ARCS V

Remedial Activities at Uncontrolled Hazardous Waste Sites in Region V

EPA United States Environmental Protection Agency

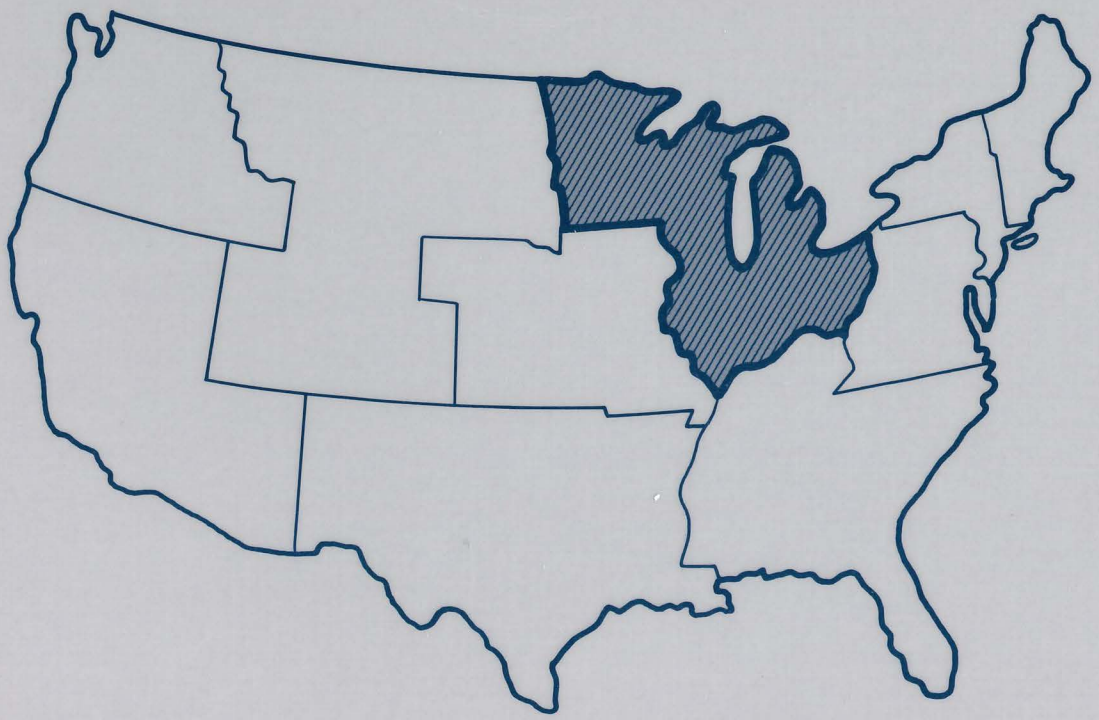
Agency Review Draft

ALTERNATIVE ARRAY MEMORANDUM
AND PRELIMINARY
IDENTIFICATION OF ARARs

Onalaska Municipal Landfill, Wisconsin

WA 01-5LL5/Contract No. 68-W8-0040

April 26, 1989



CH2M HILL

Agency Review Draft

ALTERNATIVE ARRAY MEMORANDUM AND PRELIMINARY IDENTIFICATION OF ARARs

Onalaska Municipal Landfill, Wisconsin

WA 01-5LL5/Contract No. 68-W8-0040

April 26, 1989

GLT824/94

CH2M HILL
Engineers
Planners
Economists
Scientists

April 26, 1989

GLO65550.PP.AA

Mr. Kevin Adler
U.S. EPA, Region V
230 South Dearborn
Chicago, Illinois 60604

Dear Kevin:

Subject: Transmittal of Draft Alternative Array and Preliminary Identification of ARARs

Enclosed are two copies of the Draft Alternatives Array and Preliminary Identification of ARARs memorandum. Review of this document by EPA and WDNR is needed by July 1, 1989. Of particular importance is the agency's interpretations of the ARARs issues identified in the summary section of the memorandum.

Sincerely,

Phil Smith

Phil Smith, SM

ph/GLT824/77
cc: Robin Schmidt/WDNR (2 copies)
John Fleissner/RTL and PM, Milwaukee
Dave Lane/QC Reviewer, Milwaukee
Drew Diefendorf/QC Reviewer, Milwaukee
Randy Videkovich/APM-OPNS, Milwaukee

MEMORANDUM

TO: Kevin Adler/U.S. EPA

FROM: Phil Smith/CH2M HILL

DATE: April 26, 1989

SUBJECT: Onalaska Municipal Landfill Alternatives Array and Preliminary Identification of ARARs

PROJECT: GLO65550.PP.WP

INTRODUCTION

The purpose of this preliminary identification of remedial alternatives and applicable or relevant and appropriate requirements (ARARS) is to identify the federal and state environmental laws, regulations, criteria, advisories, and guidance that are likely to affect remedial investigations and the evaluation of remedial actions at the Onalaska site.

Review of these preliminary ARARs by the Wisconsin Department of Natural Resources (WDNR) and the U.S. EPA Region V is requested. A summary of the most important ARARs issues is provided at the end of this memorandum. Agency interpretations of the ARARs will be used during the remainder of the RI/FS and the revised list of ARARs will be presented in the Onalaska feasibility study.

ARARs provide the basis for determining acceptable levels of environmental control as specifically required by other environmental laws. Actions taken at NPL sites, according to specific language in the Superfund Amendments and Reauthorization Act of 1986 (SARA), must at least meet these levels of control or obtain specific waivers of ARARs as defined in SARA.

In addition to federal requirements, state laws and regulations can also be ARARs when they are identified to the EPA by the state for inclusion in the remedial investigation and feasibility study (RI/FS) process. The State of Wisconsin has regulations in addition to and sometimes more stringent than the federal regulations. The document, "Legally Applicable or Relevant and Appropriate

State Standards, Requirements, Criteria, and Limitations for Superfund Projects in Wisconsin," was used to identify potential Wisconsin ARARs.

In addition to the requirements of state and federal environmental laws and regulations, this document also identifies environmental criteria that do not impose mandatory levels of environmental control on CERCLA actions, but do provide a reasonable basis for evaluating conditions and actions. These criteria and guidance documents are "to be considered" (TBC) by EPA in determining appropriate actions. If EPA judges ARARs to be insufficiently protective of human health or the environment, TBCs may be incorporated in the site remedy.

This preliminary identification document is a reference for the identification of potential requirements and criteria. Its use will facilitate the efficient and effective inclusion of ARARs and TBCs into the remedial action process.

DEFINITIONS OF ARARS

Congress specified in Section 121(d) of SARA that site cleanups conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) shall attain legally applicable or relevant and appropriate standards, requirements, criteria or limitations of all federal and duly promulgated state environmental and public health laws. These provisions are known in the Superfund program as ARARs. The definitions of ARARs are specific to the process and must be clearly understood to appreciate the outcome of any ARARs evaluation.

The definitions used in this document have been developed from OSWER Directive No. 9234.1-.01 CERCLA Compliance with Other Laws Manual and are presented below.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant,

remedial action, location, or other circumstance at a CERCLA site.

For a requirement to be applicable, the remedial action or the circumstances at the site must satisfy all of the jurisdictional prerequisites of that requirement. For example, the minimum technology requirements for landfills under RCRA would apply only if a new hazardous waste landfill (or an expansion of an existing landfill) were to be built on a CERCLA site.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, although not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. However, in some circumstances a requirement may be relevant but not appropriate for the site-specific situation.

The relevance and appropriateness of a requirement can be judged by comparing the factors addressed in the requirement with the features of the site. These factors include the characteristics of the remedial action, the hazardous substances in question, and the physical circumstances of the site. For example, although RCRA capping regulations are not applicable to capping in-place hazardous waste that was disposed of prior to November 19, 1980, (the effective date of the original RCRA regulations) and left undisturbed by the remedial action, the RCRA regulation for closure by capping may be deemed relevant and appropriate.

A requirement that is judged to be relevant and appropriate must be complied with to the same degree as if it were applicable. Moreover, remedial actions must comply with a relevant and appropriate requirement that is more stringent than an applicable requirement. If, for example, a state standard is "applicable" while a more stringent federal standard is "relevant and appropriate," the more stringent federal standard will govern. However, relevance and appropriateness must each be established separately and there is discretion in the determination of relevance and appropriateness. For example, it is possible for only

portions of a relevant regulation to be considered appropriate, while other portions of the same regulation may be dismissed as not appropriate to the circumstances at a given site.

EPA, in OSWER Directive No. 9234.1-.01, defines three types of ARARs:

- Chemical-specific
- Location-specific
- Action-specific

Chemical-specific ARARs include those laws and requirements that regulate the release to the environment of materials having certain chemical or physical characteristics or materials containing specified chemical compounds. These requirements generally set health- or risk-based concentration limits or discharge limitations for specific hazardous substances. If, in a specific situation, a chemical is subject to more than one discharge or exposure limit, the more stringent of the requirements should generally be applied.

Location-specific ARARS are those requirements that relate to the geographical or physical position of the site, rather than to the nature of the contaminants or the proposed site remedial actions. These requirements may limit the type of remedial actions that can be implemented or may impose additional constraints on the remedial action. Flood plain restrictions and protection of endangered species are among the location-specific potential ARARs.

Action-specific ARARs are requirements that define acceptable treatment and disposal procedures for hazardous substances. These ARARs generally set performance, design, or other similar action-specific controls or restrictions on particular kinds of activities related to management of hazardous substances or pollutants. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. Since there are usually several alternative actions for any remedial site, very different requirements can come into play. The action-specific requirements do not in themselves determine the remedial alternative; rather, they indicate how or to what level treatment or cleanup will be achieved.

ARARs, in accordance with Section 121(d)2(A) of CERCLA, apply only to actions or conditions that are located entirely onsite. Section 121(e) of CERCLA states that no federal, state, or local permit is required for remedial actions conducted entirely onsite. Therefore, actions conducted entirely onsite must meet only the substantive, and not the administrative requirements of ARARs. Any action that takes place offsite is subject to the full requirements of applicable federal, state, and local regulations.

In determining the extent to which onsite CERCLA response actions must comply with other environmental and public health laws, distinction between substantive and administrative requirements must be made. Substantive requirements may be applicable or relevant and appropriate, while administrative requirements that are part of the same law or body of regulations will not be ARARs. Substantive requirements are those requirements that pertain directly to actions or conditions in the environment. Examples of substantive requirements include quantitative health- or risk-based restrictions that limit exposure to types of

hazardous substances, and restrictions upon activities in certain special locations.

Administrative requirements are those mechanisms that facilitate the implementation of the substantive requirements of a statute or regulation. Administrative requirements include the approval of administrative bodies, consultation, issuance of permits, documentation, reporting, recordkeeping, and enforcement.

In addition to laws and regulations, many federal and state environmental and public health programs also develop criteria, advisories, guidance, and proposed standards that are not legally binding but that may provide useful information or recommended procedures. These criteria are TBCs and are evaluated when ARARs do not exist for a site condition or contaminant or when multiple contaminants or exposure pathways make the ARARs insufficiently protective. The analysis of ARARs and TBCs serves to establish protective cleanup level targets and to help identify preferred remedial action alternatives.

This document addresses the potential State of Wisconsin ARARs. The Wisconsin Department of Natural Resources (DNR)

will receive a copy of this document and will be asked to identify any additional requirements that could be potential ARARs. There are five criteria that define state ARARs. To be considered as ARARs, the requirements must:

- Be promulgated standards
- Be more stringent than federal requirements
- Be identified to EPA in a timely manner
- Not result in a statewide prohibition on land disposal
- Be consistently applied statewide.

It is EPA's policy that state ARARs will be achieved to the greatest extent practicable.

SITE BACKGROUND

A site description, site history and summary of existing site data is presented in Attachment 1. It is a

reproduction of Section 2 of the QAPP for the Onalaska Municipal Landfill site.

PRELIMINARY REMEDIAL ACTION ALTERNATIVES

Since identification of federal and state ARARs are dependent on the remedial actions considered for the the site, preliminary remedial action alternatives were developed. A summary of the major components contained in each alternative are listed in Figure 1. These preliminary remedial action alternatives were developed based on limited data for the sole purpose of identifying potential ARARs. The remedial alternatives developed in the Feasibility Study may be significantly different from those identified here.

ALTERNATIVE 1--NO ACTION

Consideration of the No Action alternative is required for baseline comparative purposes by current EPA RI/FS Guidance (OSWER Directive 9355.3-01). It includes monitoring and access restrictions as allowed in the RI/FS Guidance. Monitoring of surface water and sediment in the Black River and wetland south of the site and monitoring of groundwater

TECHNOLOGIES	ALTERNATIVES 1 NO ACTION	2 DMZ GROUNDWATER COLLECTION & TREATMENT	3 ONSITE GROUNDWATER COLLECTION & TREATMENT	4 DMZ GROUNDWATER COLLECTION & TREATMENT & CAP UPGRADE	5 SOIL VAPOR EXTRACTION	6 SOURCE DISPOSAL AT RCRA LANDFILL	7 SOURCE INCINERATION
ACCESS RESTRICTIONS	✖	✖	✖	✖	✖	✖	✖
GROUNDWATER MONITORING	✖	✖	✖	✖	✖	✖	✖
DMZ GROUNDWATER EXTRACTION		✖		✖	✖	✖	✖
ONSITE GROUNDWATER EXTRACTION			✖				
OIL/WATER SEPARATION TREATMENT		✖	✖	✖	✖	✖	✖
AIR STRIPPING TREATMENT		✖		✖	✖	✖	✖
NAPHTHA RECOVERY AND RECYCLE		✖	✖	✖	✖	✖	✖
METALS PRECIPITATION			✖				
BIOLOGICAL TREATMENT			✖				
TERTIARY TREATMENT			✖				
WPDES DISCHARGE TO BLACK RIVER		✖	✖	✖	✖	✖	✖
UPGRADE OF CAP				✖	✖	✖	✖
SOIL VAPOR EXTRACTION [a]					✖		
EXCAVATION OF SOURCE WASTES						✖	✖
DRUM CONTENT INCINERATION						✖	✖
SOIL DISPOSAL AT RCRA LANDFILL						✖	
ONSITE SOIL INCINERATION							✖

[a] *Soil washing to be considered in the alternative if semi-volatile organics or inorganics present unacceptable risks.*

GL065550.PP\WP\PRELIM. REMED. ALT ARRAY 3/14/89

FIGURE 1
PRELIMINARY REMEDIAL ACTION ALTERNATIVES ARRAY
ONALASKA MUNICIPAL LANDFILL

may be a viable alternative. It is possible that the RI may conclude that no human receptors of contaminanted groundwater exist in the projected flow direction. Also, the travel time of organic contaminants to the southern wetland may be on the order of 50 years, assuming no degradation. During this period dispersion, biodegradation, chemical degradation and volatilization may act to reduce contaminant concentrations and, as a result, measurable impacts on environmental receptors may not occur.

Deed restrictions to prevent future use of the groundwater between the site and the discharge zone would have to be implemented far into the future. An ARAR waiver for exceedance of drinking water Maximum Contaminant Levels (MCLs) may not be needed for this alternative because SARA Section 121(d)(B)(ii) allows establishment of alternate concentration limits for groundwater in cases similar to those assumed for this alternative.

ALTERNATIVE 2--DMZ GROUNDWATER COLLECTION AND TREATMENT

Groundwater exceeding Wisconsin groundwater quality enforcement standards, MCLs or other action levels

established by WDNR and U.S. EPA would be collected at the downgradient perimeter of the design management zone (DMZ) of the landfill. This zone would be established by U.S. EPA and WDNR. For this alternative it is assumed that it is a vertical plane located 300 feet from the landfill boundary. The collection system would be designed to intercept groundwater contaminants migrating from the landfill. Because of the potential for releases from drums containing liquid wastes in the landfill the collection system would be assumed to operate indefinitely. Based on preliminary data, a flow rate of 100 gpm is estimated.

Groundwater would be treated in an oil/water separator followed by air stripping treatment prior to discharge to the Black River. Air stripping treatment is presented here as an example of treatment technology. Other technologies will also be considered in the FS. Treatment of stripper air emission would likely depend on the requirements of the Wisconsin Administrative Code NR445 and evaluations of the public health effects of the air emissions. Recovered naphtha would be recycled if possible.

Long-term groundwater monitoring and access restrictions are also included in this alternative.

ALTERNATIVE 3--ONSITE GROUNDWATER COLLECTION AND TREATMENT

The objective of Alternative 3 would be to collect contaminated groundwater beneath the landfill and any that has migrated offsite and treat it to meet WPDES discharge limits. Because of the potential for landfill leachate to greatly increase the organic and inorganic contaminants in the groundwater beneath the landfill, additional treatment processes may be necessary to meet discharge permit levels. It is also possible a pure phase of naphtha could be recovered in the collection system. For this reason the onsite treatment system could be substantially more complex than the treatment necessary for the DMZ collection system and could involve the following components:

- Flow equalization
- Oil/water separation

- Metals precipitation involving: addition of chemicals such as hydroxide and polymers, clarification, solids storage and solids dewatering

- Biological treatment involving aeration, clarification, and solids dewatering

- Activated carbon adsorption

Additional components of this alternative would likely include groundwater monitoring, fencing the site, deed restrictions on use of the property and long-term maintenance of the existing cap.

ALTERNATIVE 4--DMZ GROUNDWATER COLLECTION AND TREATMENT AND CAP UPGRADE

Alternative 4 includes all of the components of Alternative 2 and adds upgrading of the existing cap.

The existing landfill cap was constructed from 1980 to 1982 and consists of 1-foot of silty clay. Upgrading of the

existing cap to provide protection from freeze-thaw and dessication would be accomplished by adding several feet of fill above the existing surface and at least 6 inches of topsoil. If the existing cap material does not have a sufficiently low infiltration properties, it could be improved by adding additional thickness of clay or by mixing bentonite into the existing material or by recompacting in place. This alternative would meet the Wisconsin DNR regulations for closure of new landfills (NR 504.07).

ALTERNATIVE 5--SOIL VAPOR EXTRACTION

Alternative 5 includes all the components of Alternative 4 and adds soil vapor extraction (SVE) of VOCs in the vadose zone of identified concentrated source areas. Potential concentrated source areas include the estimated 300 drums and buried tank truck disposed of onsite and the "designated area" where solvents were disposed.

The soil vapor extraction system would consist of:

- Air extraction wells (e.g., 2 inch diameter PVC) installed in the contaminated zone in a grid pattern:

  - Collection headers
  - Condensation traps
  - Blowers and controls
  - Sampling ports
  - Treatment of VOCs in the air stream

An option for soil washing is also included in this alternative if semivolatile organic or inorganic contaminants are found at concentrations resulting in unacceptable risk.

ALTERNATIVE 6--SOURCE DISPOSAL AT A RCRA LANDFILL

Alternative 6 includes all the components of Alternative 4 and adds excavation of concentrated source areas and offsite disposal at a RCRA Landfill. The potential source areas are the same as those described for Alternative 5. The source areas would likely be excavated under Levels B and C health and safety protection. Contents of drums and the tank truck

would be incinerated offsite at a RCRA incinerator. Excavated soils would be trucked to a RCRA landfill and disposed. The excavation would be backfilled with locally available soil and the original cap replaced prior to the upgrading of the entire landfill cap.

ALTERNATIVE 7--SOURCE INCINERATION

Alternative 7 is identical to Alternative 6 except that the contaminated soil from concentrated source areas would be incinerated onsite. Incineration offsite would be done if it proved more cost effective and sufficient capacity was available. The soil residuals would be used as backfill in the excavation.

CHEMICAL-SPECIFIC ARARS

Chemical-specific ARARs include those laws and requirements that regulate the release to the environment of specific substances having certain chemical or physical characteristics or materials containing specified chemical compounds. They are important in determining the extent of soil, sediment and groundwater remediation as well as

determining the residual levels of contaminants allowable after treatment.

SOIL AND SEDIMENT

Chemical-specific ARARS do not exist for soil or sediment for the contaminants expected at the site. Target soil and sediment concentrations will be developed in the RI risk assessment to show the contaminant concentrations corresponding to the 10^{-4} to 10^{-7} cancer risk levels. These target concentrations are TBCs only and will be calculated using the carcinogenic potency factors and exposure assumptions developed by the EPA.

GROUNDWATER

Groundwater Quality Standards

The State of Wisconsin has chemical specific standards for groundwater listed in NR 140 of the Wisconsin Administration Code. Table 1 presents the enforcement standards and preventative action limits. Chapter NR140 requires that corrective action be taken if enforcement standards or

Table 1
WISCONSIN GROUNDWATER QUALITY STANDARDS

Public Health Groundwater Quality Standards

Substance	Enforcement Standard (ug/l)*	Preventive Action Limit (ug/l)
Aldicarb	10	2
Arsenic	50	5
Bacteria, Total Coliform	1/100 ml	1/100 ml
Barium	1 mg/l	0.2 mg/l
Benzene	0.67	0.067
Cadmium	10	1
Carbofuran	50	10
Chromium	50	5
Cyanide	460	92
1,2-Dibromoethane	0.010	0.001
1,2-Dibromo-3-chloropropane (DBCP)	0.05	0.005
p-Dichlorobenzene	750	150
1,2-Dichloroethane	0.5	0.05
1,1-Dichloroethylene	0.24	0.024
2,4-Dichlorophenoxyacetic Acid	100	20
Dinoseb	13	2.6
Endrin	0.2	0.02
Fluoride	2.2 mg/l	0.44 mg/l
Lead	50	5
Lindane	0.02	0.002
Mercury	2	0.2
Methoxychlor	100	20
Methylene Chloride	150	15
Nitrate + Nitrite (as N)	10 mg/l	2 mg/l
Selenium	10	1
Silver	50	10
Simazine	2.15 mg/l	0.43 mg/l
Tetrachloroethylene	1	0.1
Toluene	343	68.6
Toxaphene	0.0007	0.00007
1,1,1-Trichloroethane	200	40
1,1,2-Trichloroethane	0.6	0.06
Trichloroethylene	1.8	0.18
2,4,5-Trichlorophenoxypropionic Acid	10	2
Vinyl Chloride	0.015	0.0015
Xylene	620	124

Public Welfare Groundwater Quality Standards

Chloride	250 mg/l	125
Color	15 color units	7.5 color units
Copper	1.0 mg/l	0.5 mg/l
Foaming agents MBAS (Methylene-Blue Active Substances)	0.5 mg/l	0.25 mg/l
Iron	0.3 mg/l	0.15 mg/l
Manganese	0.05 mg/l	0.025 mg/l
Odor	3 (Threshold Odor No.)	1.5 (Threshold Odor No.)
Sulfate	250 mg/l	125 mg/l
Total Dissolved Solids (TDS)	500 mg/l	250 mg/l
Zinc	5 mg/l	2.5 mg/l

*All units in ug/l unless otherwise noted

GLT824/84

preventative action limits are exceeded at a point of standards application. In general, corrective actions may be more extensive if enforcement standards are exceeded.

The point of standards application is one of the following locations:

- Any point of present groundwater use
- Any point beyond the boundary of the property on which the facility, practice, or activity is located
- Any point within the property boundaries beyond the three-dimensional design management zone if one is established by the department at each facility, practice, or activity.

The WDNR must designate a design management zone for the site before the point of standards application can be determined. The design management zone for solid waste disposal facilities is the area within a vertical plane located within 300 feet (NR140.22) of the facility boundary.

Wisconsin also administers the implementation of two major federal laws within the State, the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA) which contain chemical-specific standards and criteria that are often ARARs for groundwater remediation. Table 2 presents the standards and criteria pertinent to groundwater (or surface water) used as a drinking water supply.

As with the soil and sediment, TBC target concentrations will be developed in the RI risk assessment to show contaminant concentrations corresponding to the 10^{-4} to 10^{-7} cancer risk levels for drinking water ingestion. Reference doses will be used in evaluating noncarcinogens.

Surface Water Quality Standards

Chemical specific ARARs for the protection of human health and aquatic life from exposure to contaminants in the Black River are important at the Onalaska site because the river may receive the natural groundwater discharge from the site and nearly all alternatives would discharge treated groundwater to the river. Potential ARARs for protection of human health from ingestion of aquatic organisms and water

Revised 1-11-89 by J. Sepesi

Table 2

U.S. EPA DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES

Chemical	a Maximum Contaminant Level (MCL) ug/l	b Proposed Maximum Contaminant Level (MCL) ug/l	c Secondary Maximum Contaminant Level (MCL) ug/l	d Maximum Contaminant Level Goal (MCLG) ug/l	e Proposed Maximum Contaminant Level Goal (MCLG) ug/l	f Federal Water Quality Criteria (FWQC) for Protection of Human Health: g Water & Aquatic Organisms Toxicity Protection ug/l	g Water & Aquatic Organisms 10-6 Cancer Risk ug/l	h Aquatic Organisms Toxicity Protection ug/l	h Aquatic Organisms 10-6 Cancer Risk ug/l	i Modified for Water Only Toxicity Protection ug/l	i Modified for Water Only 10-6 Cancer Risk ug/l	j Organoleptic Criterion ug/l	k Office of Drinking Water Lifetime Health Advisories ug/l
Acenaphthene	-	-	-	-	-	-	-	-	-	-	-	20	-
Acrolein	-	-	-	-	-	320	-	780	-	540	-	-	-
Acrylamide	-	-	-	-	0	-	-	-	-	-	-	-	NRC
Acrylonitrile	-	-	-	-	-	-	0.058	-	0.65	-	0.063	-	-
Alachlor	-	-	-	-	0	-	-	-	-	-	-	-	NRC
Aldicarb	-	-	-	-	9	-	-	-	-	-	-	-	10
Aldrin	-	-	-	-	-	-	0.000074	-	0.000079	-	0.0012	-	-
Antimony	-	-	-	-	-	146	-	45000	-	146	-	-	-
Arsenic	50	-	-	-	50	-	0.0022	-	0.0175	-	0.0025	-	50
Asbestos	-	-	-	-	7.0 l	_	0.03 l	-	-	-	0.030 k	-	-
Barium	1000	-	-	-	1500	-	-	-	-	-	-	-	1500
Benzene	5	-	-	0	-	-	0.66	-	40	-	0.67	-	NRC
Benzidine	-	-	-	-	-	-	0.00012	-	0.00053	-	0.00015	-	-
Benzo(a)anthracene	-	-	-	-	-	-	- n	-	- n	-	- m	-	-
Benzo(a)pyrene	-	-	-	-	-	-	- n	-	- n	-	- m	-	-
Benzo(b)fluoranthene	-	-	-	-	-	-	- n	-	- n	-	- m	-	-
Benzo(k)fluoranthene	-	-	-	-	-	-	- n	-	- n	-	- m	-	-
Benzo(ghi)perylene	-	-	-	-	-	-	- n	-	- n	-	- m	-	-
Beryllium	-	-	-	-	-	-	0.0037	-	0.0641	-	0.0039	-	-
Bis(2-chloroisopropyl) ether	-	-	-	-	-	34.7	-	4.36	-	34.7	-	-	-
Bis(2-chloromethyl) ether	-	-	-	-	-	-	3.8E-06	-	0.00184	-	3.9E-06	-	-
Bis(2-chloroethyl) ether	-	-	-	-	-	-	0.03	-	1.36	-	0.03	-	-
Bis(2-ethylhexyl) phthalate	-	-	-	-	-	15000	-	50000	-	21000	-	-	-
Bromodichloromethane	100 m	-	-	-	-	See halomethanes		See halomethanes		See halomethanes		-	-
Bromoform	100 m	-	-	-	-	-	-	-	-	-	-	-	-
2-Butanone (MEK)	-	-	-	-	-	-	-	-	-	-	-	-	170
Cadmium	10	-	-	-	5	10	-	NCD	-	10	-	-	5
Carbofuran	-	-	-	-	36	-	-	-	-	-	-	-	36
Carbon tetrachloride	5	-	-	0	-	-	0.40	-	6.94	-	0.42	-	NRC
Chlorobenzene	-	-	-	-	60	488	-	15050	-	488	-	-	300

SEE LAST PAGE FOR FOOTNOTES

Revised 1-11-89 by J Sepesi

Table 2

U.S. EPA DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES

Chemical	a Maximum Contaminant Level (MCL) ug/l	b Proposed Maximum Contaminant Level (MCL) ug/l	c Secondary Maximum Contaminant Level (MCL) ug/l	d Maximum Contaminant Level Goal (MCLG) ug/l	e Proposed Maximum Contaminant Level Goal (MCLG) ug/l	f Federal Water Quality Criteria (FWQC) For Protection of Human Health: Water & Aquatic Organisms Toxicity Protection ug/l	g Water & Aquatic Organisms 10-6 Cancer Risk ug/l	h Aquatic Organisms Only Toxicity Protection ug/l	h Aquatic Organisms Only 10-6 Cancer Risk ug/l	i Modified for Water Only Toxicity Protection ug/l	i Modified for Water Only 10-6 Cancer Risk ug/l	j Organoleptic Criterion ug/l	k Office of Drinking Water Lifetime Health Advisories ug/l
Chlordane	-	-	-	-	0	-	0.00046	-	0.00048	-	0.022	-	NRC
Chloroform	100 m	-	-	-	-	-	0.19	-	15.7	-	0.19	-	-
2-Chlorophenol	-	-	-	-	-	-	-	-	-	-	-	0.1	-
3-Chlorophenol	-	-	-	-	-	-	-	-	-	-	-	0.1	-
4-Chlorophenol	-	-	-	-	-	-	-	-	-	-	-	0.1	-
Chromium	50	-	-	-	120	-	-	-	-	-	-	-	120
Chromium (hexavalent)	-	-	-	-	-	50	-	NCD	-	50	-	-	-
Chromium (trivalent)	-	-	-	-	-	170000	-	3433000	-	179000	-	-	-
Chrysene	-	-	-	-	-	-	- n	-	- n	-	- m	-	-
Copper	-	1300	1000	-	1300	-	-	-	-	-	-	1000	-
Cyanide	-	-	-	-	-	200	-	NCD	-	200	-	-	154
DDT	-	-	-	-	-	-	0.000024	-	0.000024	-	>0.0012	-	-
2,4-D	100	-	-	-	70	-	-	-	-	-	-	-	70
DBCP	-	-	-	-	0	-	-	-	-	-	-	-	NRC
Dibenzo(a,h)anthrancene	-	-	-	-	-	-	- n	-	- n	-	- m	-	-
Dibutyl phthalate	-	-	-	-	-	34000	-	154000	-	44000	-	-	-
1,2-Dichlorobenzene (o)	-	-	-	-	-	400	-	2600	-	470	-	-	620
1,3-Dichlorobenzene (m)	-	-	-	-	-	400	-	2600	-	470	-	-	620
1,4-Dichlorobenzene (p)	75	-	-	75	-	400	-	2600	-	470	-	-	75
Dichlorobenzidine	-	-	-	-	-	-	0.01	-	0.02	-	0.0207	-	-
1,2-Dichloroethane	5	-	-	0	-	-	0.94	-	243	-	0.94	-	NRC
1,1-Dichloroethene	7	-	-	7	-	-	0.033	-	1.85	-	0.033	-	7
Cis-1,2-Dichloroethene	-	-	-	-	70	-	-	-	-	-	-	-	70
Trans-1,2-Dichloroethene	-	-	-	-	70	-	-	-	-	-	-	-	70
2,3-Dichlorophenol	-	-	-	-	-	-	-	-	-	-	-	0.04	-
2,4-Dichlorophenol	-	-	-	-	-	-	-	-	-	-	-	0.3	-
2,5-Dichlorophenol	-	-	-	-	-	-	-	-	-	-	-	0.5	-
2,6-Dichlorophenol	-	-	-	-	-	-	-	-	-	-	-	0.2	-
3,4-Dichlorophenol	-	-	-	-	-	-	-	-	-	-	-	0.3	-
2,4-Dimethylphenol	-	-	-	-	-	-	-	-	-	-	-	400	-

SEE LAST PAGE FOR FOOTNOTES

Revised 1-11-89 by J. Sepesi

Table 2

U.S. EPA DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES

Chemical	a Maximum Contaminant Level (MCL) ug/l	b Proposed Maximum Contaminant Level (MCL) ug/l	c Secondary Maximum Contaminant Level (MCL) ug/l	d Maximum Contaminant Level Goal (MCLG) ug/l	e Proposed Maximum Contaminant Level Goal (MCLG) ug/l	f Federal Water Quality Criteria (FWQC) for Protection of Human Health: g Water & Aquatic Organisms Toxicity Protection ug/l	g 10-6 Cancer Risk ug/l	h Aquatic Organisms Only Toxicity Protection ug/l	h 10-6 Cancer Risk ug/l	i Modified for Water Only Toxicity Protection ug/l	i 10-6 Cancer Risk ug/l	j Organoleptic Criterion ug/l	k Office of Drinking Water Lifetime Health Advisories ug/l
1,2-Dichloropropane	-	-	-	-	6	-	-	-	-	-	-	-	-
Dichloropropene	-	-	-	-	-	87	-	14100	-	87	-	-	-
Dieldrin	-	-	-	-	-	-	0.000071	-	0.000076	-	0.0011	-	-
Diethyl phthalate	-	-	-	-	-	350000	-	1800000	-	434000	-	-	-
Dimethylphthalate	-	-	-	-	-	313000	-	2900000	-	350000	-	-	-
Dinitrophenol	-	-	-	-	-	70	-	13.4	-	70	-		
2,4-Dinitro-methylphenol	-	-	-	-	-	14.3	-	765	-	13.4	-		
2,4-Dinitrotoluene	-	-	-	-	-	-	0.11	-	9.1	-	0.11	-	-
Dioxane	-	-	-	-	-	-	-	-	-	-	0.46	-	NRC
Diphenylhydrazine	-	-	-	-	-	-	0.042	-	0.56	-	-	-	-
Endosulfan	-	-	-	-	-	74	-	159	-	138	-	-	-
Endrin	0.2	-	-	-	-	1	-	NCD	-	1	-	-	0.32
Epichlorohydrin	-	-	-	-	0	-	-	-	-	-	-	-	NRC
Ethylbenzene	-	-	-	-	680	1400	-	3280	-	2400	-	-	3400
Ethylenebromide	-	-	-	-	0	-	-	-	-	-	-	-	NRC
Fluoranthene	-	-	-	-	-	42	-	54	-	188	-	-	-
Halomethanes	-	-	-	-	-	-	0.19 o	-	15.7 o	-	0.19 o	-	-
alpha-HCCH(BHC)	-	-	-	-	-	-	0.0092	-	0.031	-	0.013	-	-
beta-HCCH(BHC)	-	-	-	-	-	-	0.0163	-	0.0547	-	0.023	-	-
gamma-HCCH(Lindane)	4	-	-	-	0.2	-	0.0186	-	0.0625	-	0.017	-	7000
Heptachlor	-	-	-	-	0	-	0.00028	-	0.00029	-	0.011	-	2
Heptachlor Epoxide	-	-	-	-	0	-	-	-	-	-	-	-	-
Hexachlorobenzene	-	-	-	-	-	-	0.00072	-	0.00074	-	0.021	-	NRC
Hexachlorobutadiene	-	-	-	-	-	-	0.45	-	50	-	0.45	-	-
Hexachlorocyclopentadiene	-	-	-	-	-	206	-	14800	-	206	-	-	-
Hexachloroethane	-	-	-	-	-	-	1.9	-	8.74	-	2.4	-	-
Iron	-	-	300	-	-	-	-	-	-	-	-	-	-
Isophorone	-	-	-	-	-	5200	-	520000	-	5200	-	-	-
Lead	50	5	-	-	20	50	-	NCD	-	50	-	-	20
Mangenese	-	-	50	-	-	-	-	-	-	-	-	-	-

SEE LAST PAGE FOR FOOTNOTES

Revised 1-11-89 by J. Sepesi

Table 2

U.S. EPA DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES

Chemical	a Maximum Contaminant Level (MCL) ug/l	b Proposed Maximum Contaminant Level (MCL) ug/l	c Secondary Maximum Contaminant Level (MCL) ug/l	d Maximum Contaminant Level Goal (MCLG) ug/l	e Proposed Maximum Contaminant Level Goal (MCLG) ug/l	f Federal Water Quality Criteria (FWQC) For Protection of Human Health: g Water & Aquatic Organisms Toxicity Protection ug/l	g 10-6 Cancer Risk ug/l	h Aquatic Organisms Toxicity Protection ug/l	h 10-6 Cancer Risk ug/l	i Modified for Water Only Toxicity Protection ug/l	i 10-6 Cancer Risk ug/l	j Organoleptic Criterion ug/l	k Office of Drinking Water Lifetime Health Advisories ug/l
Mercury	2	-	-	-	3	0.144	-	0.146	-	10	-	-	1.1
Methoxychlor	100	-	-	-	340	-	-	-	-	-	-	-	340
2-Methyl-4-chlorophenol	-	-	-	-	-	-	-	-	-	-	-	1800	-
3-Methyl-4-chlorophenol	-	-	-	-	-	-	-	-	-	-	-	3000	-
3-Methyl-6-chlorophenol	-	-	-	-	-	-	-	-	-	-	-	20	-
Methylene chloride	-	-	-	-	-	See halomethanes		See halomethanes		See halomethanes		-	NRC
4-Methylphenol	-	-	-	-	-	-	-	-	-	-	-	0.1	-
Nickel	-	-	-	-	-	13.4	-	100	-	15.4	-	-	150
Nitrobenzene	-	-	-	-	-	19800	-	2130000	-	19800	-	-	-
N-Nitrosodimethylamine	-	-	-	-	-	-	0.0014	-	16	-	0.0014	-	-
N-Nitrosodiethylamine	-	-	-	-	-	-	0.0008	-	1.2	-	0.0008	-	-
N-Nitrosodibutylamine	-	-	-	-	-	-	0.0064	-	0.587	-	0.0064	-	-
N-Nitrosopyrrolidine	-	-	-	-	-	-	0.016	-	91.1	-	0.016	-	-
N-Nitrosodiphenylamine	-	-	-	-	-	-	4.9	-	16.1	-	4.9	-	-
Oxamyl	-	-	-	-	-	-	-	-	-	-	-	-	175
PCB	-	-	-	-	0	-	0.000079	-	0.000079	-	0.013	-	-
Pentachlorobenzene	-	-	-	-	-	74	-	85	-	570	-	-	-
Pentachlorophenol	-	-	-	-	220	1010	-	29400	-	1010	-	30	220
Phenol	-	-	-	-	-	3500	-	769000	-	3500	-	-	-
Selenium	10	-	-	-	45	10	-	NCD	-	10	-	-	-
Silver	50	-	-	-	-	50	-	NCD	-	50	-	-	-
Styrene	-	-	-	-	140	-	-	-	-	-	-	-	140
2,3,7,8-TCDD	-	-	-	-	-	-	1.3E-08	-	2.2E-07	-	1.8E-08	-	NRC
1,2,4,5-Tetrachlorobenzene	-	-	-	-	-	38	-	48	-	180	-	-	
Tetrachloroethene	-	-	-	-	0	-	0.80	-	8.85	-	0.88	-	10
1,1,2,2-Tetrachloroethane	-	-	-	-	-	-	0.17	-	10.7	-	0.17	-	-
2,3,4,6-Tetrachlorophenol	-	-	-	-	-	-	-	-	-	-	-	1.0	-
Thallium	-	-	-	-	-	13	-	48	-	17.8	-	-	-
Toluene	-	-	-	-	2000	14300	-	424000	-	15000	-	-	2420
Toxaphene	5	-	-	-	0	-	0.00071	-	0.00073	-	0.026	-	-

SEE LAST PAGE FOR FOOTNOTES

Revised 1-11-89 by J. Sepesi

Table 2

U.S. EPA DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES

Chemical	a Maximum Contaminant Level (MCL) ug/l	b Proposed Maximum Contaminant Level (MCL) ug/l	c Secondary Maximum Contaminant Level (MCL) ug/l	d Maximum Contaminant Level Goal (MCLG) ug/l	e Proposed Maximum Contaminant Level Goal (MCLG) ug/l	f Federal Water Quality Criteria (FWQC) For Protection of Human Health: g Water & Aquatic Organisms Toxicity Protection ug/l	g 10-6 Cancer Risk ug/l	h Aquatic Organisms Toxicity Protection ug/l	h 10-6 Cancer Risk ug/l	i Modified for Water Only Toxicity Protection ug/l	i 10-6 Cancer Risk ug/l	j Organoleptic Criterion ug/l	k Office of Drinking Water Lifetime Health Advisories ug/l
2,4,5-TP	-	-	-	-	52	-	-	-	-	-	-	-	52
1,1,1-Trichloroethane	200	-	-	200	-	18400	-	1030000	-	19000	-	-	200
1,1,2-Trichloroethane	-	-	-	-	-	-	0.6	-	41.8	-	0.60	-	-
Trichloroethene	5	-	-	0	-	-	2.7	-	80.7	-	2.8	-	NRC
2,4,5-Trichlorophenol	-	-	-	-	-	2600	-	NCD	-	2600	-	1000	
2,4,6-Trichlorophenol	-	-	-	-	-	-	1.2	-	3.6	-	1.8	-	-
Vinyl Chloride	2	-	-	0	-	-	2.0	-	525	-	2	-	NRC
Xylenes	-	-	-	-	440	-	-	-	-	-	-	-	400
Zinc	-	-	5000	-	-	-	-	-	-	5000	-	-	-

a. Safe Drinking Water Act Primary Maximum Contaminant Levels-MCLs (40 CFR 141). Enforceable standards set as close to MCLGs as feasible and are based treatment technologies and cost.

b. Proposed MCLs. August 24, 1988 (53 FR 32259).

c. Safe Drinking Water Act Secondary Maximum Contaminant Levels (40 CFR 143). They are based on criteria such as taste and odor.

d. Safe Drinking Water Act Maximum Contaminant Level Goal-MCLGs (40 CFR 141.50). Non-enforceable health goals. Previously named RMCLs.

e. Proposed MCLGs. Proposed November 13, 1985 (50 FR 46936), except tetrachloroethene June 12, 1984 (49 FR24330) and lead and copper, August 24, 1988 (53 FR 32259).

f. Clean Water Act Fedral Water Quality Criteria (FWQC) for human health protection presented criteria for carcinogens and noncarcionogens. EPA considered the maximum protection of human health from carcinogenic effects to be zero. EPA recognized the zero level as unobtainable and presented concentrations representing a range of risks from 10-4 to 10-7. This table presents the 10 -6 lifetime cancer risk. The AWQC for noncarcinogens represents toxicity protection from noncarcinogenic health effects. EPA also presented criteria for taste and odor (organoleptic effects). Listed at 45 FR 79318-79379; November 28, 1980.

g. FWQC for protection from ingestion of contaminated aquatic organisms and contaminated water.

h. FWQC for protection from ingestion of contaminated aquatic organisms. NCD indicates no criteria derived for exposure through ingestion of aquatic organisms.

i. FWQC modified for protection from ingestion of contaminated water. These values are not AWQC but the criteria modified for application for groundwater contamination situations at Superfund sites. From the "Superfund Public Health Evaluation Manual". U.S. EPA 1986.

j. Organoleptic criterion based on taste and odor. Not health based.

k. Drinking water health advisories issued by the U.S. EPA Office of Drinking Water (ODW). Lifetime health advisories assume exposure from other sources. Based on noncarcinogenic health effects. NRC indicates no lifetime criteria because the chemical is considered a carcinogen. ODW does not issue lifetime health advisories for chemicals considered carcinogenic. Refer to Table 2 for a complete listing of health advisories.

l. Million fibers/liter

m. Based on standard for total trihalomethane of 100 ug/l.

n. Criteria set for all carcinogenic PAH's: water only = 0.0031 ug/l; water and organisms = 0.0028 ug/l; and organism only = 0.0311 ug/l.

o. Halomethane criterion is for chloromethane, bromomethane, dichloromethane, bromodichloromethane, tribromomethane, dichlorodofluoromethane, trichlorofluoromethane, or combinations of these chemicals.

during recreational use are listed in Table 2 for the CWA Federal Water Quality Criteria (FWQC) and in Table 3 for Wisconsin Water Quality Criteria (NR 105). Wisconsin surface water quality criteria and standards are dependent on the water use designation of the river. The Black River is believed to be classified for warm water sport fish communities. This classification should be confirmed by WDNR.

Potential ARARs for protection of aquatic life are listed in Tables 4 and 5. These standards are expressed according to acute and chronic toxicity levels. Table 4 lists Wisconsin water quality criteria. The column for warm water sport fish would be applicable to discharge to the Black River. Table 5 lists the CWA FWQC for aquatic life protection.

Discharges to Surface Water

Discharges of treated groundwater to the Black River are regulated by Chapter 147, Wisconsin Stats. These regulations state that no discharge shall contain quantities of listed pollutants greater than those that would remain after the discharge had received treatment by the best

Table 3
WISCONSIN WATER QUALITY CRITERIA (ug/L)
Human Threshold Criteria (HTC) (a)
Human Cancer Criteria (HCC) (b)

Substance	Basis (c)	Public Water Supply			Non Water Supply		
		Warm Water Sport Fish Communities	Cold Water Communities	Great Lakes Communities	Warm Water Sport Fish Communities	Cold Water Communities	Warm Water Forage and Limited Forage Fish Communities and Limited Aquatic Life
Acrolein	T	230	110	110	470	140	2800
Acrylonitrile	C	0.56	0.44	0.44	4.7	1.4	130
Aldrin	C	0.00054	0.00017	0.00017	0.00057	0.00017	0.0061
Antimony	T	120	120	120	7800	7800	24000
Arsenic (d)	C	50	50	50	50	50	50
alpha-BHC	C	0.07	0.033	0.034	0.15	0.045	26
beta-BHC	C	0.12	0.059	0.06	0.27	0.079	46
gamma-BHC (Lindane)	C	0.14	0.067	0.068	0.3	0.09	53
BHC, technical grade	C	0.094	0.044	0.045	0.2	0.06	35
Benzene (e)	C	5	5	5	140	45	1300
Benzidine	C	0.0011	0.00064	0.00065	0.0038	0.0011	0.3
Benzo(a)pyrene	C	0.023	0.023	0.023	0.1	0.1	6.1
Beryllium	C	0.033	0.033	0.033	0.2	0.2	7.9
Bis(2-chloroethyl) ether	C	0.3	0.28	0.28	8.8	2.9	61
Bis(2-chloroisopropyl) ether	T	27	26	26	1100	360	5600
Bis(chloromethyl) ether	C	0.00037	0.00037	0.00037	0.0034	0.0015	0.0075
Cadmium (e)	T	10	10	10	82	82	2800
Carbon Tetrachloride	C	2.5	2.1	2.1	31	10	540
Chlordane	C	0.0043	0.0013	0.0013	0.0044	0.0013	54
Chlorobenzene	T	1100	640	950	14000	4400	240000
Chloroethene (vinyl Chloride)	C	0.15	0.15	0.15	10	3.7	30
Chloroform (trichloromethane)	C	1.9	1.8	1.8	87	31	380
Chromium (+3)	T	140000	140000	140000	9500000	9500000	29000000
Chromium (+6) (e)	T	50	50	50	9000	9000	27000
Cyanide, total	T	600	600	600	40000	40000	120000
4,4'-DDT	C	0.00014	0.000042	0.000043	0.00014	0.000042	83
1,2-Dichlorobenzene	T	2000	1400	1400	10000	3000	500000
1,3-Dichlorobenzene	T	2100	1500	1600	13000	4000	500000
1,4-Dichlorobenzene	C	15	11	11	100	30	3500
3,3-Dichlorobenzidine	C	0.09	0.038	0.039	0.16	0.047	41
1,2-Dichloroethane	C	3.8	3.7	3.7	370	170	760
1,1-Dichloroethene	C	2.3	2.1	2.1	48	15	480
cis-1,2-Dichloroethene	T	280	270	270	15000	5400	56000
trans-1,2-Dichloroethene	T	280	270	270	15000	5400	56000
Dichloromethane (methylene chloride)	C	48	47	47	3600	1400	9600
2,4-Dichlorophenol	T	2200	1400	1400	10000	2900	560000
Dichloropropenes (f)	T	69	66	66	3200	1100	14000
Dieldrin	C	0.00054	0.00017	0.00017	0.00057	0.00017	2.3
Di-2-ethylhexyl phthalate	T	11000	5800	5900	30000	8900	3400000
Diethyl phthalate	T	270000	170000	170000	1100000	330000	70000000
Dimethyl phthalate	T	240000	180000	190000	1700000	530000	56000000
Di-n-butyl phthalate	T	23000	13000	13000	65000	19000	7000000

SEE LAST PAGE FOR FOOTNOTES

Table 3
WISCONSIN WATER QUALITY CRITERIA (ug/L)
Human Threshold Criteria (HTC) (a)
Human Cancer Criteria (HCC) (b)

Substance	Basis (c)	Public Water Supply			Non Water Supply		
		Warm Water Sport Fish Communities	Cold Water Communities	Great Lakes Communities	Warm Water Sport Fish Communities	Cold Water Communities	Warm Water Forage and Limited Forage Fish Communities and Limited Aquatic Life
4,6-Dinitro-o-cresol	T	10	9.5	10	220	70	2200
Dinitrophenols (f)	T	55	54	54	3000	1100	11000
2,4-Dinitrotoluene	C	9.2	8.6	8.6	260	85	1900
1,2-Diphenylhydrazine	C	0.39	0.28	0.28	2.4	0.74	91
Endosulfan	T	51	22	23	94	28	22000
Endrin	T	0.065	0.02	0.021	0.069	0.02	250
Ethylbenzene	T	2100	1400	1400	10000	3000	540000
Fluoranthene	T	28	9.1	9.3	32	9.5	41000
Halomethanes (g)	C	1.9	1.8	1.8	87	31	380
Heptachlor	C	0.0014	0.00041	0.00042	0.0014	0.00042	16
Hexachlorobenzene	C	0.0053	0.0016	0.0016	0.0055	0.0016	41
Hexachlorobutadiene	C	4.4	4.2	4.2	160	53	900
Hexachlorocyclopentadiene	T	160	160	160	7100	2500	33000
Hexachloroethane	C	18	11	11	65	19	4900
Isophorone	T	4100	3900	3900	170000	59000	840000
Lead (d)	T	50	50	50	50	50	50
Mercury	T	0.079	0.079	0.079	0.08	0.08	880
Nickel	T	170	170	170	460	460	56000
Nitrobenzene	T	15000	15000	15000	540000	180000	3200000
N-Nitrosodiethylamine	C	0.008	0.008	0.008	1.1	0.67	1.6
N-Nitrosodimethylamine	C	0.013	0.013	0.013	1.8	1	2.7
N-Nitrosodi-n-butylamine	C	0.063	0.059	0.059	1.9	0.64	13
N-Nitrosodiphenylamine	C	45	24	24	120	36	14000
N-Nitrosopyrrolidine	C	0.16	0.16	0.16	29	23	33
Pentachlorobenzene	T	46	15	15	51	15	93000
Pentachlorophenol	T	840	760	760	17000	5400	180000
Phenol	T	2800	2700	2700	160000	58000	560000
Polychlorinated biphenyls (PCB's) (h)	C	0.00049	0.00014	0.00015	0.00049	0.00015	16
Polynuclear Aromatic Hydrocarbons (i)	C	0.023	0.023	0.023	0.1	0.1	6.1
Selenium (e)	T	10	10	10	170	170	5600
Silver	T	6.4	6.4	6.4	430	430	1300
1,2,4,5-Tetrachlorobenzene	T	24	7.9	8.1	28	8.4	28000
2,3,7,8-Tetrachlorodibenzo-o-dioxin	C	0.000000097	0.00000003	0.00000003	0.0000001	0.00000003	0.00045
1,1,2,2-Tetrachloroethane	C	1.7	1.6	1.6	64	22	350
Tetrachloroethene	C	5.8	4.6	4.6	49	15	1300
Thallium	T	6.5	6.5	6.5	11	11	3000
Toluene	T	8900	7600	7600	110000	34000	1900000
Toxaphene	C	0.0056	0.0017	0.0017	0.0057	0.0017	62
1,1,1-Trichloroethane (e)	T	200	200	200	33000	11000	200000
1,1,2-Trichloroethane	C	5.8	5.3	5.3	140	46	1200
Trichloroethene (e)	C	5	5	5	360	110	3600
2,4,5-Trichlorophenol	T	1600	790	810	3700	1100	560000

SEE LAST PAGE FOR FOOTNOTES

Table 3
WISCONSIN WATER QUALITY CRITERIA (ug/L)
Human Threshold Criteria (HTC) (a)
Human Cancer Criteria (HCC) (b)

Substance	Basis (c)	Public Water Supply			Non Water Supply		
		Warm Water Sport Fish Communities	Cold Water Communities	Great Lakes Communities	Warm Water Sport Fish Communities	Cold Water Communities	Warm Water Forage and Limited Forage Fish Communities and Limited Aquatic Life
2,4,6-Trichlorophenol	C	9	4.1	4.2	18	5.4	3600

(a) HTC considers ingestion of surface water and aquatic organisms from the surface water. Assumptions: Humans consume 2L/day for public supplies, 0.01 L/day from recreational uses, and 0.02 kg/day sportfish consumption.
(b) HCC is established to protect humans from an incremental cancer risk, from ingestion of surface water and aquatic organisms, not to exceed one in 100,000. The combined cancer risk of individual carcinogens in a mixture is assumed additive. All other assumptions are the same as for HTC.
(c) Basis for the criteria: T=Human Threshold Criteria (HTC), C=Human Cancer Criteria (HCC)
(d) For this substance, the criteria equal the maximum contaminant level.
(e) For this substance, the criteria for public water supply receiving water classifications equal the maximum contaminant level pursuant to s.NR 105.08(3)(b).
(f) The Human Threshold Criteria for this Chemical class is applicable to each isomer.
(g) Human cancer criteria for Halomethanes are applicable to any combination of the following chemicals: bromomethane (methyl bromide), chloromethane (methyl chloride), tribromomethane (bromoform), bromodichloromethane (dichloromethyl bromide), dichlorodifluoromethane
(h) For purposes of regulating the discharge of PCB under ch.NR 106, the human cancer criteria for PCB shall apply only to Arochlors 1254 and 1260. In determining for a discharge the Arochlor mixture present or the predominant Arochlor mixture, when more than one Arochlor is present, the department may take into account factors such as: source of the PCB or Arochlor mixture, historical information, amount of quantitative chemical information, quality of available data, and variability of the data.
(i) Human Cancer Criteria for polynuclear aromatic hydrocarbons are applicable to any combination of the following chemicals: benzo(a)anthracene (1,2-benzanthracene), benzo(b)fluoranthene (3,4-benzofluoranthene), benzo(g,h,i)perylene (1,12-benzoperylene), benzo(k)fluoranthene (11,12-benzofluoranthene), chrysene, dibenzo(a,h)anthracene (1,2,5,6-dibenzanthracene),indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene.

Table 4

WISCONSIN WATER QUALITY CRITERIA (ug/L)

Acute Toxicity Criteria (ATC) (a)

Chronic Toxicity Criteria (CTC)(b)

	Great Lakes		Cold Water		Warm water Sportfish		All Other Fish & Aquatic Life Subcategories	
Substance	ATC	CTC	ATC	CTC	ATC	CTC	ATC	CTC
Aldrin	1.94	-	1.94	-	2.16	-	2.16	-
Arsenic (c)	363.8	153	363.8	153	363.8	153	363.8	153
gamma-BHC	1.32	0.335	.32	0.335	3.80	0.877	3.80	0.877
Cadmium ‡	8.57		8.57		63.27		63.27	
Chlordane	1.06	0.188	1.06	0.188	1.06	0.188	1.06	0.188
Chlorine (c)	18.4	7.06	18.4	7.06	18.4	7.06	18.4	7.06
Chromium (+3) ‡	3301.14	95.37	3301.14	95.37	3301.14	95.37	3301.14	95.37
Chromium (+6) (c)	14.2	9.74	14.2	9.74	14.2	9.74	14.2	9.74
Copper ‡	31.85	22.12	31.85	22.12	31.85	22.12	31.85	22.12
Cyanide, free	22.4	4.96	22.4	4.96	46.2	4.96	46.2	4.96
4,4'-DDT	0.43	-	0.43	-	0.43	-	0.43	-
Dieldrin	1.33	-	1.33	-	2.10	-	2.10	-
Endosulfan	0.169	0.115	0.169	0.115	0.471	0.321	0.471	0.321
Endrin	0.101	-	0.101	-	0.158	-	0.158	-
Heptachlor	0.396	-	0.396	-	0.396	-	0.396	-
Lead ‡	408.57	24.38	408.57	24.38	408.57	24.38	408.57	24.38
Mercury (+2) (c)	1.53	-	1.53	-	1.53	-	1.53	-
Nickel ‡	1963.83	118.86	1963.83	118.86	1963.83	118.86	1963.83	118.86
Parathion	0.08	0.0141	0.08	0.0141	0.08	0.0141	0.08	0.0141
Pentachlorophenol ‡‡	6.23	4.73	6.23	4.73	6.23	4.73	6.23	4.73
Selenium (c)	58	7.07	58	7.07	58	7.07	58	7.07
Silver ‡	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48
Toxaphene	0.61	0.01	0.81	0.01	0.61	0.01	0.81	0.01
Zinc ‡	185.76	89.23	202.93	89.23	185.76	89.23	202.93	89.23

‡ Criterion is dependent on the hardness of the water.

Assumed hardness: 200

‡‡Criterion is dependent on the pH of the water.

Assumed pH: 6.5

(a) ATC is the maximum daily concentration of a substance which ensures adequate protection of sensitive aquatic species and may not be exceeded more than once every three years.

(b) CTC is the maximum 4-day concentration of a substance which ensures adequate protection of sensitive aquatic species and may not be exceeded more than once every three years. CTC is based on acute/chronic toxicity ratios as defined in NR 105.06(5).

(c) Criterion listed is applicable to the "total recoverable" form except for chlorine which is applicable to the "total residual" form.

Revised 1-11-89 by J. Sepesi

Table 5

CRITERIA FOR AQUATIC LIFE PROTECTION

	Federal Water Quality Criteria [a]		Lowest Reported Effects Level [b]	
Chemical	Acute Criteria ug/l	Chronic Criteria ug/l	Acute ug/l	Chronic ug/l
Acenaphthene	-	-	1700	520
Acrolein	-	-	68	21
Acrylonitrile	-	-	7550	2600
Aldrin	4 (2)	-	-	-
Antimony	-	-	9000	1600
Arsenic	360 (3)	190 (3)	3243	812
Barium	-	-	5000	-
Benzene	-	-	5300	-
Benzidine	-	-	2500	-
Beryllium	-	-	130	5.3
Cadmium	8.6 (3) *	2.0 (3) *	1	0.15
Carbon tetrachloride	-	-	35200	-
Chlorobenzene	-	-	250	50
Chlordane	2.4 (2)	0.0043 (2)	-	-
Chloroform	-	-	28900	1240
2-Chloronaphthalene	-	-	1600	-
2-Chlorophenol	-	-	500000	-
3-Chlorophenol	-	-	500000	-
4-Chlorophenol	-	-	500000	-
Chromium(hexavalent)	16 (3)	11 (3)	-	-
Chromium(trivalent)	3064 (3) *	365 (3) *	2221	66
Copper	34 (3) *	21 (3) *	-	-
Cyanide	22 (3)	5.2 (3)	44.73	7.849
DDE	-	-	1050	-
DDT	1.1 (2)	0.0010 (2)	-	-
1,2-Dichlorobenzene (o)	-	-	1120	763
1,3-Dichlorobenzene (m)	-	-	1120	763
1,4-Dichlorobenzene (p)	-	-	1120	763
1,2-Dichloroethane	-	-	118000	20000
1,1-Dichloroethene	-	-	11600	-
Cis-1,2-Dichloroethene	-	-	11600	-
Trans-1,2-Dichloroethene	-	-	11600	-
1,2-Dichloropropane	-	-	23000	5700
Dichloropropene	-	-	23000	5700
Dieldrin	1.0 (2)	0.0019 (2)	-	-
Diethyl Phthalate	-	-	940	3
Dimethylphthalate	-	-	940	3

See last page for explaination of footnotes.

Revised 1-11-89 by J. Sepesi Table 5

CRITERIA FOR AQUATIC LIFE PROTECTION

	Federal Water Quality Criteria [a]		Lowest Reported Effects Level [b]	
Chemical	Acute Criteria ug/l	Chronic Criteria ug/l	Acute ug/l	Chronic ug/l
2,4-Dichlorophenol	-	-	2020	365
Di-n-butyl Phthalate	-	-	940	3
2,4-Dimethylphenol	-	-	2120	-
2,4-Dinitrotoluene	-	-	330	230
Diphenylhydrazine	-	-	270	-
Endosulfan	0.22 (2)	0.056 (2)	-	-
Endrin	0.18 (2)	0.0023 (2)	-	-
Ethylbenzene	-	-	32000	-
Fluoranthene	-	-	3980	-
Halomethanes	-	-	11000	-
alpha-HCCH(BHC)	-	-	100	-
beta-HCCH(BHC)	-	-	100	-
gamma-HCCH(Lindane)	2.0 (2)	0.080 (2)	-	-
Heptachlor	0.52 (2)	0.0038 (2)	-	-
Hexachlorobutadiene	-	-	90	9.3
Hexachlorocyclopentadiene	-	-	7.0	5.2
Iron	-	1.0 (1)	-	-
Isophorone	-	-	117000	-
Lead	197 (3) *	7.7 (3) *	-	-
Mercury (inorganic)	2.4 (3)	0.012 (3)	-	-
Methoxychlor	-	0.03 (1)	-	-
Nickel	3124 (2) *	162 (2) *	-	-
Nitrobenzene	-	-	27000	-
N-Nitrosodimethylamine	-	-	5850	-
N-Nitrosodiethylamine	-	-	5850	-
N-Nitrosodi-n-butylamine	-	-	5850	-
N-Nitrosopyrrolidine	-	-	5850	-
N-Nitrosodiphenylamine	-	-	5850	-
PCB's	2.0 (2)	0.014 (2)	-	-
Pentachlorophenol	-	-	55	3.2
Phenol	-	-	10200	2560
Selenium	20 (5)	5 (5)	-	-
Silver	13.4 (2) *	-	-	0.12
Tetrachloroethene	-	-	5280	840
1,1,2,2-Tetrachloroethane	-	-	-	2400
2,3,4,6-Tetrachlorophenol	-	-	970	30

See last page for explaination of footnotes.

Revised 1-11-89 by J. Sepesi Table 5

CRITERIA FOR AQUATIC LIFE PROTECTION

	a Federal Water Quality Criteria		b Lowest Reported Effects Level	
Chemical	Acute Criteria ug/l	Chronic Criteria ug/l	Acute ug/l	Chronic ug/l
Thallium	-	-	1400	40
Toluene	-	-	17500	-
Toxaphene	1.6 (2)	0.013 (2)	-	-
1,1,1-Trichloroethane	-	-	18000	-
1,1,2-Trichloroethane	-	-	18000	2400
Trichloroethene	-	-	45000	-
2,4,6-Trichlorophenol	-	-	970	30
Xylenes	-	-	-	-
Zinc	211 (4) *	191 (4) *	-	-

FOOTNOTES:

* Criterion is dependent on the hardness of the water.
Assumed Hardness (mg/l) 200.0

a. Federal Water Quality Criteria for Protection of Freshwater Aquatic Life. From the following sources:
(1) From "Quality Criteria for Water" (Red Book), U.S. EPA; July 1976
(2) From 45 FR 79318, November 1980. Ambient Water Quality Criteria: Availability of Documents. Acute criterion reflects a concentration which should not be exceeded at any time Chronic criterion relects an average concentration over a 24-hour period.
(3) From 50 FR 30784, July 29, 1985. Ambient Water Quality Criteria: Availability of Documents. Acute criterion reflects a one hour average not to be exceeded more than once every three years on average. Chronic criterion reflects a 4-day average concentration not to be exceeded more than once in three years on the average.
(4) From 52 FR 6213, March 2, 1987. Ambient Water Quality Criteria: Availability of Documents. Acute criterion reflects a one hour average not to be exceeded more than once every three years on average. Chronic criterion reflects a 4-day average concentration not to be exceeded more than once in three years on the average.
(5) From 53 FR 177, January 5, 1988. Ambient Water Quality Criteria: Availability of Documents. Acute criterion reflects a one hour average not to be exceeded more than once every three years on average. Chronic criterion reflects a 4-day average concentration not to be exceeded more than once in three years on the average.

b. Not enough data was available to derive a numerical national water quality criteria for aquatic life protection for these chemicals. Values reflect lowest reported effects levels. From 45 FR 79318 November 1980.

available technology economically achievable (BATEA) or greater than any lesser quantity necessary to provide an ample margin of safety. Treatment with air stripping included in Alternatives 2, 4, 5, 6 and 7 or the more extensive treatment of Alternative 3 is expected to meet this requirement for treatment.

LOCATION-SPECIFIC ARARS

Location-specific ARARs are those requirements that relate to the geographical position of the site. The location-specific requirements currently identified as potential ARARs for CERCLA remedial actions are listed in Table 6.

There are several location-specific ARARs applicable to the Onalaska site. The site is located within the Black River 100-year flood plain. Therefore the requirements of RCRA--40 CFR 264.18(b) and Executive Order 11988, Protection of Flood plains may be applicable or relevant and appropriate to actions on the site. These regulations would affect the siting of treatment systems such as incinerators air strippers, or biological treatment, units.

Table 6 (Page 1 of 2)
POTENTIAL FEDERAL LOCATION-SPECIFIC ARARs (Federal only)
ONALASKA SITE

Location-Specific Requirement	Prerequisite(s)	Citation	Potential ARAR Status	Analysis
New treatment, storage, or disposal of hazardous waste prohibited	RCRA hazardous waste; treatment, storage, or disposal	RCRA--40 CFR 264.18(a)	Not ARAR	There is no evidence of a potentially active fault within 61 meters of the site.
Facility must be designed, constructed, operated, and maintained to avoid washout	RCRA hazardous waste; treatment, storage, or disposal	RCRA--40 CFR 264.18(b)	Applicable	The site lies inside the mapped 100-year floodplain.
Action to avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values	Action that will occur in a floodplain, i.e., lowlands, and relatively flat areas adjoining inland and coastal waters and other flood prone areas	Executive Order 11988, Protection of Floodplains, (40 CFR 6, Appendix A)	Applicable	As above.
Placement of noncontainerized or bulk liquid hazardous waste prohibited	RCRA hazardous waste; placement	RCRA--40 CFR 264.18(c)	Not ARAR	The site does not contain any salt dome formations, underground mines, or caves used for waste disposal. No such disposal is planned for site wastes.
Action to recover and preserve artifacts	Alteration of terrain that threatens significant scientific, prehistorical, historical, or archaeological data	National Archaeological and Historical Preservation Act (16 U.S.C. Section 469); 36 CFR Part 65	Not ARAR	There are no known archeological or historical artifacts on the site.
Action to preserve historic properties; planning of action to minimize harm to National Historic Landmarks	Property included in or eligible for the National Register of Historic Places	National Historic Preservation Act Section 106 (16 USC 470 et seq.); 36 CFR Part 800	Not ARAR	The Onalaska site is not included in the National Register of Historic Places.
Action to conserve endangered species or threatened species, including consultation with the Department of the Interior	Determination of endangered species or threatened species	Endangered Species Act of 1973 (16 USC 1531 et seq.); 50 CFR Part 200, 50 CFR Part 402	Unlikely ARAR	No endangered species are known to exist at the site. No evidence of unique habitat is present.
Action to minimize the destruction, loss, or degradation of wetlands	Wetland as defined by Executive Order 11990 Section 7	Executive Order 11990, Protection of Wetlands, (40 CFR 6, Appendix A)	Applicable	Wetland areas exist south of the site.
Action to prohibit discharge of dredged or fill material into wetland without permit	Sediment removal requiring nearby disposal	Clean Water Act Section 404; 40 CFR Parts 230, 231	Applicable	Wetland areas exist south of the site.
Area must be administered in such a manner as will leave it unimpaired as wilderness and to preserve its wilderness character	Federally owned area designated as wilderness area	Wilderness Act (16 USC 1131 et seq.); 50 CFR 35.1 et seq.	Not ARAR	The Onalaska site has not been designated as a Federal Wilderness Area.
Only actions allowed under the provisions of 16 USC Section 668 dd(c) may be undertaken in areas that are part of the National Wildlife Refuge System	Area designated as part of National Wildlife Refuge System	16 USC 668 dd et seq.; 50 CFR Part 27	Not ARAR	The Onalaska site has not been designated as a National Wildlife Refuge.
Action to protect fish or wildlife	Diversion, channeling, or other activity that modifies a stream or river and affects fish or wildlife	Fish and Wildlife Coordination Act (16 U.S.CC. 661 et seq.); 40 CFR 6.302	Not ARAR	No modifications to the Black River are planned.

Table 6 (Page 2 of 2)
POTENTIAL FEDERAL LOCATION-SPECIFIC ARARs (Federal only)
ONALASKA SITE

Location-Specific Requirement	Prerequisite(s)	Citation	Potential ARAR Status	Analysis
Avoid taking or assisting in action that will have direct adverse effect on scenic river	Activities that affect or may affect any of the rivers specified in Section 1276(a)	Scenic Rivers Act (16 U.S.C. 1271 et seq. Section 7(a)); 40 CFR 6.302(e)	Applicable	The Black River is designated for recreational use.
Conduct activities in manner consistent with approved State management programs	Activities affecting the coastal zone including lands thereunder and adjacent shorelands	Coastal Zone Management Act (16 U.S.C. Section 1451 et seq.)	Not ARAR	The Onalaska site is an inland area with no direct access to coastal areas.
Action to dispose of dredge and fill material into ocean waters is prohibited without a permit	Oceans and waters of the United States	Clean Water Act Section 404 40 CFR 125 Subpart M; Marine Protection Resources and Sanctuary Act, Section 103	Not ARAR	No waters of sufficient size are located on the Onalaska site to make dredge disposal feasible.

GLT824/73

Alternatives including upgrading of the cap and excavation of hot spots could affect the wetlands south of the site. Potential ARARs regarding these wetlands include Executive Order 11990 which requires that actions at the site be conducted in a manner minimizing the destruction, loss, or degradation of wetlands.

In summary, it is expected that all of the remedial action alternatives could comply with the identified location-specific ARARs. Many of these ARARs require special considerations to be included in the development, and later the design, of the remedial actions.

POTENTIAL ACTION-SPECIFIC ARARS

Action-specific ARARs are requirements that define acceptable treatment and disposal procedures for hazardous substances.

The potential federal action-specific ARARs are listed in Table 7. The Wisconsin ARARs that may be applicable for each alternative action are listed in Table 8. All tables

Table 7
POTENTIAL FEDERAL ACTION-SPECIFIC ARARS
ONALASKA SITE

FEDERAL REGULATIONS	REQUIREMENT	POTENTIAL ARAR STATUS	ANALYSIS
CLEAN AIR ACT			
Section 101	Calls for development and implementation of regional air pollution control programs.	Applicable	Section 101 of the Clean Air Act delegates primary responsibility for regional air quality management to the states. The rules for implementation of regional air quality plans are contained in 40 CFR 52. Regulations promulgated under the Clean Air Act may apply to possible actions at the site that generate air emissions, but are most applicable to stationary sources such as incinerators.
FEDERAL WATER POLLUTION CONTROL ACT AS AMENDED BY THE CLEAN WATER ACT OF 1977			
Section 208(b)	The proposed action must be consistent with regional water quality management plans as developed under Section 208 of Clean Water Act.	Applicable	Substantive requirements adopted by the state pursuant to Section 208 of the Clean Water Act would be applicable to direct discharge of treatment system effluent or other discharges to surface water.
U.S. EPA REGULATIONS ON APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS			
40 CFR 52	Requires the filing of a notice with the state regarding intent to install a new stationary source of air pollution.	Applicable	40 CFR 52 concerns the installation of stationary sources of air emissions. At the site such actions may include air stripping or incineration. Provisions enforceable by the state follow the federal Prevention of Significant Deterioration (PSD) program with modifications to conform with regional and local ambient air quality standards. A CERCLA response action is not required to obtain permits under the PSD program, but must comply with the substantive requirements of a PSD review.
U.S. EPA REGULATIONS ON NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS			
40 CFR 61	Requires limiting ambient hydrogen sulfide emissions to less than 0.10 ppm. The regulation also includes emission standards for mercury, vinyl chloride, benzene, asbestos, beryllium, inorganic arsenic, and radionuclides--all of which are designated hazardous air pollutants.	Applicable	Emissions from incinerators or air strippers must meet emission standards.
U.S. EPA NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT REGULATIONS			
40 CFR 122.44	Federally approved state water quality standards. These may be in addition to or more stringent than federal water quality standards.	Applicable	All substantive requirements under the cited sections of 40 CFR 122 would be applicable to the direct discharge of effluents to an onsite or offsite surface water body. Administrative requirements, such as permitting and reporting procedures, would be applicable only for effluents discharged to an offsite location (such as a discharge into a stream flowing offsite). Therefore, at the Onalaska site these requirements would be applicable to proposed discharges into the Black River.
40 CFR 122.44(a)	Requires the use of the Best Available Technology (BAT) for toxic & non-conventional wastewaters or the Best Conventional Technology (BCT) for conventional pollutants. The nature of the wastewater and the technology-based limitations will be determined by the state on a case-by-case basis.	Applicable	
40 CFR 122.44(e)	Discharge limits must be established for toxics to be discharged at concentrations exceeding levels achievable by the technology-based (BAT/BCT) standards. The discharge limitations would be evaluated on a case-by-case basis depending on the proposed treatment system and the receiving water.	Applicable	

Table 7
POTENTIAL FEDERAL ACTION-SPECIFIC ARARS
ONALASKA SITE

FEDERAL REGULATIONS	REQUIREMENT	POTENTIAL ARAR STATUS	ANALYSIS
40 CFR 122.44(i)	Requires monitoring of discharges to ensure compliance. Monitoring programs shall include data on the mass, volume, and frequency of all discharge events.	Applicable	Administrative requirement applicable only for discharges to offsite surface water.
40 CFR 122.21	Permit application must include a detailed description of the proposed action, including a listing of all required environmental permits.	Applicable	Administrative requirement applicable only for discharges to offsite waters.
U.S. EPA REGULATIONS ON CRITERIA FOR THE NPDES			
40 CFR 125.100	The site operator shall develop a best management practice (BMP) program and shall incorporate it into the operations plan or the NPDES permit application if required.	Applicable	Substantive requirements of 40 CFR 125 would be applicable to the direct discharge of treatment system effluent to an onsite or offsite surface water body. The permitting requirements would be applicable only if the effluent is discharged to offsite surface waters.
40 CFR 125.104	The BMP program must establish procedures for managing potential spills, predict spill flow and ensure RCRA management of spilled waste.	Applicable	
U.S. EPA PROCEDURES FOR APPROVING STATE WATER QUALITY STANDARDS			
40 CFR 131	States are granted enforcement jurisdiction over direct discharges and may adopt reasonable standards to protect or enhance the uses and qualities of surface water bodies in the state.	Applicable	Applicable to direct discharge of treatment system effluent or other process waters. Such a discharge into the Black River would activate the administrative requirements of this rule because it would affect offsite surface waters.
U.S. EPA REGULATIONS ON TEST PROCEDURES FOR THE ANALYSIS OF [WATER] POLLUTANTS			
40 CFR 136.1-136.4	These sections require adherence to sample preservation procedures including container materials and sample holding times.	Applicable	Applicable to direct discharge of treatment system effluent.
PERMIT REGULATIONS FOR THE UNDERGROUND INJECTION CONTROL (UIC) PROGRAM			
40 CFR 144.4	Criteria for determining if an aquifer may be exempted from UIC regulations based on aquifer use, yield, or groundwater quality.	Unlikely ARAR	Deep well injection of site wastewaters is not expected to be a feasible action at the Onalaska site.
40 CFR 144.12	Prohibits underground injection of wastes into zones where contaminants may migrate to an underground source of drinking water (USDW).	As above	
40 CFR 144.13(a)	Prohibits construction of new class IV hazardous waste injection wells (wells located within 0.25 mile of an USDW are considered "class IV" wells).	As above	
40 CFR 144.13(c)	If approved by U.S. EPA, a class IV well may be operated to reinject treated groundwater into the same aquifer from which it was withdrawn if done as part of a CERCLA/RCRA response action.	As above	

Table 7
POTENTIAL FEDERAL ACTION-SPECIFIC ARARS
ONALASKA SITE

FEDERAL REGULATIONS	REQUIREMENT	POTENTIAL ARAR STATUS	ANALYSIS
40 CFR 144.15	Hazardous waste injection wells must comply with RCRA hazardous waste reporting requirements.	As above	
40 CFR 144.16	State UIC director may lessen stringency of construction and operating requirements if USDW will not be affected by the proposed injection program.	As above	
40 CFR 144.25	Special reporting requirements for owners/operators of injection well systems.	As above	
40 CFR 144.26	Submit detailed inventory information to state UIC director.	As above	
40 CFR 144.28	Report non-compliance orally within 24 hours. Prepare, maintain, and comply with a plugging and abandonment plan.	As above	
40 CFR 144.55	Permit applicants for class I injection well (wells used to inject hazardous waste) must identify all wells that penetrate the injection zone. Also, applicants must propose plans for any well abandonments or other necessary corrective actions.	As above	
U.S. EPA CRITERIA AND STANDARDS FOR THE UNDERGROUND INJECTION CONTROL PROGRAM			
40 CFR 146.13	Injection pressure may not exceed predetermined maximum level.	As above	
U.S. EPA INTERIM REGULATIONS ON DISCHARGE OF DREDGED OR FILL MATERIAL INTO NAVIGABLE WATERS			
40 CFR 230. 10	Dredge and fill requirements.	Unlikely ARAR	Dredging of the Black River is not anticipated.
U.S EPA REGULATIONS FOR IDENTIFYING HAZARDOUS WASTE			
40 CFR 261	Identifies those wastes subject to regulation as hazardous wastes.	Applicable	The criteria and limitations used to identify wastes as being hazardous or non-hazardous in 40 CFR 261 are applicable to all proposed cleanup actions at the Onalaska site. Determining whether wastes qualify as hazardous will often establish the applicability of other regulations. Recovered naptha may be recycled and requirements of 261.6 may be applicable. Used oil being recycled and not burned for energy recovery is not regulated under RCRA Parts 262 through 270. If naptha is to be used for energy recovery 40 CFR 266 Subpart D may be applicable.
U.S EPA REGULATIONS FOR OWNERS AND OPERATORS OF PERMITTED HAZARDOUS WASTE FACILITIES			
Subpart G--Closure Requirements			
40 CFR 264.111	Closure performance standards specify that site closure must be completed in a manner that ensures protection against contaminant migration and complies with other specific closure-related sections of 40 CFR 264.	Applicable to hazardous wastes left onsite. Relevant & appropriate for clean closure.	40 CFR 264.111 and 40 CFR 264.117 concern site closure requirements, including operation and maintenance, site monitoring, record-keeping, and site use. The closure requirements would be applicable when, under a proposed action, hazardous wastes are left in place. The requirements may be relevant and appropriate for a proposed "clean closure" action (involving removal of all hazardous materials) if it is determined that a monitoring program is needed to ensure that remedial action goals are satisfied.
40 CFR 264.117(c)	Post-closure use of the site must not compromise the integrity of covers, liners, or other containment or monitoring components used to minimize long-term site hazards.		

Table 7
POTENTIAL FEDERAL ACTION-SPECIFIC ARARS
ONALASKA SITE

FEDERAL REGULATIONS	REQUIREMENT	POTENTIAL ARAR STATUS	ANALYSIS
Subpart I--Storage Containers			
40 CFR 264.171	Maintain good condition of storage containers.	Applicable to hazardous wastes. Relevant & appropriate for non-haz. wastes.	Regulations cited under 40 CFR 264.171 to 264.178 (Subpart I) concern permanent onsite storage of hazardous wastes or temporary storage phases used during various cleanup actions such as removal or incineration. The storage regulations would only be applicable to storage of hazardous wastes, but may be relevant and appropriate to storage of certain non-hazardous wastes or storage system effluents if these materials present risks similar to those associated with hazardous wastes.
40 CFR 264.172	Containers used must be compatible with waste composition.	As above	
40 CFR 264.173	Containers must be kept closed during storage.	As above	
40 CFR 264.174	Container storage system shall be inspected weekly.	As above	
40 CFR 264.175	Requires a sound structural base for containment area and a containment system adequate for an emergency release of 10 percent of total stored waste.	As above	
40 CFR 264.176	Requires that stored ignitable or reactive wastes be kept at least 50 feet from the site property boundary.	As above	
40 CFR 264.177	Mixing of incompatible materials shall be prevented through use of quality assurance methods in the case of reuse of containers or through separation or adequate barrier protection in the case of incompatible wastes stored simultaneously on the same site.	As above	
40 CFR 264.178	Uncontained residues must be cleaned from the containment system prior to site closure.	As above	
Subpart J--Tank Storage			
40 CFR 264.191	Tanks must have sufficient shell strength to ensure against collapse or rupture.	Applicable to hazardous wastes. Relevant & appropriate for non-haz. wastes.	Regulations under 40 CFR 264.191 to 264.198 (Subpart J) apply to tank storage of hazardous materials. Requirements under these regulations are applicable to tank storage of hazardous materials and may be relevant and appropriate for tank storage of certain non-hazardous wastes or treatment system effluents if the risks they present are similar to those associated with hazardous wastes.
40 CFR 264.192	The waste and tank material must be compatible.	As above	
40 CFR 264.193	Tanks must have a secondary containment design to prevent release.	As above	
40 CFR 264.194	Open tanks must have controls to prevent overfilling and design levels that will provide adequate freeboard.	As above	
40 CFR 264.195	Requires regular inspection of overfilling controls, control equipment, waste level, and tank condition. Compilation and review of monitoring data are also required.	As above	

Table 7
POTENTIAL FEDERAL ACTION-SPECIFIC ARARS
ONALASKA SITE

FEDERAL REGULATIONS	REQUIREMENT	POTENTIAL ARAR STATUS	ANALYSIS
40 CFR 264.196	Repair all corrosion, cracks, or leaks.	As above	
40 CFR 264.197	At closure remove all waste and waste residue from discharge equipment and containment area.	As above	
40 CFR 264.198	Damage resulting from ignition or reaction of applicable wastes shall be prevented through use of an adequate buffer zone as specified by National Fire Protection Association standards.	As above	
Subpart K--Surface Impoundments			
40 CFR 264.221	New surface impoundments and extensions of existing surface impoundments must be constructed with two liners, with a bottom liner of a material capable of preventing wastes from migrating into the liner during the active life of the facility. Liner design must prevent potential failures due to waste composition, climate, pressure gradients, and routine facility operations. A leachate collection system must be installed between the top and bottom liners. The surface impoundment must be designed to prevent overtopping.	Applicable to hazardous wastes. Relevant & appropriate for non-haz. wastes.	Rules under 40 CFR 264.221 to 264.231 (Subpart K) concern hazardous waste containment using new or existing onsite surface impoundments. No new surface impoundments are expected to be constructed.
40 CFR 264.226	Inspect liners during and after construction, then weekly during system operation.	As above	
40 CFR 264.227	Stop operation of the surface impoundment if the level drops substantially or if the dike leaks. Manage ignitable/reactive wastes to avoid conditions leading to reaction or ignition.	As above	
40 CFR 264.228	Closure requirements for surface impoundments. Must remove or decontaminate hazardous waste residues from discharge equipment and containment system components before capping. The integrity of the final cover used for a surface impoundment must be protected by supporting any capped waste piles and through the use of run-on/run-off control.	As above	See above.
Subpart L--Waste Piles			
40 CFR 264.251	For design and use of waste piles, requires liner with a leachate collection and removal system. Also requires a run-on/run-off design that will ensure the stability of waste piles in the event of a 25-year storm.	Not an ARAR	No waste piles are onsite and no new ones are anticipated.
40 CFR 264.258	Requirements for closure of waste piles specify that wastes must be stabilized to support cover. Requires removal or decontamination of hazardous waste residues from containment system components.	As above	

Table 7
POTENTIAL FEDERAL ACTION-SPECIFIC ARARs
ONALASKA SITE

FEDERAL REGULATIONS	REQUIREMENT	POTENTIAL ARAR STATUS	ANALYSIS
Subpart M--Land Treatment			
40 CFR 264.271	For acceptable land treatment, hazardous wastes must be degraded, transformed, or immobilized. The treatment zone shall be less than 1.5 meters deep and situated at least 1 meter above the water table.	Unlikely ARAR	Regulations cited under 40 CFR 264.272 to 264.283 (Subpart M) pertain to land treatment of hazardous wastes. Land treatment of wastes is an unlikely alternative.
40 CFR 264.272	Prior to implementation of land treatment, the operator must demonstrate, through field tests, laboratory analysis, or pertinent data, that wastes in the proposed treatment zone can be degraded, transformed, or immobilized.	As above	
40 CFR 264.273	Adequate run-on/run-off design must be used to maintain integrity of land disposal unit during a 25-year storm. Maximum degradation efficiency must be maintained during the land treatment process.	As above	
40 CFR 264.278	Unsaturated zone monitoring is required to confirm that all hazardous materials remain in the specified land treatment zone.	As above	
40 CFR 264.281	Special requirements for reactive or ignitable waste in land treatment zones.	As above	
40 CFR 264.282	Special requirements for incompatible wastes in land treatment zones.	As above	
40 CFR 264.283	Special requirements for RCRA hazardous wastes F020, F021, F023, F026, F027 in land treatment zones.	As above	
Subpart N--Landfills			
40 CFR 264.301	Concerns design, operation, and maintenance of a new hazardous waste landfill. Two or more liners must be used to prevent waste migration. A leachate collection system must be installed above and between the liners. Run-on/run-off design must protect landfill integrity in the event of a 25-year storm. The design must prevent wind dispersal of contaminated particulates.	Unlikely ARAR	Rules cited under 40 CFR 264.301 to 264.314 (Subpart N) pertain to design, construction, operation, and maintenance of a new hazardous waste landfill. Reconsolidation, placement, and closure of wastes in previously contaminated areas (such as waste piles or surface impoundments) are discussed in Subparts K and L of 40 CFR 264. The rules under 40 CFR 264.301 to 314 may apply to construction of a new onsite landfill for contaminated soils, sediments, or incinerator residues. It is unlikely that a new landfill will be constructed at this site. Placement of treated or untreated soil or sediment that is classified as hazardous waste may make Subpart N applicable.
40 CFR 264.303	Inspect liners and covers weekly and after storms or other events of concern.	As above	
40 CFR 264.304	Record and maintain physical and chemical data on composition of waste cells.	As above	
40 CFR 264.310	Install final cover to prevent infiltration. Must follow RCRA cap design requirements and must maintain benchmarks used to locate waste cells.	As above	

Table 7
POTENTIAL FEDERAL ACTION-SPECIFIC ARARs
ONALASKA SITE

FEDERAL REGULATIONS	REQUIREMENT	POTENTIAL ARAR STATUS	ANALYSIS
40 CFR 264.314	Free liquids must be mixed with an absorbent or solidified before placement in landfill.	As above	Further applicable or relevant and appropriate requirements for waste treatment prior to land disposal are contained under 40 CFR 268 (U.S. EPA Regulations on Land Disposal Restrictions).
Subpart O--Incinerators			
40 CFR 264.340	Allows waiver of other substantive requirements pertaining to incineration (except waste analysis and closure requirements) if the waste to be processed is defined as hazardous based solely on ignitability, corrosovity, or both. Special rules for incineration of PCBs are described in 40 CFR 761.	Applicable to hazardous wastes. Relevant & appropriate for non-haz. wastes.	Regulations cited under 40 CFR 264.340 to 40 CFR 264.351 pertain to all proposed onsite hazardous waste incineration technologies. Most of these rules would be applicable to incineration of hazardous wastes or subsequent disposal of incinerator residues that remain hazardous in nature. These rules may be relevant and appropriate for incineration of certain non-hazardous wastes or disposal of non-hazardous incinerator residues; the determination would depend on the risks associated with incineration or disposal of these non-hazardous materials.
40 CFR 264.341	The waste feed must be analyzed during trial burns to define its composition.	Applicable	
40 CFR 264.343	Incinerator performance standards. Incineration must achieve destruction and removal efficiencies (DREs) of 99.99% for principle organic hazardous constituents (POHCs) and 99.9999% for dioxins or hazardous wastes F020, F021, F022, F023, F026, and F027.	Applicable to hazardous wastes. Relevant & appropriate for non-haz. wastes.	These performance standards would be applicable if onsite incineration is selected for use in disposing of the specified hazardous substances at the Moss-American site.
40 CFR 264.351	Closure requirements for hazardous waste incinerators. All hazardous incinerator residue must be disposed of according to RCRA standards.	As above	
Subpart X--Miscellaneous Treatment			
40 CFR 264 Subpart X	Standards for environmental performance of miscellaneous treatment units.	Applicable to hazardous wastes. Relevant & appropriate for non-haz. wastes.	Miscellaneous treatment units may include temporary waste holding units or effluent pretreatment units, but do not include incinerators, landfills, containers, underground injection wells, wastewater pretreatment units, or similar methods for which specific management rules have been promulgated under other Subparts of 40 CFR 264. At the Onalaska site, the rules of Subpart X may apply to use of onsite physical, chemical, or biological treatment technologies.
U.S. EPA INTERUM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE FACILITIES			
40 CFR 265	Regulations for interim hazardous waste facilities in operation both before and after November 19, 1980.	Not ARAR	The site did not have interim status. Regulations under 40 CFR 265 are not considered applicable to a CERCLA site because the performance standards under 40 CFR 264 are more stringent.

Table 7
POTENTIAL FEDERAL ACTION-SPECIFIC ARARS
ONALASKA SITE

FEDERAL REGULATIONS	REQUIREMENT	POTENTIAL ARAR STATUS	ANALYSIS
U.S. EPA REGULATIONS ON LAND DISPOSAL RESTRICTIONS			
40 CFR 268 Subpart C	The land disposal restrictions under this subpart prohibit land-based disposal of certain solvent-containing wastes, dioxin-containing wastes, and listed wastes.	Applicable	The rules in 40 CFR 268 restrict land disposal of several types of hazardous wastes and, as such, may affect the implementation of several potential actions, including actions involving disposal of contaminated soils or sediments. The land disposal ban may be applicable or relevant and appropriate to the proposed cleanup of the Onalaska site because qualifying hazardous wastes might be present in onsite soils and sediments.
40 CFR 268 Subpart D	Some hazardous wastes restricted from land disposal in Subpart C may be land-disposed providing they are first adequately treated in accordance with this subpart.	Applicable	
U.S. EPA PRETREATMENT STANDARDS			
40 CFR 403.5	If wastes are discharged to a publicly owned treatment works facility (POTW) the treatment process must not allow waste to pass through untreated or result in contaminated sewage sludge.	Not an ARAR	Treatment system effluent from the Onalaska site is unlikely to be discharged to a POTW.
U.S. EPA DISPOSAL REQUIREMENTS FOR PCBs (PER TOXIC SUBSTANCES CONTROL ACT)			
40 CFR 761	Rules under 40 CFR 761 apply to disposal of PCBs. Generally, these regulations require that whenever disposal of PCBs is undertaken, they must be incinerated unless the concentrations are less than 50 ppm. The only possible exception (if PCB concentrations are between 50 and 500 ppm) would be an EPA-approved landfill for PCBs. The rules of this section also contain performance standards for incineration of PCBs.	Unlikely ARAR	The substantive rules of 40 CFR 761 would only be applicable to proposed actions at the Onalaska site if concentrated PCBs (50 ppm or greater) were found in onsite soils. Available data indicate that PCBs have not been detected.

Table 8 (Page 1 of 3)
POTENTIAL WISCONSIN ARARs
ONALASKA MUNICIPAL LANDFILL

Citation	Requirement	Prerequisites	Potential ARAR Status	Analysis
NR 102--Water Quality Standards for Wisconsin Surface Waters	Specifies water quality standards for use classifications. Dissolved oxygen must not be lowered below 5 mg/l and pH must be maintained within 6 to 9 units. See NR 102 for additional standards.	Actions that include discharges to the Black River.	Applicable	Actions involving groundwater discharges to the Black River must meet water quality standards.
NR 104--Intrastate Water uses and Designated Standards	Designates use classifications for surface waters.	Actions that include discharges to or alterations of the Black River.	Applicable	Designates the Black River for warm water sport fish committee and recreational use. Actions involving discharges to or alterations of the Black River must not preclude these uses.
NR 105--Surface Water Quality Criteria for Toxic and Organoleptic Substances	Specifies water quality criteria for toxic and organoleptic substances for protection of human health and welfare and aquatic life.	Discharges to the Black River	Applicable	Water quality criteria are used by WDNR in setting WPDES discharge limits for toxics.
NR 106--Procedures for Calculating Water Quality Based Effluent Limitations for Toxic and Organoleptic Substances Discharged to Surface Waters	Specifies procedures for how effluent limitations are to be calculated for toxic and organoleptic substances.	Discharges to the Black River containing toxic or organoleptic substances	Applicable	WDNR will use procedures to establish water quality based discharge limits for toxics. Biological toxicity tests may be required for the discharge.
NR 112--Well Construction and Pump Installation	Specifies construction standards for well and pump installations and abandonment of wells.	Installation of monitoring wells, pump test wells, new residential wells or new public water supply wells.	Applicable	Construction of monitoring wells must conform to standards specified.
NR 116--Wisconsin's Flood Plain Management Program	Requires and establishes standards for municipal flood plain zoning ordinances.	Actions involving construction of facilities or alterations of the flood plain.	Relevant and Appropriate	Actions involving construction of facilities or alterations of the flood plain must meet the standards of the municipal flood plain ordinance. NR 116 defines the requirements of the municipal ordinance.
NR 140--Groundwater Quality	Specifies groundwater quality preventative action limits and enforcement standards. Notification requirements and potential response actions when standards are exceeded are listed.	Any facility, practice, or activity that may affect groundwater quality.	Applicable	One or more response actions listed in NR 140 would be required if enforcement standards are exceeded at the point of standards application.

Citation	Requirement	Prerequisites	Potential ARAR Status	Analysis
NR 181--Hazardous Waste Management	Establishes requirements for the . identification of hazardous waste and standards for the storage, transport, and disposal of hazardous waste. Generally parallels RCRA part 264 requirements (see Federal ARARs table).	Soil or sediment that is contaminated as a result of a spill of hazardous waste after August 1, 1980. Management of soil or sediment contaminated with hazardous waste.	Relevant and Appropriate	See Federal ARARs, 40 CFR Part 261 through 264. Naptha has the characteristic of ignitability and as a result is a RCRA hazardous waste if recovered. Soil/sediment contaminated with naptha is also a RCRA hazardous waste.
NR 181.415--Prohibited Activities	Prohibits underground injection of hazardous waste, land treatment of hazardous waste, and use of hazardous waste in mixtures for dust suppression.	Actions including underground injection of untreated hazardous waste. Placement of hazardous waste on the soil surface or incorporated into the soil.	Relevant and Appropriate	No underground injection of hazardous waste is anticipated. Soil flushing may include addition of surfactants to treated groundwater which is used to leach contaminants to extraction wells. An exception to 181.415 may be necessary.
NR 200--Application for Discharge Permit	Discharge permit is required for discharges to surface waters and to land areas where water may percolate to groundwater.	Discharges to surface waters or land areas.	Relevant and Appropriate	WPDES permits are not required for onsite discharges. All the substantive requirements, however, must be met.
NR 211--General Pretreatment Requirements	Prohibits discharges to POTWs which pass through or interfere with the operation or performance of the POTW and thereby cause a POTW to violate its WPDES permit.	Discharges to POTWs.	Not an ARAR	No discharge to POTW's expected.
NR 214--Land Application and Disposal of Liquid Industrial Wastes and Byproducts	Requires land disposal systems to meet design and construction criteria and requires plans and specification to be approved by WDNR. Effluent limitations and groundwater monitoring requirements are also specified.	Discharge of industrial liquid wastes not considered a hazardous waste (i.e., not regulated under NR 180).	Applicable	If groundwater is not considered a hazardous waste, NR 214 would be applicable to land application of treated or untreated groundwater.
NR 220--Categories and Classes of Point Sources and Effluent Limitations	Requires WDNR to establish effluent limits for uncategorized point sources and to base those limits on best practicable control technology currently available or best available control technology economically achievable.	Point source discharge not categorized in NR 221 to NR 299.	Applicable	The substantive requirements of obtaining a WPDES permit would be necessary.
CH147.Stats--Pollution Discharge Elimination	Requires point source discharges to obtain a permit from WDNR.	Point source discharge to surface water or groundwater.	Applicable	Substantive requirements in obtaining a permit would have to be met. The actual permit, however, would not have to be obtained for onsite discharges.

Citation	Requirement	Prerequisites	Potential ARAR Status	Analysis
NR 440--Standards of Performance for New Stationary Sources	Specifies standards of performance for new stationary sources, including incinerators (NR 440.21), specifies monitoring requirements and requires review of plans.	Stationary source emitting air pollutants.	Relevant and Appropriate	NR 181 is applicable to incinerators burning hazardous wastes. Requirements of NR 440.21 may also be relevant and appropriate to an incinerator buring nonhazardous waste.
NR 445--Control of Hazardous Pollutants	Specifies emission limits and control requirements for air contaminant sources emitting hazardous pollutants.	New or existing air contaminant sources such as incinerators or actions that may emit air pollutants.	Applicable	Emissions from incineration alternatives or alternatives such as air strippers that may emit hazardous air pollutants must meet NR 445 requirements.
NR 445.04--Emission Limits for New or Modified Sources	Specifies air concentrations not to be exceeded off the source's property in terms of 24-hour and 1-hour averages. Requires lowest achievable emission rates and best available control technology for air contaminants without acceptable ambient concentrations.	New or modified source of air contaminants.	Applicable	Emissions from air strippers resulting in exceedance of the 24-hour and 1-hour average limits would require treatment.
NR 504--Landfill Location, Performance, and Design Criteria	Specifies locational criteria, performance standards, and minimum design requirements for solid waste disposal facilities.	Expansion of an existing facility or construction of a new facility after February 1, 1988.	Portions Relevant and Appropriate	Although NR 504 does not pertain to inactive landfills, requirements for gas control and final cover may be considered relevant and appropriate. These include passive gas venting trenches and gas monitoring at the facility perimeter. Final cover requirements include 2-foot clay layer (or approved geomembrane), a 1.5 to 2.5-foot cover layer, 6 inches of topsoil, and revegetation.
NR 506.08--Landfill Operational Criteria--Closure Requirements	Specific closure requirements for landfills including notification, establishment of 2 feet of soil cover and revegetation and hazardous air contaminant control for facilities over 500,000 CY.	Closure of a solid waste disposal facilities.	Relevant and Appropriate	Closure according to NR 506.08 already has occurred. At a minimum reconstruction of the cover according to NR 506.08 is necessary if excavations through the cover occur. The landfill is below the 500,000 CY minimum for hazardous air contaminant control requirement.
NR 508--Landfill Monitoring, Remedial Actions and In-field Conditions Reports	Specifies monitoring requirements for groundwater, vadose zone, leachate, gas, surface water and air. Also specifies the design management zone as 300 feet from the waste boundary.	Expansion of an existing facility or construction of a new facility after February 1, 1988. Also WDNR may require monitoring at closed existing facilities.	Portions Applicable	Monitoring requirements at existing facilities are at the discretion of WDNR. The landfill currently is monitoring groundwater per WDNR requirements.
NR 514--Plan of Operation and Closure Plans for Landfills	Requires plan of operation and closure plans.	Expansion of an existing facility or construction of a new facility.	Not an ARAR	Landfill has already been closed. Submittal of additional closure plans per NR 514 would not be necessary.

are arranged in order of citation so that regulations cited elsewhere in this report may be easily located.

Important action-specific ARAR considerations for the alternatives are discussed below.

IDENTIFICATION OF HAZARDOUS WASTE

The definition of the waste disposed at the landfill is important in determining the status of RCRA requirements. Since the waste disposed at the Onalaska site was generated and managed prior to the effective date of RCRA, November 1980, RCRA is not applicable to the site, unless wastes are excavated or "managed." RCRA requirements may be relevant and appropriate if wastes disposed prior to November 1980 are defined as RCRA hazardous waste or are sufficiently similar to RCRA hazardous waste. Based on a review of the site history potential RCRA hazardous waste disposed at the site include waste naphtha and toluene. Waste naphtha would be classified as a RCRA hazardous waste since it has the characteristic of ignitability (flash point is 103°F). Waste toluene may be a F005 listed waste (a spent nonhalogenated solvent) from nonspecific sources if

the solvent mixture contained more than 10 percent toluene before use. Soils contaminated as a result of disposal of either of these wastes would also be classified as a RCRA hazardous waste as a result of the mixture rule (40 CFR 261.3(c)(2)(i)).

LANDFILL CLOSURE COVER REQUIREMENTS

As discussed above RCRA requirements are not applicable but may be considered relevant and appropriate to alternatives not managing soils or solid wastes. The more significant RCRA requirements include construction of a cover having a permeability less than or equal to the permeability of the underlying natural subsoils present. The existing cover appears to meet this ARAR.

The Wisconsin Administrative Code NR504 has more stringent requirements for new landfills or expansions of existing landfills. Though not applicable these may be considered relevant and appropriate. Portions of these requirements include a 1.5 to 2.5-foot cover layer and 0.5-foot of topsoil above a 2-foot clay layer. If NR504 is considered relevant and appropriate, Alternatives 1 to 3 which do not

upgrade the existing cover would not meet this ARAR since the existing cover is believed to be limited to 1-foot of silty clay. Alternatives 4 through 7 all include upgrading of the existing cover to lower the permeability and provide freeze-thaw protection to the compacted clay section. These alternatives would meet NR504 requirements.

GROUNDWATER TREATMENT REQUIREMENTS

Alternatives 2 through 7 include collection and treatment of contaminated groundwater. Because discharge will likely be to the Black River, WPDES permit requirements and discharge limits will be necessary prior to the FS conceptual design of the treatment system.

At a minimum, NR220 requires best available control technology for treatment prior to discharge. When Remedial Investigation groundwater contamination results are available they will be summarized and submitted to U.S. EPA and WDNR for preliminary determination of WPDES limits for discharge from the DMZ and onsite collection systems.

AIR EMISSION TREATMENT REQUIREMENTS

Alternatives 2, 4, 5, 6 and 7 include air stripping treatment for removal of VOCs. Alternative 5 also includes air emissions from soil vapor extraction. The need for air emission treatment such as granular activated carbon treatment would be evaluated based on requirements of NR445 and an evaluation of public health risks. If emission treatment is needed other technologies such as flaring and catalytic oxidation will also be considered. If emissions are predicted to cause exceedance of the standards offsite (the point of compliance) then air emission treatment would be included in the remedial alternative.

SOIL FLUSHING ARARs

Consideration of soil flushing technology in Alternative 5 if SVE is not considered effective for all the contaminants of concern is warranted. Since soil flushing may include addition of surfactants and treated groundwater to the soil to promote leaching of contaminants to the groundwater extraction system it would be regulated under NR220 and must meet the substantive requirements of a WPDES permit.

Though not specifically prohibited in the Wisconsin administrative code, soil flushing is similar to use of wells for underground injection of water and land treatment of hazardous waste, both of which are prohibited activities.

LAND DISPOSAL RESTRICTIONS

Alternative 6 includes offsite disposal at a RCRA landfill of contaminated source areas. Land disposal restrictions (40 CFR 268) prohibit land disposal of F005 wastes after November 8, 1990 unless constituents in the Toxicity Characteristic Leaching Procedure (TCLP) extract are below the concentrations in Table 9. In addition methylene chloride must be below 0.44 mg/l in wastewaters from the treatment of the waste itself.

Land disposal of nonliquids are also prohibited if they contain halogenated organic compounds (HOCs) greater than 1,000 mg/kg (California list wastes). Incineration is the required treatment for these wastes.

Treatment standards prior to land disposal for hazardous wastes having the characteristic of ignitability have not

Table 9
CONSTITUENT CONCENTRATION LIMITS
IN TCLP WASTE EXTRACT

F001-F005 Spent Solvents	Concentration (in mg/l)
Acetone	0.59
n-Butyl alcohol	5.0
Carbon disulfide	4.81
Carbon tetrachloride	0.96
Chlorobenzene	0.05
Cresols (and cresylic acid)	0.75
Cyclohexanone	0.75
1,2-Dichlorobenzene	0.125
Ethyl acetate	0.75
Ethylbenzene	0.053
Ethyl ether	0.75
Isobutanol	5.0
Methanol	0.75
Methylene chloride	0.96
Methyl ethyl ketone	0.75
Methyl isobutyl ketone	0.33
Nitrobenzene	0.125
Pyndine	0.33
Tetrachloroethylene	0.05
Toluene	0.33
1,1,1-Trichloroethane	0.41
1,1,2-Trichloro-1,2,2-Trifluorethane	0.96
Trichloroethylene	0.091
Trichlorofluoromethane	0.96
Xylene	0.15

Source: 40CFR268.11

GLT824/72

yet been identified. EPA is to evaluate these wastes by May 8, 1990. Until then ignitable wastes can be landfilled if the generator demonstrates that there is no practically available treatment for the wastes.

In summary, Alternative 6 may not meet the RCRA land disposal restriction ARARs if contaminated soil contains:

- HOCs greater than 1,000 mg/kg
- Constituents in TCLP extract greater than values listed in Table 9

EPA as the generator, would also have to demonstrate that there is no practical available treatment for soils contaminated with naphtha.

SUMMARY

Preliminary alternatives were developed for the purpose of early identification of ARARs and are summarized in Figure 1. Potential ARARs are listed in Tables 1 to 8. Review by WDNR and U.S. EPA of the Alternatives Array and

ARARs is requested prior to the start of the Feasibility Study. Agency ARARs interpretation will be incorporated into the development and evaluation of alternatives.

The major ARARs issues affecting the feasibility of the preliminary alternatives at this stage of the project are summarized below.

CHEMICAL-SPECIFIC ARARS ISSUES

- Definition of the design management zone for the landfill for consideration of NR140 rules

- Establishment of chemical-specific limits for discharge of treated groundwater to the Black River. Once the RI groundwater data is available, it will be summarized and submitted to U.S. EPA and WDNR to aid in identification of the discharge limits.

- Establishment of chemical-specific limits for air emissions.

LOCATION SPECIFIC ARARS ISSUES

- Identification of threatened or endangered species that could be affected by remedial actions.

ACTION SPECIFIC ARARS ISSUES

- Determination of whether excavated soils or landfill wastes should be considered RCRA ignitable or F005 hazardous wastes.

- Determination of whether the existing landfill cover meets Wisconsin ARARs for closure of the Onalaska site.

- Determination if Wisconsin ARARs preclude soil washing as a remedial action because soil washing is similar to underground injection and land treatment of hazardous waste.

- Determination of whether source disposal at a RCRA landfill would be allowed within the land ban restrictions.

GLT824/82

GLT824/82

Attachment 1
SITE BACKGROUND

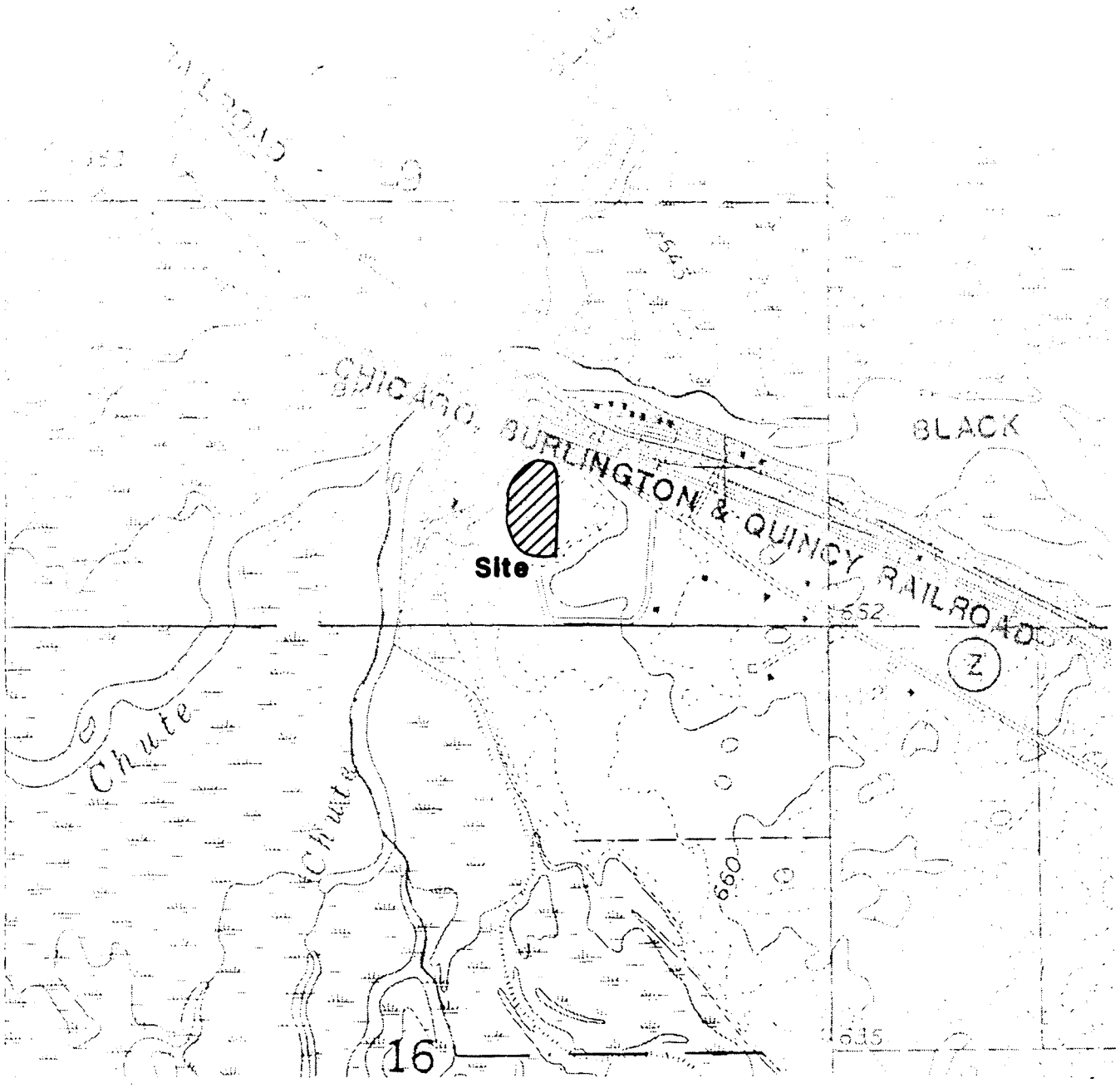
Section 2

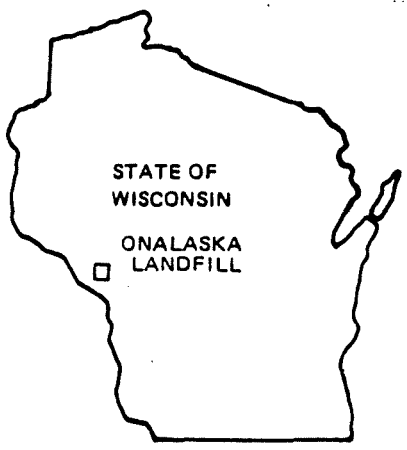
PROJECT DESCRIPTION

SITE DESCRIPTION

The Onalaska Municipal Landfill is in LaCrosse County, Wisconsin, approximately 10 miles north of LaCrosse near the confluence of the Mississippi River and within 400 feet of the Black River (Figure 2-1). Several homes are within 500 feet of the site and a subdivision of about 50 homes is 1.25 miles southeast of the site. The area is generally rural and homes use a local surficial sand and gravel aquifer as a water supply.

The 11 acre site was previously mined as a sand and gravel quarry in the early 1960s (see Figure 2-2). In the mid 1960s the quarry operation ceased and the Town of Onalaska began using the quarry as a municipal landfill. Between 1969 and 1980 municipal trash along with chemical wastes were disposed in the landfill. The landfill was capped with 2 feet of compacted clay. Two gates restrict but do not entirely prevent vehicular access to the site. Groundwater contamination has been documented during the period of 1980 to 1982 and 300 feet south of the landfill.





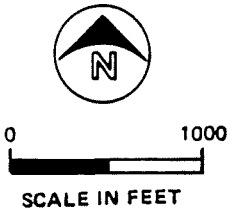


FIGURE 2-1
SITE LOCATION MAP
ONALASKA LANDFILL QAPP

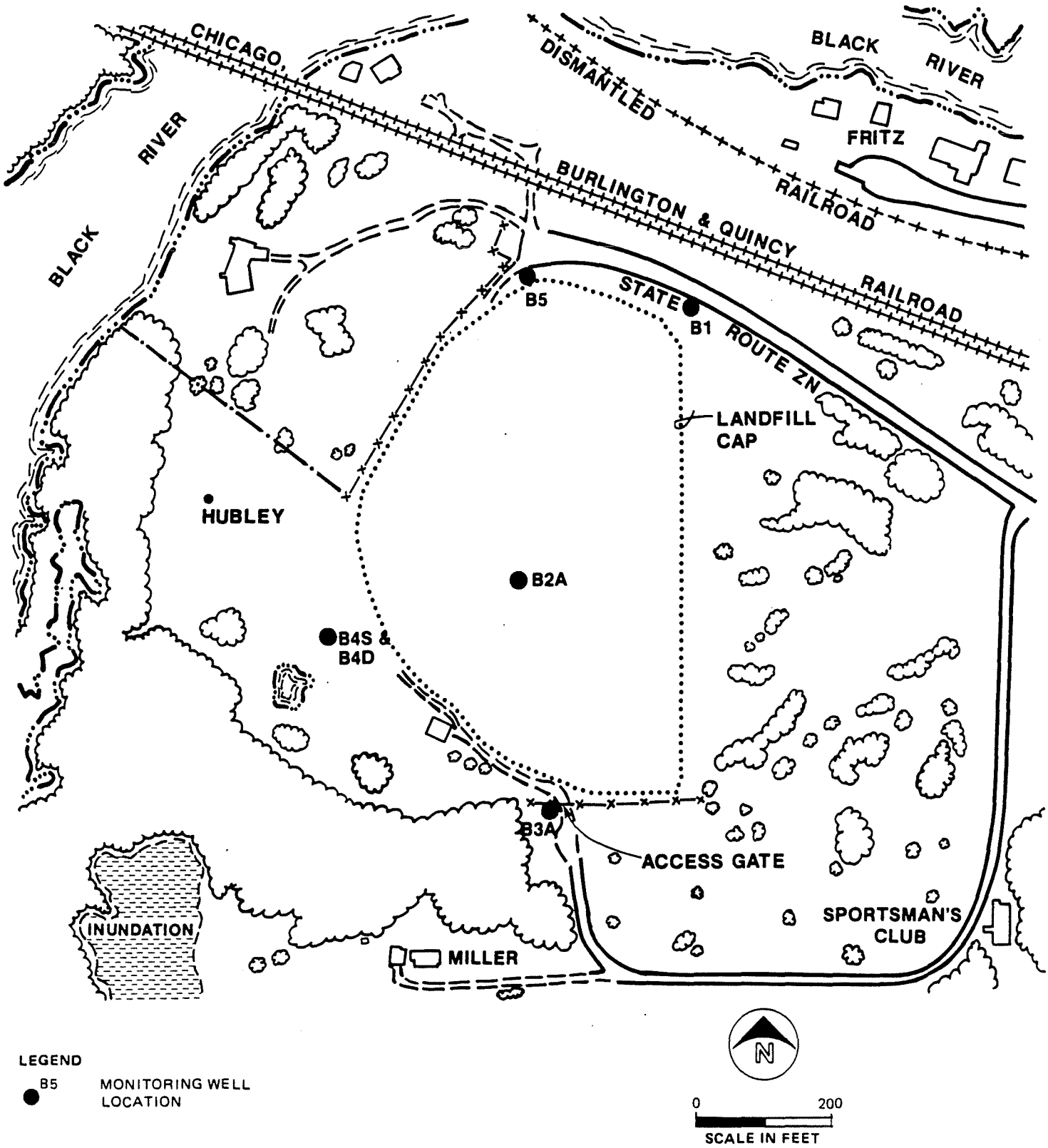


FIGURE 2-2
SITE MAP
ONALASKA LANDFILL QAPP

SITE SPECIFIC GEOLOGY

The site geology consists of soil units and unconsolidated deposits overlaying a sandstone bedrock. The soil units consist of a group of fine sands to loamy fine sands, prevalent on alluvial terraces. The soil drains readily and is easily eroded by the wind. The wetlands adjacent to the site are underlain by poorly drained alluvial soils consisting of sandy and silty materials.

The unconsolidated deposits are approximately 135 feet thick and consist primarily of sand and gravel of glacio-fluvial and alluvial origin. The site is located within an eroded bedrock valley which has been filled with outwash transported by the Black and Mississippi Rivers near the end of Wisconsin stage glaciation.

Two distinct subsoils were observed at the site by Warzyn Engineering during the in-field investigation. Near the surface the silt and clay content is a little higher, and a noncontinuous lense of silty clayey sand was noted. The hydraulic conductivity of the subsoil was estimated to range from 1×10^{-3} to 1×10^{-6} cm/sec (Warzyn, 1978). The other subsoil observed at the site consists predominantly of very fine to coarse sands with trace amounts of gravel, silt, and clay. The hydraulic conductivity of the subsoil ranges from 1×10^{-2} to 1×10^{-3} cm/sec (Warzyn, 1978).

Bedrock in the vicinity of the Onalaska Landfill consists of undifferentiated Cambrian sandstone up to 1,200 feet thick (Young and Borman, 1973) and includes the Jordan Sandstone, St. Lawrence Formation, Franconia, Galesville, Eau Claire, and Mount Simon Sandstones. The sandstones are fine to coarse-grained and contain small amounts of shale. Bedrock was not encountered in any of the borings performed on site, but was found at a 134 foot depth while drilling a replacement well on the Miller property 300 feet south of the site.

HYDROLOGY/HYDROGEOLOGY

The location of the Onalaska Landfill in relation to the Black and Mississippi Rivers is of critical importance in understanding the surface-groundwater flow regime at the site. The Black River flows in a south-southwesterly direction within 400 feet of the site. As the Black River flows past the site, the river channel branches into tributaries that flow into Lake Onalaska and the Mississippi River. Maximum, average, and minimum discharges of the Black River are measured 6 miles upstream at the Galesville, Wisconsin, gaging station and are 65,500, 1,635 and 180 cfs, respectively.

The main channel of the Mississippi River flows southeast within 1.5 miles of the site. The Mississippi River is

dammed approximately 6 miles south of the site forming Lake Onalaska and most of the wetlands adjacent to the site. The dam creates flood prone areas in the wetlands adjacent to the Town of Onalaska Landfill site.

Groundwater flow directions were determined from six monitoring wells, based on historic reference quarterly water level measurements and water level measurements recorded June 1, 1988 (Figure 2-3). For the majority of the year, horizontal groundwater flow is to the south-southwest, toward the wetlands bordering the Black River. However, during the spring runoff period the flow field is altered, and groundwater flows to the south-southeast away from the river.

The horizontal groundwater gradient ranges from 2.2×10^{-3} to 2.2×10^{-4} and averages 5.3×10^{-4}, remaining relatively flat throughout the year. The variation in horizontal groundwater gradients is due to seasonal variation associated with spring runoff. Vertical groundwater gradients measured at the monitoring well nest (B4S and B4D) indicate there is a slight downward gradient of 1×10^{-2}.

Careful review of the historic groundwater level measurements indicates that the direction of groundwater flow displays considerable variation. The groundwater flow regime at the Onalaska Landfill Site is driven by

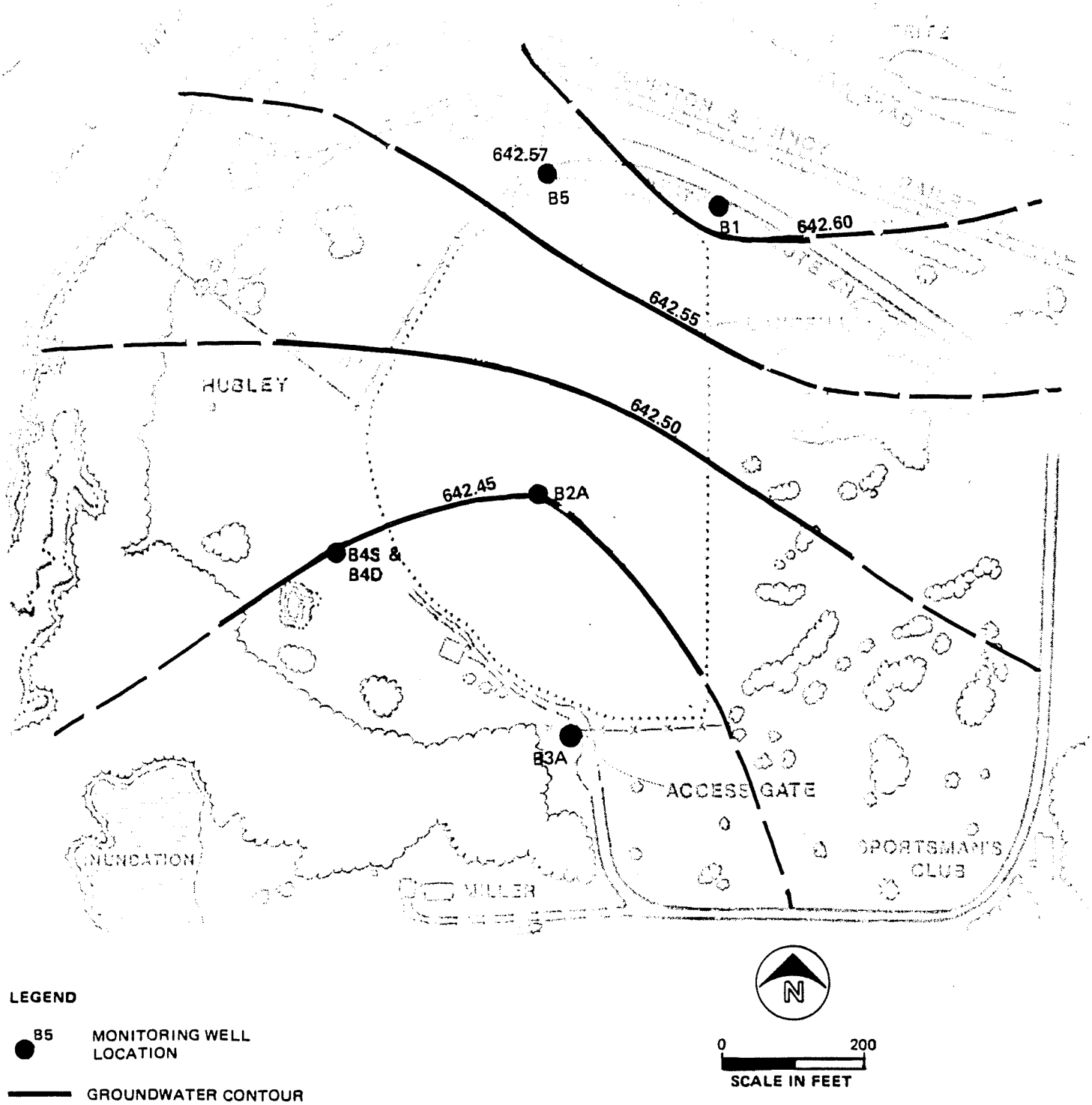


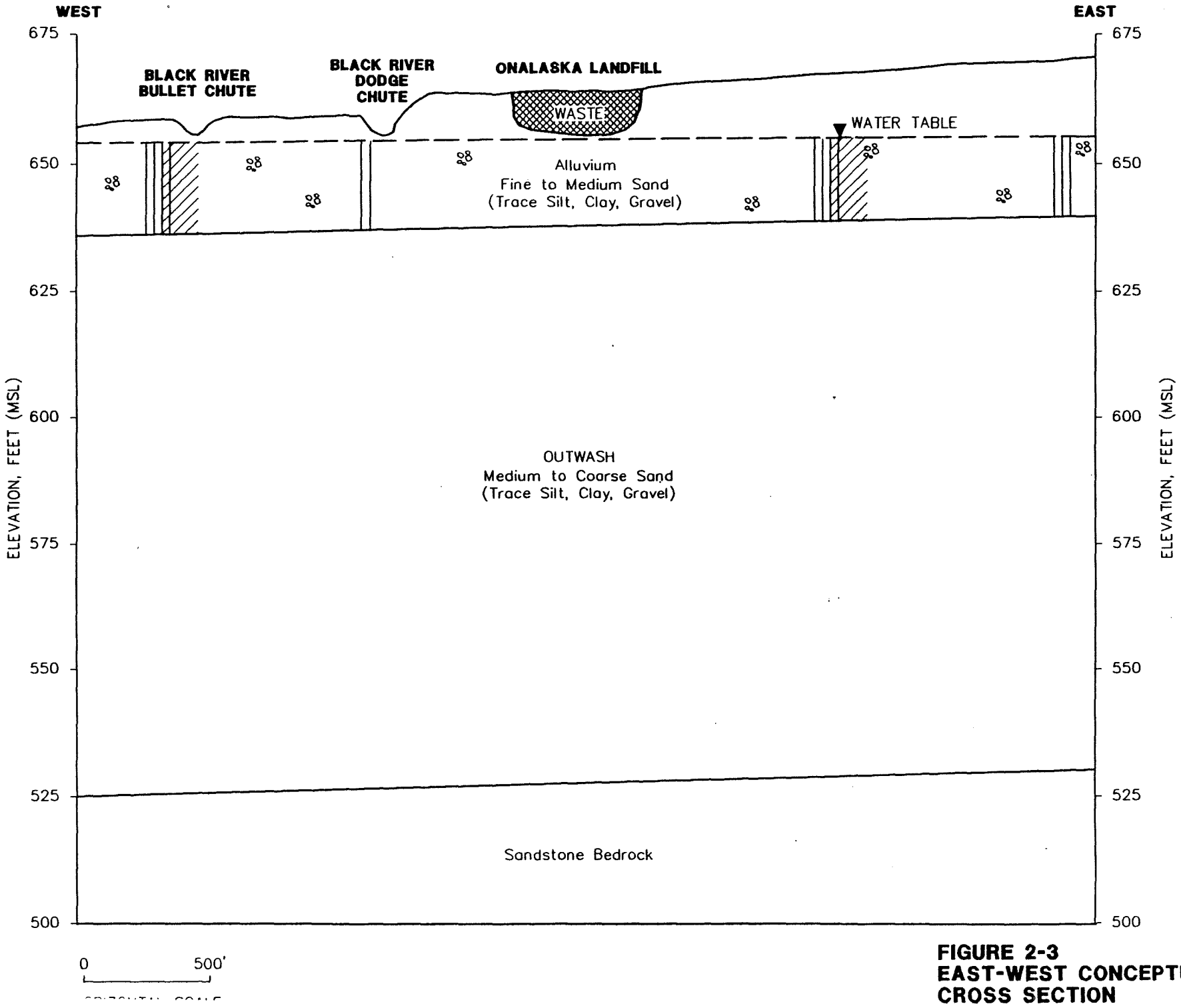
FIGURE 2-3
GROUNDWATER CONTOUR MAP, 6/1/88
ONALASKA LANDFILL QAPP

the seasonal surface water fluctuations in the Black and Mississippi Rivers. The fluctuations are directly related to the elevation changes of the Black River and Lake Onalaska, which either recharges the adjacent sand and gravel aquifer or receives groundwater discharge as the river and lake levels fluctuate. During the majority of the year groundwater is discharging under the site to the upper Mississippi River Wildlife and Fish Refuge bordering the Black River in a south-southwesterly direction. However, during spring runoff when surface water levels are high, the Black River and Lake Onalaska recharge the sand and gravel aquifer. This modifies the direction of groundwater flow to the south-southeast away from the river. The seasonal changes in the groundwater flow regime correlate extremely well with seasonal changes in the Black River discharge volume. (Borman and Young, 1973). A conceptual cross section of the site showing the proximity of the Black River to the landfill is presented in Figure 2-4.

SITE HISTORY AND BACKGROUND

SITE HISTORY

The Town of Onalaska owned and was licensed to operate the Onalaska landfill from 1969 until Wisconsin Department of Natural Resources (WDNR) ordered its closure in 1980. The Onalaska Landfill was also called "Lytles Dump" and "Brice



W85550.PP\CROSS 9/2/88

FIGURE 2-3
EAST-WEST CONCEPTUAL CROSS SECTION

Prairie" by some of the locals in the area. During the 11 years of operation, the Onalaska Landfill provided waste disposal for residential, commercial and industrial generators located within the township and for nonresidents with a written permit. The landfill also accepted refuse from other townships.

Landfill operations were informal. During the first 3 years of operation (1969-1971) there was no attendant at the landfill. Later, operating hours were posted and an operator was present to cover incoming waste and measure the nonresidential waste for billing purposes. The landfill boundaries were defined by a cable or fence partially surrounding the site. A lockable gate was installed at the site in early 1971 to restrict site access. However, keys were readily provided to the clients that wished to use the landfill outside the posted operating hours.

Seven acres of the Onalaska Landfill were reportedly reserved for using the compaction and cover method of waste disposal. The landfill was regularly inspected by the WDNR. Early WDNR records indicate that open burning was practiced at the site in late 1970. WDNR prohibited all open burning in January 1971 after receiving several complaints about noxious odors and dirty, black smoke resulting from the landfill burning of naphtha, an oily industrial solvent waste. Consequently, WDNR required an area be designated

specifically for the disposal of industrial solvents and wastes delivered to the site. Several industrial firms are known to have used the Onalaska Landfill for waste disposal. A partial list of industrial contributors is shown in Tables 2-1 and 2-2.

Outers Laboratories and Metallics, Inc. contributed significant quantities of industrial wastes to the site. Daily landfill operation reports indicate Outers Labs and Metallics, at the time owned by the same individual, were disposing of industrial waste oils and solvents as early as July 7, 1970. Early WDNR records report that Outers delivered liquid solvent residues to the site for burning. The waste solvents consisted primarily of naphtha, toluene, and paint residues. Initially, Outers and Metallics hauled solvent wastes in 55 gallon barrels. Once a week, a combined total of 20 to 25 barrels containing industrial waste from both companies were hauled to the landfill. The barrels were emptied and the waste was burned. After burning was banned, the liquid waste was dumped in the designated area and poured into pre-excavated holes and immediately buried. Occasionally, full barrels were left at the site if the barrels could not be easily emptied or because the barrels were damaged or leaking. In later years, the liquid waste was hauled in a 500 gallon truck instead of barrels. At that time, approximately 300 barrels were mass buried at the landfill. On another occasion, the

Table 2-1
ONALASKA LANDFILL USERS

Town of Onalaska

Town of Medary

Town of Campbell

City of Onalaska

City of French Island

City of West Salem

Outers Laboratories

Metallics, Inc.

Continental Can Company, Inc.

Heileman's Brewing Company

Bly Rendering Works

St. Francis Hospital

Trempealeau Electric Company

Modern Clean-Up Service (hauler)

Onalaska Rubbish Service (hauler)

Bill's Pumping Service (hauler)

Hilltopper Rubbish Service (hauler)

Midway Machine Products

Coulee Tool and Die

Empire Screen Printing, Inc.

L. B. White Company, Inc.

Pesticide firm from Waterloo, Iowa

Septic Tank Cleaner Firm

Unknown nearby school

GLI824/8-2

Table 2-2
PARTIAL LIST OF WASTES DEPOSITED AT
ONALASKA LANDFILL

	SOURCE
Hi Flash Naphtha (metal cleaning waste)	Outers/Metallics
Mineral Spirits	Outers/Metallics
Gun Oil	Outers
Gun Cleaning Solvents	Outers
Paint Residues	Outers/Metallics
Asphaltum	Outers/Metallics
Water Soluble Solvents (Okite Materials)	Outers/Metallics
Lubricating Oils	Outers/Metallics
Synthetic Lubricant (PTL-1009) (amine soap)	Continental Can
Cannery wash (99 percent water)	Continental Can
Septic Tank Sludges	Septic Tank Sludge Haulers
Animal Carcasses, Hides, Intestines	Bly Rendering Works
Animal Manure	Bly Rendering Works
Transformers	Trempealeau Electric
Entire Rendering Works Building (4 stories)	Bly Rendering Works
Insecticides (DDT, etc.)	Waterloo, Iowa
Beer Cooling Units	Heileman's Brewing
Beer Cans (partially full and empty)	Heileman's Brewing
Cardboard, Wood, Paper Waste	St. Francis Hospital, Outers/ Metallics
Plastic Waste	St. Francis Hospital
Empty Drums	Outers/Metallics
Full Drums (Naphtha and Paint Wastes)	Outers/Metallics
Tank Truck (paint wastes) (500 gal)	Outers/Metallics
Municipal Rubbish	Town or City of: Onalaska, Medary, Campbell, French Island, West Salem
Tires	Tire Haulers

GLT824/8-1

tank truck was buried, presumably in the south section of the landfill, when the contents could not be drained because the discharge outlet was plugged with hardened paint resin and solvent. In August 1975, WDNR recommended Outers Labs find alternative methods to dispose of their "naphtha" waste. Outers investigated and eventually implemented a reclamation process to recover some of the raw materials from the waste. In April 1976 Outers informed WDNR that they were no longer disposing of liquid wastes in the Onalaska Landfill.

On February 9, 1978, the WDNR issued an order to the township to submit an infield conditions report for the Onalaska Landfill because the site was not in compliance with the Wisconsin solid waste codes. Warzyn Engineering, Inc. investigated the site for the township and submitted a report to the WDNR on April 17, 1978. Warzyn recommended phased abandonment of the site. In June 1978, WDNR reported that an average of one one foot existed between the groundwater table and the base of the refuse pile at the site. Studies showed that the recurrent seasonal fluctuations in water levels sometimes allowed the groundwater to be in direct contact with a portion of the waste for extended periods of time.

On October 19, 1978, Warzyn Engineering submitted a plan of operation for the phased abandonment of the landfill. On

May 4, 1979, WDNR issued a plan approval and ordered the landfill closed by September 30, 1979. On May 30, 1980, WDNR modified the order to close the landfill by September 30, 1980. Closure proceeded in phases and the landfill received its final cap in July 1982.

In September 1982, WDNR sampled monitoring wells and private wells for compliance with drinking water standards for organic and inorganic constituents. The investigations indicated groundwater contamination had occurred. One residential well south of the site, Cecil Miller's well, exceeded the drinking water standards for barium and five organic compounds were detected above background levels. In January 1983, the town of Onalaska replaced Mr. Miller's well with a deep well.

On May 2, 1983, an EPA Potential Hazardous Waste site inspection report was submitted. In September 1984 the Onalaska Landfill was placed on the National Priorities list with a hazard ranking of 42.97.

HAZARDOUS MATERIALS CHARACTERIZATION

The Onalaska landfill used about seven acres for open pit disposal. Records indicate the refuse was compacted and covered at the end of each collection day. There is little indication that the wastes were segregated to any large

extent, so industrial, commercial and municipal wastes are generally mixed throughout the fill area. The industrial waste solvents from Outers Laboratories and Metallics, Inc. were an exception. An area in the landfill was designated specifically for liquid industrial waste disposal (WDNR correspondence and license applications). However, the designated disposal area was not strictly limited to the industrial wastes from Outers and Metallics. Records indicate other commercial wastes were deposited simultaneously in the same prepared area (depositions October 1981 and October 1982). For a time, open burning occurred at the site. Until early 1971 when open burning was banned, the industrial solvents from Outers and Metallics were burned on a regular basis at apparently random locations throughout the landfill. Some refuse was also burned on a bi-monthly basis. Open burning reportedly continued, even though banned, as late as 1979 (WDNR).

Source Description

Table 2-3 shows a summary of the primary industrial and commercial waste contributors to the landfill and lists the types of waste, amount delivered and the approximate time period they used the site for waste disposal.

Outers Laboratories and Metallics, Inc. contributed the greatest quantities of liquid industrial wastes delivered to

Table 2-3
MAJOR COMMERCIAL AND INDUSTRIAL WASTE CONTRIBUTIONS

Generator	Description of Waste Deposited	Manner of Disposal	Quantity	Time Frame
Outers Laboratories Metallics, Inc.	Naphtha (VM&P); Naphtha (High-Flash) Naphtha (Stoddards Solvent) Toluene; Solvosol	Open burning and occasional burial of drums throughout site	5,000 gal/mo	late 1969-71 1971-1976
		Open pit dumping followed by cover and compacting	6-7 drums/mo	
		Barrels (intact)	300 barrels	1976
	Paint and ink residues	500 gallons tank truck, and 5 gallon pails		
	Degreasers (water soluble) Cutting oils, lube oils, asphaltum			
	Gun oil and/or gun cleaning solvents	Small bottles	Truck load	
	Solid wastes (paper, plastics, packing material)	Open pit dumping	Two noncompacting trucks/week	1970-1978
Continental Can Co., Inc.	Can wash containing 99% water synthetic lubricant PTL-1009	Bill's Pumping Service land applied	600 gal/week	2 yrs, 10 mos. (1975-78)
St. Francis Hospital	Paper, plastics, miscellaneous	Direct dumping	20 cy every 4 days	1978 (?)
Trempeauleau Electric	Transformers (transformer oil may have been used to burn off insulation to salvage copper	Dumped near sign "Place Transformers Here"	12 each	1973 (?)
Heileman's Brewing Company	Shorts and rejects of empty cans Beer cooling units	Direct dumping	Unknown	1975 (?)
Bly Rendering Works	Stack of animal hides after fire; cattle intestines, manure	Pit dumping	3 dump trucks/wk	
	Entire building, four stories	Buried in deep hole		
Unknown Firm from Waterloo, Iowa	Insecticides (DDT, etc) (in paper bags)	Buried in designated area (sign)	Unknown	1975 (?)
Unknown Septic Tank Cleaners	Septic Waste	Land dumping	Unknown	1970 - (?)

the landfill. Their liquid wastes consisted primarily of naphtha-based solvents used in a metal cleaning process and solvent wastes from paint spray, gun cleaning, and machine shop cleaning fluids (correspondence from Outers Labs). During the period the liquid solvent wastes were delivered to the site for open burning (1969-1971), no specific area was used for dumping and burning of the waste. Drums containing solvent or paint residue waste were also left to be burned and/or buried. Later, the wastes were poured directly into prepared pits from 55 gallon barrels and, in later years, from a 500 gallon tank truck. Paint residues and solvents were also delivered to the landfill and deposited along with the other solvent wastes. In addition, they deposited smaller quantities of other wastes that included paint and ink components, cutting oils, lubricating oils, and asphaltum. Outers and Metallics delivered about 20 to 25 drums of solvent and paint residue per week from late 1969 to 1975 (correspondence from Outers to WDNR, November 10, 1975) resulting in a total estimated volume of about 320,000 gallons.

Continental Can discharged large quantities of can manufacturing wastes. The waste was composed of mostly water and an amine soap, and is believed to be biodegradable (correspondence from Town of Onalaska, July 21, 1977). Continental Can reportedly discharged 600 gallons per week

of can wash waste between 1975 and 1978, resulting in a total estimated volume of 90,000 gallons.

There are no other known industrial liquid wastes at the site. The other industrial contributions are listed in Table 2-3 and consisted primarily of solid wastes that include insecticides, paint cans, bottles, plastics, paper and other commercial rubbish. Figure 2-5 shows the approximate boundary of the landfill disposal area and possible disposal locations for some specific wastes.

Waste Description

Review of the existing records suggests Outers and Metallics may have delivered at least two kinds of naphtha to the site, high-flash naphtha and VM&P or Stoddard naphtha. The "high-flash" naphtha is a coal tar derivative consisting primarily of a mixture of aromatic hydrocarbons. It was probably used as a degreasing agent or a general solvent. The VM&P or Stoddard naphthas are slightly more volatile and both are derived from petroleum. The petroleum naphthas consist of a mixture of aliphatic hydrocarbons, naphthenes and alkyl benzenes. They are used as universal solvents for general cleaning and as paint thinners. These naphthas were probably used in a paint cleaning process at one of the plants and overall as general solvents. Both the petroleum and coal derived naphthas are less dense than water and

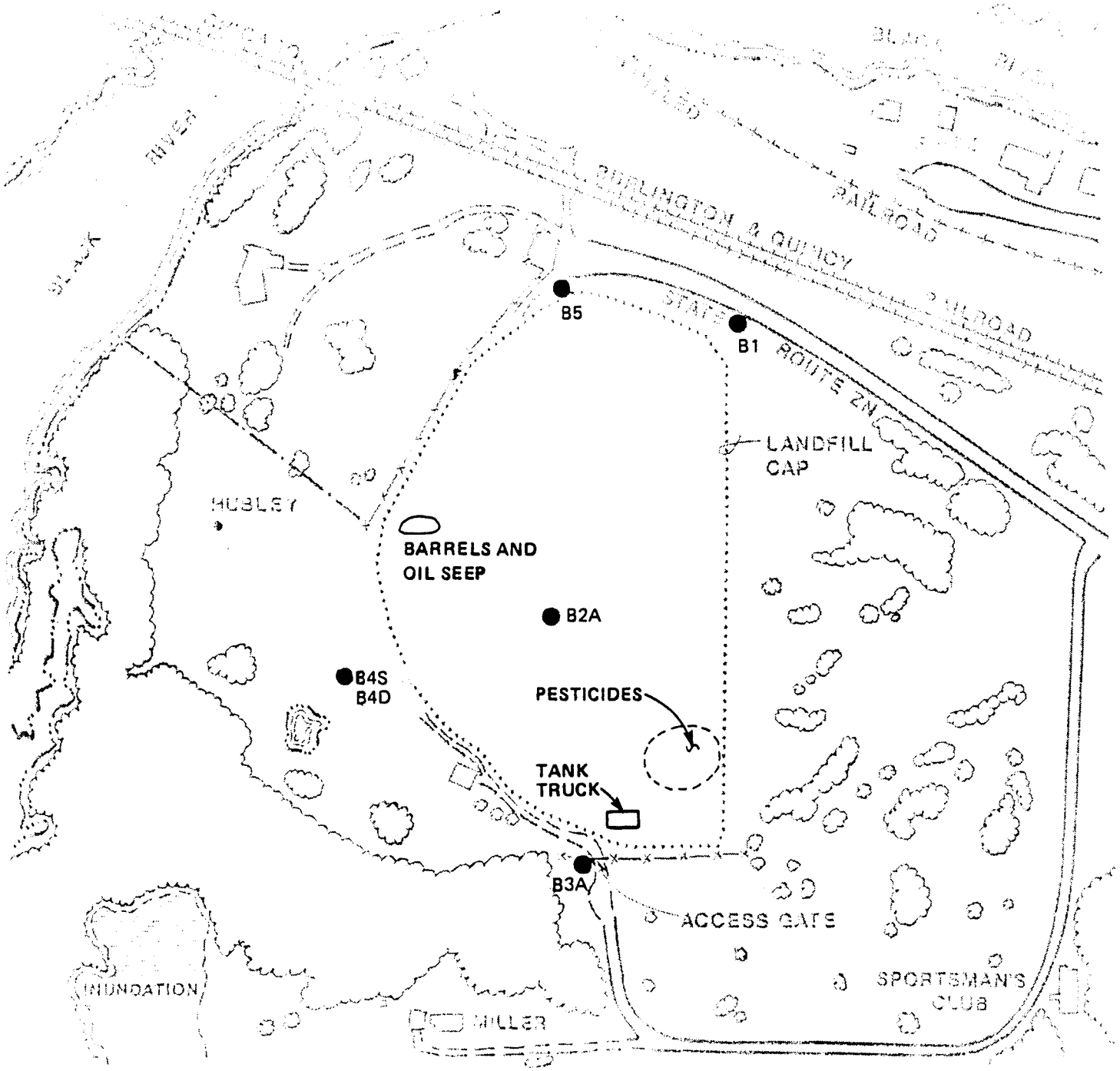


FIGURE 2-5
POTENTIAL WASTE BURIAL LOCATIONS
ONALASKA LANDFILL QAPP

would float on the water table if the waste reached the aquifer. Some of the organic compounds detected in the groundwater from past analyses may be derived from the naphtha wastes floating on the water table. The liquid naphtha waste could generate a complex mixture of dissolved organic compounds in groundwater over a period of time. The two types of naphtha would each produce a different suite of degradation products of varying composition. It is impossible to predict the exact composition of each mixture, but generally the degradation products will consist of aliphatic and aromatic carboxylic acids, toluene, and other complex mixtures of aromatic and aliphatic hydrocarbons. Adding to the contaminants, the naphtha solvents will also contain constituents derived from the process for which they were used, including metal particles, paint and ink residues, etc.

Barium has been detected in the groundwater at elevated concentrations. Sources other than naturally occurring barium are unknown.

SITE ENVIRONMENTAL QUALITY

Existing Groundwater Quality

Inorganic and organic analytical data are available for six monitoring wells onsite installed by the Town of Onalaska in

1978 and 5 residential wells near the site. The wells are all completed in the sand and gravel aquifer. The monitoring wells are screened near the water table and the residential wells are probably shallow sand points. Three of the residential wells and most of the monitoring wells were sampled quarterly from 1978 to the present. Analysis was done for indicators of inorganic contamination and included chloride, iron, manganese, alkalinity, hardness and conductivity. Analysis for organic contamination included COD, 1,1-dichloroethene (1,1-DCE), 1,1-dichloroethane (1,1-DCA), 1,1,1-trichloroethane (1,1,1-TCA), trichloroethene (TCE), tetrachloroethene (PCE), toluene(TN), ethylbenzene(EB) and xylene (XY).

Sampling of the wells was performed by WDNR personnel, Waryzn Engineering and Davey Labs. Analytical laboratories have included Davey Labs, Thompson Labs, and Wisconsin State Lab of Hygiene. Evaluation of the data is intended to provide an overview of existing groundwater quality and to help formulate an initial conceptual model of the sources and pathways of contaminant migration to aid in the further sampling locations.

Spatial and temporal trends in chloride provided the clearest indication of conservative inorganic selection of contaminant migration. Figures 2-6 through 2-8 present contours of chloride concentrations from 1978 to 1988 based

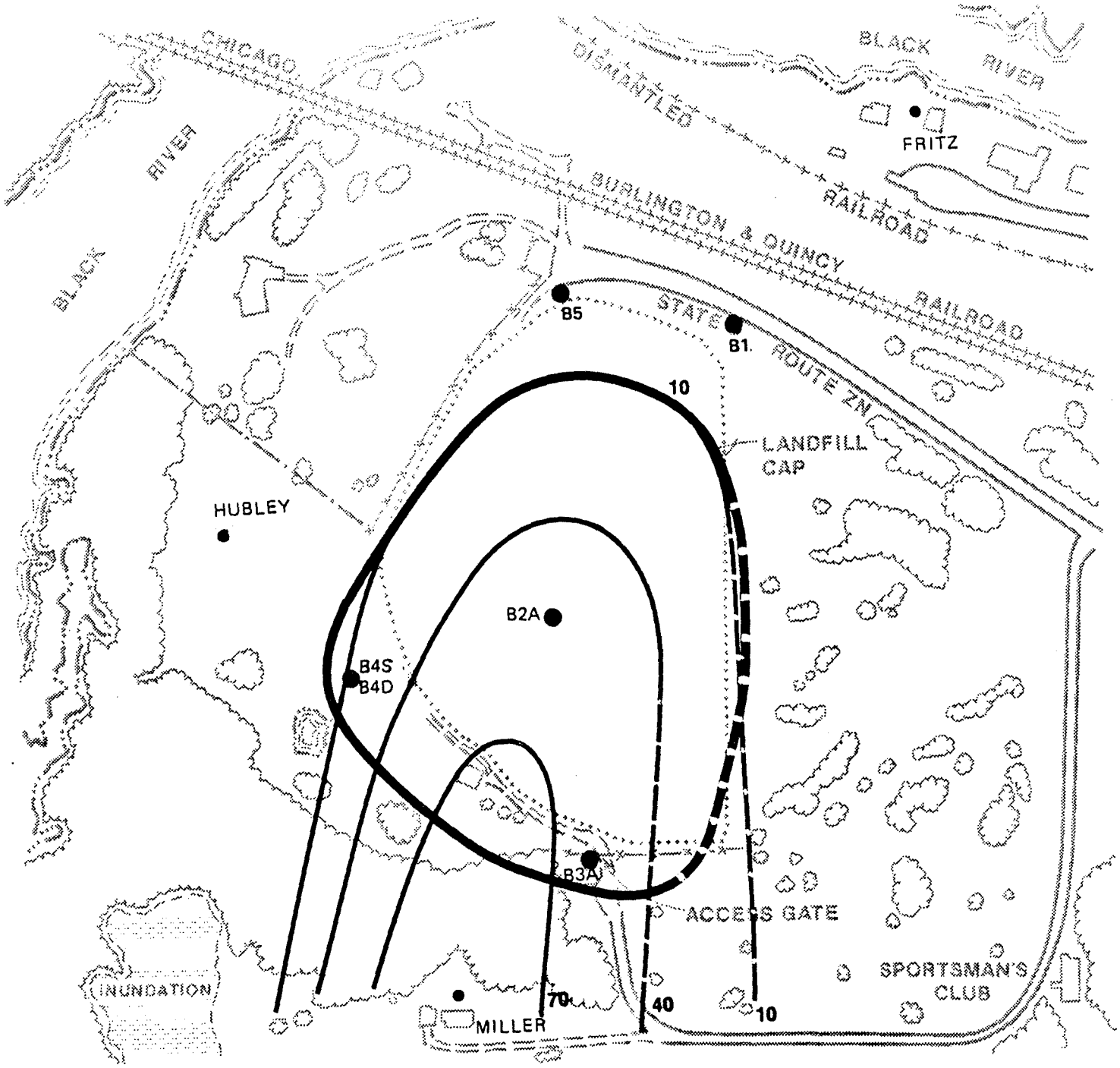


FIGURE 2-6
GROUNDWATER CHLORIDE (mg/l)
(1978-1980)
ONALASKA LANDFILL QAPP

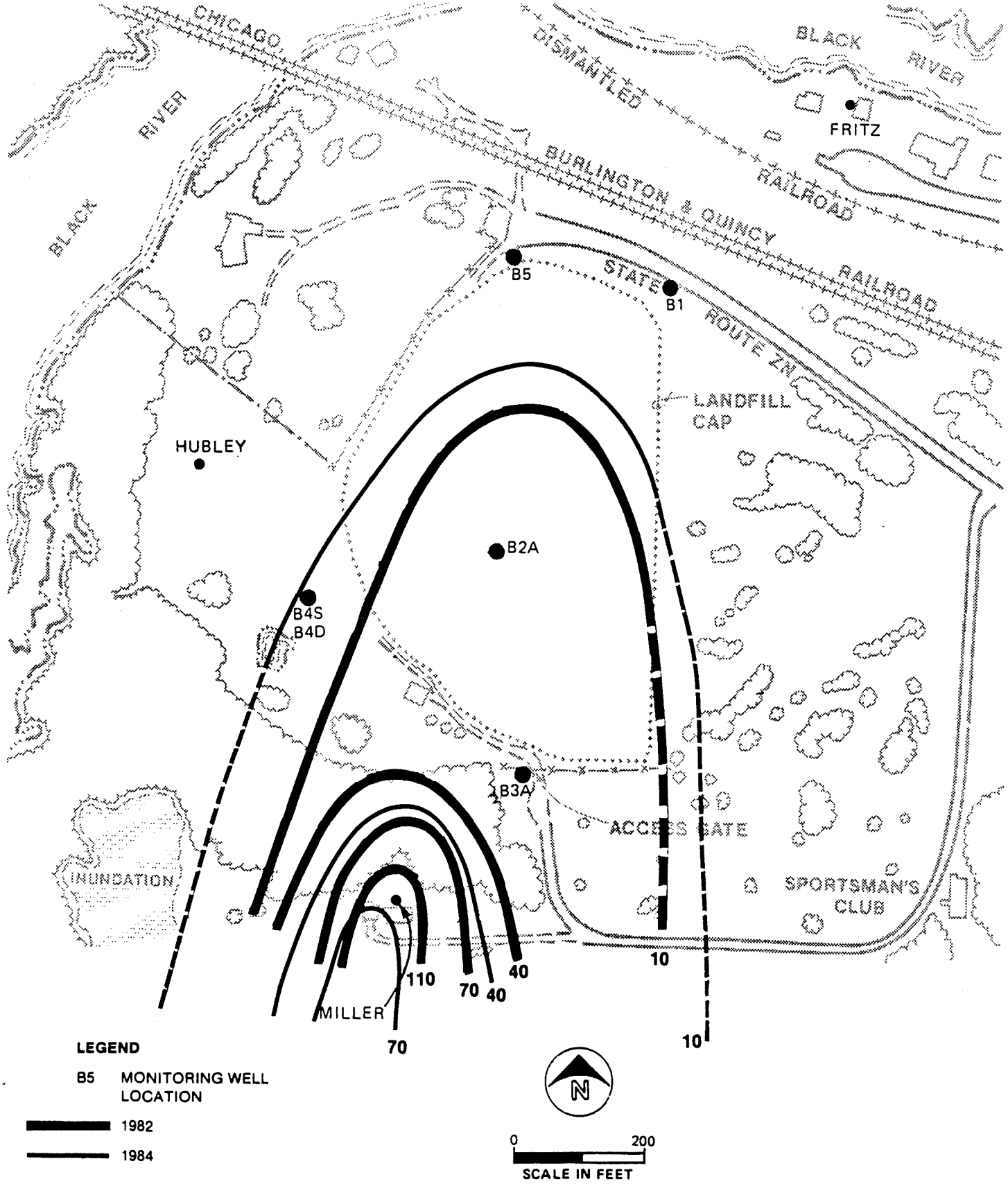


FIGURE 2-7
GROUNDWATER CHLORIDE (mg/l)
(1982-1984)
ONALASKA LANDFILL QAPP

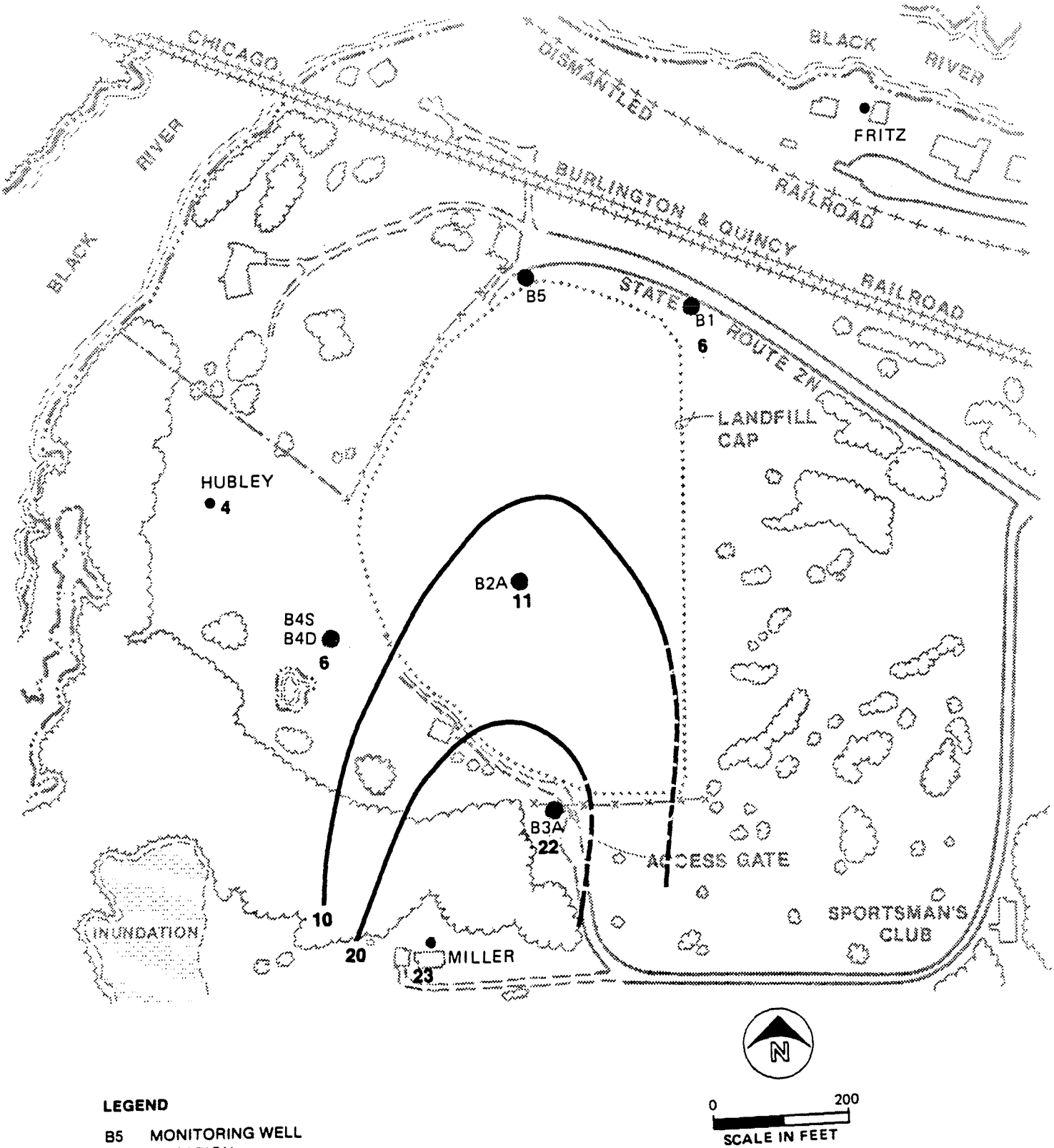


FIGURE 2-8
GROUNDWATER CHLORIDE (mg/l)
(1986-1988)
ONALASKA LANDFILL QAPP

on results of the analyses from the 6 monitoring wells and the Fritz, Hubley and "old" Miller wells. The contouring suggests that in 1978 the chloride concentration was only slightly elevated onsite relative to the general background level of about 5 mg/l (as found in the upgradient Fritz well). In 1980 the concentration of chloride is shown to have generally increased and a plume of elevated chloride is migrating offsite to the south. The 1982 and 1984 data shows chloride levels diminishing onsite while the plume continues migrating to the south. The site was capped from 1980 to 1982 and is reflected by the diminishing chloride concentrations onsite in the groundwater. Figure 2-8 presents the average of the three most recent samples available, two samples in March and September of 1986 and one sample in March of 1988. The contours show continued decrease in chloride levels onsite and south of the site as the chloride disperses and migrates south. The calculated average groundwater velocity of 80 feet/year presented earlier corresponds well to the migration of chloride seen in these figures.

Additional discussion of inorganic and organic contamination is presented in the Final Work Plan, Section 2. The existing groundwater quality data is presented in Appendix A of the Work Plan.

In summary the following observations are made based on the evaluation of the existing groundwater data.

- Concentrations of chloride, barium, iron and manganese above background are found onsite and immediately south of the site.

- The migration of chloride and measurements of conductivity over time appear consistent with the calculated average groundwater direction and velocity of 80 feet/year to the south, south-west.

- Capping the site in 1982 appears to have resulted in diminished concentrations of chloride, total dissolved solids (as measured by conductivity) and oxidizable organics (as measured by COD) in groundwater beneath and immediately south of the site.

- Barium continues to exceed the primary MCL in groundwater onsite and immediately south of the site. Iron and manganese greatly exceed secondary MCLs in groundwater onsite.

- VOCs were routinely detected in wells B4S, B4D, B3A and the old Miller well. Concentrations in

B4S were orders-of-magnitude greater than the other wells.

PRELIMINARY RISK ASSESSMENT

The preliminary risk assessment is based on the existing data available for the Onalaska site. The risk assessment identifies potential contaminants of concern based on the existing data and identifies potential exposure pathways based on current knowledge of site characteristics and waste/contaminant characteristics. It also compares existing environmental concentrations to standards and criteria and estimates the risk associated with those levels. The preliminary risk assessment is summarized here. More detail can be found in the Final Work Plan Section 2.

Potential chemicals of concern are discussed in Section 3f. The target compounds include TCL VOC's, Semi-VOC's, Pesticides/PCBs and inorganics.

The major potential exposure pathways associated with the site are:

- Release of contaminant to the groundwater, contaminant migration through the groundwater and exposure through use of the groundwater as drinking water source

- Release of contaminant to the groundwater, contaminant migration through the groundwater, discharge of the groundwater to the Black River or Lake Onalaska, and the exposure of fish and wildlife in the Upper Mississippi Wildlife and Fish Refuge

- Erosion of the cap and exposure of landfill contents leading to the release of contaminants to the air and exposure of nearby residents

- Erosion of the cap and exposure of landfill contents leading to the exposure of trespassers onto the site

The only exposure pathway that can be preliminarily quantitatively assessed at this time is the pathway involving release of contaminants to groundwater and subsequent use of the groundwater as a water supply. Other pathways cannot be addressed for a lack of data.

Contaminant concentrations detected in the groundwater were compared to drinking water standards and criteria. For the comparison, the last three sampling rounds in each monitoring well and Miller's old well were used. The old Miller well and monitoring wells 2A, 3A, 4S and 4D had contaminants exceeding criteria or standards. Monitoring

well B4S had the greatest number of chemicals exceeding criteria or standards. Contaminants exceeding criteria or standards included barium, trichloroethene, 1,1-dichloroethene, 1,1,2,2-tetrachloroethane, 1,1,1-trichloroethane, ethylbenzene, xylene and toluene.

The risks associated with drinking water containing contaminant levels detected were also evaluated. The risks are based on the highest levels detected in each of the last three sampling rounds. Cancer risks associated with the highest levels detected in the monitoring wells range from 10^{-3} to 10^{-5}. Reference dose values are exceeded for barium, ethylbenzene, manganese, and toluene.

As the analyses indicate, ingestion of the groundwater detected in monitoring wells south of the site could pose adverse health effects.

TARGET COMPOUNDS

The existing data were reviewed in proceeding sections on hazardous materials characterization and existing groundwater quality. The review helps suggest some of the potential chemicals of concern at the Onalaska site.