedy must comply with state standards
- * EPA guidance documents state that exceedances of state standards, as opposed to the site representing an unacceptable risk, are a cause for action at Superfund municipal landfill sites.

A copy of the qualitative assessment is found in the administrative record. Presented below is a brief summary of the assessment and its conclusions.

The groundwater, surface soil/sediment, and air pathways were evaluated as possible exposure routes for contaminants. The groundwater data came from on

site monitoring wells and off site private water supply wells. No surface water bodies are present on the site. The sediment samples were collected from areas which runoff water, when present, would settle out and deposit sediment. Soil gas samples and one ambient air sample were collected and used in the evaluation of the air pathway.

Groundwater Pathway

The following compounds were identified as contaminants of concern:

benzene	- barium	benzoic acid
chrysene	iron	diethylphthalate
tetrachloroethylene	manganese	2,4-dimethyl phenol
vinyl chloride		
1,1-dichloroethylene		

The compounds listed in the first column represent are probable carcinogens. The qualitative health assessment concludes that persons who drink groundwater every day, over a lifetime, with the highest concentration of these contaminants detected in on site monitoring wells are at an increased risk of getting cancer. This does not represent a present use scenario since the wells containing these concentrations are on Sauk County property and this water is not being used for water supply purposes. This represents a possible, though not probable future use scenario. The future use scenario is not probable since NR 112, Wis. Adm. Code on private water supplies requires a minimum setback distance of 1200 feet from landfills.

The compounds listed in the second and third columns are not carcinogens, but were evaluated for non-carcinogenic health effects. The qualitative risk assessment concludes that there are no adverse health effects associated with exposure to these compounds at the highest concentrations detected in on site groundwater monitoring wells.

Two additional compounds were detected in monitoring of private wells around the landfill. 1,1,1-trichloroethane and 1,1-dichloroethane were detected in two private wells. The concentrations detected are far below the drinking water standards for these compounds. The qualitative risk assessment concludes that there are no adverse health effects expected from exposure to these compounds in the private wells.

Surface Soil and Sediment Pathway

Because there are no surface water bodies at the site, the surface soil and sediment data were evaluated together. The following compounds were identified as contaminants of concern for surface soils:

arsenic	beryllium	polyaromatic hydrocarbons (PAHs)
lead	manganese	

Arsenic and beryllium are probable carcinogens. The concentrations of these metals in surface soils are at concentrations that could cause an increased

risk of cancer if they were ingested at a rate of 100 mg/day for a lifetime. This exposure is only appropriate for assessing exposures in urban areas or in residential yards. Because the location of the surface soil contamination is in a rural area that has restricted access, no increased cancer risk would be expected from incidental exposures to the highest concentrations of arsenic and beryllium.

PAHs were detected in samples of surface soils on site. PAHs are created from the incomplete combustion of fossil fuels. They are often associated with vehicle emissions and/or oil and grease spills. Individual PAHs are rarely identified in the absence of others. The health effects of the individual PAHs may not be exactly alike. However, the coincident detection of a number of these compounds makes it difficult to isolate health effects for individual PAHs. For this reason the toxicity of these PAHs is evaluated as a group. There are over one hundred different PAH compounds. Long term exposure to some PAH compounds has been shown to cause cancer in humans exposed through inhalation and dermal absorption. These PAHs were detected in soils at concentrations that could cause an increased cancer risk if they were ingested at a rate of 100 mg/day for a lifetime. This exposure scenario is only appropriate for assessing surface soil exposures in urban areas or residential yards. Because the location of the surface soil contamination is in a rural area with restricted access, no increased cancer risk would be expected from incidental exposures to the highest concentrations of PAHs at the site.

Arsenic, beryllium, lead and manganese were also evaluated for non-carcinogenic health effects.. Exposure to the highest concentrations of these compounds detected in the surface soil samples are not expected to cause adverse health effects.

Air Pathway

Gas samples collected as part of the investigation were primarily soil gas and not ambient air. Samples of soil gas are not indicative of ambient air quality. It is expected that concentrations in ambient air would be considerably less than those detected in soil gas. Because the data collected were for soil gas and not for ambient air, the qualitative risk assessment does not include estimates of potential exposure concentrations. The following compounds were identified as contaminants of concern for the air pathway:

benzene	freon
1,1-dichloroethylene	acetone
methylene chloride	methyl ethyl ketone
tetrachloroethylene	toluene
vinyl chloride	xylene
	1,2-dichloroethylene

Those compounds listed in the first column are probable carcinogens and were detected in soil gas at concentrations above that considered to pose a health concern in ambient air.

Compounds listed in the second column were evaluated for non-carcinogenic health effects. The highest concentration of these compounds detected in soil gas were below levels that would be expected to cause adverse health effects.

In addition to carcinogenic and non-carcinogenic health effects, landfill gas also represents another hazard. Methane generated by decomposing refuse, when mixed with oxygen in the right concentration, is an explosion hazard. Soil gas probes around the landfill detected methane at high enough concentrations to represent an explosion and fire hazard.

To control the methane and other landfill gases listed above, the selected remedy has an active gas collection and treatment system. The gas will be collected through a series of wells and piping. The gas is then routed to a flare where it is destroyed by controlled combustion.

VII. ENVIRONMENTAL STANDARDS NOT MET AT THE SITE

The Sauk County landfill does not meet the following applicable State environmental standards:

NR 504.05(7), Wis. Adm. Code

Administrative code that requires facilities accepting waste which may generate explosive gases must prevent the migration of the gas. The old landfill currently has no gas extraction system.

NR 504.05(8), Wis. Adm. Code

Administrative code that requires facilities accepting municipal solid waste to efficiently collect and combust hazardous air contaminants generated by waste decomposition.

NR 506.08(3), Wis. Adm. Code

Administrative code that requires that landfills must be sloped to allow surface water runoff and that the landfill surface must have at least a 2% slope.

NR 506.08(6), Wis. Adm. Code

Administrative code that requires all facilities which accepted greater than 500,000 cubic yards of waste to collect and combust hazardous air contaminants.

NR 445, Wis. Adm. Code

Administrative code which regulates the discharge of hazardous air contaminants

NR 140, Wis. Adm. Code

Administrative code which regulates groundwater quality and actions taken to restore groundwater quality. Tables 5 and 6 within NR 140 lists potential actions to be taken when preventive action limits and enforcement standards are exceeded. One potential action listed in both Tables includes a change in the design or construction of a facility.

Once the gas collection and flaring system part of the source control remedy is installed and properly operating, the Sauk County landfill will achieve compliance with the NR 445 and NR 500 series codes listed above. Regrading of the site to promote drainage from the landfill surface, and the gas extraction system will help to achieve compliance with NR 140.

VIII. Description of the Remedial Alternatives

A. Source Control Remedial Action Objectives

Remedial action objectives were developed for this site to address the source of contamination, to provide short and long term protection of human health and the environment, and to meet applicable or relevant and appropriate requirements. The site specific source control remedial objectives for this landfill are to:

1. Prevent direct contact with the landfill wastes
2. Reduce contaminant leaching to groundwater
3. Control surface water runoff and erosion of the landfill cap
4. Control and destroy landfill gas.

B. Development of Alternatives

The source control remedial action objectives for this site involve limiting the potential for exposure to contaminants via inhalation, ingestion, and dermal absorption pathways, and controlling landfill gas emission and migration.

The remedial alternatives were assembled from applicable remedial technology options. The alternatives surviving the initial screening were evaluated and compared with respect to the nine criteria set forth in the National Contingency Plan ("NCP"). In addition to the remedial action alternatives, the NCP requires that a no-action alternative also be considered for the site. The no action alternative serves primarily as a point of comparison for the other alternatives.

C. Source Control Alternatives

Alternative A - No Action

Alternative B - Construction of a Gas Extraction System

Alternative C - Side Slope Enhancement

Alternative D - Construction of a Soil Protective Layer

Alternative E - Construction of a Geosynthetic Membrane

Alternative G - Construction of a Composite Cover Over the Entire
Landfill

Alternative H - Construction of a Composite Cover on the Landfill Top
Only

A complete description of the various alternatives is provided in the Focused Feasibility Study. A brief narrative description of each alternative is provided below:

Alternative A: No Action

The No Action alternative is developed to act as a baseline to compare all other alternatives against. This alternative consists of continued monitoring of groundwater, regrading the site to eliminate low spots and promote positive drainage from the landfill, provide for proper surface water drainage, fencing the landfill and obtaining deed restrictions on the future use of this disposal area. Maintenance of the site includes inspection, mowing to prevent tree growth, filling low areas resulting from settling of the wastes and repairing any erosional problems.

Alternative B: Construction of a Gas Extraction System Only

As with Alternative A, groundwater monitoring, regrading as needed, fencing, deed restrictions and cap maintenance would be provided. In addition, an active gas collection system would be installed. The system would consist of eight extraction wells located as two rows of four in a north-south orientation in the landfill. The landfill gas would be collected in the wells and then sent to a flare using subsurface piping. The flare would then burn the gas, destroying the contaminants present in the gas. Condensate from the gas system will be treated as leachate.

The Evergreen Property Owners Association commented that they are concerned with contamination of the groundwater since all of the residents in the area use groundwater as their water source. VOCs are present in one home near the landfill. The concentrations of these VOCs are very low and are below drinking water standards. WDNR has included monitoring of some private homes as part of the remedy in order to make sure that the groundwater at private wells is safe. In addition, WDNR has created a contingency remedy. Should groundwater data from monitoring wells located next to the landfill indicate that groundwater quality should start getting worse, then additional source control measures, such as a new landfill cap are required to be placed on the landfill. WDNR will review the data at 5 year increments to determine if the remedy is still protective, or whether additional source control measures need to be taken.

Alternative C: Side Slope Enhancement

Clay thickness on the side slopes of the landfill averages about 12". Under this alternative, the topsoil would be removed and the clay would be compacted on the side slopes to provide a minimum clay thickness of 24". The top surface of the landfill already has a clay thickness of approximately 24". All of the provisions of Alternative B are also part of this alternative.

Alternative D: Construction of a Soil Protective Layer

The existing landfill does not have a frost protection and plant rooting zone layer. Under this alternative, the topsoil would be removed and stockpiled. As under Alternative C, compacted clay would be added to provide a minimum 24" clay layer on the side slopes. An 18"-30" soil protective layer would then be

constructed over the entire landfill. The purpose of this layer is to provide a plant rooting soil for the surface vegetation and to protect the clay layer from freezing and desiccation. The topsoil would then be replaced and the site re-vegetated.

As under Alternatives B & C, an active gas recovery system would be installed, the site would be fenced, and groundwater monitoring and site maintenance provided.

Alternative E: Construction of a Geosynthetic Membrane

This alternative is identical to Alternative D except for the addition of geosynthetic membrane placed immediately above the clay layer. A 40-60 mil plastic geomembrane and drainage layer are placed on top the clay layer, and geotextile fabric is placed on top of the drainage layer. The purpose of the geotextile is to prevent soil from moving into the drainage layer and decreasing it's ability to drain water off the geomembrane. The 18"-30" protective layer and topsoil will be placed above the geotextile.

This alternative also has a gas extraction system as part of the remedy.

Alternative F: Construction of a Soil Cover

This alternative consists of constructing a soil cover in conformance with NR 504.07, Wis. Adm. Code. Specifically this alternative includes removing the topsoil and stockpiling it for re-use. The low spots on the cap would then be filled in and the site re-graded to promote surface water runoff. The landfill cover consists of (from the surface downward):

- A topsoil layer of at least 6" that will sustain plant growth, reduce erosion and promote drainage.
- An 18" to 30" frost protection and plant rooting layer.
- A low permeability clay layer that is at least 24 inches thick.
- A minimum 6" grading layer to attain a stable base and meet minimum slope requirements for the cover system.

A gas collection and combustion system are included with this alternative. The site would be fenced, deed restrictions on future property use, groundwater monitoring and maintenance of the cap are also part of this alternative.

Alternative G: Construction of a Composite Cover Over the Entire Landfill

This alternative consists of the construction of a composite cover over the entire landfill. A composite cover is one which has both soil and geomembrane components. The composite cover is identical to the soil cover described in Alternative F, with the addition of a geomembrane and drainage layer on top of the clay layer, and geotextile fabric placed on top of the drainage layer. The entire landfill is then covered with topsoil and seeded.

A gas extraction system is also part of this alternative.

Alternative H: Construction of a Composite Cover on the Landfill Top Only

This alternative is identical to Alternative G except that the composite cover described in Alternative G would only be placed on the top surface of the landfill. The soil cover described on Alternative F would be constructed on the side slopes of the landfill.

IX. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

A. Introduction

U.S. EPA has established in the NCP 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 ARARs, utilize permanent solutions and treatment technologies to the maximum extent practicable, and to 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 at 40 CFR 300.430(e)(9)(iii) as the basis of comparison. These nine criteria are summarized as follows:

THRESHOLD CRITERIA - The selected remedy must meet the threshold criteria.

1. Overall Protection of Human Health and the Environment
A remedy must provide adequate protection and describe how risks are eliminated, reduced or controlled through treatment, engineering controls or institutional controls.
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)
A remedy must meet all applicable or relevant and requirements of federal/state laws. If not, a waiver may apply.

PRIMARY BALANCING CRITERIA are used to compare the effectiveness of the remedies.

3. Long-term Effectiveness and Permanence
Once clean up goals have been met, this refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time.
4. Reduction of Toxicity, Mobility or Volume Through Treatment
The purpose of this criteria is to anticipate the performance of the treatment technologies that may be employed.
5. Short-term Effectiveness
This refers to how fast a remedy achieves protection. Also, it weighs potential adverse impacts on human health and the environment during the construction and implementation period.
6. Implementability

This criteria requires consideration of the technical and administrative feasibility of a remedy, including whether needed services and materials are available.

7. Cost

Capital, operation and maintenance, and 30 year present worth costs are addressed.

MODIFYING CRITERIA deal with support agency and community response to the alternatives.

8. State Acceptance

After review of the Focused Feasibility Study and the Proposed Plan, support agency's concurrence or objections are taken into consideration.

9. Community Acceptance

This criteria summarizes the public's response to the alternative remedies after the public comment period. The comments from the public are addressed in the Responsiveness Summary attached to this ROD.

B. Evaluation of the Remedial Alternatives for Source Control

1. 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-quality remedy. These two criteria are discussed below:

a. Overall Protection of Human Health and the Environment

All of the alternatives provide a soil barrier which eliminates the direct exposure to the waste within the landfill. Fencing of the landfill will also eliminate potential exposure pathways by keeping persons from trespassing on to the landfill surface. The gas collection and combustion system proposed as part of Alternatives B through H will eliminate the exposure to landfill gas.

Alternative A - Because this alternative fails to control the migration of landfill gas, persons working near or on the landfill, and persons who trespass on the landfill may be exposed to the contaminants and explosive hazard of landfill gas. This alternative is not protective of human health and the environment.

Alternative B - This alternative will efficiently collect and burn the landfill gas, eliminating the exposure to persons entering the site. Collecting landfill gas will capture some VOCs so they are unable to contaminate the groundwater. Regrading of the site will promote drainage from the landfill so that precipitation is able to run off rather than flow into the surface depressions currently present on the landfill surface.

Alternatives C,D,E,F,G and H all provide improved barriers to the movement of precipitation into the waste. However, the efficiency of each of the alternatives in reducing infiltration is variable.

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

Alternative A - Administrative Rules relating to landfills require that landfills over 500,000 cubic yards must efficiently collect and burn landfill gas. This alternative fails to provide for the collection and combustion of landfill gas, and therefore does not comply with state laws and will not be evaluated further.

Alternatives B,C,D,E,F,G and H all propose gas collection and combustion systems and comply with state laws requiring these systems. Emissions from the gas system must comply with NR 445, Wis. Adm. Code.

Alternatives B,C,D - These alternatives will comply with the landfill capping requirements of NR 506.08(3), Wis. Adm. Code.

Alternatives E,F,G,H - These alternatives comply or exceed (on a performance basis) the solid waste capping requirements for landfills in NR 504.07, Wis. Adm. Code.

2. Primary Balancing Criteria

Alternatives which satisfy the two threshold criteria are then evaluated according to the five primary balancing criteria.

a. Long-term Effectiveness and Permanence

Alternatives B,C,D, & F - The long-term effectiveness and permanence of any of the landfill capping options is highly dependent upon how well the cap is maintained with time. These alternatives are multi-layer soil designs. All of these remedies have a maintenance component. With proper maintenance, these remedies will provide a landfill cap that is protective of human health and the environment with time.

Alternatives E,G & H - These remedies entail composite designs. This means that they have both soil and plastic components in the landfill cap. These types of landfill caps also need to be properly maintained. However, the presence of the plastic membrane will generally give these caps a higher degree of long-term effectiveness and permanence.

b. Reduction in Toxicity, Mobility or Volume Through Treatment

The gas extraction system proposed as part of Alternatives B,C,D,E,F,G & H will reduce the toxicity and mobility of the landfill gas by capturing the gas and destroying it rather than letting the gas diffuse from the landfill.

The toxicity, mobility or volume of the landfilled waste is not affected by any of the proposed alternatives. Instead, the alternatives eliminate the exposure to the waste and reduce the amount of contamination that can leave the waste and affect groundwater. This approach is consistent with EPA Guidance.

c. Short-term Effectiveness

All of the alternatives, B,C,D,E,F,G & H, will reduce the amount of contamination coming from the landfill by reducing infiltration and capturing the landfill gas. These benefits will occur immediately after the systems are in place. All of these alternatives should be operational within a single construction season.

Potential short term adverse impacts on human health include drilling into the landfill. Methane, an explosive gas, is generated by decomposing refuse. Installation of gas extraction wells will require that special precautions be taken by the drilling firm in order to protect the safety of their workers.

Another short term adverse impact of all the alternatives is damage to the vegetation currently on the landfill. Vegetation removes water from the soil and transpires it back to the atmosphere. Until the vegetation has been restored, there is a potential for additional leachate generation. Another short term impact may be additional erosion of soil from the landfill cover until the vegetation is re-established.

d. Implementability

Installation of the gas extraction system common to all of the alternatives is easily implemented using established engineering and construction techniques.

Alternatives B,C,D & F are easily implemented using common earth moving and compaction equipment. In addition, because soil landfill caps have been used in this state for the past several years, there are many firms available with the expertise to construct a soil cap.

Alternatives E,G & H involve a plastic geomembrane. The sheets of membrane must be seamed together to eliminate leaks. Placing and seaming a geomembrane is more difficult than constructing a soil cover. However, these types of caps are becoming more common and there are many firms available with the expertise to construct this type of cap.

e. Costs

Alternative B

Capital Costs - \$444,000

Annual Costs - \$28,200

Present Worth - \$832,000

Alternative C

Capital Costs - \$737,600

Annual Costs - \$28,200

Present Worth - \$1,126,000

Alternative D

Capital Costs - \$1,063,000

Annual Costs - \$28,200

Present Worth - \$1,452,000

Alternative E

Capital Costs - \$1,720,000

Annual Costs - \$28,200

Present Worth - \$2,109,000

Alternative F

Capital Costs - \$1,799,000

Annual Costs - \$28,200

Present Worth - \$2,187,000

Alternative G

Capital Costs - \$2,456,000

Annual Costs - \$28,200

Present Worth - \$2,844,000

Alternative H

Capital Costs - \$2,149,000

Annual Costs - \$28,200

Present Worth - \$2,537,000

The cost of each remedial alternative generally increases as the amount of material and construction required to implement the remedy increases.

3. Modifying Criteria

a. State Acceptance

The WDNR is the lead agency on this case and authors this ROD.

b. Community Acceptance

Comments by the Evergreen Property Owners Association supported Alternative E as was listed in the Proposed Plan issued by WDNR. A Sauk County property owner and Sauk County officials submitted comments and data which support Alternative B as the best source control remedial action. All of the comments indicated that they want the solution to be cost effective. The substantive comments received by WDNR are listed in the attached Responsiveness Summary.

c. Summary

With the exception of Alternative A, all of the source control remedial alternatives meet the threshold criteria of being protective and complying with applicable or relevant and appropriate requirements.

A decision as to the best source control remedy is based upon an analysis of the balancing criteria. The criteria of Reduction in Toxicity, Mobility or Volume, Short-term Effectiveness, and Implementability are all equally met by each of the alternatives. The primary factors in the decision are Long-Term Effectiveness and Permanence, and Cost.

As stated earlier, the Long-term Effectiveness and Permanence is strongly controlled by how well the landfill cap is maintained. Proper maintenance of

the landfill cover is part of this remedy. Annual reports detailing the maintenance are also required. WDNR also has the right to inspect the landfill to see that it is properly maintained. Long term effectiveness and permanence are also addressed through the contingency plan which monitors possible changes in groundwater quality.

The data and analysis provided by Sauk County in Technical Memo #3, and in comments submitted during the public comment period show that the existing landfill cap is having a beneficial effect on groundwater quality. A gas extraction system and regrading of the landfill are necessary to comply with ARARs, and to reduce or eliminate exposure pathways. These are the most substantive parts of Alternative B.

Alternative B is also the least costly of the alternatives that comply with ARARs. Since it meets the threshold criteria and other balancing criteria, cost becomes that final factor to consider. Alternative B is a cost effective source control remedy.

CONCLUSIONS OF LAW

Alternative B will protect human health and the environment from exposure pathways identified in the Summary of Site Risk section of this ROD, complies with all legally applicable, or relevant and appropriate requirements for this final source control remedy, and is cost effective.

A. Protection of Human Health and the Environment

The selected remedy provides protection of human health and the environment through capping to contain wastes, which will alleviate threats from direct contact and minimize leachate generation. It will also provide active gas extraction of VOCs and other landfill gases.

B. Attainment of ARARs

The selected remedy will be designed to meet all applicable, or relevant and appropriate requirements under federal and state environmental laws. Since the Sauk County landfill is a state lead cleanup, no CERCLA on site permit exemption is available. All permits and approvals required to implement the remedy must be obtained and strictly complied with. The primary ARARs that will be achieved by the selected alternative are:

1. Action specific ARARs

Wisconsin Statutes, section 114.43 to 144.47

Wis. Adm. Codes, ss. NR 504.05(7), NR 504.07(3), NR 506.08(6) and NR 508.04 - Landfill gas control. Standards for landfill gas control and monitoring practices. These requirements are applicable to the landfill gas collection system at the site.

Wis. Adm. Codes, ss. NR 504.08(3), NR 514.07 and NR 516 - Landfill Closure Requirements. Substantive requirements for the design, construction,

upgrading, maintenance and documentation of landfill caps. Cap design, construction, maintenance and documentation must comply with these applicable requirements.

Wis. Adm. Codes, ss NR 508.04 and NR 140 - Groundwater monitoring requirements. Substantive requirements for groundwater monitoring plans must meet these applicable requirements.

Wis. Adm. Code, NR 600 series - Hazardous waste requirements. This code was enacted to regulate the transportation, storage and disposal of hazardous waste. This code is neither applicable, nor relevant and appropriate for this site.

RCRA, Subtitle C - Hazardous waste requirements. Subtitle C are the federal regulations enacted for hazardous waste. Hazardous waste was placed in the landfill, however, the disposal took place prior to promulgation to Subtitle C. This regulation is neither applicable, nor relevant and appropriate for this site.

RCRA, Subtitle D - Solid waste requirements. Subtitle D are federal regulations enacted for solid waste disposal. The regulations are applicable to facilities which accepted waste after October 9, 1991. The Sauk County landfill closed in 1983. The Subtitle D regulations are neither applicable, nor relevant and appropriate for this site.

2. Chemical Specific ARARs

Clean Air Act [42 U.S.C. 7401 et seq.]; Wisconsin Statutes, sections 144.30 to 144.426

40 CFR 50; Wis. Adm. Code, chs. NR 404, NR 415 to NR 449 - Emission Standards. Standards for emission of pollutants into ambient air and procedures for measuring specific air pollutants. Cap construction could cause air emissions of VOCs, particulate, fugitive dust or other contaminants which could adversely affect human health and the environment. The design of the remedy must reduce air emissions to acceptable levels or provide treatment to satisfy these applicable standards.

Wis. Adm. Code, NR 140 - Groundwater Quality Standards. The remedy is designed to reduce the amount of contamination entering groundwater and achieve compliance with standards found in NR 140.

C. Cost Effectiveness

The selected remedy provides for overall cost effectiveness. The evaluation showing that the existing landfill cap is having a beneficial effect on groundwater quality provides for flexibility in choosing from the remedial alternatives. The selected remedy will improve on the beneficial effects of this cap by capturing VOCs with the gas system. Since Alternative B complies with ARARs and is the least costly, Alternative B is also the most cost effective.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies

The selected alternative represents the best balance of alternatives with respect to the nine evaluation criteria. The cap eliminates the direct exposure pathway and reduces the amount of leachate generated within the site. The active gas extraction system provides for removal and treatment of the dominant threat to groundwater (i.e. VOCs) and will effectively control other landfill gases. Potential future threats will be addressed, if necessary, through the contingency aspect of the remedy.

E. Preference for Treatment as a Principal Element

By treating the waste mass with active gas extraction, the remedy satisfies the statutory preference for remedies that employ treatment of the principal contaminant threat to permanently and significantly reduce toxicity, mobility or volume through treatment.

DECISION: THE SELECTED REMEDY

Based on an evaluation of the alternatives, the Wisconsin Department of Natural Resources believes that Alternative B, the selected remedy, will be protective of human health and the environment, comply with ARARs, be cost effective, and will use permanent solutions to the maximum extent practicable.

The selected source control remedy for the site includes the following:

- * continued monitoring of the groundwater at on site groundwater monitoring wells and off site private wells
- * regrading of the landfill surface to promote drainage off of the landfill cover
- * fencing the landfill
- * installation of a gas extraction system to efficiently collect and combust landfill gases
- * placing a deed restriction on the property to prohibit the disturbance of the surface of the landfill cap in the future
- * future maintenance of the landfill cap
- * a contingency plan to address unexpected releases from the site.

Regrading of the landfill surface conforms to the applicable provisions of the NR 500 rule series in the Wisconsin Administrative Code, including the final cover requirements of NR 506.08(3) which require that the landfill surface maintain at least 2% slopes and convey surface water from the landfill cap.

The remedy also complies with the following applicable provisions of the NR 500 Rule which pertain to active landfill gas extraction and treatment: NR 504.05(7), NR 504.07(3), NR 506.08(6) and NR 508.04. The remedy also complies with the air emission rules in ch. NR 445.

Annual maintenance is an important aspect of this remedy. Annual reports will be required summarizing the previous years maintenance of the cap, and an evaluation of the effectiveness of the gas extraction system. This report shall also contain the results of all groundwater monitoring completed at the site during the previous year and include an evaluation relative to compliance with NR 140, Wis. Adm Code standards. The report is to be submitted by July 15 of each year, starting in 1995.

At the 5 year review of this source control remedy (i.e. by October 15, 1999), WDNR will study the annual reports to determine whether the remedy continues to effectively protect human health and the environment, and whether the source control remedy is being adequately maintained. The groundwater quality data will be evaluated to determine if the groundwater quality continues to improve. If the data indicates that groundwater quality is no longer improving, then WDNR may require additional source control actions.

In order to determine if the existing landfill cover continues to prevent or abate attainment or exceedance of groundwater standards, by July 15, 2004 and in 5 year intervals after this, a report will be prepared which summarizes the monitoring data at all groundwater monitoring wells. The point of compliance for groundwater quality standards is the edge of the waste boundary. If the data shows that NR 140, Wis. Adm Code preventive action limits for VOCs are not consistently met at wells in the monitoring plan, then the remedy requires that a landfill cover as described in Alternative E of the Source Control Focused Feasibility Study be designed and constructed on the landfill. "Consistently met" is defined as 50% or more of the VOC data points from each well, within the previous three years, must be less than the NR 140 preventive action limit for each VOC detected respectively.

The WDNR has determined that the selected remedy, Alternative B, will achieve the source control remedial action objectives for this site.

RESPONSIVENESS SUMMARY

This Responsiveness Summary has been prepared to meet the requirements of Sections 113 (k) (2) (B) (iv) and 117(b) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), which requires the United States Environmental Protection Agency (EPA) or the state on state lead sites to respond ". . . to each of the significant comments, criticisms, and new data submitted in written or oral presentations" on a proposed plan or draft Record of Decision for the remedial action. The Responsiveness Summary addresses concerns by the public and potentially responsible parties (PRPs) in written and oral comments received by the state regarding the proposed source control remedy at the Sauk County Landfill Superfund site.

A. OVERVIEW

I. BACKGROUND/PROPOSED PLAN

The Sauk County landfill Superfund site is situated on a 320 acre parcel of land located between the Cities of Reedsburg and Baraboo. Also located on this parcel is the active Sauk County solid waste landfill. This active landfill is located approximately several hundred feet north of the old, closed landfill. The active landfill is not part of this Record of Decision (ROD).

The Sauk County landfill accepted municipal and industrial waste from Sauk County between the years 1973 and 1983. The site was designed as a natural attenuation landfill. This means it has no liner or leachate collection system designed into modern landfills. It is approximately 14 acres in size and has a volume of about 750,000 cubic yards. The landfill accepted large quantities of foundry sand, municipal wastes and industrial wastes from homes and businesses located within the county.

The Proposed Plan for this landfill called for the construction of a multi-layered composite landfill cap and gas extraction system. Because of comments received during the public comment period, the WDNR has changed the remedial action to call for additional soil being added to the existing landfill cap which will promote drainage off of the landfill surface, construction of an gas extraction system, continued groundwater monitoring, and a contingency plan to address possible future releases of VOCs from the site.

II. PUBLIC COMMENT PERIOD

A public comment period was held from September 8, 1993 to November 9, 1993 to allow interested parties to comment on the Proposed Plan in accordance with Section 117 of CERCLA. In

addition, a public meeting was held on September 21, 1993 at the Rock Springs Community Center. The WDNR presented the Proposed Plan, answered questions and accepted comments from the public. During the public comment period, WDNR received 31 written and verbal comments concerning the Proposed Plan. These comments focused primarily on the extent to which the existing landfill cover is working to reduce leaching of contaminants to groundwater, and the cost associated with implementing the Proposed Plan.

B. COMMUNITY INVOLVEMENT

Public interest in the project has been high, particularly among landowners and residents living near the landfill. The residents organized themselves into the Evergreen Property Owners Association. The Association applied for, and was awarded a Technical Assistance Grant from EPA. The purpose of the grant is to provide funding which allows parties affected by Superfund sites to retain their own technical consultant.

The property owners primary concern is that the contaminated groundwater will affect their wells, and possibly their health. In order to get answers to their questions, residents have written letters to WDNR, and to the Division of Health. In addition, the residents organized a public meeting on November 30, 1992 in which staff from WDNR, the Division of Health and Simon Hydro-Search (consultant for Sauk County) attended and responded to questions from the public.

The Evergreen Property Owners Association submitted written comments in support of the Proposed Plan. This group believes that the membrane cap is a superior source control action when compared to the other alternatives presented.

In addition to comments received from the Evergreen Property Owners Association, Sauk County submitted comments concerning the effectiveness of the existing cap, and the cost associated with placing the membrane landfill cover discussed in the Proposed Plan.

The above concerns will be responded to in the following sections.

C. SUMMARY OF SIGNIFICANT PUBLIC COMMENTS

Comment 1

Sauk County, through their consultant, commented that the existing landfill cap is effective in reducing the contamination entering groundwater. Evidence for this includes:

- Concentrations of total VOCs in well TW-25 have dropped from over 15,000 ppb to about 100 ppb since VOCs have been measured in this well (1985-1993)

- vinyl chloride is the only parameter for which NR 140 Enforcement Standards are exceeded at TW-25
- TW-25 is located immediately downgradient of the landfill and has historically shown the highest level of contamination
- Changes for tetrachloroethylene are proposed for NR 140, Wis. Adm. Code. Once these changes become effective, groundwater enforcement standards will only be exceeded at wells within 150' of the landfill.

Response

These comments have been reviewed and were taken into account in re-evaluating the alternatives for the source control remedy for the site.

Comment 2

Sauk County commented that Alternative B of the Focused Feasibility Study calls for regrading the site to promote positive drainage from the site. The WDNR Proposed Plan states that Alternative B doesn't address regrading of the site.

Response

WDNR acknowledges that the Proposed Plan contained an error in the description of Alternative B with respect to regrading the site.

Comment 3

Several comments were received such that if the present cap is working, then to require Sauk County to install a new membrane cap is a waste of money.

Response

WDNR reviewed the technical arguments, as well as the cost considerations in their decision on the source control remedy for the site.

Comment 4

The Sauk County Board Chairman commented that the proper response for this landfill is to install a gas extraction system.

Response

A gas extraction system is incorporated as part of the source control remedial action for the site.

Comment 5

The Evergreen Property Owners Association (EPOA), through their consultant, commented that they wish to work with WDNR to derive

remedial remedies which use tax dollars wisely, and protect public health, safety and welfare.

Response

WDNR believes the final source control remedial action is protective of public health, safety and the environment. WDNR also believes that the remedial action is cost effective.

Comment 6

EPOA commented that the condition of the existing cap (i.e. areas where surface water can collect rather than drain off) is of poor quality.

Response

The selected remedial action calls for regrading of the landfill surface to promote drainage off of the landfill surface. The remedy also requires that the positive drainage and vegetative cover be maintained.

Comment 7

EPOA was concerned that a water balance calculation hadn't been performed to estimate the amount of infiltration entering the waste.

Response

Simon Hydro-Search submitted (on 11/08/93) a water balance analysis using the Hydrologic Evaluation of Landfill Performance (or HELP) model. Simon Hydro-Search believes that the initial analysis using HELP completed by Warzyn in 1987 was inaccurate. Warzyn estimated 4.4 inches/year of infiltration. Simon Hydro-Search, using the HELP model predicts that 0.4 inches/year is entering the waste.

The difference between these two calculations is primarily due to the value used for hydraulic conductivity of the clay soil capping layer. Simon Hydro-Search believes that permeability data from lab testing of the soils is applicable over the entire two foot thickness of the clay layer.

WDNR believes that the Simon Hydro-Search analysis is flawed. First, lab permeability testing is usually an order of magnitude or more less than that measured in the field for similar soils. Second, WDNR doesn't believe Simon Hydro-Search's assumption that the full two feet of clay has the permeability measured in the lab is valid. This soil is only covered by approximately 6 inches of topsoil. It is likely that cracks from freeze/thaw and desiccation extend into the clay. It is also likely that plant roots extend into the clay.

Regardless of the analyses from the HELP model, VOC concentrations in groundwater monitoring wells are decreasing. This is probably the best measure of the current effectiveness of the existing cap.

Comment 8

EPOA commented that without water table wells installed through the waste and directly beneath the landfill, there is no way to be certain that leachate is not mounding up beneath the landfill.

Response

Wells installed through the waste and into the water table would be the best method of determining if leachate is mounding beneath the site. However, it is unlikely that leachate is mounding beneath the site. For mounding to occur, water must move through the waste faster than the underlying aquifer material can move it. The wells installed into the waste indicate no leachate is present so the waste is not saturated and acting as a constant source of water to the water table. In addition, groundwater elevations measured on the edges of the landfill indicate a flow direction at the water table from east to west. The data corresponds to this flow direction and doesn't indicate a mound beneath the landfill. A third factor to consider is that once the cap was placed on the waste, infiltration was reduced and there is less water available to support mounding of the water table.

Comment 9

EPOA has commented that the VOC data at TW-25 has stabilized in the samples collected between 1991 and 1993. Their comment indicates this indicates a continuing source of VOCs to groundwater.

Response

An analysis of the data from TW-25 and TW-26A was presented by Simon Hydro-Search in their letter received on November 15, 1993. This analysis indicates that the reduction in VOC concentrations in well TW-25 and TW-26A can be explained by exponential decay. Semi-log plots of the data versus time indicate that the VOCs have a half-life of about 1 year. Simon Hydro-Search's analysis indicates that the contamination has already left the landfill and the VOCs found in TW-25 are likely residual contamination attached to the aquifer matrix. If significant concentrations of VOCs were continually released from the landfill, then the data wouldn't correspond to the analysis.

The WDNR agrees with the Simon Hydro-Search analysis of the data. However, other factors besides exponential decay, such as minimizing infiltration and dilution, are probably also playing a role in the declining VOC concentrations. Future sampling and analysis of the monitoring wells will determine if the landfill is releasing VOCs.

Comment 10

EPOA commented that the data from TW-25A (screened in the Wonewoc Formation) shows a continuing release to the Wonewoc Formation. EPOA is concerned since this is the sole source drinking water aquifer to the area.

Response

Simon Hydro-Search prepared a similar analysis using the data from TW-26A. This well is screened in the Lone Rock Formation, just above the Wonewoc Formation. The data from this well also indicates there doesn't appear to be a continual loading of VOCs from the rock and soil units above.

Because the Wonewoc Formation acts as the water supply aquifer for residents in the area, WDNR included as part of the remedy monitoring of private wells, and a contingency plan should VOC concentrations at monitoring wells near the landfill start to increase. If VOCs are released from the landfill in the future and detrimentally affect groundwater, then a composite landfill cap is to be installed.

Comment 11

EPOA commented that the VOC data distribution isn't explained by the groundwater flow regimes presented in Technical Memo #3.

Response

The flow systems from the landfill towards the west are adequately defined. The water table aquifer and the upper potentiometric surface (i.e. the upper portion of the Lone Rock Formation) flow predominantly to the west, southwest. Once below the confining layers of the Lone Rock Formation, gradients indicate groundwater flow towards the east. Additional groundwater monitoring wells were installed east of the landfill. One well was screened at the water table; the second well was screened in the Wonewoc Formation. Water samples collected in November, 1993 from these new wells east of the landfill had no detections of VOCs.

Comment 12

EPOA commented that the best source control solution for this landfill is Alternative E, a composite landfill cover and gas extraction system.

Response

WDNR initially selected Alternative E as the source control action for the landfill. However, data presented during the public comment period show that Alternative B, regrading the site and installing a gas extraction system is the best source control remedy. The existing cap is limiting the amount of leachate being generated by the landfill, is cost effective and is protective of public health and the environment, and complies with state law.

Comment 13

Sauk County commented that NR 504.07, Wis. Adm. Code isn't an Applicable or Relevant and Appropriate Requirement (ARAR) because the landfill was approved prior to the promulgation date of the NR 500 code series.

Response

NR 504 is an ARAR when a site receives a plan approval after the promulgation date of NR 500, or when the criteria of NR 506.08(3) are met. NR 506.08(3) states that the final cover requirements of NR 504.07 are to be used when it is necessary to..."prevent or abate attainment or exceedances of groundwater quality standards of Ch. NR 140, Wis. Adm. Code". Based upon the groundwater quality data from well TW-25 and other wells at the site, the existing landfill cap is currently preventing the exceedance of groundwater quality standards.

Comment 14

Sauk County commented that NR 140.26, Wis. Adm. Code isn't an ARAR because it doesn't mandate a cap design or composition.

Response

NR 140.26 is an ARAR because groundwater enforcement standards in NR 140 are exceeded at monitoring wells at the site. Table 2 of NR 140.26 is a list of actions that WDNR may take in order to achieve compliance with the groundwater quality standards. A change in the design of a facility is included in the list of actions. NR 140.26 is an applicable requirement to this site.

Comment 15

Sauk County commented that the water balance presented by their consultant shows little difference in infiltration between the existing cap and the cap listed in Alternative E. Sauk County further comments that if the caps behave similarly, then the more expensive composite cap of Alternative E is not cost effective.

Response

WDNR believes the water balance presented by the County's consultant is flawed. Please see response to Comment 7.

Comment 16

Sauk County commented that WDNR placed too great an emphasis on permanence as compared to cost effectiveness when issuing the Proposed Plan. Sauk County cites a court case in which the judge ruled that

permanence has no greater emphasis than cost effectiveness or any of the other balancing criteria.

Response

WDNR agrees that cost effectiveness and permanence have equal weight when making remedial decisions at Superfund sites. But before an alternative's cost effectiveness is evaluated, the alternative must meet the threshold criteria.

Comment 17

Sauk County commented that with the proposed changes to NR 140, groundwater enforcement standards are only exceeded at wells located within 150 feet of the site. Also, in general, the number of compounds exceeding groundwater enforcement standards has declined over the past several years.

Response

WDNR used this information in its decision to select the source control remedial action for the site.

Comment 18

By providing semi-log plots of time vs. concentration of total VOCs data, Sauk County commented that the half-life of total VOCs is about 1.1 years. This estimate was provided by using data between 1985 and 1993. Assuming this relationship holds true, all of the VOCs should fall below preventive action limits in about 2 years.

Response

WDNR has reviewed the plots of data provided by Sauk County. This data was used by WDNR in selecting the source control remedial action for the site. However, should the decreasing trend in VOC concentrations not continue, the remedy includes a contingency for possible future VOC releases from the landfill.

Comment 19

Sauk County provided plots of precipitation for Baraboo. A comparison of the precipitation data and the total VOC data at TW-25 indicates that wet years and dry years do not appear to have affected the amount of VOCs being released from the landfill. Sauk County comments that this is further data showing the landfill is not releasing significant quantities of VOCs to groundwater.

Response

WDNR has reviewed the plots of data provided by Sauk County. This data was used by WDNR in selecting the source control remedial action for the site.

Comment 20

Sauk County commented that except for the surface depressions from settlement of waste, the existing landfill cap has been well maintained. Erosion gullies have been repaired as soon as possible and the vegetation is in good shape. In addition, all of the Alternatives, except Alternative A (the no-action alternative) call for regrading the surface of the landfill to promote positive drainage from the landfill.

Response

WDNR believes Sauk County has properly maintained the vegetation on the existing landfill cap.

Comment 21

Sauk County commented that the decline in total VOCs as shown by the data from TW-25 and TW-26A can be explained using the exponential decay equation. Sauk County presented an analysis using the exponential decay equation which concludes it is mathematically not possible for the landfill to be releasing significant quantities of VOCs.

Response

WDNR has reviewed the analysis presented by Sauk County. WDNR used this data in selecting the source control remedy for this site. However, other factors, such as dilution are also contributing to the declining VOC concentrations.

Comment 22

Sauk County commented that except for east of the landfill, the flow regime has been defined as well as it needs to be. Preventive action limit exceedances have been delineated. Sauk County has installed two wells to the east of the landfill to help define the flow regimes in that direction.

Response

WDNR agrees that with the additional wells installed to the east of the landfill, the flow regime is adequately delineated.