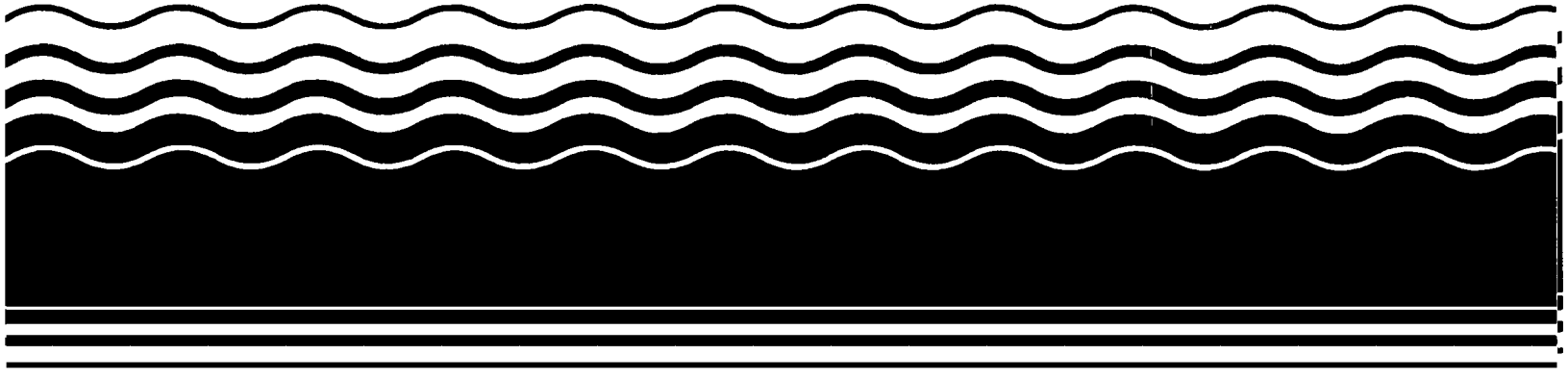
PB95-963156
EPA/AMD/R05-95/286
February 1996

EPA Superfund
Record of Decision Amendment:

Mid State Disposal Site,
Marathon County, WI
8/4/1995



ROD AMENDMENT
MID STATE DISPOSAL SITE
MARATHON COUNTY, WISCONSIN

Introduction

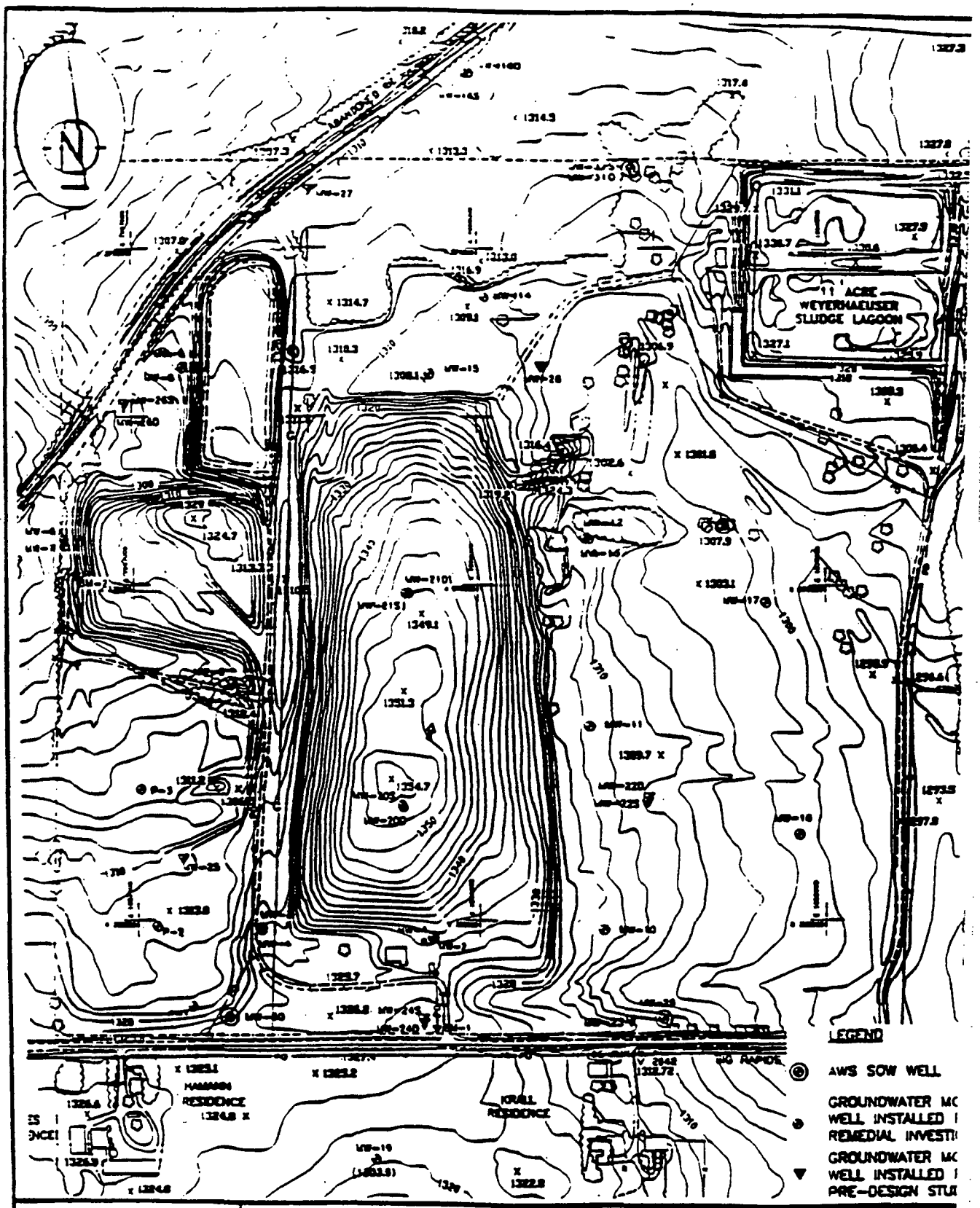
The United States Environmental Protection Agency (U.S. EPA) is changing the remedy selected in the Original Record of Decision (ROD) dated September 30, 1988.

The Mid-State Disposal site consists of a 30-acre landfill, the old mound Area, a 7-acre interim expansion landfill, and a 3-acre sludge lagoon (Figure 1). During the period of its operation from 1970 to 1979, the Mid-State Disposal site received domestic, industrial, commercial, and institutional wastes, as well as construction and demolition debris. These wastes included papermill sludges, coating sludges, fly ash, asbestos dust, mineral core waste, glue waste, solvents, pesticides, paint sludges, and heavy metals.

The ROD signed in September of 1988 selected the following remedy:

- a landfill cap which meets the requirements of Chapter NR 500 of the Wisconsin Administrative Code (WAC),
- an active gas extraction system and condensate collection system,
- improvements to site drainage,
- an alternate water supply (AWS)
- site monitoring for groundwater, surface water and landfill gas,
- off-site treatment of leachate,
- site fencing and sign posting for security,
- on-site road construction, and
- institutional controls.

A Consent Decree in the matter of United States of America v. Mid State Disposal Inc et al., was entered into on March 28, 1990; whereby the agreement allowed for the Remedial Design/Remedial Action (RD/RA) to be performed by the Settling Defendants and oversight of such RD/RA by U.S. EPA and WDNR.



PROJECT/CLIENT

MID-STATE WASTE DISPOSAL SITE
WELL LOCATION DIAGRAM

Figure 1

DRAWN BY	C.R.H.
CHECKED BY	J.M.T.
APPROVED BY	T.W.W
SCALE	1" = 400'
FIGURE	
DISPLOT	MS-3EXTR.DWG
PLOT DATE	
SITE PRO	821

The need to collect additional information to facilitate remedial design was recognized in the ROD and a Pre-design Study was completed in 1991. The remedial design was completed in 1993, with construction completed in the Spring of 1994. Of the nine remedial components noted above, all except Component 4, the AWS, have been implemented or initiated as part of the Operation and Maintenance.

As provided for in section 300.515(e) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) a public comment period with the opportunity for a public meeting was held from June 16, 1995 through July 15, 1995. In addition to the public comment period, the nine residents on Big Rapids Road were sent letters explaining how the changes presented in this document would affect them individually. No comments were received during the public comment period.

This ROD Amendment will become part of the Administrative Record pursuant to the NCP Section 300.825 (a)(2) including responses to comments received during the public comment period and the public meeting (if requested by the public). The Administrative Record can be found at the site repository located at:

Marathon County Public Library
Stratford Branch
300 East Larch Street
Stratford, Wisconsin 54484

Reasons for Issuing the ROD Amendment

During the course of the Pre-design activities, an initial hydrogeologic evaluation of the area around the site was completed to address the potential of establishing high-capacity water supply wells. The results of this study indicated that an AWS consisting of two upgradient wells was not a feasible alternative. The results of the study were discussed in a report entitled, Proposed Alternate Water Supply System April 16, 1991. Complete results of the initial hydrogeologic investigation for the AWS component of the remedy were presented in the Pre-Design Report, Appendix J, dated October 18, 1991. The findings are briefly summarized below.

Based upon the review of area geology and hydrogeology, and the estimate of the residents' water needs, three locations were identified as potentially having the geology and location favorable for development of an AWS. These three sites were 1) Big Rapids County Park adjacent to the Eau Pleine River, located 2-1/4 miles west of the nearest potential receptor; 2) the confluence of Rock Creek and Big Eau Pleine River next to the abandoned railroad trestle, approximately 1-1/2 miles south of the nearest residence; and, 3) Fenwood Creek where it crosses County Trunk Highway P, approximately 1-1/4 miles from the nearest residence.

Results of a geophysical seismic survey conducted at each of the three sites indicated that the site with the greatest potential for development of a large capacity supply well(s) in unconsolidated deposits was the Big Rapids Park site.

However, the deposits encountered in the test borings at the Big Rapids Park site were judged to be of insufficient permeability to support a public supply well. Water consumption estimates based on information from the 9 residents affected indicated a supply well was needed that could generate 100 gallons/minute. The deposits encountered at the Big Rapids site were estimated to yield only 10 gallons/minute maximum.

Given that peak water demands typically occur, according to well established cycles in the dairy industry and households, the possibility of incorporating a water storage system to store water during periods of low usage was investigated. This element was determined not to be feasible for the following reasons:

1. Even with a storage system, the water-bearing deposits believed most suitable for an AWS would produce less than the estimated requirement of 15,691 gallons per day.

2. The potential for malfunction would be high, especially during extremely cold winter months.

Based on the lack of a sufficiently thick water bearing for an AWS, additional evaluation of hydrology and water quality was undertaken. The AWS Final Scope of Work (SOW) was prepared to provide the additional data necessary to evaluate the hydrology and water quality which would provide a trend analysis on which a decision regarding the construction of the AWS could be based.

The AWS Scope of Work

The objective of this study was to provide a consistent and reliable data base upon which a decision regarding the construction the AWS could be based. Specific data requirements included:

1. Groundwater quality information sufficient to evaluate groundwater quality trends over time and to assist in evaluating hydrogeologic conditions at the site.

2. Groundwater elevation data to evaluate groundwater and contaminant movement, particularly in the area of the groundwater divides.

3. Additional hydrogeologic information in the area encompassed by the two groundwater divides.

TABLE 1
ALTERNATE WATER SUPPLY ANALYTICAL PARAMETERS
MID-STATE DISPOSAL SITE

PARAMETER	NR 140 ES	NR 140 PAL	USEPA MCL	METHOD DETECTION LIMIT	STANDARD REPORTING LIMIT
VOCs					
Vinyl Chloride	0.2	0.02	2	0.45	2.0
Dichlorodifluoromethane	1000	200	---	0.48	2.0
1,1-Dichloroethane	850	85	---	0.27	1.0
Methylene Chloride	150	15	5	0.33	1.0
Cis-1,2-Dichloroethene	70	7	70	0.15	1.0
Chloroform	6	0.6	100	0.45	1.0
Trichloroethene	5	0.5	5	0.24	1.0
1,2-Dichloropropane	5	0.5	5	0.27	1.0
1,3-Dichloropropene	*	*	---	0.33	2.0
Benzene	5	0.5	0.5	0.24	1.0
Toluene	343	68.6	1000	0.15	1.0
Tetrachloroethene	5	0.5	5	0.15	1.0
Naphthalene	40	8	---	0.27	1.0
1,1,1-Trichloroethane	200	40	200	0.15	1.0
1,2-Dichloroethane	5	0.5	5	0.24	1.0
Chlorobenzene	100	20	100	0.18	1.0
p-Isopropyltoluene	*	*	---	0.21	1.0
1,2-Dichlorobenzene	600	60	600	0.12	1.0
n-Butylbenzene	*	*	---	0.21	1.0
1,4-Dichlorobenzene	75	15	75	0.12	1.0
Styrene	100	10	100	0.18	1.0
1,2,4 - Trichlorobenzene	*	*	70	0.18	1.0
Hexachlorobutadiene	*	*	---	0.12	1.0
1,2,3-Trichlorobenzene	*	*	---	0.21	1.0
1,2-Dibromo-3-Chloropropane	0.2	0.02	0.2	0.27	1.0
4-Chlorotoluene	*	*	---	0.12	1.0
2-Chlorotoluene	*	*	---	0.12	1.0
1,1,2-Trichloroethane	0.6	0.06	5	0.18	1.0
tert-Butylbenzene	*	*	---	0.15	1.0
1,2-Dibromoethane	0.05	0.005	0.05	0.27	1.0
1,1,2,2-Tetrachloroethane	*	*	---	0.18	1.0
1,2,3-Trichloropropane	*	*	---	0.27	1.0
Meta-& Para- Xylene *	620	124	10,000	0.36	2.0
1,2,4-Trimethylbenzene	*	*	---	0.18	1.0
Chloromethane	*	*	---	0.68	2.0
Ortho-Xylene *	620	124	10,000	0.15	1.0
Bromobenzene	*	*	---	0.27	1.0
Ethylbenzene	700	140	700	0.12	1.0
N-Propylbenzene	*	*	---	0.24	1.0
1,3,5-Trimethylbenzene	*	*	---	0.3	1.0
Sec-butylbenzene	*	*	---	0.24	1.0
Dibromochloromethane	215	43	100	0.21	1.0
Bromodichloromethane	179	36	100	0.48	1.0
Surrogate Recovery, % (PID/HALL)					

NOTES:

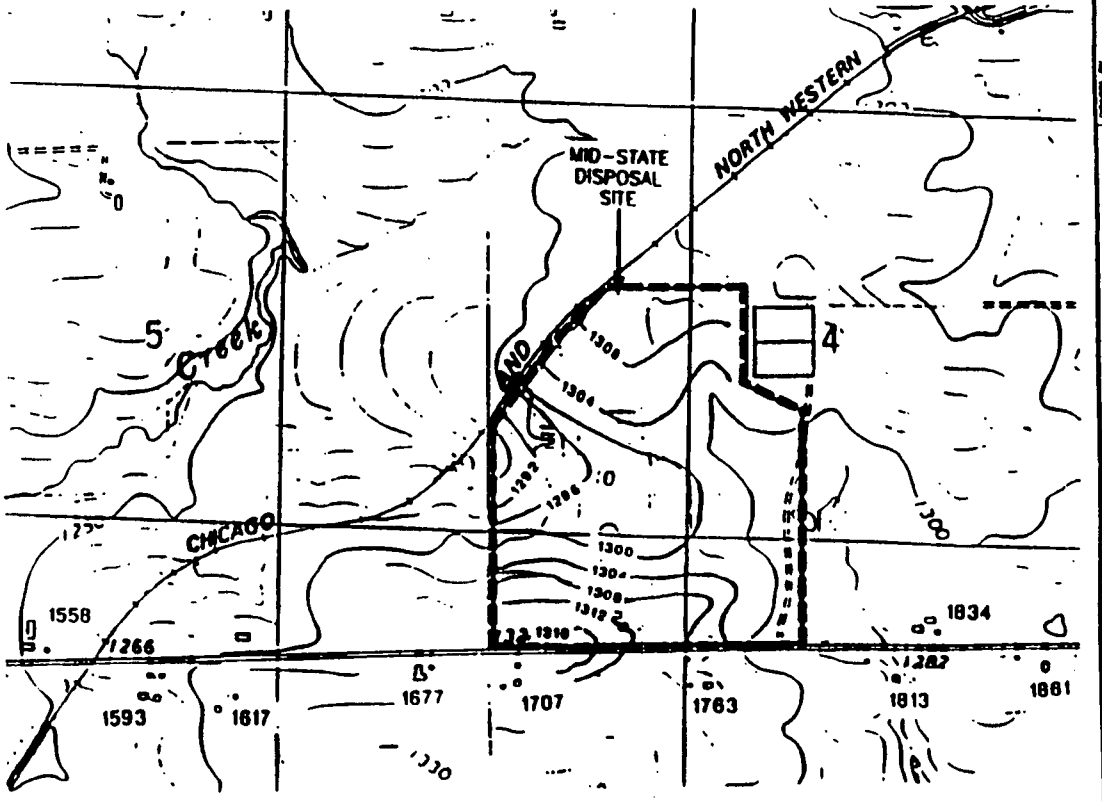
1. * = No PAL; No E.S.
2. * ES, PAL and MCL for xylenes apply to total xylene concentration.
3. MCL = Maximum Contaminant Level for public water systems.
4. --- = No MCL

TABLE 1. cont.
INORGANIC AND INDICATOR PARAMETERS
ALTERNATE WATER SUPPLY ANALYTICAL PARAMETERS
MID-STATE DISPOSAL SITE

PARAMETER	NR 140 ES	NR 140 PAL	USEPA MCL	INSTRUMENT DETECTION LIMIT
METALS, ug/l				
Arsenic	50	5	50	1.0
Barium	2000	400	2000	0.7
Cadmium	5	0.5	5	1.0
Chromium	100	10	100	3.4
Copper	1300	130	1300	5.2
Iron	300	150	300 *	12.4
Lead	15	1.5	15	1.0
Manganese	50	25	—	0.5
Mercury	2	0.2	2	0.1
Selenium	50	10	50	2.0
Silver	50	10	—	8.7

1. ^ = No PAL: No E.S.
2. * = MCL for iron is a secondary maximum contaminant level (this is not a health based standard).
3. — = No MCL

Figure 2



LEGEND

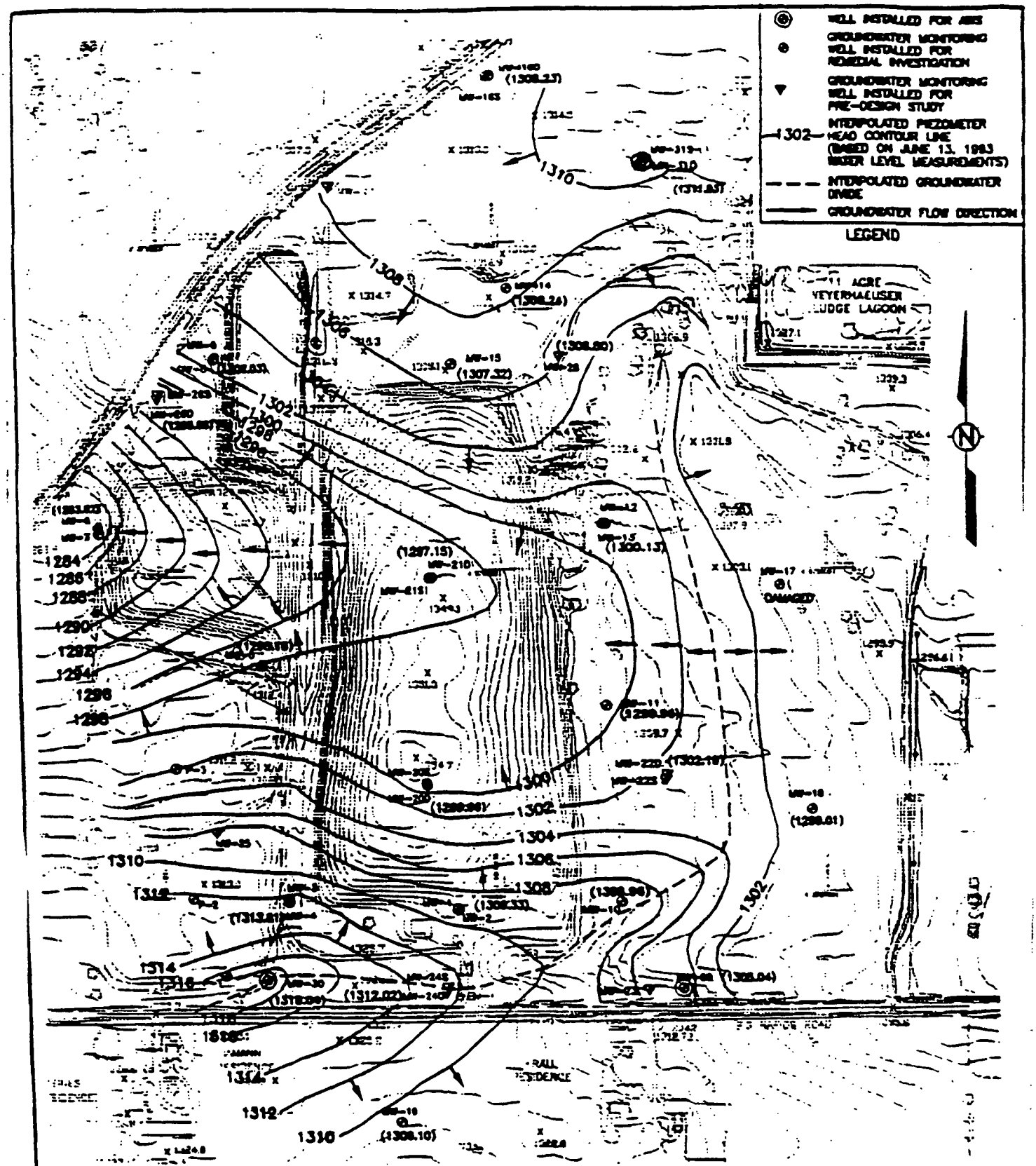
1558 WELL DESIGNATION

—1300— INTERPOLATED PIEZOMETER HEAD COUNTOUR LINE (BASED ON JUNE 13, 1993 WATER LEVEL MEASUREMENTS)

SOURCE USGS TOPOGRAPHIC MAP, STRATFORD QUADRANGLE, DATE 1981

DRAWN BY	J.M.T.	6/24/94
CHECKED BY	J.A.K.	6/22/94
APPROVED BY	J.M.T.	6/24/94

RESIDENTIAL WELL LOCATIONS
AWS SCOPE OF WORK



PROJECT/CLIENT

PIEZOMETRIC HEAD DISTRIBUTION
AND GROUNDWATER FLOW DIAGRAM
IN BEDROCK AQUIFER
MID-STATE WASTE DISPOSAL SITE

DRAWN BY	J.M.I.	6/22/84
CHECKED BY	J.M.T.	6/22/84
APPROVED BY	J.M.T.	6/22/84
CADFILE 82685602	SCALE 1" = 400'	
STS PROJECT NO. 82685XJ	FIGURE NO. 3	

Figure 3

The data needs were satisfied by installation of additional wells at the Mid-State site and completion of six rounds of groundwater sampling and analysis.

The AWS SOW monitoring consisted of collection of water level data at each background and on-site monitoring well, and collection and analysis of groundwater samples from the background wells and selected on-site and nine residential wells on a quarterly basis for six rounds. Figure 1 presents a site diagram showing the locations of the background wells and on-site monitoring wells. Figure 2 shows the location of each of the nine residential wells relative to the Mid-State site. Figure 3 shows the location of the groundwater divides and their relationship to the monitoring wells and the landfill areas.

Background Wells: Background wells are located up-gradient to the site which is generally considered north of the site (wells MW-16, MW-27, and MW-31). In addition to indicator parameters, background wells were tested for Volatile Organic Compounds (VOCs) and metals (Table 1). Various VOCs were detected sporadically and in various sample rounds. Most hits were accounted for as being laboratory artifacts or were also found in the quality control samples such as the field blanks. There were several detects of low level VOCs not attributable to laboratory QC samples, but they were not confirmed in following rounds. Therefore VOC results from the background wells did not affect the interpretation of VOC data from the monitoring wells or residential wells.

Iron, Mercury, Lead and Cadmium were detected sporadically during the 6 sampling rounds (Table 2). In the case of Mercury, Lead and Cadmium, these compounds exceeded their respective Preventative Action Limits (PALs)- [as per NR140 Wisconsin Administrative Code (WAC)] only once during the 6 rounds and therefore do not effect the interpretation of the on-site well data. Manganese was consistently detected above the Enforcement Standard (ES) (as per NR140 WAC) in the three background wells. Remedial Investigation data also suggests that on-site wells and residential wells have PAL and ES exceedances as well. However, since the background wells are significantly upgradient of any on site sources it can be concluded that the manganese concentration is a natural occurrence for this area. Also, given the fact that Manganese, like iron, is a public welfare standard, the concentrations do not present a threat to public health.

Monitoring Wells: On-site groundwater quality has been evaluated by sampling and analysis of 20 monitoring wells located either hydraulically downgradient of the fill areas or sludge lagoon, or located within the fill areas.

Metals: Evaluation of the on-site groundwater data shows localized impacts of iron at two of the 20 wells tested. The most significant iron concentration has been observed at MW-9. However, wells deeper and downgradient of MW-9 show no indication of elevated iron concentrations. Therefore, the higher concentration of iron at MW-9 is likely associated with a localized iron source. MW-30 also showed elevated iron concentrations, however statistical analysis demonstrated a decreasing trend in the concentrations. As iron is a public welfare

Table 2

HISTORICAL SUMMARY OF ES/PAL EXCEEDANCES OF INORGANIC PARAMETERS ALTERNATE WATER SUPPLY SAMPLING MID-STATE DISPOSAL SITE
(Units in ug/l)

	ROUND 1		ROUND 2		ROUND 3		ROUND 4		ROUND 5		ROUND 6	
WELL NO	ES	PAL	ES	PAL	ES	PAL	ES	PAL	ES	PAL	ES	PAL
MW 1		Cd (1.3 E)					Abandoned		Abandoned		Abandoned	
MW 8		Cd (1.4 E)							Not sampled		Not sampled	
MW 8		Cd (2.8 E)		Fe (330)		Fe (231 B,F)						Cd (1.1 E)
MW 9	Fe (214 000)		Fe (180,000)		Fe (178,000 F)		Fe(185,000)	Cr (12.6)	Fe (148,000)		Fe (175,000)	
MW 10								Cd (1.2 E)				
MW 11	Fe (4 140 B)							Cd (1.2 E)				
MW 12		Fe (157 B,F)										
MW 13			Fe (420)									
MW 100	Mn (97.6 B,F)	Cd (1.9 E)	Mn (76.5 F)	Pb (5.3)	Mn (82.7 B,F)		Mn (81.7)		Mn (84.3 B)		Mn (73.7 F)	
MW 105	Mn (513 B,F)	Hg (0.32)		Cd (1.2 E), Pb (10.6)						Pb (2.0 E)		
MW 16		Cd (4.6 E)										
MW 33		Fe (237 B)										
MW 34D		Fe 275 (B,F)										Cd (1.4 E)
MW 37	Mn (109 B,F)	Cd (1.9 E)*		Mn (31.3 F)	Fe (475 B,F), Mn (85.3 B,F)					Pb (1.8 E)		
MW 50	Fe (850)	Cd (1.3 E)		Fe (187)		Fe (198 B,F)			Fe (304)			Fe (183)
MW 51S			Mn (458 F)		Mn (374 B,F)		Mn (368)		Mn (220)	Pb (1.7 E)*	Mn (345 F)	
MW 51D					Mn (170 B,F)		Mn (198)					
RW 1808										Fe (184)		
RW 1817						Cd (1.4 E)						
RW 1827										Fe (228)		
RW 1813								Cd (1.3 E)				
FB									Fe (1880)	Pb (1.8 E)		

Cd (1.3) = Cadmium detected at an extimated concentration of 1.3 ug/l
B = Analyte also detected in Lab blank
F = Analyte also detected in associated field blank
E = Analyte detected but below the Contract Detection limit
Cd = Cadmium
Cr = Chromium
Fe = Iron
Hg = Mercury
Pb = Lead
Mn = Manganese
ES = NR 140 Enforcement Standard
PAL = NR 140 Preventive Action Limit
* = Exceedance in one of two duplicates only

Table 3

HISTORICAL SUMMARY OF ES/PAL EXCEEDANCES
OF VOLATILE ORGANIC COMPOUNDS
ALTERNATE WATER SUPPLY SAMPLING
OLD STATE DISPOSAL SITE
(Units in ug/l)

	ROUND 1		ROUND 2		ROUND 3		ROUND 4		ROUND 5		ROUND 6	
Well No.	ES	PAL	ES	PAL	ES	PAL	ES	PAL	ES	PAL	ES	PAL
MW 1	TCE (5.0)	CF (BCM (2.9)) 1,2 DCP (0.3) BZ (4.0) 1,1 DCE (0.8 J) PCE (0.5)	TCE (0.1), 1,1,2-TCA (0.8 J) BZ (0.3), DBCP (1.0 J) PCE (5.1), EDB (0.8 J)	CF (1.0), 1,2 DCA (0.8 J) 1,2 DCP (1.0), DCM (37 J) C in 1,2 DCE (7.0)			Abandoned		Abandoned		Abandoned	
MW 8			VC (2.7)		BZ (0.7 J)			BZ (0.8 J)	Not sampled		Not sampled	
MW 10		TCE (0.9 J), PCE (2.5)	PCE (5.4), VC (3.2)	TCE (3.3)	VC (0.8 J)	TCE (1.5), PCE (2.7)	VC (3.9) TCE (0.1), PCE (7.7)	BZ (0.8 J)	VC (2.0)	TCE (4.3) BZ (0.65 J), PCE (4.0)	VC (5.0), TCE (4.0), PCE (9.0)	BZ (2.0)
MW 11								PCE (1.0)				
MW 18							VC (0.8 J)					PCE (0.80 J)
MW 19					DBCP (0.8 J)		VC (2.0)*	PCE (0.8 J)*				
MW 32D	TCE (0.3), PCE (0.4)	BZ (0.5 J), 1,1 DCE (1.4)	VC (0.8), TCE (0.8), PCE (0.4)	BZ (0.7 J)	VC (0.4), TCE (11.3), PCE (1.2.4)	BZ (1.3)	VC (0.1), TCE (10.0), PCE (11.7)	BZ (1.3)	VC (5.0) TCE (10), PCE (10)	BZ (1.3)	VC (4.5), TCE (0.2), PCE (0.5)	BZ (1.0)
MW 34D		PCE (0.7 J)										
MW 34S		PCE (0.7 J)		PCE (0.8 J)		PCE (0.8 J)		PCE (0.8 J)		PCE (0.6) J)		TCE (0.50 J), PCE (0.6)
MW 36S								PCE (3.3)				
MW 37D								PCE (1.0)*				
MW-101S						BZ (1.0)				BZ (3.4)		
PZ 02										CF (1.3)		
PZ 03		1,1 DCE (0.7 J)								CF (0.70 J)		

TCE (0.9J) = Trichloroethene detected at an estimated concentration of 0.9 ug/l

J = Estimated Value Compound detected below the quantitation limit
TCE = Trichloroethene
VC = Vinyl Chloride
DCM = Methylene Chloride
PCE = Tetrachloroethene
BCM = Bromochloromethane
1,2 DCA = 1,2 Dichloroethane
1,1 DCE = 1,1 Dichloroethene
1,2 DCE = 1,2 Dichloroethene
1,1,2 TCA = 1,1,2 Trichloroethane
1,2 DCP = 1,2 Dichloropropane
DBCP = 1,2 Dibromo 3-chloropropane
BZ = Benzene
CF Chloroform
ES = NR 140 Enforcement Standard
PAL = NR 140 Preventive Action Limit
* = Exceedance in one of two duplicates only

standard, not a public health standard, the level is established for aesthetic reasons and therefore the concentrations pose no threat to public health.

Cadmium was detected at many of the on-site monitoring wells only once in most wells. It appears that the presence of Cadmium is due to either seasonable variation or post-sampling contamination. Cadmium was never found to exceed the ES. In accordance with NR140 WAC, an acceptable action in such a situation is continued monitoring for cadmium.

Chromium was also detected sporadically at the site, but never exceeded the ES. This parameter will also be included in the monitoring program. PAL and ES exceedances for metals can be found in Table 2.

VOCs: VOCs for which PAL and ES exceedances were consistently observed were limited to vinyl chloride (VC), tetrachloroethene (PCE), trichloroethene (TCE), and benzene. PAL and ES exceedances were observed in samples collected from site monitoring wells, as shown in Table 3. These wells for the most part were located inside of the groundwater divides. In general, the four VOCs of concern have not been consistently detected in wells outside the divides with the exception of MW-18, MW-19 and MW-31. PCE and VC exceeded their PALs once in well MW-19. However follow-up samples did not confirm the presence of these compounds and the original detections occurred in only one of two samples taken from that well. MW-31 had the same scenario as MW-19. PCE was detected once during the sampling rounds and was present in only one of two samples taken from that well. MW-18 had one PCE PAL exceedance but was detected 4 other times below the PAL. Statistical analysis was performed on up-gradient wells to determine if an increasing trend was present for this contaminant. Linear regression analysis performed on the data for VC, Benzene, TCE, and PCE for wells MW-6, MW-10, MW-22D, and MW-24S showed no statistically supported trend of increasing concentrations. For data values below the quantitation limit (which is the case for most PAL levels), the variability is likely due to the error inherent in measurements below quantifiable levels. Since PCE was detected (below quantitation limits) consistently in MW-18, it has been included in the long-term monitoring plan. The concentrations of VC, benzene, TCE, and PCE at MW-10 do appear to be generally increasing with time. MW-10 is located just east of the southeast corner of the fill area, and northwest of the intersection of the two groundwater divides. The confirmed presence of contaminants in samples drawn from MW-10 is of concern because MW-10 is located along the groundwater divide and north of the residential wells. Samples from downgradient wells MW-22S, MW-29, and MW-23 have not shown evidence of contaminant impacts downgradient of MW-10. Wells MW-23 and MW-29 lie between MW-10 and the receptors to the south and east. MW-23 and MW-29 are both included in the long-term monitoring program and will serve as early indicators if contaminants begin to move toward the residences.

Residential Wells: Residential groundwater quality has been monitored at nine residential wells located along Big Rapids Road to the south, southeast, and southwest of the site. Exceedances of PALs and ESs for metals or VOCs have not been consistently observed in

TABLE 4
RESIDENTIAL WELL DATA ROUNDS 1 THROUGH 3

	Round 1	Round 1	Round 2	Round 2	Round 3	Round 3
Well No.	Metals	VOCs	Metals	VOCs	Metals	VOCs
RW-1558	Fe 33.0 EB	DCM 1.0 U			Fe 17.6 U	n-PB 0.4 E NPH 0.8 U t-B 1.1 U
RW-1593	Fe 10.3 EB			NPH 0.7 E	Fe 34.4 U	DCM 0.9 U t-B 1.1 U
RW-1617	Fe 53.7 EB		Fe 23.2 E	NPH 0.7 E 111-TCA 0.7 U	Cd 1.4 E* Fe 19.8 U*	DCM 1.0* t-B 0.5 U* Tol 0.2 U* 124TMB 0.4 E*
RW-1677	Fe 8.5 E			NPH 0.6 E		NPH 1.1 U t-B 1.1 U
RW-1707	Fe 11.6 E			Styrene 0.2 E	Fe 7.6 U	DCM 1.0 U BZ 0.3 E 2CT 0.1 E Tol 0.3 U NPH 0.9 U t-B 0.4 U
RW-1763	Fe 61.2 E	DCDFM 1.7 J	Fe 14.3 E	111-TCA 1.2 U		DCM 0.4 U t-B 0.3 U
RW-1813	Fe 15.7 E	BZ 0.4 J		111-TCA 0.3 U*		BZ 1.5 iPB 0.3 E NPH 1.0 U t-B 0.6 U
RW-1834	Fe 15.0 E			111-TCA 0.4 U		Tol 0.3 U NPH 1.3 U t-B 0.2 U
RW-1861	Fe 20.5 E			111-TCA 0.3 U	Fe 20.5 U	NPH 0.8 U t-B 0.3 U

TABLE 4 (continued)
RESIDENTIAL WELL DATA ROUNDS 4 THROUGH 6

	Round 4	Round 4	Round 5	Round 5	Round 6	Round 6
Well No.	Metals	VOCs	Metals	VOCs	Metals	VOCs
RW-1558		DCM 1.0 U	Fe 164	DCM 4.0 U t-B 0.2 U	Fe 13.4 U	DCM 1.9 U NPH 0.3 J t-B 0.2 U
RW-1593	Fe 53.0 U	t-B 0.4 U DCM 2.1 U	Fe 15.6 U	DCM 3.8 U Tol 0.2 U t-B 0.2 U	Fe 18.5 U	DCM 2.1 U t-B 0.2 U
RW-1617	Fe 38.8 U	NPH 0.3 J DCM 2.1 U	Fe 65.2 U	Tol 0.2 U DCM 5.5 U	Fe 43.3 U	t-B 0.3 U DCM 1.6 U
RW-1677	Fe 11.4 U	DCM 2.6 U t-B 0.2 U	Fe 228	DCM 5.5 U		DCM 4.1 U NPH 0.3 U t-B 0.2 U
RW-1707	Fe 46.6 U	2CT 0.1 J t-B 0.3 U DCM 1.7 U	Fe 10.1 U	Tol 0.2 U DCM 3.5 U	Fe 14.3 U	BZ 0.26 J t-B 0.17 U DCM 0.94 U
RW-1763	Fe 34.1 U	DCM 2.3 U	Fe 52.8 U	DCM 3.8 U	Fe 37.2 U	PCE 0.15 J t-B 0.15 U DCDFM 1.4 J DCM 1.1 U
RW-1813	Cd 1.3 E* Fe 33.6* Cr 7.1*	DCM 2.3 U* PCE 0.6 U* t-B 0.2 U*	Fe 21.7 U	DCM 4.6 U* BZ 2.4* 111-TCA 0.2 U* t-B 0.3 U*	Fe 20.5 U*	DCM 1.5 U* t-B 0.3 U*
RW-1834		DCM 1.7 U t-B 0.2 U	Fe 36.0 U	DCM 4.2 U t-B 0.29 U		DCM 1.3 U t-B 0.28 U
RW-1861	Fe 58.2 E	DCM 2.1 U	Fe 16.9 U	DCM 5.3 U Tol 0.16 U t-B 0.18 U	Fe 21.6 U	DCM 1.1 U t-B 0.31 U

TABLE 4 LEGEND

DCDFM = Dichlorodiflouromethane
111-TCA = 1,1,1-Trichloroethane
2CT = 2-Chlorotoluene
1,2,4-TMB = 1,2,4-Trimethylbenzene
PCE = Tetrachloroethene
i-PB = Isopropylbenzene
t-B - tert-butylbenzene
n-PB = n-Propylbenzene

Cd = Cadmium
Fe = Iron
Cr = Chromium
DCM = Methylenechloride
BZ = Benzene
NPH = Naphthalene
Tol = Toluene
o-X = ortho-Xylene

Notes

Units are in ug/L
B = Analyte also detected in a laboratory blank
U = Analyte detected at a comparable concentration in one or more blanks.
E = Concentraiton is below the contract required detection limit.
J = Concentration is an estimated value below the quantitation limit
* = Highest result of replicates
' = Detected in one of the replicates only.

samples drawn from the residential wells, with the exception of well 1813. A summary of parameters detected in residential well samples throughout the six rounds of the AWS is presented in Table 4. Generally, iron appears to be a naturally occurring element at the site and is a common laboratory contaminant at low levels; and t-butylbenzene and methylene chloride are confirmed laboratory contaminants. These three analytes were detected in nearly every sample (including background samples) and blank submitted for each round. Other analytes detected in residential well samples and background samples included: naphthalene; 1,1,1-trichloroethane, toluene, 2-chlorotoluene, dichlorodiflouromethane, styrene, ortho-xylene, PCE and benzene. Results indicate that these VOCs are present as laboratory contamination. Repeated use of these constituents in the laboratory creates a potential source of contamination. With the exception of Benzene as discussed below, none of the above VOCs were detected consistently in any residential well or on-site monitoring well sample. Data validation procedures and intra-well comparisons indicate that reported concentrations of these analytes may represent false positives or analytical noise, or were introduced as post-sampling contaminants. Therefore, the data suggests that these VOCs are not site contaminants.

The intra-well and upgradient well comparisons performed for the residential wells support evidence of contamination at only one residential well; that being the apparent presence of benzene in RW-1813. However, comparison of the benzene data at RW-1813 to benzene concentrations at upgradient wells (MW-23, MW-29) indicates that the Mid-State Landfill is probably not the source of benzene contamination at RW-1813. However to ensure the validity of this theory and to ensure safe drinking water to this resident, RW-1813 will be included in the long-term sampling plan.

Conclusions drawn from the AWS SOW:

Based on the data collected during this study, it can be stated that groundwater data continues to support the groundwater flow pattern presented in previous reports, in particular the lack of groundwater mounding below the site and the existence of two groundwater divides on the Mid-State site. The first divide (east-west) inhibits groundwater flow from the fill areas to the south towards the nearest residents. The second divide (north-south) limits flow to the east. Given the position of the two divides and the absence of groundwater mounding below the fill areas, the primary direction of flow from below the fill areas continues to be towards the west. (Figure 3)

Groundwater quality in the monitoring wells and residential wells has been consistent with time when the AWS data is compared to the RI and pre-design data. Affected groundwater has not migrated off-site so as to create adverse exposure to area residential wells. No consistent site related contamination has been detected during the study in the residential wells.

The selected remedy components currently in-place should improve groundwater quality over time due to reduced infiltration as a result of the cover, VOC removal via the leachate seep collection system and active gas extraction system, and a probably southward shift in the east-

west divide as a result of reduced infiltration.

Based on the information obtained above, there appears to be no need for the provision of an alternate water supply at this time.

Amended Alternative

No Alternative Water Supply with a contingency for point of use systems in the event that a degradation of water quality is demonstrated.

A contingency plan will be implemented for a particular resident if the same target compound is detected above its Enforcement Standard in each of two or more samples collected from that particular residential well during two different sampling rounds.

The owner and/or user of the residential well will be notified by the WDNR of the first Enforcement Standard exceedance and the re-sampling date. If the second sample collected is also above an Enforcement Standard and the data is unqualified, the contingency plan will be implemented.

Users of potentially affected residential wells will be supplied with bottled water for human consumption within 48 hours of a first ES exceedance. If the ES exceedance is verified by the second sample, a long-term protective measure will be implemented. If livestock are affected, an interim water supply for livestock will also be provided. If the target compound is detected in the verification sample at a concentration exceeding the Enforcement Standard, a point-of-use treatment systems, as described below will be installed at the affected residences as a long term measure.

Based on the successful implementation of point of use treatment systems at other sites, the WDNR approves the use of such systems. The system hardware will consist of granulated activated carbon (GAC) treatment systems permitted by the Department of Industry, Labor and Human Relations and the WDNR. The main components of a suitable GAC system are a water meter, valves situated between the system components for ease of removal, sampling ports, three 14-inch by 72 inch GAC treatment vessels, and the existing pressure tank. Operation and Maintenance per the manufacturer specifications is also necessary for proper operation of the system. The treatment vessels contain 5 cubic feet of granular activated carbon each. The three vessels operate in series supplying a flow rate of 10 g.p.m. with a contact time of 10 to 15 minutes.

The VOC compounds will be adsorbed on the GAC media. If inorganics are a concern, ion exchange system or other appropriate treatment method will be utilized. As the available pores in the GAC media become occupied, the media will eventually become saturated and a "breakthrough" condition will occur. At breakthrough, VOC compounds will begin to pass through the treatment system. Regular monitoring of the system will be conducted to

determine when breakthrough occurs.

The GAC cartridges will be exchanged before breakthrough contaminants reach a drinking water quality standard or Enforcement Standard. Monthly monitoring of systems will be conducted for the first year of operation. The sampling frequency will then be reduced to quarterly sampling.

A maximum of two samples will be collected monthly for each treatment unit. One sample will be taken before the first treatment unit, and one sample will initially be taken after the first treatment unit to monitor breakthrough of the first GAC canister. When the second sample indicates that breakthrough has occurred in the first canister, the second sample will be taken between the second and third canisters for the next sampling period. When the sample taken between the second and third canisters indicates breakthrough, the third canister will be moved to the 1st position and the new or regenerated 1st and 2nd canister will be moved to the second and third canister positions.

GAC cartridges are also subject to biofouling, which can result in clogging of the cartridge and/or undesirable bacteria and organic mass in the outflow. Monitoring for, or maintenance to avoid biofouling will be conducted in accordance with the manufacturer's recommendations. Therefore, should biofouling occur, the third canister will be moved to the first position and the first and second canisters would be replaced.

IMPORTANT NOTE: LONG TERM MONITORING WILL CONTINUE FOR 30 YEARS.

The wells to be sampled in the long term monitoring plan were chosen to provide a spatial distribution around the disposal areas and to target the main discharge areas consistent with WAC NR508. Sampling at these well locations will provide the data necessary to evaluate the effectiveness of the remedy and monitor for the possibility of off-site movement of affected groundwater. Based also on spatial distribution and data collected during the 6 rounds of the Alternate Water Supply Study, Residential wells 1707, 1763, 1813, and 1834 are included in the long term monitoring plan. These wells are closest to the site and as in the case of RW 1813, have had intermittent detects of contaminants. These contaminant levels are not a health risk and cannot be confirmed as being from the landfill (as explained in the results section), but to be conservative, these wells will continue to be monitored. The wells will be sampled quarterly for the first two years in accordance with NR508.10(3) and the Consent Decree. Thereafter, sampling will be performed semi-annually. In addition, every five years, functioning wells will be sampled for field pH, temperature, and conductivity: VOCs and 8 RCRA metals. After five (5) years of sampling, the sampling frequency, location and analyses requirements will be evaluated as part of the statutory 5-year performance review. Any changes made to the sampling program must be approved by U.S. EPA and WNDR. The sampling program will be evaluated every 5 years during the thirty years of its existence. Wells to be monitored during the long term monitoring plan are shown in Table 5.

Table 5
Long-Term Groundwater Monitoring
Locations, Frequency, and Trigger Wells
Mid-State Disposal Site
STS Project No. 82685XJ

Monitoring Well Well I.D.	Monitoring Frequency	Trigger Well	Trigger Mechanism
MW-3	Once/5 Years		
MW-4	Once/5 Years		
MW-5	Once/5 Years		
MW-6	*	Yes	3 Consecutive PAL Exceedances [1]
MW-7	Once/5 Years		
MW-8	Once/5 Years		
MW-9	Once/5 Years		
MW-10	*		
MW-11	Once/5 Years		
MW-12	Once/5 Years		
MW-13	Once/5 Years		
MW-14	*		
MW-15	Once/5 Years		
MW-16S	Once/5 Years		
MW-16D	Once/5 Years		
MW-17	*	Yes	3 Consecutive PAL Exceedances [1]
MW-18	Semi-annually [2]	Yes	3 Consecutive PAL Exceedances [1]
MW-19	Semi-annually [2]	Yes	3 Consecutive PAL Exceedances [1]
MW-22S	*		
MW-22D	*		
MW-23	*	Yes	3 Consecutive PAL Exceedances [1]
MW-24S	*		
MW-24D	*		
MW-25	Once/5 Years		
MW-26S	*		
MW-26D	*		
MW-27	Once/5 Years		
MW-28	Once/5 Years		
MW-29	*	Yes	3 Consecutive PAL Exceedances [1]
MW-30	*	Yes	3 Consecutive PAL Exceedances [1]
MW-31S	*		
MW-31D	*		
Residential Wells			
RW-1707	*^		
RW-1763	*^		
RW-1813	*^		
RW-1834	*^		

Notes:

* = Wells to be monitored quarterly for 2 years and semi-annually thereafter.

^ = Monitoring frequency at this location may be modified, depending on groundwater quality at the trigger wells.

[1] = Refers to 3 consecutive PAL Exceedances of a health-based NR140, WAC groundwater quality standard.

[2] = Well will be tested for VOCs, cadmium, iron and chromium only.

Overall protection of Human Health and the Environment - The amended alternative and the original alternative are considered protective of human health and the environment given the additional information documented in the AWS study. No adverse effects to the water supply are anticipated. As stated above, the amended alternative includes groundwater quality monitoring, and a provision through which treatment of water if water quality should deteriorate would be implemented.

Compliance with ARARs - With the other components of the final remedy for the Mid-State landfill in-place, the amended remedy and the original remedy are equivalent with regard to their compliance with the ARARs. Contaminant levels in the residential wells are well below the enforceable and health based levels which renders the original alternative unnecessary at this time. Each alternative includes long-term monitoring to detect changes in on and off-site groundwater quality. With both alternatives, ARAR NR140 would require additional action if results of the long-term monitoring demonstrated NR140 Enforcement Standard exceedances at any of the residential wells.

Long-Term Effectiveness and Permanence - A significant residual risk does not exist with either the amended remedy or the original remedy. The original remedy, which relies on a remote source of water, would remain unaffected even if unforeseeable significant changes in the contaminant and groundwater flow regime occur, although this is not anticipated. The amended alternative entails no residual risk at present and unlikely will entail residual risk in the future based on the source control measures already instituted at the site and the additional water quality and hydrogeologic data collected since the RI. If significant and unforeseeable changes in the pattern and distribution of the contaminants occur, these would be detected by the long-term monitoring program and appropriate actions, as stated in the contingency plan component of the amended alternative, would be taken. The original remedy requires extensive and permanent (beyond 30 years) operation and maintenance.

Reduction of Toxicity, Mobility and Volume Through Treatment - Neither alternative provides a reduction in mobility, toxicity and volume through treatment. This has been achieved through those parts of the original remedy already performed.

Short-Term Effectiveness - The original alternative would have the greatest short-term impacts on the environment, community and workers during implementation due to pipeline construction. Wetlands are present in the site area and their locations would have to be identified and taken into consideration for pipeline location and construction. The amended alternative would have no short-term effects on the environment or community.

Implementability - The amended alternative is technically feasible. The original remedy as specified in the FS is not technically feasible given the local unconsolidated sediments are not of sufficient thickness or quality to provide a reliable water supply for nine residents and their farms.

Costs - The original alternative may require land acquisition or permanent easements. An access road would be required which would entail long term operation and maintenance. The capital cost would be approximately $248,000 and the O&M would be $194,000.

For the amended alternative, no inconvenience to the residences would be involved and the there would be only cost associated with sampling and analytical analysis. The contingency portion of this alternative would cost approximately $134,000 and O&M would be $69,000.

State Acceptance - In recent years, point-of-use treatment as described in the contingency portion of the amended alternative has been implemented at other sites in Wisconsin and has been demonstrated to be effective and acceptable to the residents involved. After review of these additional case studies, the WDNR has adopted the stance that point-of-use treatment systems are acceptable in a limited number of situations, including the Mid-State site. The original alternative would not be acceptable since it is not technically feasible. The amended alternative would be acceptable to WDNR since it is protective of human health and the environment.

Community Acceptance - The residents whose wells have been part of the AWS scope of work sampling program have been notified after every quarterly sampling event with the results of the data from their wells. In addition, after the AWS 6 sampling rounds had been completed, letters were sent to each resident describing the overall findings of the sampling rounds in relation to their personal well and the site. A one page questionnaire regarding their feelings on the alternate water supply and communications during the site work was sent out. One response was received out the nine sent indicating that they were in favor of eliminating the AWS as long as they would still be protected if conditions changed. They also indicated that they were pleased with the information provided by U.S. EPA. No comments were received during the public comment period.

Amended Remedy

Based on the performance of the amended remedy against the nine evaluation criteria previously discussed and the additional data collected during the Pre-Design Study and AWS SOW Study, U.S. EPA believes that the amended remedy as described in this document (no alternative water supply) is the most appropriate solution for the Mid-State site.

Statutory Determinations

Overall Protection of Human Health and the Environment:
This amended remedy combined with the actions already taken is overall protective of human health and the environment. The contingency plan provides a means of additional, rapidly implementable protection to human health, should enforcement standard exceedances at designated trigger wells indicate adverse changes in site conditions.

Attainment of ARARs:
Since other components of the remedy have been implemented and available data indicates that groundwater quality off-site has not been adversely affected, the amended remedy currently complies with ARARs. It will also be effective in both the long-term and short-term. The long-term groundwater monitoring systems will serve as an early indicator of any change that may develop. The contingency plan included in the amended remedy provides for continued compliance with ARARs, should results of the long-term monitoring indicate deterioration of off-site groundwater quality.

Cost Effectiveness:
The amended remedy provides overall cost effectiveness. The only cost that would be incurred with this remedy is the analytical cost associated with long-term monitoring. Should conditions change, the contingency plan included in this remedy is also cost effective. Implementation is not a problem and no costs will be incurred to treat uncontaminated groundwater or to supply water to residential homes who's water supplies are uncontaminated.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable:
The amended remedy, in combination with the work already performed, provides a permanent solution to the maximum extent practical for this site.

Preference for Treatment as a Principle Element:
Because no health based levels were exceeded off-site and the positions and performance of the groundwater divides have been verified, treatment of the principle threat posed by the groundwater on-site was not found appropriate or practical.

The statutory five-year review will continue for that portion of the remedy already performed (Landfill cap, leachate and gas collection system) as this results in hazardous substances remaining on-site. This review is scheduled for March 31, 1998.

Louise A. Wilson

for Valdas V. Adamkus
Regional Administrator

9/4/95
Date