RIVERSIDE DISPOSAL AREA INTERIM RESPONSE ACTION PLAN (IRAP) – OCTOBER 31, 2002

ADDENDUM #1
AUGUST 15, 2003

Ford/Kingsford Site
Kingsford, Michigan

FILE COPY

ARCADIS

Infrastructure, buildings, environment, communications

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ENVIRONMENT

Mr. Chris Austin
Michigan Department of Environmental Quality
1420 U.S. 2 West
Crystal Falls, MI 49920

Subject:
Addendum for the Former Riverside Disposal Area Interim Response Action Plan, Ford/Kingsford Site, Kingsford, Michigan.

Date:
15 August 2003

Contact:
Ric Studebaker

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Our ref:
WI000975.0032.0001

Dear Mr. Austin:

ARCADIS on behalf of Ford Motor Company (Ford) and The Kingsford Products Company (KPC), has prepared this addendum to the document entitled "*Former Riverside Disposal Area Interim Response Action Plan, Ford/Kingsford Site, Kingsford, Michigan*" dated October 31, 2002. As discussed during our previous telephone conversations and project meetings, the purpose of this addendum is to facilitate final approval of the interim response action for the former Riverside Disposal Area (RDA).

As you are aware, the RDA interim response action activities are nearly complete, including waste consolidation and/or disposal, engineered soil cover installation, and completion of the area as a community soccer facility to promote beneficial reuse of the property. Site fencing and permanent markers have been installed, as defined in the RDA Interim Response Action Plan (IRAP), and the appropriate maintenance and inspection plans have been implemented. Following receipt of IRAP approval from the Michigan Department of Environmental Quality (MDEQ), Ford/KPC can establish the restrictive covenant for the RDA and finalize the interim response.

Based on revisions to the Michigan Part 201 Rules (effecive December 21, 2002), several summary tables for the RDA IRAP have been updated to reflect changes to the applicable criteria. Updated Tables 1, 2, 3, and 5 are provided as an attachment to this addendum. Although some of the criteria values have changed, these changes do not affect the RDA interim response action.

Several constituents, predominantly metals, present in the surface and subsurface material samples (collected prior to the response action) now have concentrations above newly established or revised groundwater/surface water interface criteria (antimony, barium, cadmium, chromium, copper, lead, manganese, nickel, zinc, and diethylphthalate). These same constituents were already appropriately addressed by the interim response due to the presence of co-located constituents at concentrations above other applicable criteria. In addition, subsurface soil and groundwater data presented in the IRAP indicated that these constituents are not being leached from the

2.6.1.26 - 8/15/03

RDA, so the groundwater/surface water interface is an incomplete pathway. The only new constituent identified above revised criteria is BHC (alpha), present at a concentration above the generic Residential and Commercial I Drinking Water Protection Criteria.

The interim response action for the RDA is only intended to address the former RDA itself (as defined in the IRAP document), and will be an integral component of the final site-wide remedy.

Specifically in accordance with Rule 526(5)(d), the interim response activities will primarily address the issues of direct contact at the RDA, and will be incorporated into the final overall site-wide remedy. The implementation of this interim response action will not conflict with any potential future remedial activities that may be undertaken to address environmental media outside the boundaries of the RDA.

Following the receipt of final MDEQ approval for the RDA IRAP, the restrictive covenant will be recorded with the Dickinson County Register of Deeds office, and the final signage will be erected at the RDA, completing the interim response action.

We trust this information will meet your needs. If you have any questions, or require any further information, please contact the undersigned.

Sincerely,

ARCADIS G&M, Inc.

Richard L. Studebaker, Jr., PE
Senior Engineer/Project Manager

Copies:
David Miller
Daniel Musgrove

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	Surface Soil							
Depth	0'	0'	0'	0'	0'	0'	0'	0'
Sample Date	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88
Sample Name	1 (94730)	2 (94731)	3 (94732)	4 (94733)	5 (94734)	6 (94735)	7 (94736)	8 (94737)
VOC								
Benzene	<2	<2	<2	<2	<2	<2	<2	<2
Carbon disulfide	<10	<10	<10	<10	<10	<10	<10	<10
Methylene chloride	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	<2	<2	<2	<2	<2	<2	<2	<2
Toluene	<2	<2	<2	<2	<2	<2	<2	<2
Trichloroethene	<2	<2	<2	<2	<2	<2	<2	<2
Xylenes (total)	<10	<10	<10	<10	<10	<10	<10	<10
SVOC								
2,4-Dimethylphenol	<330	<330	<330	<330	<330	<330	<330	<330
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	<330	<330	<330	<330	680	<330	<330	<330
Benzo(a)pyrene	<330	<330	<330	<330	1,400	<330	<330	<330
Benzo(b)fluoranthene	<330	<330	<330	<330	1,700	<330	<330	<330
Benzo(g,h,i)perylene	<330	<330	<330	<330	790	<330	<330	<330
Benzo(k)fluoranthene	<330	<330	<330	<330	1,000	<330	<330	<330
bis(2-Ethylhexyl)phthalate	<330	<330	<330	<330	620	<330	<330	<330
Butylbenzylphthalate	330	<330	<330	<330	<330	<330	<330	<330
Chrysene	<330	<330	<330	<330	1,500	<330	<330	<330
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	640	<330	<330	<330	<330	<330	<330	<330
Fluoranthene	<330	<330	<330	<330	1,400	<330	<330	<330
Fluorene	<330	<330	<330	<330	<330	<330	<330	<330
Indeno(1,2,3-c,d)pyrene	<330	<330	<330	<330	930	<330	<330	<330
Naphthalene	<330	<330	<330	<330	1,700	<330	<330	<330
Phenanthrene	<330	<330	<330	<330	<330	<330	<330	<330
Pyrene	<330	<330	<330	<330	2200	<330	<330	<330

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	Surface Soil							
Depth	0'	0'	0'	0'	0'	0'	0'	0'
Sample Date	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88
Sample Name	1 (94730)	2 (94731)	3 (94732)	4 (94733)	5 (94734)	6 (94735)	7 (94736)	8 (94737)
METALS								
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA
Barium	490,000	670,000	110,000	1,100,000	100,000	540,000	290,000	360,000
Beryllium	570	<200	230	1,500	460	940	290	580
Cadmium	2,700	1,600	<200	530	930	3,100	3,400	1,200
Calcium	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	30,000	6,500	18,000	24,000	**44,000**	21,000	14,000	15,000
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Copper	290,000	180,000	16,000	280,000	180,000	320,000	140,000	110,000
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA
Lead	160,000	64,000	31,000	130,000	140,000	93,000	79,000	68,000
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	190	<100	<100	<100	370	180	310	190
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	17,000	7,200	9,600	24,000	31,000	25,000	11,000	13,000
Potassium	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA
Titanium	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	450,000	280,000	71,000	140,000	250,000	330,000	190,000	140,000
PEST/PCB								
4,4'-DDD	<16	<16	<16	<16	<16	<16	<16	<16
4,4'-DDE	<16	<16	<16	<16	<16	<16	<16	<16

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	**Surface Soil**							
Depth	**0'**	**0'**	**0'**	**0'**	**0'**	**0'**	**0'**	**0'**
Sample Date	**08/15/88**	**08/15/88**	**08/15/88**	**08/15/88**	**08/15/88**	**08/15/88**	**08/15/88**	**08/15/88**
Sample Name	**1 (94730)**	**2 (94731)**	**3 (94732)**	**4 (94733)**	**5 (94734)**	**6 (94735)**	**7 (94736)**	**8 (94737)**
PEST/PCB (continued)								
BHC (alpha)	<8	<8	<8	<8	<8	<8	<8	<8
Chlordane (gamma)	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	<16	<16	<16	<16	<16	<16	<16	<16
Endosulfan II	<16	<16	<16	<16	<16	<16	<16	<16
Endrin ketone	<16	<16	<16	<16	<16	<16	<16	<16
Heptachlor	<8	<8	<8	<8	<8	<8	<8	<8
Methoxychlor	<80	<80	<80	<80	<80	<80	<80	<80

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	SDB3 (Waste)		SDB4 (Waste)	Surface Soil			
Depth	**0-0.5'**	**0-0.5'**	**0-0.67'**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**
Sample Date	**05/13/96**	**05/13/96**	**05/13/96**	**08/06/99**	**08/06/99**	**08/06/99**	**08/05/99**
Sample Name	**SS-19**	**SS-19RE**	**SS-21**	**SSRIV-1**	**SSRIV-2**	**SSRIV-3**	**SSRIV-4**
VOC							
Benzene	<13	<13	<12	<69	<70	<75	<76
Carbon disulfide	3 J	<13	<12	<350	<350	<370	<380
Methylene chloride	<13 BJ	96 B	<12 BJ	<350	<350	<370	<380
Tetrachloroethene	<13	<13	<12	**120**	<70	<75	**380**
Toluene	2 J	<13	<12	<140	<140	<150	<150
Trichloroethene	<13	<13	<12	93	<70	<75	<76
Xylenes (total)	<13	<13	<12	<210	<210	<220	<230
SVOC							
2,4-Dimethylphenol	**34,000**	NA	<380	<460	<460	<480	<500
2-Methylnaphthalene	15,000	NA	1,300	<460	<460	<480	<500
2-Methylphenol	**15,000**	NA	<380	<460	<460	<480	<500
4-Methylphenol	**20,000**	NA	<380	NA	NA	NA	NA
Benzo(a)anthracene	1,400 J	NA	120 J	<460	<460	<480	<500
Benzo(a)pyrene	<12,000	NA	42 J	<460	<460	<480	<500
Benzo(b)fluoranthene	<12,000	NA	<380	<460	<460	<480	<500
Benzo(g,h,i)perylene	<12,000	NA	52 J	<460	<460	<480	<500
Benzo(k)fluoranthene	2,000 J	NA	52 J	<460 J	<460	<480 J	<500
bis(2-Ethylhexyl)phthalate	<12,000	NA	<380	<460	<460	<480	<500
Butylbenzylphthalate	<12,000	NA	<380	<460	<460	<480	<500
Chrysene	1,900 J	NA	240 J	<460	<460	<480	<500
Dibenzofuran	9,600 J	NA	330 J	<460	<460	<480	<500
Di-n-butylphthalate	<12,000	NA	<380	450 J	<460	<480	<500
Fluoranthene	4,200 J	NA	120 J	<460	<460	<480	<500
Fluorene	5,200 J	NA	<380	<460	<460	<480	<500
Indeno(1,2,3-c,d)pyrene	<12,000	NA	<380	<460	<460	<480	<500
Naphthalene	7,600 J	NA	690	<460	<460	<480	<500
Phenanthrene	12,000 J	NA	830	<460	<460	<480	<500
Pyrene	<12,000	NA	160 J	<460	<460	<480	<500

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	SDB3 (Waste)		SDB4 (Waste)	Surface Soil			
Depth	**0-0.5'**	**0-0.5'**	**0-0.67'**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**
Sample Date	**05/13/96**	**05/13/96**	**05/13/96**	**08/06/99**	**08/06/99**	**08/06/99**	**08/05/99**
Sample Name	**SS-19**	**SS-19RE**	**SS-21**	**SSRIV-1**	**SSRIV-2**	**SSRIV-3**	**SSRIV-4**
METALS							
Aluminum	**1,480,000**	NA	**4,160,000**	**14,000,000**	**5,300,000**	**7,800,000**	**5,500,000**
Antimony	<3,400 N	NA	**3,200 BN**	**3,800 J**	<2,000 J	<3,200 J	<2,000 J
Arsenic	**33,400**	NA	3,900	8,500	3,700	5,300	4,900
Barium	177,000 N	NA	**5,730,000 N**	1,300,000	140,000	540,000	550,000
Beryllium	210 B	NA	650 B	2,100 J	310 J	930 J	610 J
Cadmium	**7,900**	NA	4,300	2,200	1,700	3,900	**29,000**
Calcium	1,850,000	NA	2,360,000	110,000,000 J	7,300,000 J	30,000,000 J	29,000,000 J
Chromium	4,900	NA	**45,500**	22,000	19,000	28,000	20,000
Cobalt	**1,300 B**	NA	**11,900 B**	**10,000**	**5,300**	**5,800**	**5,000**
Copper	**118,000,000 N***	NA	227,000 N*	400,000	61,000	420,000	270,000
Cyanide	550 B	NA	160 B	NA	NA	NA	NA
Iron	**4,130,000 ***	NA	**12,800,000 ***	**27,000,000**	**24,000,000**	**17,000,000**	**17,000,000**
Lead	**2,220,000**	NA	**3,530,000**	170,000	99,000	250,000	150,000
Magnesium	420,000 B	NA	894,000 B	4,400,000	2,200,000	2,200,000	2,800,000
Manganese	**206,000 ***	NA	**546,000 ***	**3,500,000 J**	**550,000 J**	**1,600,000 J**	**1,700,000 J**
Mercury	**22,400**	NA	190	51 J	650 J	270	200
Molybdenum	NA	NA	NA	**3,200 J**	<570 J	**2,500 J**	**2,900 J**
Nickel	3,600 B	NA	8,400 B	25,000	14,000	30,000	19,000
Potassium	621,000 B	NA	337,000 B	9,000,000 J	760,000 J	3,200,000 J	1,700,000 J
Selenium	**19,300 N**	NA	2,000 N	<2,800 J	<1,400 J	<1,500 J	<1,500 J
Silver	**88,200**	NA	970 B	430 J	<700	550 J	430 J
Sodium	121,000 B	NA	63,100 B	550,000	46,000	280,000	200,000 J
Thallium	<8,900	NA	**2,400 B**	1,600 J	<510 J	950 J	<690 J
Titanium	NA	NA	NA	800,000 J	270,000 J	440,000 J	280,000 J
Vanadium	<680	NA	14,600	26,000	18,000	26,000	22,000
Zinc	<1,100 N*	NA	**2,780,000 N***	340,000 J	260,000 J	370,000 J	390,000 J
PEST/PCB							
4,4'-DDD	89 P	NA	<3.8	NA	NA	NA	NA
4,4'-DDE	86 P	NA	<3.8	NA	NA	NA	NA

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	**SDB3 (Waste)**		**SDB4 (Waste)**	**Surface Soil**			
Depth	**0-0.5'**	**0-0.5'**	**0-0.67'**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**
Sample Date	**05/13/96**	**05/13/96**	**05/13/96**	**08/06/99**	**08/06/99**	**08/06/99**	**08/05/99**
Sample Name	**SS-19**	**SS-19RE**	**SS-21**	**SSRIV-1**	**SSRIV-2**	**SSRIV-3**	**SSRIV-4**
PEST/PCB (continued)							
BHC (alpha)	**44 P**	NA	<1.9	NA	NA	NA	NA
Chlordane (gamma)	<11	NA	3.7 P	NA	NA	NA	NA
Dieldrin	73 P	NA	<3.8	NA	NA	NA	NA
Endosulfan II	<22	NA	6.9	NA	NA	NA	NA
Endrin ketone	55 P	NA	<3.8	NA	NA	NA	NA
Heptachlor	42 P	NA	<1.9	NA	NA	NA	NA
Methoxychlor	170	NA	<19	NA	NA	NA	NA

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	**Surface Soil**							
Depth	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**
Sample Date	**08/05/99**	**08/06/99**	**08/05/99**	**08/05/99**	**08/06/99**	**08/06/99**	**08/05/99**	**08/05/99**
Sample Name	**SSRIV-97 (SSRIV-4)**	**SSRIV-5**	**SSRIV-6**	**SSRIV-7**	**SSRIV-8**	**SSRIV-9**	**SSRIV-10**	**SSRIV-11**
VOC								
Benzene	<74	<62	<67	<70	47	<66	<72	52 J
Carbon disulfide	<370	<310	<330	<350	<350	<330	<360	<400
Methylene chloride	<370	<310	<330	<350	<350	<330	<360	<400
Tetrachloroethene	**410**	**110**	**110**	**120**	<69	<66	**210**	**260**
Toluene	<150	<120	<130	<140	130	<130	<140	<160
Trichloroethene	<74	<62	<67	<70	<69	<66	<72	<81
Xylenes (total)	<220	<180	<200	<210	<210	<200	110	<240
SVOC								
2,4-Dimethylphenol	<480	<400	<430	<460	<460	<430	<480	<530
2-Methylnaphthalene	<480	<400	<430	<460	<460	<430	<480	<530
2-Methylphenol	<480	<400	<430	<460	<460	<430	<480	<530
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	<480	<400	<430	<460	<460	<430	<480	<530
Benzo(a)pyrene	<480	<400	<430	<460	<460	<430	<480	<530
Benzo(b)fluoranthene	<480	<400	<430	<460	<460	<430	<480	<530
Benzo(g,h,i)perylene	<480	<400	<430	<460	<460	<430	<480	<530
Benzo(k)fluoranthene	<480	<400 J	<430	<460	<460 J	<430	<480	<530
bis(2-Ethylhexyl)phthalate	<480	<400	<430	<460	<460	<430	230 J	<530
Butylbenzylphthalate	<480	<400	<430	<460	<460	<430	<480	<530
Chrysene	<480	<400	<430	<460	<460	<430	<480	<530
Dibenzofuran	<480	<400	<430	<460	<460	<430	<480	<530
Di-n-butylphthalate	<480	<400	<430	<460	<460	<430	<480	<530
Fluoranthene	<480	<400	<430	<460	<460	<430	<480	<530
Fluorene	<480	<400	<430	<460	<460	<430	<480	<530
Indeno(1,2,3-c,d)pyrene	<480	<400	<430	<460	<460	<430	<480	<530
Naphthalene	<480	<400	<430	<460	<460	<430	<480	<530
Phenanthrene	<480	<400	<430	<460	<460	<430	<480	<530
Pyrene	<480	<400	<430	<460	<460	<430	<480	<530

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	**Surface Soil**							
Depth	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**
Sample Date	**08/05/99**	**08/06/99**	**08/05/99**	**08/05/99**	**08/06/99**	**08/06/99**	**08/05/99**	**08/05/99**
Sample Name	**SSRIV-97 (SSRIV-4)**	**SSRIV-5**	**SSRIV-6**	**SSRIV-7**	**SSRIV-8**	**SSRIV-9**	**SSRIV-10**	**SSRIV-11**
METALS								
Aluminum	**5,400,000**	**7,300,000**	**5,600,000**	**10,000,000**	**4,500,000**	**5,500,000**	**11,000,000**	**4,600,000**
Antimony	<2,300 J	<3,100 J	<500 J	<1,500 J	<2,400 J	<2,500 J	3,900 J	<1,300 J
Arsenic	4,500	1,600	2,400	16,000	5,300	1,700	6,400	4,200
Barium	570,000	110,000	380,000	730,000	360,000	530,000	930,000	420,000
Beryllium	610 J	300 J	360 J	1,300	370 J	590 J	1,200 J	480 J
Cadmium	**30,000**	3,800	1,900	**6,300**	2,200 J	1,800	**8,600**	3,100
Calcium	27,000,000 J	4,700,000 J	61,000,000 J	39,000,000 J	18,000,000 J	15,000,000 J	24,000,000 J	28,000,000 J
Chromium	24,000	17,000	19,000	29,000	10,000	12,000	**63,000**	17,000
Cobalt	**5,400**	**4,500**	**3,800**	**7,500**	**3,500**	**5,800**	**10,000**	**4,500**
Copper	270,000	38,000	220,000	1,500,000	130,000	150,000	500,000	220,000
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA
Iron	**17,000,000**	**17,000,000**	**12,000,000**	**28,000,000**	**16,000,000**	**12,000,000**	**30,000,000**	**12,000,000**
Lead	150,000	61,000	240,000	160,000	220,000	190,000	610,000	120,000
Magnesium	2,000,000	2,100,000	3,500,000	2,700,000	2,500,000	3,100,000	3,800,000	2,000,000
Manganese	**1,600,000 J**	**370,000 J**	**760,000 J**	**2,100,000 J**	**1,500,000 J**	**1,500,000 J**	**2,600,000 J**	**1,300,000 J**
Mercury	210	480 J	75 J	320	130	250	1,200 J	76 J
Molybdenum	**2,800 J**	1,000 J	<540 J	**3,400**	690 J	<650 J	**5,200 J**	**2,000 J**
Nickel	23,000	19,000	10,000	41,000	8,800	13,000	38,000	19,000
Potassium	1,800,000 J	960,000 J	840,000 J	4,600,000 J	1,200,000 J	1,400,000 J	3,800,000 J	2,200,000 J
Selenium	<590 J	<1,200 J	<1,300 J	<2,800 J	<1,300 J	<2,500 J	<2,900 J	<1,600 J
Silver	360 J	<620	130 J	500 J	110 J	170 J	970	250 J
Sodium	130,000 J	48,000	68,000	380,000	76,000	95,000	350,000	120,000
Thallium	<740 J	<620 J	<670 J	890 J	<690 J	<660 J	1,200 J	<810 J
Titanium	280,000 J	290,000 J	460,000 J	570,000 J	270,000 J	460,000 J	540,000 J	240,000 J
Vanadium	22,000	23,000	21,000	31,000	15,000	16,000	33,000	18,000
Zinc	380,000 J	120,000 J	270,000 J	390,000 J	1,300,000 J	300,000 J	970,000 J	260,000 J
PEST/PCB								
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	**Surface Soil**							
Depth	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**	**6"-12"**
Sample Date	**08/05/99**	**08/06/99**	**08/05/99**	**08/05/99**	**08/06/99**	**08/06/99**	**08/05/99**	**08/05/99**
Sample Name	**SSRIV-97 (SSRIV-4)**	**SSRIV-5**	**SSRIV-6**	**SSRIV-7**	**SSRIV-8**	**SSRIV-9**	**SSRIV-10**	**SSRIV-11**
PEST/PCB (continued)								
BHC (alpha)	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane (gamma)	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	Surface Soil			Criteria		
Depth	6"-12"	6"-12"	6"-12"		Residential	Residential
Sample Date	08/06/99	08/06/99	08/06/99	Residential	Drinking Water	Indoor Air
Sample Name	SSRIV-12	SSRIV-96 (SSRIV-12)	SSRIV-13	Direct Contact	Protection	Inhalation
VOC						
Benzene	<57	<57	<79	180,000 (I)	100 (I)	1,600 (I)
Carbon disulfide	<280	<280	<400	280,000 (I,R) C,DD	16,000 (I,R)	76,000 (I,R)
Methylene chloride	<280	<280	<400	1,300,000	100	45,000
Tetrachloroethene	<57	<57	<79	88,000 C	100	11,000
Toluene	<110	<110	140	250,000 (I) C	16,000 (I)	250,000 (I) C
Trichloroethene	<57	<57	<79	500,000 C,DD	100	7,100
Xylenes (total)	<170	<170	<240	150,000 (I) C	5,600 (I)	150,000 (I) C
SVOC						
2,4-Dimethylphenol	<380	<380	<520	11,000,000	7,400	NLV
2-Methylnaphthalene	<380	<380	<520	8,100,000	57,000	ID
2-Methylphenol	<380	<380	<520	11,000,000 J	7,400 J	NLV
4-Methylphenol	NA	NA	NA	11,000,000 J	7,400 J	NLV
Benzo(a)anthracene	<380	<380	<520	20,000 (Q)	(Q) NLL	(Q) NLV
Benzo(a)pyrene	<380	<380	<520	2,000 (Q)	(Q) NLL	(Q) NLV
Benzo(b)fluoranthene	<380	<380	<520	20,000 (Q)	(Q) NLL	(Q) ID
Benzo(g,h,i)perylene	<380	<380	<520	2,500,000	NLL	NLV
Benzo(k)fluoranthene	<380	<380	<520 J	200,000 (Q)	(Q) NLL	(Q) NLV
bis(2-Ethylhexyl)phthalate	<380	<380	<520	2,800,000	NLL	NLV
Butylbenzylphthalate	<380	<380	<520	310,000 C	310,000 C	NLV
Chrysene	<380	<380	<520	2,000,000 (Q)	(Q) NLL	(Q) ID
Dibenzofuran	<380	<380	<520	ID	ID	ID
Di-n-butylphthalate	<380	<380	1700	760,000 C	760,000 C	NLV
Fluoranthene	<380	<380	<520	46,000,000	730,000	1,000,000,000 D
Fluorene	<380	<380	<520	27,000,000	390,000	580,000,000
Indeno(1,2,3-c,d)pyrene	<380	<380	<520	20,000 (Q)	(Q) NLL	(Q) NLV
Naphthalene	<380	<380	<520	16,000,000	35,000	250,000
Phenanthrene	<380	<380	<520	1,600,000	56,000	2,800,000
Pyrene	<380	<380	<520	29,000,000	480,000	1,000,000,000 D

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	Surface Soil			Criteria		
Depth	6"-12"	6"-12"	6"-12"		Residential	Residential
Sample Date	08/06/99	08/06/99	08/06/99	Residential	Drinking Water	Indoor Air
Sample Name	SSRIV-12	SSRIV-96 (SSRIV-12)	SSRIV-13	Direct Contact	Protection	Inhalation
METALS						
Aluminum	**8,300,000**	**8,100,000**	**6,700,000**	50,000,000 (B) DD	1,000 (B)	(B) NLV
Antimony	<2,800 J	<2,800 J	<1,000 J	180,000	500 M	NLV
Arsenic	1,700	1,100	6,600	7,600	23,000	NLV
Barium	43,000	41,000	710,000	37,000,000 (B)	1,300,000 (B)	(B) NLV
Beryllium	280 J	260 J	820 J	410,000	51,000	NLV
Cadmium	44	32	2,900	550,000 (B)	6,000 (B)	(B) NLV
Calcium	820,000 J	860,000 J	17,000,000 J	NE	NE	NE
Chromium	14,000	17,000	24,000	2,500,000 total/dissolved	30,000 total/dissolved	total/dissolved NLV
Cobalt	**4,800**	**4,800**	**5,700**	2,600,000	800	NLV
Copper	8,300	7,700	630,000	20,000,000 (B)	5,800,000 (B)	(B) NLV
Cyanide	NA	NA	NA	12,000 (P,R)	4,000 (P,R)	(P,R) NLV
Iron	**12,000,000**	**14,000,000**	**20,000,000**	160,000,000 (B)	6,000 (B)	(B) NLV
Lead	6,000	5,300	170,000	400,000 (B)	700,000 (B)	(B) NLV
Magnesium	1,700,000	2,000,000	1,400,000	1,000,000,000 (B) D	8,000,000 (B)	(B) NLV
Manganese	**330,000 J**	**410,000 J**	**1,800,000 J**	25,000,000 (B)	1,000 (B)	(B) NLV
Mercury	17 J	14 J	400	160,000 (B,Z) (total)	1,700 (B,Z) (total)	48,000 (B,Z) (total)
Molybdenum	<260 J	<210 J	<2,300 J	2,600,000 (B)	1,500 (B)	(B) NLV
Nickel	11,000	12,000	25,000	40,000,000 (B)	100,000 (B)	(B) NLV
Potassium	310,000 J	270,000 J	2,400,000 J	NE	NE	NE
Selenium	<1,100 J	<1,100 J	<1,500 J	2,600,000 (B)	4,000 (B)	(B) NLV
Silver	<570	<570	870	2,500,000 (B)	4,500 (B)	(B) NLV
Sodium	27,000 J	34,000	170,000	1,000,000,000 D	2,500,000	NLV
Thallium	<400 J	<570 J	<770 J	35,000 (B)	2,300 (B)	(B) NLV
Titanium	420,000 J	350,000 J	310,000 J	NE	NE	NE
Vanadium	27,000	27,000	20,000	750,000 DD	72,000	NLV
Zinc	21,000 J	23,000 J	390,000 J	170,000,000 (B)	2,400,000 (B)	(B) NLV
PEST/PCB						
4,4'-DDD	NA	NA	NA	95,000	NLL	NLV
4,4'-DDE	NA	NA	NA	45,000	NLL	NLV

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	Surface Soil			Criteria		
Depth	6"-12"	6"-12"	6"-12"		Residential	Residential
Sample Date	08/06/99	08/06/99	08/06/99	Residential	Drinking Water	Indoor Air
Sample Name	SSRIV-12	SSRIV-96 (SSRIV-12)	SSRIV-13	Direct Contact	Protection	Inhalation
PEST/PCB (continued)						
BHC (alpha)	NA	NA	NA	2,600	18	30,000
Chlordane (gamma)	NA	NA	NA	31,000 (J)	(J) NLL	11,000,000 (J)
Dieldrin	NA	NA	NA	1,100	NLL	140,000
Endosulfan II	NA	NA	NA	1,400,000 (J)	(J) NLL	(J) ID
Endrin ketone	NA	NA	NA	NE	NE	NE
Heptachlor	NA	NA	NA	5,600	NLL	350,000
Methoxychlor	NA	NA	NA	1,900,000	16,000	ID

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	Criteria (continued)	
Depth	Residential	Residential
Sample Date	Ambient Air	Groundwater/Surface
Sample Name	Particulate Inhalalation	Water Interface Protection
VOC		
Benzene	380,000,000 (I)	4,000 (I) X
Carbon disulfide	47,000,000,000 (I,R)	(I,R) ID
Methylene chloride	6,600,000,000	19,000 X
Tetrachloroethene	5,400,000,000	900 X
Toluene	27,000,000,000 (I)	2,800 (I)
Trichloroethene	1,800,000,000	4,000 X
Xylenes (total)	290,000,000,000 (I)	700 (I)
SVOC		
2,4-Dimethylphenol	4,700,000,000	7,600
2-Methylnaphthalene	ID	ID
2-Methylphenol	67,000,000,000 J	1,400 J
4-Methylphenol	67,000,000,000 J	1,400 J
Benzo(a)anthracene	(Q) ID	(Q) NLL
Benzo(a)pyrene	1,500,000 (Q)	(Q) NLL
Benzo(b)fluoranthene	(Q) ID	(Q) NLL
Benzo(g,h,i)perylene	800,000,000	NLL
Benzo(k)fluoranthene	(Q) ID	(Q) NLL
bis(2-Ethylhexyl)phthalate	700,000,000	NLL
Butylbenzylphthalate	47,000,000,000	26,000 X
Chrysene	(Q) ID	(Q) NLL
Dibenzofuran	ID	1,700
Di-n-butylphthalate	3,300,000,000	11,000
Fluoranthene	9,300,000,000	5,500
Fluorene	9,300,000,000	5,300
Indeno(1,2,3-c,d)pyrene	(Q) ID	(Q) NLL
Naphthalene	200,000,000	870
Phenanthrene	6,700,000	5,300
Pyrene	6,700,000,000	ID

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring Depth Sample Date Sample Name	Criteria (continued) Residential Ambient Air Particulate Inhalalation	Residential Groundwater/Surface Water Interface Protection
METALS		
Aluminum	(B) ID	(B) NE
Antimony	13,000,000	94,000
Arsenic	720,000	70,000 X
Barium	330,000,000 (B)	260,000 (B) G,X
Beryllium	1,300,000	24,000 G
Cadmium	1,700,000 (B)	2,500 (B) G,X
Calcium	NE	NE
Chromium	260,000 total/dissolved	3,300 total/dissolved
Cobalt	13,000,000	2,000
Copper	130,000,000 (B)	48,000 (B) G
Cyanide	250,000 (P,R)	200 (P,R) M
Iron	(B) ID	(B) NE
Lead	100,000,000 (B)	1,700,000 (B) G,M,X
Magnesium	6,700,000,000 (B)	(B) NE
Manganese	3,300,000 (B)	36,000 (B) G,X
Mercury	20,000,000 (B,Z) (total)	100 (B,Z) (total) M
Molybdenum	(B) ID	16,000 (B) X
Nickel	13,000,000 (B)	50,000 (B) G
Potassium	NE	NE
Selenium	130,000,000 (B)	400 (B)
Silver	6,700,000 (B)	500 (B) M
Sodium	ID	NE
Thallium	(B) ID	4,200 (B) X
Titanium	NE	NE
Vanadium	ID	190,000
Zinc	(B) ID	110,000 (B) G
PEST/PCB		
4,4'-DDD	44,000,000	NLL
4,4'-DDE	32,000,000	NLL

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kinsgford, Michigan.

Well/Boring	Criteria (continued)	
Depth	Residential	Residential
Sample Date	Ambient Air	Groundwater/Surface
Sample Name	Particulate Inhalalation	Water Interface Protection
PEST/PCB (continued)		
BHC (alpha)	1,700,000	NE
Chlordane (gamma)	31,000,000 (J)	(J) NLL
Dieldrin	680,000	NLL
Endosulfan II	(J) ID	(J) NLL
Endrin ketone	NE	NE
Heptachlor	2,400,000	NLL
Methoxychlor	ID	NE

Footnotes on Page 16.

Table 1. Summary of Constituents Detected in Surface Material Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

All results are in micrograms per kilogram (µg/kg).

Bold	Indicates a value above the Residential and Commercial I Drinking Water Protection Criteria.
Italics	Indicates a value above the Residential Indoor Inhalation Criteria.
Underline	Indicates a value above the Groundwater Surface Water Interface Protection Screening Level.
(shaded)	Indicates a value above the Residential and Commercial I Ambient Air Particulate Criteria.
(boxed)	Indicates a value above the Residential and Commercial I Direct Contact Criteria.
<	Less than detection limit.
*	Duplicate analysis was not within control limits.
B	Constituent was also detected in laboratory blank.
J	Estimated result.
N	Spike sample recovery is not within control limits.
NA	Not analyzed.
P	Greater than 25% RPD between two columns for pesticide or PCB
SVOCs	Semi volatile organic compounds.
VOCs	Volatile organic compounds.

Criteria Footnotes:

B	Background may be substituted if higher than the calculated cleanup criteria.
C	Value presented is a screening level based on the chemical specific generic soil saturation concentration (Csat) since the calculated risk-based criterion is greater than Csat.
D	Calculated criterion exceeds 100%, hence it is reduced to 100%.
DD	Hazardous substance causes developmental effects.
G	GSI criterion is hardness dependent.
I	Chemical may exhibit the characteristic of ignitability, as defined in 40 CFR 261.21.
ID	Insufficient data.
J	Chemical may be present in several isomer forms. Isomer specific concentrations must be added together for comparison to criteria.
NLL	Chemical is not likely to leach under most soil conditions.
NLV	Chemical is not likely to volatilize under most soil conditions.
P	Amenable or Method OIA-1677 analysis are used to quanitfy cyanide concentrations for compliance with all groundwater criteria.
Q	Criterion for carcinogenic polycyclic aromatic hydrocarbons (PAHs) were developed using "relative potential potenicies" (RPPs) to benzo(a)pyrene.
R	Hazardous substance may exhibit the characteristic of reactivity as defined in 40 CFR 261.23.
X	The GSI criterion is not protective for surface water that is used as a drinking water source.
Z	Mercury generic cleanup criteria based on data for different species of mercury.

Table 2. Summary of Constituents Detected in Waste Material Removed from the Riverside Disposal Area, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

			Criteria		
Well/Boring	**Surface Waste**	**Drum Waste**			
Sample Date	**08/15/88**	**08/15/88**	**Residential**	**Residential**	**Residential**
Sample I.D.	**9 (94738)**	**11 (94740)**	**Direct**	**Drinking Water**	**Indoor Air**
Type	**Paint Waste - Removed**	**Drum Waste - Removed**	**Contact**	**Protection**	**Inhalation**
VOC					
SVOC					
2,4-Dimethylphenol	<3,300	**45,000**	11,000,000	7,400	NLV
Di-n-butylphthalate	16,000	<16,000	760,000 C	760,000 C	NLV
Phenol	<3,300	18,000	12,000,000 C,DD	88,000	NLV
Metals					
Barium	350,000	26,000	37,000,000 (B)	1,300,000 (B)	(B) NLV
Cadmium	**120,000**	**120,000**	550,000 (B)	6,000 (B)	(B) NLV
Chromium	**36,000,000**	3,500	2,500,000 total/dissolved	30,000 total/dissolved	total/dissolved NLV
Copper	36,000	1,400,000	20,000,000 (B)	5,800,000 (B)	(B) NLV
Lead	**12,000,000**	14,000	400,000 (B)	700,000 (B)	(B) NLV
Nickel	10,000	9,200	40,000,000 (B)	100,000 (B)	(B) NLV
Zinc	**96,000,000**	320,000	170,000,000 (B)	2,400,000 (B)	(B) NLV

Table 2. Summary of Constituents Detected in Waste Material Removed from the Riverside Disposal Area, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

	Criteria	
Well/Boring Sample Date Sample I.D. Type	**Residential Ambient Air Particulate Inhalation**	**Residential Groundwater/ Surface Water Interface Protection**
VOC		
SVOC		
2,4-Dimethylphenol	4,700,000,000	7,600
Di-n-butylphthalate	3,300,000,000	11,000
Phenol	40,000,000,000	4,200
Metals		
Barium	330,000,000 (B)	260,000 (B) G,X
Cadmium	1,700,000 (B)	2,500 (B) G,X
Chromium	260,000 total/dissolved	3,300 total/dissolved
Copper	130,000,000 (B)	480,000 (B) G
Lead	100,000,000 (B)	1,700,000 (B) G,M,X
Nickel	13,000,000 (B)	50,000 (B) G
Zinc	(B) ID	110,000 (B) G

Table 2. Summary of Constituents Detected in Waste Material Removed from the Riverside Disposal Area, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Not all the compounds analyzed for are listed in this table. This table presents only those compounds that were detected in one or more samples at least once over the course of the investigation.

All results are in micrograms per kilogram (µg/kg).

Underline	Value above the Groundwater Surface Water Interface Protection Screening Level.
<	Less than detection limit.
(shaded)	Value above the Residential and Commercial I Ambient Air Particulate Criteria.
(boxed)	Value above the Residential and Commercial I Direct Contact Criteria.
B	Constituent was also detected in laboratory blank.
Bold	Value above the Residential and Commercial I Drinking Water Protection Criteria.
SVOCs	Semi volatile organic compounds.

Criteria Footnotes:

B	Background may be substituted if higher than the calculated cleanup criteria.
C	Value presented is a screening level based on the chemical specific generic soil saturation concentration (Csat) since the calculated risk-based criterion is greater than Csat.
D	Calculated criterion exceeds 100%, hence it is reduced to 100 percent.
G	GSI criterion is hardness dependent.
ID	Insufficient data.
NLV	Chemical is not likely to volatilize under most soil conditions.
X	The GSI criterion is not protective for surface water that is used as a drinking water source.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GMSB-4			SDB1		SDB3
Sample Depth	05-25'	27'	55'	4-8'	16-22'	4-8'
Sample Date	06/03/97	06/03/97	06/03/97	05/13/96	05/13/96	05/13/96
Sample Name	GMSB-4/5-25	GMSB-4/27	GMSB-4/55	SS-15	SS-16	SS-20
Material Type	Waste	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste
VOC						
1,1,2,2-Tetrachloroethane	<8.5 J	<5.2 J	NA	<11	<17	<21
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (total)	NA	NA	NA	<11	<17	<21
1,3,5-Trimethylbenzene	NA	NA	NA	NA	NA	NA
2-Butanone (MEK)	<85 J	<52 J	NA	<11	<17	<21
2-Hexanone	<85 J	<52 J	NA	<11	<17	<21
4-Methyl-2-pentanone (MIBK)	<85 J	<52 J	NA	<11	<17	<21
Acetone	63 J	<52 J	NA	<11	<17 BJ	<21
Benzene	5.9 J	<5.2 J	NA	<11	<17	<21
cis-1,2-Dichloroethene	<8.5 J	<5.2 J	NA	NA	NA	NA
Ethylbenzene	<8.5 J	<5.2 J	NA	<11	<17	<21
Isopropylbenzene	NA	NA	NA	NA	NA	NA
Methylene chloride	<8.5 J	<5.2 J	NA	<11 BJ	<17 BJ	<21 BJ
Naphthalene	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NA	NA	NA	NA	NA	NA
n-Propylbenzene	NA	NA	NA	NA	NA	NA
p-Isopropyltoluene	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA	NA	NA
Tetrachloroethene	<8.5 J	<5.2 J	NA	<11	<17	<21
Toluene	<8.5 J	<5.2 J	NA	<11	<17	<21
Trichloroethene	<8.5 J	<5.2 J	NA	<11	<17	<21
Xylene, o	NA	NA	NA	NA	NA	NA
Xylenes (total)	23 J	<5.2 J	NA	<11	<17	<21
Xylenes, m+p	NA	NA	NA	NA	NA	NA
SVOC						
1,2,4-Trichlorobenzene	<280	<170	NA	<320	<350	<17,000
2,4-Dimethylphenol	900	<170	NA	<320	<350	<17,000

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GMSB-4			SDB1		SDB3
Sample Depth	**05-25'**	**27'**	**55'**	**4-8'**	**16-22'**	**4-8'**
Sample Date	**06/03/97**	**06/03/97**	**06/03/97**	**05/13/96**	**05/13/96**	**05/13/96**
Sample Name	**GMSB-4/5-25**	**GMSB-4/27**	**GMSB-4/55**	**SS-15**	**SS-16**	**SS-20**
Material Type	**Waste**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Waste**
SVOC (continued)						
2-Methylnaphthalene	350	<170	NA	<320	<350	<17,000
2-Methylphenol	<280	<170	NA	<320	<350	<17,000
4-Methylphenol	340	<170	NA	<320	<350	<17,000
Acenaphthene	190 J	<170	NA	<320	<350	<17,000
Anthracene	<280	<170	NA	<320	<350	<17,000
Benzo(a)anthracene	110 J	<170	NA	<320	<350	<17,000
Benzo(a)pyrene	<280	<170	NA	<320	<350	<17,000
Benzo(b)fluoranthene	85 J	<170	NA	<320	<350	<17,000
Benzo(g,h,i)perylene	<280	<170	NA	<320	<350	<17,000
Benzo(k)fluoranthene	<280	<170	NA	<320	<350	<17,000
bis(2-Ethylhexyl)phthalate	<280	<170	NA	52 J	<350	<17,000
Butylbenzylphthalate	<280	<170	NA	<320	<350	<17,000
Chrysene	120 J	<170	NA	<320	<350	<17,000
Dibenzofuran	160 J	<170	NA	<320	<350	<17,000
Diethylphthalate	<280	<170	NA	<320	<350	<17,000
Di-n-butylphthalate	460	<170	NA	<320	<350	<17,000
Fluoranthene	370	<170	NA	<320	<350	<17,000
Fluorene	180 J	<170	NA	<320	<350	<17,000
Indeno(1,2,3-c,d)pyrene	<280	<170	NA	<320	<350	<17,000
Naphthalene	430	<170	NA	<320	<350	<17,000
n-Nitrosodiphenylamine	<280	<170	NA	<320	<350	<17,000
Phenanthrene	570	<170	NA	<320	<350	<17,000
Phenol	<280	<170	NA	<320	<350	<17,000
Pyrene	270 J	<170	NA	<320	<350	<17,000
Metals						
Aluminum	**3,600,000**	NA	NA	**5,290,000**	**3,290,000**	**6,680,000**
Antimony	**15,000**	NA	NA	<2,400 N	<2,900 N	$\boxed{\textbf{2,920,000 N}}$

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GMSB-4			SDB1		SDB3
Sample Depth	**05-25'**	**27'**	**55'**	**4-8'**	**16-22'**	**4-8'**
Sample Date	**06/03/97**	**06/03/97**	**06/03/97**	**05/13/96**	**05/13/96**	**05/13/96**
Sample Name	**GMSB-4/5-25**	**GMSB-4/27**	**GMSB-4/55**	**SS-15**	**SS-16**	**SS-20**
Material Type	**Waste**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Waste**
Metals (continued)						
Arsenic	5,320	NA	NA	3,800	1,000 B	**53,200**
Barium	375,000	NA	NA	18,700 BN	11,400 BN	**1,960,000 N**
Beryllium	<855	NA	NA	290 B	<140	1,100 B
Cadmium	3,330	NA	NA	280 B*	210 B	4,200
Calcium	22,700,000	NA	NA	1,350,000	4,780,000	43,700,000
Chromium	**41,900**	NA	NA	12,900	13,000	**32,600**
Cobalt	<8,550	NA	NA	**6,100 B**	**3,500 B**	**22,300**
Copper	159,000	NA	NA	26,800	17,900 N*	**20,700,000 N***
Cyanide	NA	NA	NA	<110	<120	700 B
Iron	**21,600,000 MBB**	NA	NA	**10,100,000 ***	**7,300,000 ***	**45,300,000 ***
Lead	249,000	NA	NA	2,100	2,100	**17,700,000**
Magnesium	2,760,000	NA	NA	3,680,000	4,360,000	3,590,000
Manganese	**830,000**	NA	NA	**162,000 ***	**141,000 ***	**1,460,000 ***
Mercury	361 J	NA	NA	<50	<60	**5,200**
Nickel	26,000	NA	NA	37,700	23,200	**141,000**
Potassium	1,580,000	NA	NA	516,000 B	333,000 B	2,040,000 B
Selenium	1,550	NA	NA	<600 N	<710 N	2,200 N
Silver	<427	NA	NA	<650	<780	**14,400**
Sodium	<855,000	NA	NA	58,900 B	77,500 B	106,000 B
Thallium	<427	NA	NA	2,000	1,400 B	**4,300 B**
Vanadium	13,700	NA	NA	17,700	11,000 B	13,800 B
Zinc	1,580,000	NA	NA	18,900 N*	18,100 N*	2,230,000 N*
PEST/PCB						
4,4'-DDD	<56	NA	NA	<3.3	<3.6	<5.6
4,4'-DDE	<56	NA	NA	<3.3	<3.6	<5.6
Aldrin	<29	NA	NA	<1.7	<1.8	<2.9
Aroclor 1248	<290	NA	NA	<33	<36	<56

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GMSB-4			SDB1		SDB3
Sample Depth	**05-25'**	**27'**	**55'**	**4-8'**	**16-22'**	**4-8'**
Sample Date	**06/03/97**	**06/03/97**	**06/03/97**	**05/13/96**	**05/13/96**	**05/13/96**
Sample Name	**GMSB-4/5-25**	**GMSB-4/27**	**GMSB-4/55**	**SS-15**	**SS-16**	**SS-20**
Material Type	**Waste**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Waste**
PEST/PCB (continued)						
Aroclor 1260	<560	NA	NA	<33	<36	<56
BHC (alpha)	<29	NA	NA	<1.7	<1.8	<2.9
BHC (delta)	<29	NA	NA	<1.7	<1.8	<2.9
BHC (Lindane) (gamma)	<29	NA	NA	<1.7	<1.8	<2.9
Chlordane (alpha)	<29	NA	NA	<1.7	<1.8	<2.9
Chlordane (gamma)	<29	NA	NA	<1.7	<1.8	<2.9
Dieldrin	<56	NA	NA	<3.3	<3.6	<5.6
Endosulfan II	<56	NA	NA	<3.3	<3.6	6.7 P
Endrin	<56	NA	NA	<3.3	<3.6	<5.6
Endrin aldehyde	<56	NA	NA	<3.3	<3.6	<5.6
Endrin ketone	<56	NA	NA	<3.3	<3.6	<5.6
Heptachlor	<29	NA	NA	<1.7	<1.8	4.1 P
Heptachlor epoxide	<29	NA	NA	<1.7	<1.8	<2.9
Total Organic Carbon	43,000,000	950,000	8,200,000	NA	NA	NA

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB3 (continued)				SDB4	SDB6
Sample Depth	**4-8'**	**8-14'**	**8-14'**	**12'**	**16-20'**	**4-8'**
Sample Date	**05/13/96**	**05/13/96**	**05/13/96**	**05/13/96**	**05/13/96**	**05/14/96**
Sample Name	**SS-20RE**	**SS-17**	**SS-17RE**	**SDB3**	**SS-22**	**SS-25**
Material Type	**Waste**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Waste**
VOC						
1,1,2,2-Tetrachloroethane	<21	<14	<14	NA	<11	<21
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (total)	<21	2 J	<14	NA	<11	130
1,3,5-Trimethylbenzene	NA	NA	NA	NA	NA	NA
2-Butanone (MEK)	<21	<14	<14	NA	<11	<21
2-Hexanone	<21	<14	<14	NA	<11	<21
4-Methyl-2-pentanone (MIBK)	<21	<14	<14	NA	<11	<21
Acetone	18 J	16 B	34 B	NA	<11 BJ	17 J
Benzene	<21	2 J	5 J	NA	<11	<21
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA
Ethylbenzene	<21	<14	<14	NA	<11	9 J
Isopropylbenzene	NA	NA	NA	NA	NA	NA
Methylene chloride	51 B	<14 BJ	50 B	NA	<11 BJ	<56 B
Naphthalene	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NA	NA	NA	NA	NA	NA
n-Propylbenzene	NA	NA	NA	NA	NA	NA
p-Isopropyltoluene	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA	NA	NA
Tetrachloroethene	16 J	6 J	<10 J	NA	<11	35
Toluene	<21	5 J	15	NA	<11	2 J
Trichloroethene	7 J	23	37	NA	<11	<21
Xylene, o	NA	NA	NA	NA	NA	NA
Xylenes (total)	<21	<14	<14	NA	<11	52
Xylenes, m+p	NA	NA	NA	NA	NA	NA
SVOC						
1,2,4-Trichlorobenzene	NA	<11,000	NA	<13,000	<350	<580
2,4-Dimethylphenol	NA	**76,000**	NA	**42,000**	<350	<580

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	**SDB3 (continued)**				**SDB4**	**SDB6**
Sample Depth	**4-8'**	**8-14'**	**8-14'**	**12'**	**16-20'**	**4-8'**
Sample Date	**05/13/96**	**05/13/96**	**05/13/96**	**05/13/96**	**05/13/96**	**05/14/96**
Sample Name	**SS-20RE**	**SS-17**	**SS-17RE**	**SDB3**	**SS-22**	**SS-25**
Material Type	**Waste**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Waste**
SVOC (continued)						
2-Methylnaphthalene	NA	8,100 J	NA	4,900 J	<350	340 J
2-Methylphenol	NA	**48,000**	NA	**32,000**	<350	<580
4-Methylphenol	NA	**49,000**	NA	**32,000**	<350	1,000
Acenaphthene	NA	<11,000	NA	<13,000	<350	<580
Anthracene	NA	<11,000	NA	<13,000	<350	<580
Benzo(a)anthracene	NA	<11,000	NA	<13,000	<350	<580
Benzo(a)pyrene	NA	<11,000	NA	<13,000	<350	<580
Benzo(b)fluoranthene	NA	<11,000	NA	<13,000	<350	<580
Benzo(g,h,i)perylene	NA	<11,000	NA	<13,000	<350	<580
Benzo(k)fluoranthene	NA	<11,000	NA	<13,000	<350	<580
bis(2-Ethylhexyl)phthalate	NA	<11,000	NA	<13,000	<350	<580
Butylbenzylphthalate	NA	<11,000	NA	<13,000	<350	<580
Chrysene	NA	<11,000	NA	<13,000	<350	<580
Dibenzofuran	NA	3,000 J	NA	<13,000	<350	220 J
Diethylphthalate	NA	<11,000	NA	<13,000	<350	<580
Di-n-butylphthalate	NA	<11,000	NA	3,400 JB	<350	130 J
Fluoranthene	NA	1,500 J	NA	<13,000	<350	<580
Fluorene	NA	3,200 J	NA	1,900 J	<350	110 J
Indeno(1,2,3-c,d)pyrene	NA	<11,000	NA	<13,000	<350	<580
Naphthalene	NA	6,200 J	NA	6,900 J	<350	800
n-Nitrosodiphenylamine	NA	<11,000	NA	<13,000	<350	<580
Phenanthrene	NA	4,800 J	NA	2,500 J	<350	700
Phenol	NA	31,000	NA	20,000	<350	240 J
Pyrene	NA	2,100 J	NA	1,300 J	<350	<580
Metals						
Aluminum	NA	**6,470,000**	NA	NA	**3,450,000**	**868,000**
Antimony	NA	**15,900 BN**	NA	NA	<2,500 N	<4,900 N

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	**SDB3 (continued)**				**SDB4**	**SDB6**
Sample Depth	**4-8'**	**8-14'**	**8-14'**	**12'**	**16-20'**	**4-8'**
Sample Date	**05/13/96**	**05/13/96**	**05/13/96**	**05/13/96**	**05/13/96**	**05/14/96**
Sample Name	**SS-20RE**	**SS-17**	**SS-17RE**	**SDB3**	**SS-22**	**SS-25**
Material Type	**Waste**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Waste**
Metals (continued)						
Arsenic	NA	17,700	NA	NA	1,900 B	2,100 B
Barium	NA	799,000 N	NA	NA	13,300 BN	427,000 N
Beryllium	NA	740 B	NA	NA	280 B	<240
Cadmium	NA	4,100	NA	NA	<180	<360
Calcium	NA	22,500,000	NA	NA	8,700,000	10,400,000
Chromium	NA	30,000	NA	NA	10,500	2,600 B
Cobalt	NA	**15,100**	NA	NA	**3,800 B**	**1,800 B**
Copper	NA	**19,000,000 N***	NA	NA	18,900 N*	35,300 N*
Cyanide	NA	510 B	NA	NA	<110	<220
Iron	NA	**56,800,000 ***	NA	NA	**7,380,000 ***	**1,710,000 ***
Lead	NA	**1,910,000**	NA	NA	2,000	28,400
Magnesium	NA	4,210,000	NA	NA	6,920,000	935,000 B
Manganese	NA	**862,000 ***	NA	NA	**149,000 ***	**393,000 ***
Mercury	NA	1,200	NA	NA	<50	<110
Nickel	NA	**144,000**	NA	NA	93,800	<1,500
Potassium	NA	1,390,000 B	NA	NA	344,000 B	1,740,000 B
Selenium	NA	<4,500 N	NA	NA	<620 N	<1,200 N
Silver	NA	**9,600**	NA	NA	<680	<1,400
Sodium	NA	220,000 B	NA	NA	62,500 B	118,000 B
Thallium	NA	**11,100 B**	NA	NA	960 B	<1,300
Vanadium	NA	15,000	NA	NA	11,200	1,100 B
Zinc	NA	2,080,000 N*	NA	NA	17,300 N*	61,600 N*
PEST/PCB						
4,4'-DDD	NA	14	NA	NA	<3.5	<5.7
4,4'-DDE	NA	<4.6	NA	NA	<3.5	<5.7
Aldrin	NA	<2.4	NA	NA	<1.8	<2.9
Aroclor 1248	NA	<46	NA	NA	<35	<57

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB3 (continued)				SDB4	SDB6
Sample Depth	4-8'	8-14'	8-14'	12'	16-20'	4-8'
Sample Date	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/14/96
Sample Name	SS-20RE	SS-17	SS-17RE	SDB3	SS-22	SS-25
Material Type	Waste	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste
PEST/PCB (continued)						
Aroclor 1260	NA	<46	NA	NA	<35	<57
BHC (alpha)	NA	15 P	NA	NA	<1.8	<2.9
BHC (delta)	NA	<2.4	NA	NA	<1.8	<2.9
BHC (Lindane) (gamma)	NA	<2.4	NA	NA	<1.8	12 P
Chlordane (alpha)	NA	<2.4	NA	NA	<1.8	<2.9
Chlordane (gamma)	NA	<2.4	NA	NA	<1.8	<2.9
Dieldrin	NA	5.7 P	NA	NA	<3.5	<5.7
Endosulfan II	NA	<4.6	NA	NA	<3.5	<5.7
Endrin	NA	<4.6	NA	NA	<3.5	<5.7
Endrin aldehyde	NA	<4.6	NA	NA	<3.5	<5.7
Endrin ketone	NA	<4.6	NA	NA	<3.5	<5.7
Heptachlor	NA	3.1 P	NA	NA	<1.8	<2.9
Heptachlor epoxide	NA	17 P	NA	NA	<1.8	<2.9
Total Organic Carbon	NA	NA	NA	NA	NA	NA

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	**SDB6 (continued)**		**SDB7**				
Sample Depth	**12-16'**	**20'**	**9-12'**	**9-12'**	**16-19.5'**	**16-19.5'**	**16-19.5'**
Sample Date	**05/14/96**	**05/14/96**	**05/14/96**	**05/14/96**	**05/14/96**	**05/14/96**	**05/14/96**
Sample Name	**SS-26**	**SDB6**	**SS-27**	**SS-27RE**	**SS-28**	**SS-28RE**	**SDB7**
Material Type	**Waste**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Waste**	**Waste**	**Subsurface Soil**
VOC							
1,1,2,2-Tetrachloroethane	**19,000**	<1.2	<29	<29	<14	<14	<1.8
1,2,4-Trimethylbenzene	NA	110	NA	NA	NA	NA	3.6
1,2-Dichloroethene (total)	<16,000	NA	<29	<29	<14	<14	NA
1,3,5-Trimethylbenzene	NA	30	NA	NA	NA	NA	<1.8
2-Butanone (MEK)	<16,000	6.1	<29	<29	<14	<14	9.6
2-Hexanone	<16,000	4.4	<29	<29	<14	<14	4
4-Methyl-2-pentanone (MIBK)	<16,000	3.1	<29	<29	<14	<14	<3.5
Acetone	7,300 J	18	<29	<29	39	13 J	37
Benzene	<16,000	<1.2	4 J	<29	<14	<14	<1.8
cis-1,2-Dichloroethene	NA	3.3	NA	NA	NA	NA	<1.8
Ethylbenzene	**3,200 J**	9.2	<29	<29	<14	<14	<1.8
Isopropylbenzene	NA	3.9	NA	NA	NA	NA	<1.8
Methylene chloride	<16,000 BJ	<1.2	<110 B	<84 B	98 B	37	<1.8
Naphthalene	NA	56	NA	NA	NA	NA	1.9
n-Butylbenzene	NA	16	NA	NA	NA	NA	<1.8
n-Propylbenzene	NA	7.7	NA	NA	NA	NA	<1.8
p-Isopropyltoluene	NA	26	NA	NA	NA	NA	<1.8
sec-Butylbenzene	NA	6.6	NA	NA	NA	NA	<1.8
Tetrachloroethene	<16,000	<1.2	<29	<29	<14	<14	<1.8
Toluene	4,500 J	13	<29	<29	5 J	<14	<1.8
Trichloroethene	<16,000	<1.2	<29	<29	<14	<14	<1.8
Xylene, o	NA	31	NA	NA	NA	NA	2.1
Xylenes (total)	**28,000**	NA	<29	<29	<14	<14	NA
Xylenes, m+p	NA	49	NA	NA	NA	NA	3.7
SVOC							
1,2,4-Trichlorobenzene	<11,000	<7,900	<540	NA	<400	NA	<4,900
2,4-Dimethylphenol	<11,000	**29,000**	<540	NA	<400	NA	<4,900

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	**SDB6 (continued)**		**SDB7**				
Sample Depth	**12-16'**	**20'**	**9-12'**	**9-12'**	**16-19.5'**	**16-19.5'**	**16-19.5'**
Sample Date	**05/14/96**	**05/14/96**	**05/14/96**	**05/14/96**	**05/14/96**	**05/14/96**	**05/14/96**
Sample Name	**SS-26**	**SDB6**	**SS-27**	**SS-27RE**	**SS-28**	**SS-28RE**	**SDB7**
Material Type	**Waste**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Waste**	**Waste**	**Subsurface Soil**
SVOC (continued)							
2-Methylnaphthalene	<11,000	26,000	300 J	NA	<400	NA	<4,900
2-Methylphenol	<11,000	**21,000**	<540	NA	<400	NA	<4,900
4-Methylphenol	1,600 J	**35,000**	<540	NA	<400	NA	<4,900
Acenaphthene	<11,000	<7,900	<540	NA	<400	NA	<4,900
Anthracene	<11,000	<7,900	<540	NA	<400	NA	1,100 J
Benzo(a)anthracene	<11,000	<7,900	<540	NA	42 J	NA	1,800 J
Benzo(a)pyrene	<11,000	<7,900	<540	NA	<400	NA	1,400 J
Benzo(b)fluoranthene	<11,000	<7,900	<540	NA	<400	NA	940 J
Benzo(g,h,i)perylene	<11,000	<7,900	<540	NA	150 J	NA	520 J
Benzo(k)fluoranthene	<11,000	<7,900	<540	NA	<400	NA	13,000 J
bis(2-Ethylhexyl)phthalate	<11,000 BJ	<7,900	<540	NA	80 J	NA	<4,900
Butylbenzylphthalate	<11,000	<7,900	<540	NA	41 J	NA	<4,900
Chrysene	<11,000	<7,900	74 J	NA	49 J	NA	1,600 J
Dibenzofuran	<11,000	1,900 J	150 J	NA	<400	NA	<4,900
Diethylphthalate	<11,000	<7,900	<540	NA	<400	NA	2,800 JB
Di-n-butylphthalate	1,300 J	2,800 JB	<540	NA	<400	NA	3,100 JB
Fluoranthene	<11,000	<7,900	68 J	NA	<400	NA	2,500 J
Fluorene	<11,000	1,200 J	<540	NA	<400	NA	<4,900
Indeno(1,2,3-c,d)pyrene	<11,000	<7,900	<540	NA	<400	NA	680 J
Naphthalene	4,200 J	**64,000**	200 J	NA	<400	NA	<4,900
n-Nitrosodiphenylamine	<11,000	<7,900	<540	NA	<400	NA	<4,900
Phenanthrene	<11,000	<7,900	230 J	NA	<400	NA	2,900 J
Phenol	<11,000	20,000	<540	NA	<400	NA	<4,900
Pyrene	<11,000	<7,900	71 J	NA	<400	NA	3,300 J
Metals							
Aluminum	**13,800,000**	NA	**812,000**	NA	**4,940,000**	NA	NA
Antimony	**62,100 N**	NA	<4,100 N	NA	<4,200 N	NA	NA

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB6 (continued)		SDB7				
Sample Depth	12-16'	20'	9-12'	9-12'	16-19.5'	16-19.5'	16-19.5'
Sample Date	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96
Sample Name	SS-26	SDB6	SS-27	SS-27RE	SS-28	SS-28RE	SDB7
Material Type	Waste	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste	Waste	Subsurface Soil
Metals (continued)							
Arsenic	$\boxed{15,900}$	NA	1,300 B	NA	6,000	NA	NA
Barium	**5,600,000 N**	NA	82,100 N	NA	190,000 N	NA	NA
Beryllium	1,600	NA	410 B	NA	840 B	NA	NA
Cadmium	4,800	NA	<300	NA	4,100	NA	NA
Calcium	76,400,000	NA	183,000,000	NA	28,000,000	NA	NA
Chromium	**39,500**	NA	5,100	NA	**33,600**	NA	NA
Cobalt	**22,200**	NA	730 B	NA	**4,600 B**	NA	NA
Copper	497,000 N*	NA	199,000 N*	NA	225,000 N*	NA	NA
Cyanide	<140	NA	<190	NA	<180	NA	NA
Iron	**52,500,000 ***	NA	**1,410,000 ***	NA	**28,200,000 ***	NA	NA
Lead	384,000	NA	60,900	NA	79,500	NA	NA
Magnesium	4,720,000	NA	599,000 B	NA	2,160,000	NA	NA
Manganese	**2,530,000 ***	NA	**60,900 ***	NA	**726,000 ***	NA	NA
Mercury	730	NA	110 B	NA	100 B	NA	NA
Nickel	30,600	NA	2,000 B	NA	49,500	NA	NA
Potassium	9,590,000	NA	533,000 B	NA	2,270,000	NA	NA
Selenium	1,000 BN	NA	2,400 N	NA	1,500 BN	NA	NA
Silver	3,300	NA	2,300 B	NA	1,600 B	NA	NA
Sodium	635,000 B	NA	46,900 B	NA	207,000 B	NA	NA
Thallium	<870	NA	<1,100	NA	<1,100	NA	NA
Vanadium	18,100	NA	5,000 B	NA	10,900 B	NA	NA
Zinc	2,150,000 N*	NA	33,900 N*	NA	309,000 N*	NA	NA
PEST/PCB							
4,4'-DDD	4.4 P	NA	<5.4	NA	<4	NA	NA
4,4'-DDE	<4.3	NA	<5.4	NA	<4	NA	NA
Aldrin	<2.2	NA	<2.8	NA	<2	NA	NA
Aroclor 1248	<43	NA	<54	NA	<40	NA	NA

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB6 (continued)		SDB7				
Sample Depth	12-16'	20'	9-12'	9-12'	16-19.5'	16-19.5'	16-19.5'
Sample Date	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96
Sample Name	SS-26	SDB6	SS-27	SS-27RE	SS-28	SS-28RE	SDB7
Material Type	Waste	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste	Waste	Subsurface Soil
PEST/PCB (continued)							
Aroclor 1260	<43	NA	<54	NA	<40	NA	NA
BHC (alpha)	<2.2	NA	<2.8	NA	<2	NA	NA
BHC (delta)	<2.2	NA	<2.8	NA	<2	NA	NA
BHC (Lindane) (gamma)	<2.2	NA	<2.8	NA	<2	NA	NA
Chlordane (alpha)	<2.2	NA	<2.8	NA	<2	NA	NA
Chlordane (gamma)	<2.2	NA	2.8 P	NA	<2	NA	NA
Dieldrin	<4.3	NA	<5.4	NA	<4	NA	NA
Endosulfan II	4.5	NA	<5.4	NA	<4	NA	NA
Endrin	<4.3	NA	<5.4	NA	<4	NA	NA
Endrin aldehyde	<4.3	NA	<5.4	NA	<4	NA	NA
Endrin ketone	6.7 P	NA	<5.4	NA	<4	NA	NA
Heptachlor	<2.2	NA	<2.8	NA	<2	NA	NA
Heptachlor epoxide	7.8 P	NA	2.6 JP	NA	<2	NA	NA
Total Organic Carbon	NA	NA	NA	NA	NA	NA	NA

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB8						SDB10
Sample Depth	**4-6'**	**4-6'**	**8-10'**	**10-22'**	**10-22'**	**14'**	**4-8'**
Sample Date	**05/13/96**	**05/13/96**	**05/13/96**	**05/13/96**	**05/13/96**	**05/13/96**	**05/14/96**
Sample Name	**SS-29**	**SS-29RE**	**SS-30**	**SS-18**	**SS-18RE**	**SDB8**	**SS-23**
Material Type	**Subsurface Soil**	**Subsurface Soil**	**Waste**	**Waste**	**Waste**	**Subsurface Soil**	**Subsurface Soil**
VOC							
1,1,2,2-Tetrachloroethane	<12	<12	<64	<12	<12	NA	<74
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (total)	29	95	17 J	9 J	1 JX	NA	<74
1,3,5-Trimethylbenzene	NA	NA	NA	NA	NA	NA	NA
2-Butanone (MEK)	<12	<12	140	9 J	<12	NA	180
2-Hexanone	<12	<12	<64	<12	<12	NA	<74
4-Methyl-2-pentanone (MIBK)	<12	<12	<64	<12	<12	NA	<74
Acetone	<12 BJ	<12	460	55 B	64	NA	790
Benzene	<12	11 J	<64	2 J	<12	NA	<74
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	<12	<12	<64	<12	<12	NA	77
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	<12 BJ	66 B	77	<12 BJ	18	NA	**170 B**
Naphthalene	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NA	NA	NA	NA	NA	NA	NA
n-Propylbenzene	NA	NA	NA	NA	NA	NA	NA
p-Isopropyltoluene	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	<12	<12	<64	<12	<12	NA	<74
Toluene	<12	3 J	31 J	3 J	1 J	NA	28 J
Trichloroethene	29	96	<64	10 J	2 J	NA	<74
Xylene, o	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	<12	<12	28 J	5 J	1 JX	NA	620
Xylenes, m+p	NA	NA	NA	NA	NA	NA	NA
SVOC							
1,2,4-Trichlorobenzene	<520	<520	<20,000	<770	NA	<7,900	2,700 J
2,4-Dimethylphenol	<520	<520	**51,000**	2,500	NA	**51,000**	<10,000

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB8						SDB10
Sample Depth	4-6'	4-6'	8-10'	10-22'	10-22'	14'	4-8'
Sample Date	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/14/96
Sample Name	SS-29	SS-29RE	SS-30	SS-18	SS-18RE	SDB8	SS-23
Material Type	Subsurface Soil	Subsurface Soil	Waste	Waste	Waste	Subsurface Soil	Subsurface Soil
SVOC (continued)							
2-Methylnaphthalene	<520	<520	9,400 J	890	NA	6,400 J	<10,000
2-Methylphenol	<520	<520	**30,000**	1,100	NA	**21,000**	<10,000
4-Methylphenol	<520	<520	**98,000**	2,800	NA	**34,000**	<10,000
Acenaphthene	<520	<520	<20,000	<770	NA	<7,900	<10,000
Anthracene	<520	<520	<20,000	150 J	NA	620 J	<10,000
Benzo(a)anthracene	200 J	290 J	<20,000	280 J	NA	2,800 J	<10,000
Benzo(a)pyrene	75 J	91 J	<20,000	<770	NA	$\boxed{3,900 J}$	<10,000
Benzo(b)fluoranthene	170 J	160 J	<20,000	140 J	NA	<7,900	<10,000
Benzo(g,h,i)perylene	100 J	69 J	<20,000	<770	NA	2,900 J	<10,000
Benzo(k)fluoranthene	74 J	87 J	<20,000	<770	NA	<7,900	<10,000
bis(2-Ethylhexyl)phthalate	<520	<520	<20,000 BJ	<770	NA	<7,900	<10,000
Butylbenzylphthalate	<520	<520	<20,000	87 J	NA	<7,900	<10,000
Chrysene	330 J	320 J	<20,000	400 J	NA	6,300 J	<10,000
Dibenzofuran	<520	<520	4,200 J	290 J	NA	4700 J	<10,000
Diethylphthalate	<520	<520	<20,000	<770	NA	<7,900	<10,000
Di-n-butylphthalate	<520	<520	<20,000	<770	NA	2,200 JB	<10,000
Fluoranthene	160 J	140 J	<20,000	280 J	NA	1,000 J	<10,000
Fluorene	<520	<520	5,900 J	430 J	NA	3,000 J	<10,000
Indeno(1,2,3-c,d)pyrene	74 J	<520	<20,000	<770	NA	<7,900	<10,000
Naphthalene	<520	<520	4,300 J	760 J	NA	5,500 J	9,300 J
n-Nitrosodiphenylamine	<520	<520	3,200 J	<770	NA	<7,900	<10,000
Phenanthrene	100 J	100 J	5,400 J	700 J	NA	3,100 J	<10,000
Phenol	<520	<520	<20,000	590 J	NA	16,000	<10,000
Pyrene	550	710	3,500 J	590 J	NA	8,800	<10,000
Metals							
Aluminum	**4,640,000**	NA	**3,970,000**	**2,660,000**	NA	NA	**6,420,000**
Antimony	<3,500 N	NA	**4,000 BN**	<4,900 N	NA	NA	<3,300 N

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB8						SDB10
Sample Depth	4-6'	4-6'	8-10'	10-22'	10-22'	14'	4-8'
Sample Date	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/14/96
Sample Name	SS-29	SS-29RE	SS-30	SS-18	SS-18RE	SDB8	SS-23
Material Type	Subsurface Soil	Subsurface Soil	Waste	Waste	Waste	Subsurface Soil	Subsurface Soil
Metals (continued)							
Arsenic	2,300 B	NA	17,800	3,400 B	NA	NA	4,400
Barium	446,000 N	NA	832,000 N	401,000 N	NA	NA	613,000 N
Beryllium	720 B	NA	650 B	280 B	NA	NA	690 B
Cadmium	1,600	NA	**18,000**	**18,900**	NA	NA	1,600
Calcium	32,600,000	NA	62,500,000	6,630,000	NA	NA	54,400,000
Chromium	12,400	NA	**34,300**	**630,000**	NA	NA	11,000
Cobalt	**4,700 B**	NA	**7,800 B**	**8,200 B**	NA	NA	**4,100 B**
Copper	74,200 N*	NA	**10,100,000 N***	**13,800,000**	NA	NA	112,000 N*
Cyanide	260 B	NA	460 B	210 B	NA	NA	<140
Iron	**15,900,000 ***	NA	**110,000,000 ***	**23,300,000 ***	NA	NA	**23,900,000 ***
Lead	186,000	NA	**1,930,000**	386,000	NA	NA	91,700
Magnesium	2,280,000	NA	**9,410,000**	3,250,000	NA	NA	4,440,000
Manganese	**1,580,000 ***	NA	**1,880,000 ***	**314,000 ***	NA	NA	**1,660,000 ***
Mercury	1,200	NA	**2,900**	730	NA	NA	80 B
Nickel	11,500	NA	54,600	43,100	NA	NA	10,200 B
Potassium	1,700,000	NA	2,400,000	801,000 B	NA	NA	3,240,000
Selenium	<880 N	NA	1,700 N	**8,000 N**	NA	NA	<830 N
Silver	1,000 B	NA	**5,100**	3,100 B	NA	NA	1,200 B
Sodium	104,000 B	NA	211,000 B	455,000 B	NA	NA	188,000 B
Thallium	<940	NA	<1,000	**5,100**	NA	NA	<890
Vanadium	12,500 B	NA	5,800 B	**235,000**	NA	NA	13,100 B
Zinc	251,000 N*	NA	**4,790,000 N***	1,340,000 N*	NA	NA	190,000 N*
PEST/PCB							
4,4'-DDD	<5.2	NA	<4.3	15 P	NA	NA	<5.2
4,4'-DDE	<5.2	NA	<4.3	13 P	NA	NA	<5.2
Aldrin	<2.7	NA	7.4 P	<2.0	NA	NA	<2.7
Aroclor 1248	<52	NA	<43	<39	NA	NA	<52 JP

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB8						SDB10
Sample Depth	**4-6'**	**4-6'**	**8-10'**	**10-22'**	**10-22'**	**14'**	**4-8'**
Sample Date	**05/13/96**	**05/13/96**	**05/13/96**	**05/13/96**	**05/13/96**	**05/13/96**	**05/14/96**
Sample Name	**SS-29**	**SS-29RE**	**SS-30**	**SS-18**	**SS-18RE**	**SDB8**	**SS-23**
Material Type	**Subsurface Soil**	**Subsurface Soil**	**Waste**	**Waste**	**Waste**	**Subsurface Soil**	**Subsurface Soil**
PEST/PCB (continued)							
Aroclor 1260	<52	NA	<43	<39	NA	NA	40 JP
BHC (alpha)	<2.7	NA	<2.2	2.1 P	NA	NA	<2.7
BHC (delta)	<2.7	NA	<2.2	5.4	NA	NA	<2.7
BHC (Lindane) (gamma)	<2.7	NA	<2.2	<2.0	NA	NA	<2.7
Chlordane (alpha)	7.7	NA	13 P	<2.0	NA	NA	<2.7
Chlordane (gamma)	<2.7	NA	<2.2	<2.0	NA	NA	<2.7
Dieldrin	13 P	NA	18	4.6 P	NA	NA	<5.2
Endosulfan II	<5.2	NA	<4.3	<3.9	NA	NA	<5.2
Endrin	<5.2	NA	5.5 P	<3.9	NA	NA	<5.2
Endrin aldehyde	<5.2	NA	<4.3	<3.9	NA	NA	<5.2
Endrin ketone	12 P	NA	12	4.5 P	NA	NA	<5.2
Heptachlor	<2.7	NA	6.3 P	11 P	NA	NA	<2.7
Heptachlor epoxide	<2.7	NA	26 P	13 P	NA	NA	<2.7
Total Organic Carbon	NA	NA	NA	NA	NA	NA	NA

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB10 (continued)		Criteria		
Sample Depth	8-20'	8-20'			
Sample Date	05/14/96	05/14/96	Residential	Residential	Residential
Sample Name	SS-24	SS-24RE	Direct	Drinking	Indoor Air
Material Type	Subsurface Soil	Subsurface Soil	Contact	Water Protection	Inhalation
VOC					
1,1,2,2-Tetrachloroethane	<12	<12	53,000	170	4,300
1,2,4-Trimethylbenzene	NA	NA	110,000 (I) C	2,100 (I)	110,000 (I) C
1,2-Dichloroethene (total)	<12	<12	640,000 C	1,400	22,000
1,3,5-Trimethylbenzene	NA	NA	94,000 (I) C	1,800 (I)	94,000 (I) C
2-Butanone (MEK)	<12	<12	27,000,000 (I) C,DD	260,000 (I)	27,000,000 (I) C
2-Hexanone	<12	<12	2,500,000 C	20,000	990,000
4-Methyl-2-pentanone (MIBK)	<12	<12	2,700,000 (I) C	36,000 (I)	2,700,000 (I) C
Acetone	37	11 J	23,000,000 (I)	15,000 (I)	110,000,000 (I) C
Benzene	<12	<12	180,000 (I)	100 (I)	1,600 (I)
cis-1,2-Dichloroethene	NA	NA	640,000 C	1,400	22,000
Ethylbenzene	<12	<12	140,000 (I) C	1,500 (I)	87,000 (I)
Isopropylbenzene	NA	NA	390,000 C	91,000	390,000 C
Methylene chloride	55	<38 B	1,300,000	100	45,000
Naphthalene	NA	NA	16,000,000	35,000	250,000
n-Butylbenzene	NA	NA	2,500,000	1,600	ID
n-Propylbenzene	NA	NA	2,500,000 (I)	1,600 (I)	(I) ID
p-Isopropyltoluene	NA	NA	NE	NE	NE
sec-Butylbenzene	NA	NA	2,500,000	1,600	ID
Tetrachloroethene	<12	<12	88,000 C	100	11,000
Toluene	<12	<12	250,000 (I) C	16,000 (I)	250,000 (I) C
Trichloroethene	<12	<12	500,000 C,DD	100	7,100
Xylene, o	NA	NA	150,000 (I) C J	5,600 (I) J	150,000 (I) C J
Xylenes (total)	<12	<12	150,000 (I) C	5,600 (I)	150,000 (I) C
Xylenes, m+p	NA	NA	150,000 (I) C J	5,600 (I) J	150,000 (I) C J
SVOC					
1,2,4-Trichlorobenzene	<33,000	NA	990,000 DD	4,200	1,100,000 C
2,4-Dimethylphenol	<33,000	NA	11,000,000	7,400	NLV

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB10 (continued)		Criteria		
Sample Depth	8-20'	8-20'			
Sample Date	05/14/96	05/14/96	Residential	Residential	Residential
Sample Name	SS-24	SS-24RE	Direct	Drinking	Indoor Air
Material Type	Subsurface Soil	Subsurface Soil	Contact	Water Protection	Inhalation
SVOC (continued)					
2-Methylnaphthalene	<33,000	NA	8,100,000	57,000	ID
2-Methylphenol	<33,000	NA	11,000,000 J	7,400 J	NLV
4-Methylphenol	<33,000	NA	11,000,000 J	7,400 J	NLV
Acenaphthene	<33,000	NA	41,000,000	300,000	190,000,000
Anthracene	<33,000	NA	230,000,000	41,000	1,000,000,000 D
Benzo(a)anthracene	<33,000	NA	20,000 (Q)	(Q) NLL	(Q) NLV
Benzo(a)pyrene	<33,000	NA	2,000 (Q)	(Q) NLL	(Q) NLV
Benzo(b)fluoranthene	<33,000	NA	20,000 (Q)	(Q) NLL	(Q) ID
Benzo(g,h,i)perylene	<33,000	NA	2,500,000	NLL	NLV
Benzo(k)fluoranthene	<33,000	NA	200,000 (Q)	(Q) NLL	(Q) NLV
bis(2-Ethylhexyl)phthalate	<33,000	NA	2,800,000	NLL	NLV
Butylbenzylphthalate	<33,000	NA	310,000 C	310,000 C	NLV
Chrysene	<33,000	NA	2,000,000 (Q)	(Q) NLL	(Q) ID
Dibenzofuran	<33,000	NA	ID	ID	ID
Diethylphthalate	<33,000	NA	740,000 C	110,000	NLV
Di-n-butylphthalate	<33,000	NA	760,000 C	760,000 C	NLV
Fluoranthene	<33,000	NA	46,000,000	730,000	1,000,000,000 D
Fluorene	<33,000	NA	27,000,000	390,000	580,000,000
Indeno(1,2,3-c,d)pyrene	<33,000	NA	20,000 (Q)	(Q) NLL	(Q) NLV
Naphthalene	<33,000	NA	16,000,000	35,000	250,000
n-Nitrosodiphenylamine	<33,000	NA	1,700,000	5,400	NLV
Phenanthrene	<33,000	NA	1,600,000	56,000	2,800,000
Phenol	<33,000	NA	12,000,000 C,DD	88,000	NLV
Pyrene	<33,000	NA	29,000,000	480,000	1,000,000,000 D
Metals					
Aluminum	**741,000**	NA	50,000,000 (B) DD	1,000 (B)	(B) NLV
Antimony	<3,600 N	NA	180,000	500 M	NLV

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB10 (continued)		Criteria		
Sample Depth	8-20'	8-20'			
Sample Date	05/14/96	05/14/96	Residential	Residential	Residential
Sample Name	SS-24	SS-24RE	Direct	Drinking	Indoor Air
Material Type	Subsurface Soil	Subsurface Soil	Contact	Water Protection	Inhalation
Metals (continued)					
Arsenic	3,500	NA	7,600	23,000	NLV
Barium	**2,910,000 N**	NA	37,000,000 (B)	1,300,000 (B)	(B) NLV
Beryllium	<170	NA	410,000	51,000	NLV
Cadmium	**8,600**	NA	550,000 (B)	6,000 (B)	(B) NLV
Calcium	15,000,000	NA	NA	NA	NA
Chromium	**30,200**	NA	2,500,000 total/dissolved	30,000 total/dissolved	total/dissolved NLV
Cobalt	**47,800**	NA	2,600,000	800	NLV
Copper	128,000 N*	NA	20,000,000 (B)	5,800,000 (B)	(B) NLV
Cyanide	1,400	NA	12,000 (P,R)	4,000 (P,R)	(P,R) NLV
Iron	**79,900,000 ***	NA	160,000,000 (B)	6,000 (B)	(B) NLV
Lead	544,000	NA	400,000 (B)	700,000 (B)	(B) NLV
Magnesium	282,000 B	NA	1,000,000,000 (B) D	8,000,000 (B)	(B) NLV
Manganese	**350,000 ***	NA	25,000,000 (B)	1,000 (B)	(B) NLV
Mercury	**6,800**	NA	160,000 (B,Z) (total)	1,700 (B,Z) (total)	48,000 (B,Z) (total)
Nickel	14,400	NA	40,000,000 (B)	100,000 (B)	(B) NLV
Potassium	244,000 B	NA	NE	NE	NE
Selenium	3,400 N	NA	2,600,000 (B)	4,000 (B)	(B) NLV
Silver	3,400	NA	2,500,000 (B)	4,500 (B)	(B) NLV
Sodium	178,000 B	NA	1,000,000,000 D	2,500,000	NLV
Thallium	960 B	NA	35,000 (B)	2,300 (B)	(B) NLV
Vanadium	<730	NA	750,000 DD	72,000	NLV
Zinc	772,000 N*	NA	170,000,000 (B)	2,400,000 (B)	(B) NLV
PEST/PCB					
4,4'-DDD	<5.3	NA	95,000	NLL	NLV
4,4'-DDE	<5.3	NA	45,000	NLL	NLV
Aldrin	<2.7	NA	1,000	NLL	1,300,000
Aroclor 1248	300 P	NA	(J,T) T	(J,T) NLL	3,000,000 (J,T)

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB10 (continued)		Criteria		
Sample Depth	8-20'	8-20'			
Sample Date	05/14/96	05/14/96	Residential	Residential	Residential
Sample Name	SS-24	SS-24RE	Direct	Drinking	Indoor Air
Material Type	Subsurface Soil	Subsurface Soil	Contact	Water Protection	Inhalation
PEST/PCB (continued)					
Aroclor 1260	42 JP	NA	(J,T) T	(J,T) NLL	3,000,000 (J,T)
BHC (alpha)	<5.5 P	NA	2,600	18	30,000
BHC (delta)	<2.7	NA	NE	NE	NE
BHC (Lindane) (gamma)	<2.7	NA	8,300	20 M	ID
Chlordane (alpha)	<2.7	NA	31,000 (J)	(J) NLL	11,000,000 (J)
Chlordane (gamma)	<2.7	NA	31,000 (J)	(J) NLL	11,000,000 (J)
Dieldrin	<5.3	NA	1,100	NLL	140,000
Endosulfan II	<15 P	NA	1,400,000 (J)	(J) NLL	(J) ID
Endrin	36	NA	65,000	NLL	NLV
Endrin aldehyde	33 P	NA	NE	NE	NE
Endrin ketone	<5.3	NA	NE	NE	NE
Heptachlor	<2.7	NE	5,600	NLL	350,000
Heptachlor epoxide	<2.7	NE	3,100	NLL	NLV
Total Organic Carbon	NA	NE	NE	NE	NE

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Sample Depth Sample Date Sample Name Material Type	Criteria (continued) Residential Ambient Air Volatile Source Inhalation	Groundwater/ Surface Water Interface Protection
VOC		
1,1,2,2-Tetrachloroethane	10,000	1,600 X
1,2,4-Trimethylbenzene	21,000,000 (I)	570 (I)
1,2-Dichloroethene (total)	180,000	12,000
1,3,5-Trimethylbenzene	16,000,000 (I)	1,100 (I)
2-Butanone (MEK)	29,000,000 (I)	44,000 (I)
2-Hexanone	1,100,000	NA
4-Methyl-2-pentanone (MIBK)	45,000,000 (I)	(I) ID
Acetone	130,000,000 (I)	34,000 (I)
Benzene	13,000 (I)	4,000 (I) X
cis-1,2-Dichloroethene	180,000	12,000
Ethylbenzene	720,000 (I)	360 (I)
Isopropylbenzene	1,700,000	ID
Methylene chloride	210,000	19,000 X
Naphthalene	300,000	870
n-Butylbenzene	ID	ID
n-Propylbenzene	(I) ID	(I) NE
p-Isopropyltoluene	NE	NE
sec-Butylbenzene	ID	ID
Tetrachloroethene	180,000	900 X
Toluene	2,800,000 (I)	2,800 (I)
Trichloroethene	78,000	4,000 X
Xylene, o	46,000,000 (I) J	700 (I) J
Xylenes (total)	46,000,000 (I)	700 (I)
Xylenes, m+p	46,000,000 (I) J	700 (I) J
SVOC		
1,2,4-Trichlorobenzene	28,000,000	1,800
2,4-Dimethylphenol	NLV	7,600

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Sample Depth Sample Date Sample Name Material Type	Criteria (continued) Residential Ambient Air Volatile Source Inhalation	Groundwater/ Surface Water Interface Protection
SVOC (continued)		
2-Methylnaphthalene	ID	ID
2-Methylphenol	NLV	1,400 J
4-Methylphenol	NLV	1,400 J
Acenaphthene	81,000,000	4,400
Anthracene	1,400,000,000	ID
Benzo(a)anthracene	(Q) NLV	(Q) NLL
Benzo(a)pyrene	(Q) NLV	(Q) NLL
Benzo(b)fluoranthene	(Q) ID	(Q) NLL
Benzo(g,h,i)perylene	NLV	NLL
Benzo(k)fluoranthene	(Q) NLV	(Q) NLL
bis(2-Ethylhexyl)phthalate	NLV	NLL
Butylbenzylphthalate	NLV	26,000 X
Chrysene	(Q) ID	(Q) NLL
Dibenzofuran	ID	1,700
Diethylphthalate	NLV	2,200
Di-n-butylphthalate	NLV	11,000
Fluoranthene	740,000,000	5,500
Fluorene	130,000,000	5,300
Indeno(1,2,3-c,d)pyrene	(Q) NLV	(Q) NLL
Naphthalene	300,000	870
n-Nitrosodiphenylamine	NLV	NA
Phenanthrene	160,000	5,300
Phenol	NLV	4,200
Pyrene	650,000,000	ID
Metals		
Aluminum	(B) NLV	(B) NA
Antimony	NLV	94,000

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Sample Depth Sample Date Sample Name Material Type	Criteria (continued) Residential Ambient Air Volatile Source Inhalation	 Groundwater/ Surface Water Interface Protection
Metals (continued)		
Arsenic	NLV	70,000 X
Barium	(B) NLV	260,000 (B) G,X
Beryllium	NLV	24,000 G
Cadmium	(B) NLV	2,500 (B) G,X
Calcium	NE	NE
Chromium	total/dissolved NLV	3,300 total/dissolved
Cobalt	NLV	2,000
Copper	(B) NLV	48,000 (B) G
Cyanide	(P,R) NLV	200 (P,R) M
Iron	(B) NLV	(B) NA
Lead	(B) NLV	1,700,000 (B) G,M,X
Magnesium	(B) NLV	(B) NA
Manganese	(B) NLV	36,000 (B) G,X
Mercury	52,000 (B,Z) (total)	100 (B,Z) (total) M
Nickel	(B) NLV	50,000 (B) G
Potassium	NE	NE
Selenium	(B) NLV	400 (B)
Silver	(B) NLV	500 (B) M
Sodium	NLV	NE
Thallium	(B) NLV	4,200 (B) X
Vanadium	NLV	190,000
Zinc	(B) NLV	110,000 (B) G
PEST/PCB		
4,4'-DDD	NLV	NLL
4,4'-DDE	NLV	NLL
Aldrin	58,000	NLL
Aroclor 1248	240,000 (J,T)	(J,T) NLL

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Sample Depth Sample Date Sample Name Material Type	Criteria (continued) Residential Ambient Air Volatile Source Inhalation	 Groundwater/ Surface Water Interface Protection
PEST/PCB (continued)		
Aroclor 1260	240,000 (J,T)	(J,T) NLL
BHC (alpha)	12,000	NE
BHC (delta)	NE	NE
BHC (Lindane) (gamma)	ID	20 M
Chlordane (alpha)	1,200,000 (J)	(J) NLL
Chlordane (gamma)	1,200,000 (J)	(J) NLL
Dieldrin	19,000	NLL
Endosulfan II	(J) ID	(J) NLL
Endrin	NLV	NLL
Endrin aldehyde	NE	NE
Endrin ketone	NE	NE
Heptachlor	62,000	NLL
Heptachlor epoxide	NLV	NLL
Total Organic Carbon	NE	NE

Footnotes on Page 25.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Not all the constituents analyzed for are listed in this table. This table presents only those constituents that were detected in one or more samples at least once over the course of the investigation.

All results are in micrograms per kilogram (µg/kg).

Bold	Indicates a value above the Residential and Commercial I Drinking Water Protection Criteria.
Italics	Indicates a value above the Residential Indoor Air Inhalation Criteria.
Underline	Indicates a value above the Groundwater/Surface Water Interface Protection Screening Level.
	Indicates a value above the Residential and Commercial I Ambient Air Source Volatile Soil Inhalation Criteria.
	Indicates a value above the Residential and Commercial I Direct Contact Criteria.
<	Less than detection limit.
*	Duplicate analysis was not within control limits.
B	Constituent was also detected in laboratory blank.
J	Estimated result.
N	Spike sample recovery is not within control limits.
NA	Not analyzed.
P	Greater than 25% RPD between two columns for pesticide or PCB.
SVOCs	Semi volatile organic compounds.
VOCs	Volatile organic compounds.

Criteria Footnotes:

B	Background may be substituted if higher than the calculated cleanup criteria.
C	Value presented is a screening level based on the chemical specific generic soil saturation concentration (Csat) since the calculated risk-based criterion is greater than Csat.
D	Calculated criterion exceeds 100%, hence it is reduced to 100%.
DD	Hazardous substance causes developmental effects.
G	GSI criterion is hardness dependent.
I	Chemical may exhibit the characteristic of ignitability, as defined in 40 CFR 261.21.
ID	Insufficient data.
iso	Isomer specific.
J	Chemical may be present in several isomer forms. Isomer specific concentrations must be added together for comparison to criteria.
M	Calculated criterion is below the target detection limit (TDL), therefore, the criterion defaults to the TDL.
NE	Not established.
NLL	Chemical is not likely to leach under most soil conditions.
NLV	Chemical is not likely to volatilize under most soil conditions.
P	Amenable or Method OIA-1677 analysis are used to quantify cyanide concentrations for compliance with all groundwater criteria.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Q	Criterion for carcinogenic polycyclic aromatic hydrocarbons (PAHs) were developed using "relative potential potencies" (RFPs) to benzo(a)pyrene.
R	Hazardous substance may exhibit the characteristic of reactivity as defined in 40 CFR 261.23.
T	Refer to Toxic Substances Control Act (TSCA) to determine applicability of TSCA cleanup standards.
X	The GSI criterion is not protective for surface water that is used as a drinking water source.
Z	Mercury generic cleanup criteria based on data for different species of mercury.

Table 5. Summary of Constituents Detected in Groundwater and Groundwater Grab Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GM-30			GM-31			GM-51	
Top of Screen Depth	75	75	75	105	105	105	67	67
Sample Date	10/27/98	05/12/99	05/12/99	10/24/98	05/03/99	10/09/00	10/20/98	04/18/99
Sample Name	GWGM-30	GWGM-30	GWGM-83	GWGM-31	GWGM-31	GWGM-31	GWGM-51	GWGM-51
VOC								
1,2-Dichloroethane	<1	<1	<1	<1	<1	NA	<1	<1
Benzene	<1	<1	<1	<1	<1	NA	<1	<1
Carbon disulfide	<1	<1	<1	<1	3.4	NA	<1	<1
Carbon tetrachloride	<1	<1	<1	<1	<1	NA	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1	NA	<1	<1
Toluene	1.2	<1	<1	<1	<1	NA	<1	<1
Xylenes (total)	<3	<3	<3	<3	<3	NA	<3	<3
SVOC								
2,4-Dimethylphenol	11	R	R	<5	R	<5.0	<5	<5
bis(2-Ethylhexyl)phthalate	<5	5.6	<5	<5	15	NA	<5	<5
Di-n-butylphthalate	<5	<5	<5	<5	<5	NA	<5	<5
Metals								
Arsenic	15	<5	<5	13	<5	NA	5.4	<5
Barium	280	<200	<200	<200 J	<200	NA	<200	<200
Calcium	110,000	140,000	130,000	62,000	63,000 J	NA	65,000	73,000
Calcium-DISS	NA	NA	NA	NA	NA	64,000	NA	NA
Iron	9,300	2,600	2,400	5,900 J	4,100	NA	75	380
Iron-DISS	NA	NA	NA	NA	NA	4,800	NA	NA
Magnesium	48,000	59,000	57,000	28,000 J	29,000	NA	31,000	34,000
Magnesium-DISS	NA	NA	NA	NA	NA	29,000	NA	NA
Manganese	730	1,400	1,300	1,000	940 J	NA	70	100
Potassium	6,600	12,000	12,000	2,300	3,100	NA	2,500	2,200
Potassium-DISS	NA	NA	NA	NA	NA	2,500	NA	NA
Silver	<0.5	<0.5	<0.5	<0.5	<0.5	NA	*0.63*	<0.5
Sodium	28,000	41,000	40,000	7,900	9,800	NA	4,200	6,300
Sodium-DISS	NA	NA	NA	NA	NA	10,000 J	NA	NA

Footnotes on Page 5.

Table 5. Summary of Constituents Detected in Groundwater and Groundwater Grab Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GM-30			GM-31			GM-51	
Top of Screen Depth	**75**	**75**	**75**	**105**	**105**	**105**	**67**	**67**
Sample Date	**10/27/98**	**05/12/99**	**05/12/99**	**10/24/98**	**05/03/99**	**10/09/00**	**10/20/98**	**04/18/99**
Sample Name	**GWGM-30**	**GWGM-30**	**GWGM-83**	**GWGM-31**	**GWGM-31**	**GWGM-31**	**GWGM-51**	**GWGM-51**
Inorganic								
Alkalinity	420,000	400,000	400,000	250,000	240,000	NA	170,000	200,000
Bicarbonate	NA	NA	NA	NA	NA	260,000	NA	NA
Chloride	63,000	46,000	43,000	40,000	40,000	36,000	7,400	15,000
Phosphorus	<100	<100	140	110	<100	NA	<100	<100
Silica	<100	9,900	9,900	<100	19,100	NA	<100	15,000
Sulfate	5,900	230,000	240,000	<5,000	<5,000	<5,000	110,000	130,000
Alcohols								
Ethanol	<1,000	<1,000	<1,000	<1,000	<1,000	NA	<1,000	3,600 J
Ethylene glycol	37,000	<20,000	<20,000	<20,000	<20,000 J	NA	<20,000	<20,000 J
Methanol	<800	<800	<800	<800	*2,400 J*	NA	<800	<800 J
n-Butanol	<1,000	<1,000	1,700 J	<1,000	<1,000	NA	<1,000	<1,000 J
Acetic Acid	290	<500	<500	340	<500	NA	250	<500
Biochemical Oxygen Demand	10,000 J	5,600	5,000	2,600 J	3,900	NA	<2,000	4,700
Chemical Oxygen Demand	<10,000	<10,000	20,000	<10,000	<10,000	NA	<10,000	<10,000
Total Organic Carbon	5,400	4,000	4,100	1,000	1,300	NA	<1,000	<1,000
Methane	27,400	8,460	8,450	6,980	5,030	NA	1,860	5,400
Total Dissolved Solids	NA	NA	NA	NA	290,000	NA	NA	NA
Density	NA	NA	NA	NA	NA	NA	NA	NA

Footnotes on Page 5.

Table 5. Summary of Constituents Detected in Groundwater and Groundwater Grab Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

			Criteria			
Well/Boring	**GMSB-4**				**Residential**	**Groundwater**
Top of Screen Depth	**NA**	**NA**	**Residential**	**Residential**	**Groundwater**	**Surface**
Sample Date	**06/04/97**	**06/09/97**	**Groundwater**	**Drinking Water**	**Volatilization to**	**Water Interface**
Sample Name	**GBGMSB-4/115**	**GBGMSB-4/183.5**	**Contact**	**Protection**	**Indoor Air Inhalation**	**Protection**
VOC						
1,2-Dichloroethane	1.2	<50	19,000 I	5 I,A	9,600 I	360 I, X
Benzene	2.3	8.2 J	11,000 I	5 I,A	5,600 I	200 I, X
Carbon disulfide	0.19 J	640	1,200,000 I,R,S	800 I,R	250,000 I,R	ID
Carbon tetrachloride	0.19 J	<50	4,600	5 A	370	45 X
Ethylbenzene	0.32 J	<50	170,000 I,S	74 I,E	110,000 I	18 I
Toluene	0.56 J	5.3 J	530,000 I,S	790 I,E	530,000 I,S	140 I
Xylenes (total)	0.34 J	<50	190,000 I,S	280 I,E	190,000 I,S	35 I
SVOC						
2,4-Dimethylphenol	4.9 J	*390*	520,000	370	NLV	380
bis(2-Ethylhexyl)phthalate	20	18 J	320 AA	6 A	NLV	32
Di-n-butylphthalate	5.1	<33	11,000 S	880	NLV	9.7
Metals						
Arsenic	NA	NA	4,300	50 A	NLV	150 B, X
Barium	NA	NA	14,000,000 B	2,000 B,A	B,NLV	400 G, X
Calcium	NA	NA	NE	NE	NE	NE
Calcium-DISS	NA	NA	NE	NE	NE	NE
Iron	NA	NA	58,000,000 B	300 B,E	B,NLV	NE
Iron-DISS	NA	NA	58,000,000 B	300 B,E	B,NLV	NE
Magnesium	NA	NA	1,000,000,000 B,D	400,000 B	B,NLV	NE
Magnesium-DISS	NA	NA	1,000,000,000 B,D	400,000 B	B,NLV	NE
Manganese	NA	NA	9,100,000 B	50 B,E	B,NLV	1,800 G, B, X
Potassium	NA	NA	NE	NE	NE	NE
Potassium-DISS	NA	NA	NE	NE	NE	NE
Silver	NA	NA	1,500,000 B	34 B	B,NLV	0.2 B, M
Sodium	NA	NA	1,000,000,000 D	120,000	NLV	NA
Sodium-DISS	NA	NA	1,000,000,000 D	120,000	NLV	NA

Footnotes on Page 5.

Table 5. Summary of Constituents Detected in Groundwater and Groundwater Grab Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

			Criteria			
Well/Boring	**GMSB-4**					
Top of Screen Depth	**NA**	**NA**				
Sample Date	**06/04/97**	**06/09/97**				
Sample Name	**GBGMSB-4/115**	**GBGMSB-4/183.5**	**Residential Groundwater Contact**	**Residential Drinking Water Protection**	**Residential Groundwater Volatilization to Indoor Air Inhalation**	**Groundwater Surface Water Interface Protection**
Inorganic						
Alkalinity	NA	NA	NE	NE	NE	NE
Bicarbonate	NA	NA	NE	NE	NE	NE
Chloride	NA	NA	ID	250,000 E	NLV	X
Phosphorus	NA	NA	(total),ID	63,000 (total)	(total),NLV	NE
Silica	NA	NA	NE	NE	NE	NE
Sulfate	NA	NA	ID	250,000 E	NLV	NE
Alcohols						
Ethanol	NA	NA	1,000,000,000 I,S	1,900,000 I	I,NLV	IP
Ethylene glycol	NA	NA	1,000,000,000 S	15,000	NLV	190,000 X
Methanol	NA	NA	29,000,000 S	3,700	29,000,000 S	1,000
n-Butanol	NA	NA	8,800,000 I	950 I	I,NLV	NE
Acetic Acid	NA	NA	180,000,000	18,000 M	NLV	18,000 M
Biochemical Oxygen Demand	<2,000	<2,000	NE	NE	NE	NE
Chemical Oxygen Demand	23,000	190,000	NE	NE	NE	NE
Total Organic Carbon	11,000	56,000 H J	NE	NE	NE	NE
Methane	10,700	36,800	K,ID	K,ID	K,K	ID
Total Dissolved Solids	NA	NA	NE	NE	NE	NE
Density	1,000	990	NE	NE	NE	NE

Footnotes on Page 5.

Table 5. Summary of Constituents Detected in Groundwater and Groundwater Grab Samples, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Not all the compounds analyzed for are listed in this table. This table presents only those compounds that were detected in one or more samples at least once over the course of the investigation.

Results are reported in micrograms per liter (µg/L).

(shaded)	Value above the Residential & Commercial I Drinking Water Criteria.
(boxed)	Value above the Groundwater Contact Criteria.
Bold	Value above the Residential and Commercial I Indoor Air Inhalation Criteria.
Italics	Value above the Groundwater Surface Water Interface Criteria.
<	Less than detection limit.
J	Estimated result.
R	Rejected data.
NA	Not analyzed.
VOC	Volatile organic compounds.
SVOC	Semi-volatile organic compounds.

Criteria Footnotes:

A	Criterion is the State of Michigan Drinking Water Standard, Section 5 of the Safe Drinking Water Act, Act No. 399 of the Public Acts of 1976.
B	Background may be substituted if higher than the calculated cleanup criteria.
D	Calculated criterion exceeds 100%, hence it is reduced to 100%.
E	Criterion is the aesthetic drinking water value.
G	GSI value is pH or water hardness dependent.
H	Valence-specific chromium data must be compared to the corresponding valence-specific cleanup criteria.
I	Chemical may exhibit the characteristic of ignitability, as defined in 40 CFR 261.21.
J	Chemical may be present in several isomer forms. Isomer specific concentrations must be added together for comparison to criteria.
K	Hazardous substance may be flammable and/or explosive.
M	Calculated criterion is below the analytical method detection limit (MDL).
R	Chemical may exhibit the characteristic of reactivity, as defined in 40 CFR 261.23.
IP	In progress.
NE	Not established.

Ford Motor Company
The Kingsford Products Company

RIVERSIDE DISPOSAL AREA INTERIM RESPONSE ACTION PLAN (IRAP)

FORD/KINGSFORD SITE,
KINGSFORD, MICHIGAN

October 2002

ARCADIS

Infrastructure, buildings, environment, communications

5.28.4 – 10/1/02

ARCADIS

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Riverside Disposal Area Interim Response Action Plan (IRAP)

Ford/Kingsford Site,
Kingsford, Michigan

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Tables

Figures

Appendices

Introduction

ARCADIS, on behalf of Ford Motor Company (Ford) and The Kingsford Products Company (KPC), has prepared this Interim Response Action Plan (IRAP) for the former Riverside Disposal Area (RDA) portion of the Ford/Kingsford Site in Kingsford, Michigan. A Remedial Investigation (RI) for the Ford/Kingsford Site was completed by ARCADIS from 1997 through 2000. The RI Report was subsequently prepared and submitted to the Michigan Department of Environmental Quality (MDEQ) for the Ford/Kingsford Site (June 2002). The RI Report identified the RDA as a source area.

This IRAP has been prepared to evaluate exposure pathways and propose an interim response action for the RDA. The legal description for the RDA is included as Appendix A. For the purposes of this IRAP, the RDA is defined as only the formerly disposed waste material within the area included in the legal description. Based on soil borings and test pits installed at the RDA, the maximum vertical extent of the waste material within the RDA is approximately 25 feet below land surface (ft bls). Stratigraphic and well construction logs for earlier investigation work completed at the RDA are included in the RI Report, and are not reproduced in this document.

Ford and KPC are seeking MDEQ approval of this IRAP for the RDA, which will ultimately be incorporated into a site-wide RAP for the Ford/Kingsford Site. The site-wide RAP for the Ford/Kingsford Site will address broader issues relating to additional parts of the study area, and include the RDA. This IRAP is intended to be consistent with a final remedial action for the RDA that will satisfy the requirements for the Part 201 Limited Residential Closure category. This IRAP addresses the RDA only; it does not address impacted groundwater migrating from other portions of the Ford/Kingsford Site, nor does it address environmental media beyond the boundaries of the RDA. The IRAP for the RDA proposes relocation and consolidation of the waste material within the RDA and construction of a permeable cover system.

Site Background

The RDA is located in the northwest 1/4 of Section 2, Township 39N, Range 31W, in southwestern Dickinson County, in the south-central part of Michigan's Upper Peninsula (Figure 1). The RDA (center point) is located approximately 500 feet south of the western end of Pyle Drive and approximately 1,400 feet west of Westwood Avenue (Figure 1). The RDA is located on a topographic feature called the Upper Terrace, at an elevation of approximately 1,120 feet relative to mean sea level (ft msl).

The size of the RDA, which was historically a depression, is approximately 4 acres. Two surface water bodies are located within 1 mile of the RDA. These include the Menominee River, approximately 600 feet to the southwest, and Cowboy Lake, approximately 4,752 feet to the northwest. Hydraulically, the Menominee River is downgradient from the RDA; while Cowboy Lake is neither upgradient nor downgradient of the RDA, due to having approximately the same regional hydraulic gradient as the RDA, and is outside the influence of the RDA.

In addition, there are three other surface water bodies present in the Kingsford Area, all located upgradient of the RDA. Crystal Lake/Mud Lake is located 1.3 miles to the northeast, Chapin Mine water body is located 2.4 miles to the northeast, and Lake Antoine is located 3.5 miles northeast of the RDA. The nearest public water supply wells (located near the Ford Airport, approximately 0.7 miles north of the RDA) are hydraulically upgradient from the RDA.

Aerial photographs indicate that the area was being used for sand/gravel borrow in 1938 and that waste disposal occurred at the RDA through at least the mid 1970s. Copies of these aerial photographs are provided in Appendix B. Use of the area for disposal by Ford/KPC was discontinued in 1961. Disposal thereafter in the RDA was by unknown others. Household, municipal, and industrial wastes were disposed in the RDA, based on the investigations conducted by ARCADIS.

Land use near the RDA is a mix of residential, commercial, and open space. The RDA is bordered by a heavily wooded area along the Menominee River to the west, Pyle Drive and the Woodland Elementary School to the north, Freeman Convalescent Home to the east, and residential developments to the south. The RDA is vacant land that is vegetated with the exception of a steep slope embankment on the northwest side that has been eroded, partially exposing waste. The RDA is currently owned by the city of Kingsford and is zoned residential. However, no buildings are present on the RDA and fencing has been installed around the perimeter of the area that contains some industrial wastes, to prohibit contact with this area.

Investigative Activities

Three previous investigations within the Ford/Kingsford Site have included the RDA. These investigations include the sampling of surface material by the Michigan Department of Natural Resources (MDNR) in 1988, the completion of soil borings and material sampling by the MDEQ in 1996, and the completion of soil borings, monitoring wells, test pits, and surface soil sampling by ARCADIS from 1997 to 2000.

MDNR 1988

In August 1988, the MDNR collected nine surface samples in a grid-like pattern. In addition, the contents of a drum that was present at the RDA were sampled (Sample #11). One of the surface samples (Sample #9) was from a paint-like substance that was removed from the RDA subsequent to the sample collection. The drum that was sampled and its contents were also removed from the RDA. The analytical information for the surface samples is presented in Table 1 and the analytical information for the materials removed from the RDA is presented in Table 2.

The analytical results for the eight surface samples (excluding the sample from the drum and the sample of the paint-like material removed from the RDA) indicate that volatile organic compounds (VOCs), pesticides, and polychlorinated biphenyls (PCBs) were not detected. Semi-volatile organic compounds (SVOCs) were detected in only two of the eight samples. Inorganics, including common soil constituents, were detected in all of the surface samples. Additionally, a composite sample of soil from several locations showed radioactivity levels within normal background levels, as discussed in the report entitled "*Report to Board of Education, Breitung Township Schools*" dated December 12, 1988.

Chromium, mercury, and naphthalene were the only constituents present in these surface samples in concentrations that were above any of Michigan Part 201 residential soil criteria. The concentrations of these constituents were not above the Residential Direct Contact soil criteria. As shown in Table 1, these constituent concentrations were only above the Groundwater/Surface Water Interface Protection Criteria (GSIPC). Chromium may have also exceeded the Residential Drinking Waer Protection Criteria (DWPC) in one sample. It should be noted that the chromium concentrations reported are for total chromium, but were compared to the Chromium VI soil criteria.

MDEQ 1996

In 1996, the MDEQ completed 10 borings designated as the SDB series within and near the RDA, as part of an "*Integrated Assessment Report*". A total of 20 samples of soil and waste material (two surface and 18 subsurface) were collected and submitted for laboratory analysis. Samples were not collected from Soil Borings SDB2, SDB5, or SDB9. Analytical information for these soil and waste samples is presented in Tables 1 and 2. The locations of the soil borings are shown on Figure 2.

Surface Material

As shown in Table 1, the analytical results indicated that some of the surface sample constituents detected had concentrations above Michigan Part 201 generic Residential and Commercial I Soil Criteria. The only VOC concentration above any Michigan Part 201generic criteria was tetrachloroethene, for the DWPC. Only one soil sample contained SVOC concentrations above the GSIPC and/or DWPC including, 2,4-dimethylphenol, 2-methylphenol, 4-methylphenol, dibenzofuran, naphthalene, and phenanthrene.

Metal concentrations above the Michigan Part 201 generic criteria included aluminum, arsenic, antimony, barium, cadmium, chromium, cobalt, copper, cyanide, iron, lead, manganese, mercury, molybdenum, selenium, silver, thallium, vanadium, and zinc. Three metals, arsenic, copper, and lead, were present in concentrations that were above the Michigan Part 201 Generic Residential Direct Contact Criteria (DCC) for soil.

Subsurface Material

The analytical results from the MDEQ samples indicated that some of the subsurface sample constituents detected had concentrations above certain Michigan Part 201 generic residential soil criteria (Table 3). The VOCs with concentrations above the Michigan Part 201 criteria include: 1,1,1,2-tetrachloroethane, ethylbenzene, toluene, and xylenes (total). In addition, methylene chloride was detected at a concentration above the applicable standards in one sample; however, this constituent is a known laboratory contaminant. With the exception of methylene chloride, the VOC concentrations above the Michigan Part 201 criteria were encountered in only one of the 20 subsurface samples (Soil Boring SDB6).

SVOCs were detected at concentrations above the Michigan Part 201 criteria in 10 of the 20 subsurface samples collected by the MDEQ from five of the sampling locations. These SVOCs included: 1,2,4-trichlorobenzene, 2,4-dimethylphenol, 2-methylphenol, 4-methylphenol, benzo (a) pyrene, dibenzofuran, fluorene, naphthalene, phenol, and phenanthrene. Only one SVOC, benzo (a) pyrene, from a subsurface sample (Soil Boring SDB8) collected at a depth of 14 ft bls was detected at a concentration that was above the generic Residential and Commercial I DCC for soil.

The metals that were detected in the MDEQ subsurface samples at concentrations above the Michigan Part 201 generic soil criteria included: aluminum, arsenic, antimony, barium, cadmium, chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc. Four of these metals were detected at concentrations that were above the Residential and Commercial I DCC for soil, including antimony, arsenic, copper, and lead.

Pesticides and PCBs were detected in 12 of the 20 MDEQ subsurface samples; however, none of the constituents were present at concentrations above the Michigan Part 201 generic criteria for soil.

ARCADIS 1997-2000

Investigations conducted by ARCADIS from 1997 to 2000 focused on surface soils and on the potential for the waste material to leach constituents to groundwater. The investigations included the following activities:

- The installation and sampling of one deep soil boring, GMSB-4, within the RDA. Soil samples were collected from Soil Boring GMSB-4 at various depths from 5 to 205 ft bls, and were submitted for laboratory analysis of VOCs, SVOCs, metals, total organic carbon (TOC), chemical oxygen demand (COD), and Toxicity Characteristic Leaching Procedure (TCLP) Two groundwater grab samples were also collected from Soil Boring GMSB-4 at 115 and 183.5 ft bls, and were submitted for analysis of VOCs, SVOCs, TOC, COD, biochemical oxygen demand (BOD), and dissolved gasses.

- The installation of shallow Monitoring Well GM-31 and deep Monitoring Well GM-5, located immediately downgradient of the RDA.

- The excavation of 16 test pits (June 1998 and July 1999) around and within the RDA to delineate the extent of the waste disposal. The limits of the industrial waste at the RDA are shown on Figure 2.

- The collection and analysis of 13 surface soil samples for VOCs, SVOCs, and select metals.

The analytical results of the sampling by ARCADIS, as well as the historical samples, are discussed in detail below in the RDA Characterization Section.

RDA Characterization

As part of the RDA IRAP, exposure pathways were identified for the RDA and the laboratory analytical results for the samples collected from the RDA were compared to applicable Michigan standards, to provide a complete vertical and horizontal characterization of the RDA. Potential exposure pathways are discussed in detail later in this document.

The RDA is zoned residential and is vacant land with no buildings. City of Kingsford zoning documentation is included as Appendix C. Ford and KPC are requesting a Limited Residential Closure for the RDA.

The State of Michigan Part 201 Residential and Commercial I Generic Cleanup Criteria and Screening Levels for soil, as defined in Operational Memorandum #18 (June 7, 2000), were used to evaluate the RDA under the following five categories:

1. Residential and Commercial I DCC.

2. Residential and Commercial I DWPC.

3. Residential and Commercial I, Soil Volatilization to Indoor Air Inhalation Criteria (SVIAIC).

4. Residential and Commercial I, Ambient Air, Particulate Soil Inhalation Criteria (PSIC) for surface material and Infinite Source Volatile Soil Inhalation Criteria (ISVSIC) for subsurface material.

5. Residential and Commercial I GSIPC.

Waste Delineation

Source delineation and waste characterization activities performed during the RI at the RDA included the completion of 16 test pits, one deep soil boring (GMSB-4), and collection and analysis of a composite sample of waste material encountered in Soil Boring GMSB-4.

Waste was present in eight of the 16 test pits and Soil Boring GMSB-4. Typical waste/fill material encountered included beige, tan, and red bricks and brick fragments, natural and processed wood fragments, charred wood, coal fragments, metal fragments, broken glass, and occasional inclusions and layers of black organic, carbonized material. This waste/fill material was often covered by or intermixed with sand fill. Based on the test pit and soil boring findings, the depth of the waste/fill ranged from a depth of approximately 3.5 to 22 ft bls. The extent of fill at the RDA is estimated at approximately 300 feet by 550 feet (Figure 2).

One test pit (RTP-3) located, east of the storm water retention basin, contained materials typical of household/miscellaneous wastes, including plastic trash bags, shingles, railroad ties, cloth debris, metal debris, glass bottles, vinyl flooring, and plastic.

A cross-section of the RDA was prepared from soil boring data to illustrate the estimated extent of waste/fill material and the comparative depth of groundwater underlying the waste in this area. The location of the cross-section is shown on Figure 3 and the cross-section is shown on Figure 4.

The depth to groundwater in and around the RDA is approximately 80 ft bls (approximately 50 feet below the base of the waste). Based on groundwater elevations, the groundwater flow in the vicinity of the RDA is to the southwest towards the Menominee River. The horizontal component of the hydraulic gradient was calculated for the shallow groundwater zone, which represents the zone where the monitoring wells in the vicinity of the RDA are screened. The southwestern groundwater flow has a horizontal gradient ranging from approximately 0.0027 to 0.0029.

The groundwater elevation data from Monitoring Wells GM-5 and GM-31, which were installed as a well nest, were used to calculate the vertical component of the groundwater gradient at the RDA. The vertical groundwater gradient based on the data ranges from zero to a very slight upward gradient.

Surface Material

A total of 24 surface material samples have been collected at the RDA. Of these samples collected, 21 were representative of surface soil and three were representative of waste material. One of the surface waste samples collected in 1988 by the MDNR (Sample #9) was from a paint-like substance that was subsequently removed from the RDA. The analytical results from this surface sample (Table 2) were not used in the evaluation of the surface material.

A summary of all the surface samples collected and the analytical results of these surface samples are provided in Table 1. The locations of the surface samples are shown on Figure 2. Thirteen surface soil samples (SSRIV-1 through SSRIV-13) were collected during the RI and analyzed for VOCs, SVOCs, and select metals. The additional 11 surface soil and waste samples were collected by the MDNR during previous investigations in August 1988 and by the MDEQ in May 1996. These 11 surface samples were analyzed for VOCs, SVOCs, metals, pesticides, and PCBs.

The analytical results of the surface samples are compared to the Michigan Part 201 Residential and Commercial I Generic Cleanup Criteria and Screening Levels for soil in the following sections.

DCC

Comparison of detected constituent concentrations in the surface samples from the RDA to the DCC indicates that three constituents in the surface materials were above the DCC, including: arsenic, copper, and lead (Table 1). The surface material at Soil Borings SDB3 and SDB4, and Surface Sample SSRIV-10 had concentrations of lead above the DCC. The surface material at Soil Boring SDB3, Surface Sample SSRIV-1, and Surface Sample SSRIV-7 had concentrations of arsenic above the DCC. Also, the surface sample at Soil Boring SDB3 had a concentration of copper above the DCC.

DWPC

When comparing the analytical results from the surface material samples to the DWPC, the concentrations of 21 constituents were above the DWPC, including: tetrachloroethene, 2,4-dimethylphenol, 2-methylphenol, 4-methylphenol, aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, selenium, silver, thallium, and zinc.

Eleven of the constituents (arsenic, barium, copper, mercury, selenium, silver, thallium, zinc, 2,4-dimethylphenol, 2-methylphenol, and 4-methylphenol) were only detected once at a concentration above the DWPC, primarily in the sample collected from Soil Boring SDB3. Lead was detected twice, and antimony and chromium were detected three times at concentrations that were above the DWPC.

Aluminum, cobalt, iron, and manganese were the constituents most often present at concentrations that were above the DWPC. The surface sample of waste collected from Soil Boring SDB3 had the most constituent concentrations above the DWPC.

SVIAIC

There were no constituent concentrations present in the surface material above the SVIAIC.

PSIC

Manganese was the only constituent present in a surface sample (from only the SSRIV-1 location) at a concentration above the PSIC.

GSIPC

The analytical results indicate that concentrations of 12 constituents were above the GSIPC for soil, including: 2,4-dimethylphenol, 2-methylphenol, 4-methylphenol, dibenzofuran, naphthalene, phenanthrene, chromium, cobalt, cyanide, mercury, selenium, and silver.

Seven of the constituents (2,4-dimethylphenol, 2-methylphenol, 4-methylphenol, dibenzofuran, naphthalene, phenanthrene, and cyanide) were only detected once at a concentration that was above the GSIPC for soil, primarily in the sample collected from Soil Boring SDB3. Selenium was detected twice at concentrations that were above the GSIPC for soil. The constituents that most commonly were present at concentrations above the GSIPC for soil were chromium, cobalt, and mercury.

Subsurface Soil and Waste Material

A total of 21 unsaturated subsurface soil and waste samples were collected at the RDA. A summary of the unsaturated subsurface samples collected and the results of these analyses are provided in Table 3. The locations of the subsurface samples are shown on Figure 2. Three unsaturated subsurface soil samples were collected during the RI. Select samples were analyzed for VOCs, SVOCs, select metals, pesticides/PCBs, and TOC, while other samples were only analyzed for TOC. The additional 18 unsaturated subsurface soil and waste samples were collected by the MDEQ during previous investigations in May 1996. These 18 subsurface samples were analyzed for VOCs, SVOCs, metals, pesticides, and PCBs. The waste samples collected during the RI were taken to characterize the type of waste present within the RDA (previously described in the Waste Delineation Section). In addition to the above listed laboratory analysis, several of the subsurface samples collected during the RI were subjected to TCLP analysis. A summary of these results is provided in Table 4.

The analytical results of the subsurface samples are compared to the Michigan Part 201 Residential and Commercial I Generic Cleanup Criteria and Screening Levels for soil in the following sections.

DCC

Comparison of constituents detected in the subsurface samples from the RDA to the DCC indicates that five constituents were present at concentrations above the DCC, including benzo (a) pyrene, antimony, arsenic, copper, and lead (Table 3). Three constituents, benzo (a) pyrene (Soil Boring SDB8), antimony (Soil Boring SDB3), and copper (Soil Boring SDB3) were only detected once at a concentration that was above the DCC. The samples from Soil Borings SDB3, SDB6, and SDB8 had concentrations of arsenic above the DCC. The samples from Soil Borings SDB3, SDB8, and SDB10 had concentrations of lead that were above the DCC.

DWPC

The analytical results indicate that concentrations of 27 constituents were above the DWPC, including: 1,1,2,2-tetrachloroethane, ethylbenzene, naphthalene, methylene chloride, xylenes (total), 2,4-dimethylphenol, 2-methylphenol, 4-methylphenol, aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc.

Ten of the constituents (1,1,2,2-tetrachloroethane, ethylbenzene, naphthalene, methylene chloride, xylenes (total), arsenic, magnesium, selenium, vanadium, and zinc) were detected in only one sample from one location at a concentration above the DWPC. The most common constituents present at concentrations above the DWPC were aluminum, cobalt, iron, and manganese. The samples from Soil Borings SDB3 and SDB8 contained the highest number of constituents at concentrations above the DWPC.

SVIAIC

One constituent, 1,1,2,2-tetrachloroethane, was present at a concentration above the SVIAIC in only one sample from Soil Boring SDB6, indicating a very limited extent.

ISVSIC

One constituent, 1,1,2,2-tetrachloroethane, was present at a concentration above the ISVSIC in only one sample from Soil Boring SDB6, again indicating a very limited extent.

GSIPC

When comparing the analytical results to the GSIPC for soil, the concentrations of 21 constituents were above the GSIPC, including: 1,1,2,2-tetrachloroethane, ethylbenzene, toluene, xylenes (total), 1,2,4-trichlorobenzene, 2,4-dimethylphenol, 2-methylphenol, 4-methylphenol, dibenzofuran, fluorene, naphthalene, phenanthrene, phenol, chromium, cobalt, cyanide, mercury, selenium, silver, thallium, and vanadium.

Seven of the constituents (1,1,2,2-tetrachloroethane, ethylbenzene, toluene, xylenes (total), 1,2,4-trichlorobenzene, fluorene, and vanadium) were detected only once from one location at a concentration above the GSIPC for soil. The most common constituents that were present at concentrations above the GSIPC for soil were chromium, cobalt, silver, and mercury. The samples from Soil Borings SDB3 and SDB8 contained the highest number of constituents that were above the GSIPC for soil.

TCLP Analyses

A waste sample (GMSB-4/5-25) and several subsurface soil samples from the RDA were submitted for TCLP analysis. The results of the TCLP analysis are summarized in Table 4.

A comparison of TCLP results with Federal Standards established in 40 CFR Part 261.30, which identifies maximum concentrations for contaminants for the toxicity characteristic for hazardous waste, indicates that the levels of the analyzed constituents present in the extract of the waste material do not define the material as a hazardous waste.

Potential for Continued Leaching to Groundwater

An evaluation was made to determine whether constituents in the waste/fill material may potentially leach to groundwater. The evaluation included data collected from: (1) the composite sample of waste/fill materials sampled from Soil Boring GMSB-4, (2) groundwater grab samples collected from Soil Boring GMSB-4, and (3) groundwater samples collected from Monitoring Wells GM-5 and GM-31, located hydraulically downgradient of the RDA.

A composite waste sample was collected from Soil Boring GMSB-4 and submitted for laboratory analysis. A TCLP extraction was performed on this sample and the extract was analyzed for SVOCs, COD, and TOC. A limited SVOC analysis was performed because previous groundwater data indicated that selected SVOCs provided a "signature" of impacts to the groundwater related to the site. The laboratory results from the TCLP analyses performed on the sample from Soil Boring GMSB-4 are presented in Table 4. No SVOCs that were analyzed for were detected in the extract of the waste sample and the TOC and COD were 7 and 30 milligrams per liter (mg/L), respectively.

Groundwater grab samples were also collected during the completion of Soil Boring GMSB-4, which was drilled through the waste/fill material at the RDA and terminated at bedrock. These groundwater grab samples were collected from two intervals at depths of 115 and 183.5 ft bls (Table 5). A comparison was made between the TCLP extract results from the waste sample and the chemical results for the groundwater grab samples.

Examination of the groundwater grab sample results shows that for VOCs, the concentrations in the groundwater from both the shallow and deeper intervals were generally low for all constituents, except carbon disulfide. Carbon disulfide was detected at significantly higher concentrations in the deeper groundwater sample (640 micrograms per liter [μg/L]) than in the shallower groundwater sample (0.196 μg/L, estimated below the laboratory quantitation limit). The findings for SVOCs were similar in that concentrations of SVOCs were low for all constituents except for 2,4-dimethylphenol. The concentration of 2,4-dimethylphenol was significantly higher in the deeper groundwater sample (390 μg/L) than in the shallower groundwater sample (4.9 μg/L).

Groundwater quality hydraulically downgradient from the RDA was determined using the chemical analyses of groundwater samples collected from Monitoring Wells GM-5 and GM-31. Monitoring Well GM-31 is screened in the interval between 105 and 115 ft bls, which is representative of shallow groundwater conditions. Monitoring Well GM-5 is screened in the interval between 250 and 260 ft bls, which is representative of deeper groundwater conditions. A comparison between the shallow (Monitoring Well GM-31) and deeper (Monitoring Well GM-5) groundwater samples for VOCs indicates only low concentrations of VOCs were present in both samples. Review of the groundwater samples for the SVOCs results indicates that no SVOCs were detectable in shallow groundwater, whereas the deeper groundwater contained concentrations of 2,4-dimethylphenol ranging from 870 to 910 μg/L.

The results from these analyses show that waste/fill material in the RDA is not leaching constituents to groundwater. Groundwater samples collected from the RDA show that the water deeper in the groundwater system contains concentrations of VOCs, SVOCs, TOC, and COD (Table 5). A thick unit of silt and clay separates the waste material in the RDA from the shallow groundwater, at approximately 80 ft bls. There is no measurable groundwater encountered above the silt/clay unit. The absence of impacted shallow groundwater, along with the chemical analyses of the TCLP extraction of the composite waste/fill material, indicate constituents associated with the deep groundwater are associated with sources hydraulically upgradient of the RDA.

Groundwater

As discussed in the previous section, the results of the leachability testing and distribution of the constituents in the groundwater indicate that waste material in the RDA is not impacting groundwater quality and that the source of the constituents in the groundwater is upgradient from the RDA. This determination provided guidance on the type of response action required to address the RDA exposure pathways. Site-wide groundwater, including groundwater in the area of the RDA, will be covered by the site-wide RAP, which will address all relevant groundwater exposure pathways. However, to understand what impacts to groundwater exist in the area of the RDA from other sources, an abbreviated evaluation of groundwater sampling results compared to the Michigan Part 201 Residential and Commercial I Generic Groundwater Cleanup Criteria and Screening Levels was completed for the RDA. Specific groundwater criteria used for the purpose of this evaluation are under the following four categories:

- Residential and Commercial I Groundwater Contact Criteria (GCC).
- Residential and Commercial I Drinking Water Criteria (DWC).
- Residential and Commercial I Groundwater Volatilization to Indoor Air Inhalation Criteria (GVIAIC).

- Residential and Commercial I Groundwater/Surface Water Interface Protection Criteria (GSIPC).

The analytical results from two groundwater grab samples (Soil Boring GMSB-4) and three groundwater monitoring wells (GM-30, GM-31, and GM-5) collected in the vicinity of the RDA were used for comparison to the groundwater criteria. The locations of the soil boring and monitoring wells are shown on Figure 2. A summary of the groundwater results for VOCs, SVOCs, and metals for these locations is presented in Table 5.

GCC

There were no constituents in the groundwater that were present at concentrations above the GCC.

DWC

Comparison of the groundwater analytical results to the DWC indicates that seven constituents were present at concentrations above the DWC, including: benzene, 2,4-dimethylphenol, bis(2-ethylhexyl)phthalate, ethylene glycol, n-butanol, iron, and manganese. Four of the constituents (benzene, 2,4-dimethylphenol, ethylene glycol, and n-butanol) were detected at concentrations above the DWC only once and the results of additional groundwater sampling did not confirm the presence of ethylene glycol and n-butanol. The presence of bis(2-ethylhexyl)phthalate also was not detected in additional groundwater samples collected from Monitoring Well GM-31. The constituents that were most often detected at concentrations above the DWC were iron and manganese.

GVIAIC

There were no constituents in the groundwater that were present at concentrations above the GVIAIC.

GSIPC

Comparison of the groundwater analytical results to the GSIPC for groundwater indicates that two constituents, methanol and 2,4-dimethylphenol, were present at concentrations above the GSIPC.

Methane

Methane gas is present near the RDA, but it is not associated with the waste material in the RDA. The methane gas occurs on the northeastern and eastern side of the RDA at a depth of approximately 70 ft bls, trapped beneath a thick unit of silt and clay. A soil vapor extraction system (SVE) with an associated off-gas flaring unit, operating adjacent to the RDA, addresses the methane accumulation beneath the silt/clay layer.

Methane gas has been encountered at various locations within the Kingsford Study Area. The methane gas is generally the result of the biodegradation of organic material in the deep groundwater system and release of the methane gas from the groundwater as the pressure on the groundwater is reduced. This pressure reduction occurs in areas where the groundwater movement is vertically upwards. Methane gas that migrates in the unsaturated zone above the water table (vadose zone) may either degrade naturally, or be vented to the land surface if no confining layer is present. Investigations have shown that where a confining layer is present, migration of methane gas to the land surface is prevented.

The presence of a confining silt and clay layer, from approximately 25 to 70 ft bls, is the case at and in the vicinity of the RDA. The silt/clay unit prevents methane surface venting at and near the RDA and creates the methane gas accumulation at 70 ft bls.

Due to the presence of the confining silt/clay unit and the nature of the waste material at the RDA, methane gas will not pose a problem in the near surface at the RDA. Methane was not detected at significant levels in the soil borings or the test pits completed at the RDA. The SVE system near the RDA manages the methane gas derived from the deep groundwater.

Risk Evaluation for Soil

Risk pathways are identified showing the route(s) and receptor(s) potentially affected, so that a response action for the RDA may be evaluated for the need and ability to eliminate or minimize a risk pathway.

The potential pathways for exposure to materials at the RDA include:

- Direct contact with subsurface waste material via unauthorized excavation or construction activities.

- Direct contact or inhalation of surface soil particulates.

A discussion of the pathways and how they will be addressed by a response action is included below.

Direct Contact Pathways

A response action that creates a physical barrier or removes the waste material will eliminate the direct contact pathway for both surface and subsurface materials and the inhalation pathway for surface soil particles.

Response Action Objectives

The response action objectives address the prevention of contact with certain buried and surface waste materials. The RDA is zoned residential and the future use of the area will be restricted to recreational.

As previously discussed, waste material within the RDA does not impact the groundwater. However, groundwater in the vicinity of the RDA does contain constituent concentrations that are above several Michigan Part 201 generic groundwater criteria, due to sources upgradient of the RDA. Any response action relating to groundwater in the vicinity of the RDA will be addressed by the site-wide RAP.

RDA Response Action Evaluation

Response actions for the RDA were evaluated to address the IRAP objectives. The response options evaluated include permeable cover systems, low-permeability cover systems, excavation and off-site disposal of waste material, and institutional controls. Presented below is an evaluation of these response options.

Permeable Cover System

A permeable cover system response action for the RDA would consist of a common fill layer and a vegetative protective layer. The cover would comprise an area of approximately 4 acres centered over the RDA. Waste material located within the right-of-way for the future extension of Evergreen Court would be excavated and consolidated with existing waste in the RDA for placement beneath the cover system. The location and extent for a permeable cover system at the RDA is shown on

Figure 5. The permeable cover system for the RDA would consist of a 30-inch layer of common fill material placed above the waste material finished with a vegetative cover. The final grading of a permeable cover system would be designed to prevent erosion and surface-water ponding.

During construction, appropriate management of soil and waste would be required along with ambient air monitoring, both for construction worker health and safety requirements and for environmental protection at the site perimeter. Requirements for storm water management/erosion control and waste management would be addressed during the design of a permeable cover system. A long-term maintenance plan for a permeable cover system would also be prepared to maintain the efficacy of this response action. The estimated cost for a permeable cover system response action for the RDA is provided in Table 6.

Low-Permeability Cover System

An low-permeability cover system response action for the RDA would consist of a 40 to 60-mil, high-density polyethylene (HDPE) liner or linear low density polyethylene (LLDPE) or equal material, a sand drainage layer, a protective soil layer above the sand drainage layer, and a vegetative cover at the surface level. The sand drainage layer would serve to prevent the buildup of infiltrate on the liner surface. The sand drainage layer and liner would be gently sloped to route infiltrate away from the waste material to a point beyond the horizontal extent of waste material. The construction of an low-permeability cover system requires preparation and clearing of the area planned for construction. Additionally, a venting system installed beneath the liner for management of vapor by-products potentially generated by decomposition of the waste material would be incorporated into the low-permeability cover system.

The footprint of a low-permeability cover system would be the same as for a permeable cover system, as shown on Figure 5. As in the case for a permeable cover system, waste material located outside of the extent of the cover system would be removed and consolidated with existing waste within the RDA, for placement beneath the cover system. The low-permeability cover system liner would be buried at a depth of approximately 3 ft bls.

Similar to a permeable cover system response option, during the construction process appropriate management of soil and waste would be required and ambient air monitoring would be implemented. Requirements for storm water management/erosion control and waste management would be addressed during the design of a low-permeable cover system. A long-term maintenance plan for a low-permeability cover system would be prepared to maintain the efficacy of this response action. The estimated cost for a low-permeability cover system response action for the RDA is provided in Table 7.

Excavation and Off-Site Disposal of Waste Material

An excavation and off-site disposal of waste material response action for the RDA would require the excavation of all of the waste material at the RDA and transportation off-site for disposal of this material at an appropriate facility. The areal and vertical extents of the waste material were determined during the RDA characterization program. Based on the data collected, the volume of material requiring removal and disposal is approximately 100,000 cubic yards. The waste material is non-hazardous so the material would be disposed at an appropriate landfill facility. The estimated cost for an excavation and off-site disposal of waste material response action for the RDA is provided in Table 8.

Institutional Controls

An institutional control response action for the RDA would include, but may not be limited to, a restrictive covenant on the RDA property. At a minimum, a restrictive covenant would prohibit the use of groundwater located beneath the RDA. If a cover system is the selected response action, then a restrictive covenant would also be included in the response action and written to:

- Limit the use of the RDA property to select usage, such as for recreational purposes.
- Prohibit the removal, disturbance or manipulation of the selected cover system, unless performed in accordance with a cap maintenance plan.
- Allow an authorized person to penetrate the selected cover system only under controlled, temporary conditions, and under provisions that would restore the integrity of the cover system.
- Require maintenance of the selected cover system.
- Require the installation and maintenance of permanent site boundary markers.

Comparison of Response Actions

A response action for the RDA consisting solely of institutional controls would not meet the response action objectives of preventing contact with certain buried and surface waste material. Therefore, institutional controls could only be used, where needed, to support the other three response actions evaluated: permeable and low-permeability cover systems, and excavation and off-site disposal of waste material.

Each of these three response actions evaluated would achieve the response option objective of preventing contact with certain waste material. The permeable and low-permeability cover system response options achieve this objective by installing a soil barrier to prevent direct contact with underlying waste material. Institutional controls could be used to maintain the integrity of either of these cover systems. Both the permeable and low-permeability cover system would minimize disturbance of the waste material and can be easily implemented at the RDA. There is a lengthy history of effective application of this technology at similar sites, and the technology itself poses no additional exposure pathway to the public or environment. Future use of the RDA for recreational purposes could be integrated into a cover system design that could provide a benefit to the community.

As a low-permeability cover system is generally applicable where the underlying waste material is impacting groundwater, this type of cover system is not warranted at the RDA, because groundwater quality in the vicinity of the RDA has been impacted by up-gradient sources, and not from the waste material at the RDA. In addition, permeable systems tend to enhance biodegradation of some of the waste constituents under the permeable cover. Therefore, of the two cover system response options, a permeable cover system would be the more appropriate and cost-effective cover system for the RDA response action.

An excavation and off-site disposal of waste material response action would also achieve the response action objective, since waste material would no longer remain at the RDA. Excavation of the waste material would disturb the waste and require air and particulate monitoring beyond that required for construction of a cover system. Off-site transport of the approximately 100,000 cubic yards of waste material would require utilizing an estimated 6,700 trucks to transport the waste material to an appropriate landfill facility. The truck traffic would have a significant impact on the community roadways and traffic. After completion of an excavation activity, the remaining open excavation area would have little potential for beneficial reuse by the community.

RDA Interim Response Action

A permeable cover system with institutional controls has been selected as the interim response action for the RDA, due to minimization of disturbance to the waste material and ease of implementation. This response action is the most cost-effective option, and achieves the response action objectives for the RDA by addressing relevant exposure pathways. Future use of the RDA for recreational purposes will be integrated into the permeable cover system design, which will provide a benefit to the community and achieve response action objectives in a cost-effective manner.

A permeable cover system can be implemented at the RDA. Traditional environmental construction practices according to a site-specific health and safety plan will be more than sufficient to execute this response action. Permeable cover systems have a long history of effectiveness and ability to be implemented. There are no unusual physical features at the RDA that would preclude the use of a permeable cover system. The response action will be effective in minimizing direct contact with waste. Therefore, this response action is considered effective for all types of constituents found at concentrations above the Michigan Part 201 generic soil criteria.

The permeable cover system will consist of a common fill layer and a vegetative protective layer. The conceptual cover system footprint is shown on Figure 5. The cover system will comprise an area of approximately 4 acres centered over the RDA. Waste material, located within the right-of-way for the future extension of Evergreen Court, will be excavated and consolidated with existing waste within the RDA, for placement beneath the permeable cover system (Figure 6). There will be two types of final surface cover designed for the cover system; one for an area of a proposed recreational playing surface and one for the remaining portion of the RDA. Illustrations of the two covers are depicted on Figure 7. Both covers would consist of 30 inches of common fill material installed above the waste material, with the types of soil for the common fill layer varying between the two covers types. The final grading of the permeable cover system would be designed to prevent erosion and surface-water ponding.

During construction, appropriate management of soil and waste will be required. Ambient air monitoring will be in place, both for construction worker health and safety requirements and for environmental protection at the site perimeter. Requirements for storm water management/erosion control, waste management, and construction health and safety are included in the Waste Management Plan and Construction Health and Safety Plan Guideline documents, prepared for the selected RDA response action. A copy of these documents are included in Appendices D and E, respectively. Long-term maintenance for the permeable cover system will also be important to maintain the efficacy of the RDA response action. Periodic inspections for items such as (but not limited to) surface erosion, deep rooted vegetative weeds, and burrowing animals will be part of the long-term operation and maintenance (O&M), as each has the potential to interfere with the integrity of the permeable cover system. An O&M Plan has been prepared for the selected RDA response action, and is included in Appendix F.

In addition to the permeable cover selected as the RDA response action, a restrictive covenant limiting the use of the RDA property will also be implemented for the RDA. This restrictive covenant will be written to allow an authorized person to penetrate the cover system only under controlled, temporary conditions, in accordance with the Waste Management Plan and the Construction Health and Safety Plan Guideline. The restrictive covenant will require restoration of the integrity of the permeable cover system if disturbed.

The City of Kingsford, the current owner of the RDA property, concurs with the proposed response action of a permeable cover system and institutional controls for the RDA. Documentation of this concurrence is included in Appendix G.

Response Action Design

A permeable cover system and institutional controls have been selected by Ford and KPC as the interim response action for the RDA. A conceptional design for the response action is described in the following section. A 124,325 square foot permeable cover system for the RDA is recommended to give maximum future usefulness and achieve response action objectives in a cost-effective manner.

Cover layer fill depths and suitable compaction standards will be used to provide sufficient strength for compaction and load bearing and will be identified in the response option design. Multi-year observation at the RDA has not indicated that there is a subsidence problem at the RDA, and it is not considered to be problematic for long-term maintenance of the permeable cover system.

The following design elements will be used in preparing plans and specifications for implementation of the selected response action:

- The RDA will first be cleared and rough graded. During these activities, care will be taken to minimize the generation of airborne particles.

- The common fill layer will be at least 18- to 24-inches thick and cover the RDA as delineated on Figure 5. The thickness of fill material will depend on the location within the RDA. Additional common fill material may be placed as necessary to promote proper drainage.

- Topsoil or a topsoil/sand mixture will be placed over the common fill layer at a thickness of 6 to 12 inches. The amount of topsoil will depend on the location in the RDA. Twelve inches of topsoil/sand mixture will be placed on the cover area surface and 6 inches of topsoil will be placed over the remaining portion of the RDA. Therefore, a minimum of 30 inches of cover material (common fill layer and topsoil layer) will be maintained over the entire RDA.

- The topsoil will be seeded, fertilized, and mulched.

- A restrictive covenant will be implemented for the RDA. Restrictions for the area are generally described below, and a copy of the restrictive covenant is provided in Appendix H.

  - Construction activities (road or utility) must restore the integrity of the cover system if the cover system is negatively affected by the construction.

  - Any construction activity that may adversely affect the cover system must follow the Waste Management Plan (Appendix D) and the Construction Health and Safety Plan Guideline (Appendix E).

  - No municipal or private wells will be constructed in the RDA.

  - Permanent markers that describe the restricted area and the nature of the restrictions will be installed and maintained.

  - The cover will be maintained according to the Operation and Maintenance Plan (Appendix F).

Following area preparation, the permeable cover system construction will commence. The common fill layer will be incorporated before the topsoil layer is placed. Following final grading of the surface layer to blend in with the surrounding area, surface vegetation will be established to control surface-water run-off, erosion, and ponding.

Any utility work or road construction that penetrates through the permeable cover system will follow the Construction Health and Safety Plan Guideline and the Waste Management Plan developed for the RDA. All workers involved with future utility work or road construction in the RDA will follow the Construction Health and Safety Plan Guideline if there is the possibility of dermal contact with impacted soil/waste material beneath the permeable cover system. Any soil/waste material that is excavated during future construction activities will need to be managed in accordance with the Waste Management Plan. After any future construction activities are complete, any portion or the permeable cover system that was disturbed will need to be restored to pre-construction condition. This includes adding at least 18 inches of common fill and enough topsoil to maintain at least a 30-inch cover, as well as seeding of the disturbed area. The disturbed area will be checked for settlement after construction activities. If settling has occurred, the permeable cover system will be inspected to ensure that it still meets the original specifications.

The RDA will be inspected on a periodic basis in accordance with the O&M Plan (Appendix F) to ensure compliance with the IRAP. These inspections will be recorded in a dedicated logbook and appropriate inspection forms.

Survey reference markers will be placed at the corners of the permeable cover system. The survey reference markers will be used to both delineate the areal extent of the RDA and as reference points for any potential settling of the permeable cover system. If any portion of the permeable cover system does not meet the design specifications, it will be re-constructed so that it does. In addition, permanent markers will be installed at locations approved by MDEQ, which will describe the restricted areas of the RDA and the nature of the restrictions. Details concerning the permanent markers are provided in Appendix I. The survey reference markers and permanent markers will be inspected at least annually.

Response Action Implementation and Schedule

Construction to date at the RDA has adhered to the Waste Management Plan and Health and Safety Plan Guideline already in existence and updated for RDA construction activities. Construction best management practices are being utilized in accordance with State of Michigan soil disruption and storm water management regulations. Design documents will include construction quality control, quality assurance, and construction verification sampling plans.

Key dates for the implementation of the RDA IRAP are tentatively identified below.

Project Phase	Date
RDA IRAP Construction Initiated	August 2001
Submittal of Construction Report	March 2003

This schedule is contingent on reasonable and expected weather conditions. Every practical effort will be made to achieve the established schedule.

References

Center for Environmental Health Sciences (CEHS), Michigan Department of Public Health (MDPH), and Michigan Department of Natural Resources (MDNR), December 12, 1988. Report to Board of Education, Breitung Township Schools. Health Risk Evaluation, Land Area Near New Elementary School, Kingsford, Dickinson County, Michigan.

Earth and Water Resources Engineers. 1987. Phase II Site Investigation of the Kingsford Site, Kingsford, Michigan, 75 pages plus attachments.

ARCADIS. 1998a. Remedial Investigation Work Plan, 14 pages plus figures and tables.

ARCADIS. 1998b. Engineering Evaluation/Cost Analysis Report, 49 pages plus figures, tables and appendices.

Michigan Department of Environmental Quality. September 1997. Integrated Assessment Report for Former Ford Kingsford Plant, Kingsford, Michigan.

REAC. June 1996. Viking GC/MS Final Field Analytical Report, Former Ford/Kingsford Site, Kingsford, Michigan.

U.S. Environmental Protection Agency. 1993. Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA, EPA450-R-93-057, 57 pages.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Soil							
Depth	0'	0'	0'	0'	0'	0'	0'	0'
Sample Date	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88
Sample Name	1 (94730)	2 (94731)	3 (94732)	4 (94733)	5 (94734)	6 (94735)	7 (94736)	8 (94737)
VOC								
Benzene	<2	<2	<2	<2	<2	<2	<2	<2
Carbon disulfide	<10	<10	<10	<10	<10	<10	<10	<10
Methylene chloride	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	<2	<2	<2	<2	<2	<2	<2	<2
Toluene	<2	<2	<2	<2	<2	<2	<2	<2
Trichloroethene	<2	<2	<2	<2	<2	<2	<2	<2
Xylenes (total)	<10	<10	<10	<10	<10	<10	<10	<10
SVOC								
2,4-Dimethylphenol	<330	<330	<330	<330	<330	<330	<330	<330
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	<330	<330	<330	<330	680	<330	<330	<330
Benzo(a)pyrene	<330	<330	<330	<330	1,400	<330	<330	<330
Benzo(b)fluoranthene	<330	<330	<330	<330	1,700	<330	<330	<330
Benzo(g,h,i)perylene	<330	<330	<330	<330	790	<330	<330	<330
Benzo(k)fluoranthene	<330	<330	<330	<330	1,000	<330	<330	<330
bis(2-Ethylhexyl)phthalate	<330	<330	<330	<330	620	<330	<330	<330
Butylbenzylphthalate	330	<330	<330	<330	<330	<330	<330	<330

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Soil							
Depth	0'	0'	0'	0'	0'	0'	0'	0'
Sample Date	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88
Sample Name	1 (94730)	2 (94731)	3 (94732)	4 (94733)	5 (94734)	6 (94735)	7 (94736)	8 (94737)
SVOC								
Chrysene	<330	<330	<330	<330	1,500	<330	<330	<330
Di-n-butylphthalate	640	<330	<330	<330	<330	<330	<330	<330
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	<330	<330	<330	<330	1,400	<330	<330	<330
Fluorene	<330	<330	<330	<330	<330	<330	<330	<330
Indeno(1,2,3-c,d)pyrene	<330	<330	<330	<330	930	<330	<330	<330
Naphthalene	<330	<330	<330	<330	1,700	<330	<330	<330
Phenanthrene	<330	<330	<330	<330	<330	<330	<330	<330
Phenol	<330	<330	<330	<330	<330	<330	<330	<330
Pyrene	<330	<330	<330	<330	2,200	<330	<330	<330
Metals								
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA
Barium	490,000	670,000	110,000	1,100,000	100,000	540,000	290,000	360,000
Beryllium	570	<200	230	1,500	460	940	290	580
Cadmium	2,700	1,600	<200	530	930	3100	3,400	1,200
Calcium	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	30,000	6,500	18,000	24,000	44,000	21,000	14,000	15,000

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Soil							
Depth	0'	0'	0'	0'	0'	0'	0'	0'
Sample Date	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88
Sample Name	1 (94730)	2 (94731)	3 (94732)	4 (94733)	5 (94734)	6 (94735)	7 (94736)	8 (94737)
Metals (continued)								
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Copper	290,000	180,000	16,000	280,000	180,000	320,000	140,000	110,000
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA
Lead	160,000	64,000	31,000	130,000	140,000	93,000	79,000	68,000
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	<u>190</u>	<100	<100	<100	<u>370</u>	<u>180</u>	<u>310</u>	<u>190</u>
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	17,000	7,200	9,600	24,000	31,000	25,000	11,000	13,000
Potassium	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA
Titanium	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	450,000	280,000	71,000	140,000	250,000	330,000	190,000	140,000

Footnotes on Page 22.

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Well/Boring	Surface Soil							
Depth	0'	0'	0'	0'	0'	0'	0'	0'
Sample Date	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88	08/15/88
Sample Name	1 (94730)	2 (94731)	3 (94732)	4 (94733)	5 (94734)	6 (94735)	7 (94736)	8 (94737)
Pesticide/PCBs								
4,4'-DDD	<16	<16	<16	<16	<16	<16	<16	<16
4,4'-DDE	<16	<16	<16	<16	<16	<16	<16	<16
BHC (alpha)	<8	<8	<8	<8	<8	<8	<8	<8
Chlordane (gamma)	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	<16	<16	<16	<16	<16	<16	<16	<16
Endosulfan II	<16	<16	<16	<16	<16	<16	<16	<16
Endrin ketone	<16	<16	<16	<16	<16	<16	<16	<16
Heptachlor	<8	<8	<8	<8	<8	<8	<8	<8
Methoxychlor	<80	<80	<80	<80	<80	<80	<80	<80

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB3 (Waste)		SDB4 (Waste)	Surface Soil			
Depth	0-0.5'	0-0.5'	0-0.67'	6"-12"	6"-12"	6"-12"	6"-12"
Sample Date	05/13/96	05/13/96	05/13/96	08/06/99	08/06/99	08/06/99	08/05/99
Sample Name	SS-19	SS-19RE	SS-21	SSRIV-1	SSRIV-2	SSRIV-3	SSRIV-4
VOC							
Benzene	<13	<13	<12	<69	<70	<75	<76
Carbon disulfide	3 J	<13	<12	<350	<350	<370	<380
Methylene chloride	<13 BJ	96 B	<12 BJ	<350	<350	<370	<380
Tetrachloroethene	<13	<13	<12	120	<70	<75	380
Toluene	2 J	<13	<12	<140	<140	<150	<150
Trichloroethene	<13	<13	<12	93	<70	<75	<76
Xylenes (total)	<13	<13	<12	<210	<210	<220	<230
SVOC							
2,4-Dimethylphenol	34,000	NA	<380	<460	<460	<480	<500
2-Methylnaphthalene	15,000	NA	1300	<460	<460	<480	<500
2-Methylphenol	15,000	NA	<380	<460	<460	<480	<500
4-Methylphenol	20,000	NA	<380	NA	NA	NA	NA
Benzo(a)anthracene	1400 J	NA	120 J	<460	<460	<480	<500
Benzo(a)pyrene	<12000	NA	42 J	<460	<460	<480	<500
Benzo(b)fluoranthene	<12000	NA	<380	<460	<460	<480	<500
Benzo(g,h,i)perylene	<12000	NA	52 J	<460	<460	<480	<500
Benzo(k)fluoranthene	2000 J	NA	52 J	<460 J	<460	<480 J	<500
bis(2-Ethylhexyl)phthalate	<12000	NA	<380	<460	<460	<480	<500
Butylbenzylphthalate	<12000	NA	<380	<460	<460	<480	<500

Footnotes on Page 22.

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Well/Boring	SDB3 (Waste)		SDB4 (Waste)	Surface Soil			
Depth	0-0.5'	0-0.5'	0-0.67'	6"-12"	6"-12"	6"-12"	6"-12"
Sample Date	05/13/96	05/13/96	05/13/96	08/06/99	08/06/99	08/06/99	08/05/99
Sample Name	SS-19	SS-19RE	SS-21	SSRIV-1	SSRIV-2	SSRIV-3	SSRIV-4
SVOC							
Chrysene	1900 J	NA	240 J	<460	<460	<480	<500
Di-n-butylphthalate	<12000	NA	<380	450 J	<460	<480	<500
Dibenzofuran	9600 J	NA	330 J	<460	<460	<480	<500
Fluoranthene	4200 J	NA	120 J	<460	<460	<480	<500
Fluorene	5200 J	NA	<380	<460	<460	<480	<500
Indeno(1,2,3-c,d)pyrene	<12000	NA	<380	<460	<460	<480	<500
Naphthalene	7600 J	NA	690	<460	<460	<480	<500
Phenanthrene	12000 J	NA	830	<460	<460	<480	<500
Phenol	<12000	NA	<380	<460	<460	<480	<500
Pyrene	4500 J	NA	160 J	<460	<460	<480	<500
Metals							
Aluminum	1,480,000	NA	4,160,000	14,000,000	5,300,000	7,800,000	5,500,000
Antimony	<3,400 N	NA	3,200 BN	3,800 J	<2,000 J	<3,200 J	<2,000 J
Arsenic	33,400	NA	3,900	8,500	3,700	5,300	4,900
Barium	177,000 N	NA	5,730,000 N	1,300,000	140,000	540,000	550,000
Beryllium	210 B	NA	650 B	2,100 J	310 J	930 J	610 J
Cadmium	7,900	NA	4,300	2,200	1,700	3,900	29,000
Calcium	1,850,000	NA	2,360,000	110,000,000 J	7,300,000 J	30,000,000 J	29,000,000 J
Chromium	4,900	NA	45,500	22,000	19,000	28,000	20,000

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB3 (Waste)		SDB4 (Waste)	Surface Soil			
Depth	0-0.5'	0-0.5'	0-0.67'	6"-12"	6"-12"	6"-12"	6"-12"
Sample Date	05/13/96	05/13/96	05/13/96	08/06/99	08/06/99	08/06/99	08/05/99
Sample Name	SS-19	SS-19RE	SS-21	SSRIV-1	SSRIV-2	SSRIV-3	SSRIV-4
Metals (continued)							
Cobalt	1,300 B	NA	11,900 B	10,000	5,300	5,800	5,000
Copper	118,000,000 N*	NA	227,000 N*	400,000	61,000	420,000	270,000
Cyanide	550 B	NA	160 B	NA	NA	NA	NA
Iron	4,130,000 *	NA	12,800,000 *	27,000,000	24,000,000	17,000,000	17,000,000
Lead	2,220,000	NA	3,530,000	170,000	99,000	250,000	150,000
Magnesium	420,000 B	NA	894,000 B	4,400,000	2,200,000	2,200,000	2,800,000
Manganese	**206,000 ***	NA	**546,000 ***	**3,500,000 J**	**550,000 J**	**1,600,000 J**	**1,700,000 J**
Mercury	**22,400**	NA	190	51 J	650 J	270	200
Molybdenum	NA	NA	NA	**3,200 J**	<570 J	**2,500 J**	**2,900 J**
Nickel	3,600 B	NA	8,400 B	25,000	14,000	30,000	19,000
Potassium	621,000 B	NA	337,000 B	9,000,000 J	760,000 J	3,200,000 J	1,700,000 J
Selenium	**19,300 N**	NA	2,000 N	<2,800 J	<1,400 J	<1,500 J	<1,500 J
Silver	**88,200**	NA	970 B	430 J	<700	550 J	430 J
Sodium	121,000 B	NA	63,100 B	550,000	46,000	280,000	200,000 J
Thallium	<8,900	NA	**2,400 B**	1,600 J	<510 J	950 J	<690 J
Titanium	NA	NA	NA	800,000 J	270,000 J	440,000 J	280,000 J
Vanadium	<680	NA	14,600	26,000	18,000	26,000	22,000
Zinc	<1,100 N*	NA	**2,780,000 N***	340,000 J	260,000 J	370,000 J	390,000 J

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB3 (Waste)		SDB4 (Waste)	Surface Soil			
Depth	0-0.5'	0-0.5'	0-0.67'	6"-12"	6"-12"	6"-12"	6"-12"
Sample Date	05/13/96	05/13/96	05/13/96	08/06/99	08/06/99	08/06/99	08/05/99
Sample Name	SS-19	SS-19RE	SS-21	SSRIV-1	SSRIV-2	SSRIV-3	SSRIV-4
Pesticide/PCBs							
4,4'-DDD	89 P	NA	<3.8	NA	NA	NA	NA
4,4'-DDE	86 P	NA	<3.8	NA	NA	NA	NA
BHC (alpha)	44 P	NA	<1.9	NA	NA	NA	NA
Chlordane (gamma)	<11	NA	3.7 P	NA	NA	NA	NA
Dieldrin	73 P	NA	<3.8	NA	NA	NA	NA
Endosulfan II	<22	NA	6.9	NA	NA	NA	NA
Endrin ketone	55 P	NA	<3.8	NA	NA	NA	NA
Heptachlor	42 P	NA	<1.9	NA	NA	NA	NA
Methoxychlor	170	NA	<19	NA	NA	NA	NA

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Soil					
Depth	6"-12"	6"-12"	6"-12"	6"-12"	6"-12"	6"-12"
Sample Date	08/05/99	08/06/99	08/05/99	08/05/99	08/06/99	08/06/99
Sample Name	SSRIV-97 (SSRIV-4)	SSRIV-5	SSRIV-6	SSRIV-7	SSRIV-8	SSRIV-9
VOC						
Benzene	<74	<62	<67	<70	47	<66
Carbon disulfide	<370	<310	<330	<350	<350	<330
Methylene chloride	<370	<310	<330	<350	<350	<330
Tetrachloroethene	410	110	110	120	<69	<66
Toluene	<150	<120	<130	<140	130	<130
Trichloroethene	<74	<62	<67	<70	<69	<66
Xylenes (total)	<220	<180	<200	<210	<210	<200
SVOC						
2,4-Dimethylphenol	<480	<400	<430	<460	<460	<430
2-Methylnaphthalene	<480	<400	<430	<460	<460	<430
2-Methylphenol	<480	<400	<430	<460	<460	<430
4-Methylphenol	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	<480	<400	<430	<460	<460	<430
Benzo(a)pyrene	<480	<400	<430	<460	<460	<430
Benzo(b)fluoranthene	<480	<400	<430	<460	<460	<430
Benzo(g,h,i)perylene	<480	<400	<430	<460	<460	<430
Benzo(k)fluoranthene	<480	<400 J	<430	<460	<460 J	<430
bis(2-Ethylhexyl)phthalate	<480	<400	<430	<460	<460	<430
Butylbenzylphthalate	<480	<400	<430	<460	<460	<430

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Soil					
Depth	6"-12"	6"-12"	6"-12"	6"-12"	6"-12"	6"-12"
Sample Date	08/05/99	08/06/99	08/05/99	08/05/99	08/06/99	08/06/99
Sample Name	SSRIV-97 (SSRIV-4)	SSRIV-5	SSRIV-6	SSRIV-7	SSRIV-8	SSRIV-9
SVOC						
Chrysene	<480	<400	<430	<460	<460	<430
Di-n-butylphthalate	<480	<400	<430	<460	<460	<430
Dibenzofuran	<480	<400	<430	<460	<460	<430
Fluoranthene	<480	<400	<430	<460	<460	<430
Fluorene	<480	<400	<430	<460	<460	<430
Indeno(1,2,3-c,d)pyrene	<480	<400	<430	<460	<460	<430
Naphthalene	<480	<400	<430	<460	<460	<430
Phenanthrene	<480	<400	<430	<460	<460	<430
Phenol	<480	<400	<430	<460	<460	<430
Pyrene	<480	<400	<430	<460	<460	<430
Metals						
Aluminum	5,400,000	7,300,000	5,600,000	10,000,000	4,500,000	5,500,000
Antimony	<2,300 J	<3,100 J	<500 J	<1,500 J	<2,400 J	<2,500 J
Arsenic	4,500	1,600	2,400	16,000	5,300	1,700
Barium	570,000	110,000	380,000	730,000	360,000	530,000
Beryllium	610 J	300 J	360 J	1,300	370 J	590 J
Cadmium	30,000	3,800	1,900	6,300	2,200 J	1,800
Calcium	27,000,000 J	4,700,000 J	61,000,000 J	39,000,000 J	18,000,000 J	15,000,000 J
Chromium	24,000	17,000	19,000	29,000	10,000	12,000

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Soil					
Depth	6"-12"	6"-12"	6"-12"	6"-12"	6"-12"	6"-12"
Sample Date	08/05/99	08/06/99	08/05/99	08/05/99	08/06/99	08/06/99
Sample Name	SSRIV-97 (SSRIV-4)	SSRIV-5	SSRIV-6	SSRIV-7	SSRIV-8	SSRIV-9
Metals (continued)						
Cobalt	5,400	4,500	3,800	7,500	3,500	5,800
Copper	270,000	38,000	220,000	1,500,000	130,000	150,000
Cyanide	NA	NA	NA	NA	NA	NA
Iron	17,000,000	17,000,000	12,000,000	28,000,000	16,000,000	12,000,000
Lead	150,000	61,000	240,000	160,000	220,000	190,000
Magnesium	2,000,000	2,100,000	3,500,000	2,700,000	2,500,000	3,100,000
Manganese	**1,600,000 J**	**370,000 J**	**760,000 J**	**2,100,000 J**	**1,500,000 J**	**1,500,000 J**
Mercury	210	480 J	75 J	320	130	250
Molybdenum	**2,800 J**	**1,000 J**	<540 J	**3,400**	690 J	<650 J
Nickel	23,000	19,000	10,000	41,000	8,800	13,000
Potassium	1,800,000 J	960,000 J	840,000 J	4,600,000 J	1,200,000 J	1,400,000 J
Selenium	<590 J	<1,200 J	<1,300 J	<2,800 J	<1,300 J	<2,500 J
Silver	360 J	<620	130 J	500 J	110 J	170 J
Sodium	130,000 J	48,000	68,000	380,000	76,000	95,000
Thallium	<740 J	<620 J	<670 J	890 J	<690 J	<660 J
Titanium	280,000 J	290,000 J	460,000 J	570,000 J	270,000 J	460,000 J
Vanadium	22,000	23,000	21,000	31,000	15,000	16,000
Zinc	380,000 J	120,000 J	270,000 J	390,000 J	1,300,000 J	300,000 J

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Soil					
Depth	6"-12"	6"-12"	6"-12"	6"-12"	6"-12"	6"-12"
Sample Date	08/05/99	08/06/99	08/05/99	08/05/99	08/06/99	08/06/99
Sample Name	SSRIV-97 (SSRIV-4)	SSRIV-5	SSRIV-6	SSRIV-7	SSRIV-8	SSRIV-9
Pesticide/PCBs						
4,4'-DDD	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA
BHC (alpha)	NA	NA	NA	NA	NA	NA
Chlordane (gamma)	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Soil				
Depth	6"-12"	6"-12"	6"-12"	6"-12"	6"-12"
Sample Date	08/05/99	08/05/99	08/06/99	08/06/99	08/06/99
Sample Name	SSRIV-10	SSRIV-11	SSRIV-12	SSRIV-96 (SSRIV-12)	SSRIV-13
VOC					
Benzene	<72	52 J	<57	<57	<79
Carbon disulfide	<360	<400	<280	<280	<400
Methylene chloride	<360	<400	<280	<280	<400
Tetrachloroethene	210	260	<57	<57	<79
Toluene	<140	<160	<110	<110	140
Trichloroethene	<72	<81	<57	<57	<79
Xylenes (total)	110	<240	<170	<170	<240
SVOC					
2,4-Dimethylphenol	<480	<530	<380	<380	<520
2-Methylnaphthalene	<480	<530	<380	<380	<520
2-Methylphenol	<480	<530	<380	<380	<520
4-Methylphenol	NA	NA	NA	NA	NA
Benzo(a)anthracene	<480	<530	<380	<380	<520
Benzo(a)pyrene	<480	<530	<380	<380	<520
Benzo(b)fluoranthene	<480	<530	<380	<380	<520
Benzo(g,h,i)perylene	<480	<530	<380	<380	<520
Benzo(k)fluoranthene	<480	<530	<380	<380	<520 J
bis(2-Ethylhexyl)phthalate	230 J	<530	<380	<380	<520
Butylbenzylphthalate	<480	<530	<380	<380	<520

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Soil				
Depth	6"-12"	6"-12"	6"-12"	6"-12"	6"-12"
Sample Date	08/05/99	08/05/99	08/06/99	08/06/99	08/06/99
Sample Name	SSRIV-10	SSRIV-11	SSRIV-12	SSRIV-96 (SSRIV-12)	SSRIV-13
SVOC					
Chrysene	<480	<530	<380	<380	<520
Di-n-butylphthalate	<480	<530	<380	<380	1,700
Dibenzofuran	<480	<530	<380	<380	<520
Fluoranthene	<480	<530	<380	<380	<520
Fluorene	<480	<530	<380	<380	<520
Indeno(1,2,3-c,d)pyrene	<480	<530	<380	<380	<520
Naphthalene	<480	<530	<380	<380	<520
Phenanthrene	<480	<530	<380	<380	<520
Phenol	<480	<530	<380	<380	<520
Pyrene	<480	<530	<380	<380	<520
Metals					
Aluminum	11,000,000	4,600,000	8,300,000	8,100,000	6,700,000
Antimony	3,900 J	<1,300 J	<2,800 J	<2,800 J	<1,000 J
Arsenic	6,400	4,200	1700	1,100	6,600
Barium	930,000	420,000	43,000	41,000	710,000
Beryllium	1,200 J	480 J	280 J	260 J	820 J
Cadmium	8,600	3,100	44	32	2,900
Calcium	24,000,000 J	28,000,000 J	820,000 J	860,000 J	17,000,000 J
Chromium	63,000	17,000	14,000	17,000	24,000

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Soil				
Depth	6"-12"	6"-12"	6"-12"	6"-12"	6"-12"
Sample Date	08/05/99	08/05/99	08/06/99	08/06/99	08/06/99
Sample Name	SSRIV-10	SSRIV-11	SSRIV-12	SSRIV-96 (SSRIV-12)	SSRIV-13
<u>Metals (continued)</u>					
Cobalt	<u>10,000</u>	<u>4,500</u>	<u>4,800</u>	<u>4,800</u>	<u>5,700</u>
Copper	500,000	220,000	8,300	7,700	630,000
Cyanide	NA	NA	NA	NA	NA
Iron	30,000,000	12,000,000	12,000,000	14,000,000	20,000,000
Lead	$\boxed{610,000}$	120,000	6,000	5,300	170,000
Magnesium	3,800,000	2,000,000	1,700,000	2,000,000	1,400,000
Manganese	**2,600,000 J**	**1,300,000 J**	**330,000 J**	**410,000 J**	**1,800,000 J**
Mercury	<u>1,200 J</u>	76 J	17 J	14 J	<u>400</u>
Molybdenum	**5,200 J**	**2,000 J**	<260 J	<210 J	<2,300 J
Nickel	38,000	19,000	11,000	12,000	25,000
Potassium	3,800,000 J	2,200,000 J	310,000 J	270,000 J	2,400,000 J
Selenium	<2,900 J	<1,600 J	<1,100 J	<1,100 J	<1,500 J
Silver	<u>970</u>	250 J	<570	<570	<u>870</u>
Sodium	350,000	120,000	27,000 J	34,000	170,000
Thallium	1,200 J	<810 J	<400 J	<570 J	<770 J
Titanium	540,000 J	240,000 J	420,000 J	350,000 J	310,000 J
Vanadium	33,000	18,000	27,000	27,000	20,000
Zinc	970,000 J	260,000 J	21,000 J	23,000 J	390,000 J

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Soil				
Depth	6"-12"	6"-12"	6"-12"	6"-12"	6"-12"
Sample Date	08/05/99	08/05/99	08/06/99	08/06/99	08/06/99
Sample Name	SSRIV-10	SSRIV-11	SSRIV-12	SSRIV-96 (SSRIV-12)	SSRIV-13
Pesticide/PCBs					
4,4'-DDD	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA
BHC (alpha)	NA	NA	NA	NA	NA
Chlordane (gamma)	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Depth Sample Date Sample Name	MDEQ Criteria				
	Residential Direct Contact	Residential Drinking Water Protection	Residential Indoor Air Inhalation	Residential Ambient Air Particualte Inhalalation	Residential Groundwater/Surface Water Interface Protection
VOC					
Benzene	180,000 I	100 I	1,600 I	380,000,000 I	4,000 I, X
Carbon disulfide	280,000 C, I, R, A	16,000 I, R	76,000 I, R	47,000,000,000 I, R	ID
Methylene chloride	1,300,000	100	45,000	6,600,000,000	19,000 X
Tetrachloroethene	88,000 C	100	11,000	5,400,000,000	900 X
Toluene	250,000 C, I	16,000 I	250,000 C, I	27,000,000,000 I	2,800 I
Trichloroethene	500,000 C	100	7,100	1,800,000,000	4,000 X
Xylenes (total)	150,000 C, I	5,600 I	150,000 C, I	290,000,000,000 I	700 I
SVOC					
2,4-Dimethylphenol	11,000,000	7,400	NLV	4,700,000,000	7,600
2-Methylnaphthalene	8,100,000	57,000	ID	ID	ID
2-Methylphenol	11,000,000 J	7,400 J	NLV	6,700,000,000 J	1,400 J
4-Methylphenol	11,000,000 J	7,400 J	NLV	6,700,000,000 J	1,400 J
Benzo(a)anthracene	20,000 Q	NLL	NLV	ID	NLL
Benzo(a)pyrene	2,000 Q	NLL	NLV	1,500,000 Q	NLL
Benzo(b)fluoranthene	20,000 Q	NLL	NLV	ID	NLL
Benzo(g,h,i)perylene	2,500,000	NLL	NLV	800,000,000	NLL
Benzo(k)fluoranthene	200,000 Q	NLL	NLV	ID	NLL
bis(2-Ethylhexyl)phthalate	2,800,000	NLL	NLV	700,000,000	NLL
Butylbenzylphthalate	310,000 C	310,000 C	NLV	47,000,000,000	26,000 X

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Depth Sample Date Sample Name	MDEQ Criteria Residential Direct Contact	 Residential Drinking Water Protection	 Residential Indoor Air Inhalation	 Residential Ambient Air Particualte Inhalalation	 Residential Groundwater/Surface Water Interface Protection
SVOC					
Chrysene	2,000,000 Q	NLL	ID	ID	NLL
Di-n-butylphthalate	760,000 C	760,000 C	NLV	3,300,000,000	11,000
Dibenzofuran	ID	ID	ID	ID	1,700
Fluoranthene	46,000,000	730,000	1,000,000,000 D	9,300,000,000	5,500
Fluorene	27,000,000	390,000	580,000,000	9,300,000,000	5,300
Indeno(1,2,3-c,d)pyrene	20,000 Q	NLL	NLV	ID	NLL
Naphthalene	16,000,000	35,000	250,000	200,000,000	870
Phenanthrene	1,600,000	56,000	1,800,000	6,700,000	2,300
Phenol	12,000,000 C, AD	88,000	NLV	40,000,000,000	4,200
Pyrene	29,000,000	480,000	1,000,000,000 D	6,700,000,000	ID
Metals					
Aluminum	50,000,000 B, AD	1,000 B	NLV	ID	NA
Antimony	180,000	500 M	NLV	13,000,000	ID
Arsenic	7,600 B	23,000 B	NLV	720,000 B	70,000 B, X
Barium	37,000,000	1,300,000	NLV	330,000,000	G,X
Beryllium	410,000	51,000	NLV	1,300,000	G
Cadmium	550,000 B	6,000 B	NLV	1,700,000 B	B, G, X
Calcium	NE	NE	NE	NE	NE
Chromium	2,500,000 Hexavalent	30,000 Hexavalent	NLV	260,000 Hexvalent	3,300 Hexavalent

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Depth Sample Date Sample Name	MDEQ Criteria Residential Direct Contact	Residential Drinking Water Protection	Residential Indoor Air Inhalation	Residential Ambient Air Particualte Inhalalation	Residential Groundwater/Surface Water Interface Protection
Metals (continued)					
Cobalt	2,600,000	800	NLV	13,000,000	2,000
Copper	20,000,000	5,800,000	NLV	130,000,000	G
Cyanide	12,000 P, R	4,000 P, R	NLV	250,000 P, R	400 P, R
Iron	160,000,000 B	6,000 B	NLV	ID	NA
Lead	400,000	700,000	NLV	100,000,000	G, M, X
Magnesium	1,000,000,000 B, D	8,000,000 B	NLV	6,700,000,000 B	NA
Manganese	25,000,000 B	1,000 B	NLV	3,300,000 B	B, G, X
Mercury	160,000 INO	1,700 INO	NLV	ID	100 M, INO
Molybdenum	2,600,000 B	740 B	NLV	ID	16,000 B, X
Nickel	40,000,000 B	100,000 B	NLV	13,000,000 B	B, G
Potassium	NE	NE	NE	NE	NE
Selenium	2,600,000 B	4,000 B	NLV	130,000,000 B	400 B
Silver	2,500,000 B	4,500 B	NLV	6,700,000 B	500 B, M
Sodium	1,000,000,000 D	2,500,000	NLV	ID	NA
Thallium	35,000 B	2,300 B	NLV	ID	4,200 B, X
Titanium	NE	NE	NE	NE	NE
Vanadium	750,000	72,000	NLV	ID	190,000
Zinc	170,000,000	2,400,000 B	NLV	ID	B, G

Footnotes on Page 22.

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Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Depth Sample Date Sample Name	MDEQ Criteria Residential Direct Contact	Residential Drinking Water Protection	Residential Indoor Air Inhalation	Residential Ambient Air Particualte Inhalalation	Residential Groundwater/Surface Water Interface Protection
Pesticide/PCBs					
4,4'-DDD	95,000	NLL	NLV	44,000,000	NLL
4,4'-DDE	45,000	NLL	NLV	32,000,000	NLL
BHC (alpha)	NE	NE	NE	NE	NE
Chlordane (gamma)	31,000 J	NLL	11000000 J	31,000,000 J	NLL
Dieldrin	1,100	NLL	140,000	680,000	NLL
Endosulfan II	1,400,000 J	NLL	ID	ID	NLL
Endrin ketone	NE	NE	NE	NE	NE
Heptachlor	5,600	NLL	350,000	2,400,000	NLL
Methoxychlor	1,900,000	16,000	ID	ID	NA

Footnotes on Page 22.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

All results are in micrograms per kilogram (µg/kg).

Bold	Indicates a value above the Residential and Commercial I Drinking Water Protection Criteria.
Italics	Indicates a value above the Residential Indoor Inhalation Criteria.
Underline	Indicates a value above the Groundwater Surface Water Interface Protection Screening Level.
	Indicates a value above the Residential and Commercial I Ambient Air Particulate Criteria.
	Indicates a value above the Residential and Commercial I Direct Contact Criteria.
<	Less than detection limit.
*	Duplicate analysis was not within control limits.
B	Constituent was also detected in laboratory blank.
J	Estimated result.
N	Spike sample recovery is not within control limits.
NA	Not analyzed.
P	Greater than 25% RPD between two columns for pesticide or PCB
SVOCs	Semi volatile organic compounds.
VOCs	Volatile organic compounds.

Criteria Footnotes:

A	State of Michigan Drinking Water Standard.
AD	Substance causes developmental effects. Residential and Commercial I direct contact criteria are protective of both prenatal and postnatal exposure.
B	Background may be substituted if higher than the calculated cleanup criteria.
C	Value presented is a screening level based on the chemical specific generic soil saturation concentration (Csat) since the calculated risk-based criterion is greater than Csat.
D	Calculated criterion exceeds 100%, hence it is reduced to 100%.
G	GSI criterion is hardness dependent.
I	Chemical may exhibit the characteristic of ignitability, as defined in 40 CFR 261.21.
ID	Insufficient data.
INO	Inorgranic
J	Chemical may be present in several isomer forms. Isomer specific concentrations must be added together for comparison to criteria.

Table 1. Summary of Constituents Detected in Surface Material Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

M	Calculated criterion is below the target detection limit (TDL), therefore, the criterion defaults to the TDL.
NE	Not established.
NLL	Chemical is not likely to leach under most soil conditions.
NLV	Chemical is not likely to volatilize under most soil conditions.
P	Amenable or Method OIA-1677 analysis are used to quanitfy cyanide concentrations for compliance with all groundwater criteria.
Q	Criterion for carcinogenic polycyclic aromatic hydrocarbons (PAHs) were developed using "relative potential potenicies" (RPPs) to benzo(a)pyrene.
R	Hazardous substance may exhibit the characteristic of reactivity as defined in 40 CFR 261.23.
X	The GSI criterion is not protective for surface water that is used as a drinking water source.

Table 2. Summary of Constituents Detected in Waste Material Removed from the Riverside Disposal Area, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Waste	Drum Waste	Criteria	
Depth	0	0		
Sample Date	08/15/88	08/15/88		
Sample Name	9 (94738)	11 (94740)	Direct	Drinking Water
Location	Riverside Disposal Waste	Riverside Disposal Waste	Contact	Protection
VOC				
Benzene	<2	NA	180,000 I	100 I
Carbon disulfide	<10	NA	280,000 C, I, R, A	16,000 I, R
Methylene chloride	<5	NA	1,300,000	100
Tetrachloroethene	<2	NA	88,000 C	100
Toluene	<2	NA	250,000 C, I	16,000 I
Trichloroethene	<2	NA	500,000 C	100
Xylenes (total)	<10	NA	150,000 C, I	5,600 I
SVOC				
2,4-Dimethylphenol	<3,300	**45,000**	11,000,000	7,400
2-Methylnaphthalene	NA	NA	8,100,000	57,000
2-Methylphenol	NA	NA	11,000,000 J	7,400 J
4-Methylphenol	NA	NA	11,000,000 J	7,400 J
Benzo(a)anthracene	<3,300	<16,000	20,000 Q	NLL
Benzo(a)pyrene	<3,300	<16,000	2,000 Q	NLL
Benzo(b)fluoranthene	<3,300	<16,000	20,000 Q	NLL
Benzo(g,h,i)perylene	<3,300	<16,000	2,500,000	NLL
Benzo(k)fluoranthene	<3,300	<16,000	200,000 Q	NLL
bis(2-Ethylhexyl)phthalate	<3,300	<16,000	2,800,000	NLL
Butylbenzylphthalate	<3,300	<16,000	310,000 C	310,000 C
Chrysene	<3,300	<16,000	2,000,000 Q	NLL
Di-n-butylphthalate	16,000	<16,000	760,000 C	760,000 C
Dibenzofuran	NA	NA	ID	ID

Footnotes on Page 7.

Table 2. Summary of Constituents Detected in Waste Material Removed from the Riverside Disposal Area, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Waste	Drum Waste	Criteria	
Depth	0	0		
Sample Date	08/15/88	08/15/88		
Sample Name	9 (94738)	11 (94740)	Direct	Drinking Water
Location	Riverside Disposal Waste	Riverside Disposal Waste	Contact	Protection
<u>SVOC (continued)</u>				
Fluoranthene	<3,300	<16,000	46,000,000	730,000
Fluorene	<3,300	<16,000	27,000,000	390,000
Indeno(1,2,3-c,d)pyrene	<3,300	<16,000	20,000 Q	NLL
Naphthalene	<3,300	<16,000	16,000,000	35,000
Phenanthrene	<3,300	<16,000	1,600,000	56,000
Phenol	<3,300	<u>18,000</u>	12,000,000 C, AD	88,000
Pyrene	<3,300	<16,000	29,000,000	480,000
<u>Metals</u>				
Aluminum	NA	NA	50,000,000 B, AD	1,000 B
Antimony	NA	NA	180,000	500 M
Arsenic	NA	NA	7,600 B	23,000 B
Barium	350,000	26,000	37,000,000	1,300,000
Beryllium	<200	<200	410,000	51,000
Cadmium	**120,000**	**120,000**	550,000 B	6,000 B
Calcium	NA	NA	NE	NE
Chromium	**<u>36,000,000</u>**	<u>3,500</u>	2,500,000 Hexavalent	30,000 Hexavalent
Cobalt	NA	NA	2,600,000	800
Copper	36,000	1,400,000	20,000,000	5,800,000
Cyanide	NA	NA	12,000 P, R	4,000 P, R
Iron	NA	NA	160,000,000 B	6,000 B
Lead	**12,000,000**	14,000	400,000	700,000

Footnotes on Page 7.

Table 2. Summary of Constituents Detected in Waste Material Removed from the Riverside Disposal Area, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	Surface Waste	Drum Waste	Criteria	
Depth	0	0		
Sample Date	08/15/88	08/15/88		
Sample Name	9 (94738)	11 (94740)	Direct	Drinking Water
Location	Riverside Disposal Waste	Riverside Disposal Waste	Contact	Protection
Metals (continued)				
Magnesium	NA	NA	1,000,000,000 B, D	8,000,000 B
Manganese	NA	NA	25,000,000 B	1,000 B
Mercury	<100	<100	160,000 INO	1,700 INO
Molybdenum	NA	NA	2,600,000 B	740 B
Nickel	10,000	9,200	40,000,000 B	100,000 B
Potassium	NA	NA	NE	NE
Selenium	NA	NA	2,600,000 B	4,000 B
Silver	NA	NA	2,500,000 B	4,500 B
Sodium	NA	NA	1,000,000,000 D	2,500,000
Thallium	NA	NA	35,000 B	2,300 B
Titanium	NA	NA	NE	NE
Vanadium	NA	NA	750,000	72,000
Zinc	**96,000,000**	320,000	170,000,000	2,400,000 B
Pesticide/PCBs				
4,4'-DDD	<160	<1,600	95,000	NLL
4,4'-DDE	<160	<1,600	45,000	NLL
BHC (alpha)	<80	<800	NE	NE
Chlordane (gamma)	NA	NA	31,000 J	NLL
Dieldrin	<160	<1,600	1,100	NLL
Endosulfan II	<160	<1,600	1,400,000 J	NLL
Endrin ketone	<160	<1,600	NE	NE
Heptachlor	<80	<800	5,600	NLL
Methoxychlor	<800	<8,000	1,900,000	16,000

Footnotes on Page 7.

Table 2. Summary of Constituents Detected in Waste Material Removed from the Riverside Disposal Area, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Depth Sample Date Sample Name Location	Criteria Indoor Air Inhalation	Criteria Ambient Air Particulate Inhalation	Criteria Groundwater/ Surface Water Interface Protection
VOC			
Benzene	1,600 I	380,000,000 I	4,000 I, X
Carbon disulfide	76,000 I, R	47,000,000,000 I, R	ID
Methylene chloride	45,000	6,600,000,000	19,000 X
Tetrachloroethene	11,000	5,400,000,000	900 X
Toluene	250,000 C, I	27,000,000,000 I	2,800 I
Trichloroethene	7,100	1,800,000,000	4,000 X
Xylenes (total)	150,000 C, I	290,000,000,000 I	700 I
SVOC			
2,4-Dimethylphenol	NLV	4,700,000,000	7,600
2-Methylnaphthalene	ID	ID	ID
2-Methylphenol	NLV	6,700,000,000 J	1,400 J
4-Methylphenol	NLV	6,700,000,000 J	1,400 J
Benzo(a)anthracene	NLV	ID	NLL
Benzo(a)pyrene	NLV	1,500,000 Q	NLL
Benzo(b)fluoranthene	NLV	ID	NLL
Benzo(g,h,i)perylene	NLV	800,000,000	NLL
Benzo(k)fluoranthene	NLV	ID	NLL
bis(2-Ethylhexyl)phthalate	NLV	700,000,000	NLL
Butylbenzylphthalate	NLV	47,000,000,000	26,000 X
Chrysene	ID	ID	NLL
Di-n-butylphthalate	NLV	3,300,000,000	11,000
Dibenzofuran	ID	ID	1,700

Footnotes on Page 7.

Table 2. Summary of Constituents Detected in Waste Material Removed from the Riverside Disposal Area, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Depth Sample Date Sample Name Location	Criteria Indoor Air Inhalation	 Ambient Air Particulate Inhalation	 Groundwater/ Surface Water Interface Protection
SVOC (continued)			
Fluoranthene	1,000,000,000 D	9,300,000,000	5,500
Fluorene	580,000,000	9,300,000,000	5,300
Indeno(1,2,3-c,d)pyrene	NLV	ID	NLL
Naphthalene	250,000	200,000,000	870
Phenanthrene	1,800,000	6,700,000	2,300
Phenol	NLV	40,000,000,000	4,200
Pyrene	1,000,000,000 D	6,700,000,000	ID
Metals			
Aluminum	NLV	ID	NA
Antimony	NLV	13,000,000	ID
Arsenic	NLV	720,000 B	70,000 B, X
Barium	NLV	330,000,000	G,X
Beryllium	NLV	1,300,000	G
Cadmium	NLV	1,700,000 B	B, G, X
Calcium	NE	NE	NE
Chromium	NLV	260,000 Hexvalent	3,300 Hexavalent
Cobalt	NLV	13,000,000	2,000
Copper	NLV	130,000,000	G
Cyanide	NLV	250,000 P, R	400 P, R
Iron	NLV	ID	NA
Lead	NLV	100,000,000	G, M, X

Footnotes on Page 7.

Table 2. Summary of Constituents Detected in Waste Material Removed from the Riverside Disposal Area, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Depth Sample Date Sample Name Location	Criteria Indoor Air Inhalation	 Ambient Air Particulate Inhalation	 Groundwater/ Surface Water Interface Protection
Metals (continued)			
Magnesium	NLV	6,700,000,000 B	NA
Manganese	NLV	3,300,000 B	B, G, X
Mercury	NLV	ID	100 M, INO
Molybdenum	NLV	ID	16,000 B, X
Nickel	NLV	13,000,000 B	B, G
Potassium	NE	NE	NE
Selenium	NLV	130,000,000 B	400 B
Silver	NLV	6,700,000 B	500 B, M
Sodium	NLV	ID	NA
Thallium	NLV	ID	4,200 B, X
Titanium	NE	NE	NE
Vanadium	NLV	ID	190,000
Zinc	NLV	ID	B, G
Pesticide/PCBs			
4,4'-DDD	NLV	44,000,000	NLL
4,4'-DDE	NLV	32,000,000	NLL
BHC (alpha)	NE	NE	NE
Chlordane (gamma)	11,000,000 J	31000000 J	NLL
Dieldrin	140,000	680,000	NLL
Endosulfan II	ID	ID	NLL
Endrin ketone	NE	NE	NE
Heptachlor	350,000	2,400,000	NLL
Methoxychlor	ID	ID	NA

Footnotes on Page 7.

Table 2. Summary of Constituents Detected in Waste Material Removed from the Riverside Disposal Area, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Not all the compounds analyzed for are listed in this table. This table presents only those compounds that were detected in one or more samples at least once over the course of the investigation.
All results are in micrograms per kilogram (µg/kg).

Bold	Value above the Residential and Commercial I Drinking Water Protection Criteria (Operational Memorandum #18, June 6, 2000).
Italics	Value above the Residential Indoor Inhalation Criteria (Operational Memorandum #18, June 6, 2000).
Underline	Value above the Groundwater Surface Water Interface Protection Screening Level (Operational Memorandum #18, June 6, 2000).
<	Less than detection limit.
*	Duplicate analysis was not within control limits.
	Value above the Residential and Commercial I Ambient Air Particulate Criteria (Operational Memorandum #18, June 6, 2000).
	Value above the Residential and Commercial I Direct Contact Criteria (Operational Memorandum #18, June 6, 2000).
B	Constituent was also detected in laboratory blank.
J	Estimated result.
N	Spike sample recovery is not within control limits.
NA	Not analyzed.
P	Greater than 25% RPD between two columns for pesticide or PCB.
R	Rejected result.
SVOCs	Semi volatile organic compounds.
VOCs	Volatile organic compounds.

Criteria Footnotes:

A	State of Michigan Drinking Water Standard.
AD	Substance causes developmental effects. Residential and Commercial I direct contact criteria are protective of both prenatal and postnatal exposure.
B	Background may be substituted if higher than the calculated cleanup criteria.
C	Value presented is a screening level based on the chemical specific generic soil saturation concentration (Csat) since the calculated risk-based criterion is greater than Csat.

Table 2. Summary of Constituents Detected in Waste Material Removed from the Riverside Disposal Area, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

D	Calculated criterion exceeds 100%, hence it is reduced to 100%.
G	GSI criterion is hardness dependent.
I	Chemical may exhibit the characteristic of ignitability, as defined in 40 CFR 261.21.
ID	Insufficient data.
INO	Inorgranic
J	Chemical may be present in several isomer forms. Isomer specific concentrations must be added together for comparison to criteria.
M	Calculated criterion is below the target detection limit (TDL), therefore, the criterion defaults to the TDL.
NE	Not established.
NLL	Chemical is not likely to leach under most soil conditions.
NLV	Chemical is not likely to volatilize under most soil conditions.
Q	Criterion for carcinogenic polycyclic aromatic hydrocarbons (PAHs) were developed using "relative potential potenicies" (RPPs) to benzo(a)pyrene.
R	Hazardous substance may exhibit the characteristic of reactivity as defined in 40 CFR 261.23.
P	Amenable or Method OIA-1677 analysis are used to quanitfy cyanide concentrations for compliance with all groundwater criteria.
T	Refer to Toxic Substances Control Act (TSCA), 40 CFR 761, Subparts D and G, as ammended.
X	The GSI criterion is not protective for surface water that is used as a drinking water source.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GMSB-4			SDB1		SDB3
Depth	05-25'	27'	55'	4-8'	16-22'	4-8'
Sample Date	06/03/97	06/03/97	06/03/97	05/13/96	05/13/96	05/13/96
Sample Name	GMSB-4/5-25	GMSB-4/27	GMSB-4/55	SS-15	SS-16	SS-20
Material Type	Waste	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste
VOC						
1,1,2,2-Tetrachloroethane	<8.5 J	<5.2 J	NA	<11	<17	<21
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (total)	NA	NA	NA	<11	<17	<21
1,3,5-Trimethylbenzene	NA	NA	NA	NA	NA	NA
2-Butanone (MEK)	<85 J	<52 J	NA	<11	<17	<21
2-Hexanone	<85 J	<52 J	NA	<11	<17	<21
4-Methyl-2-pentanone (MIBK)	<85 J	<52 J	NA	<11	<17	<21
Acetone	63 J	<52 J	NA	<11	<17 BJ	<21
Benzene	5.9 J	<5.2 J	NA	<11	<17	<21
cis-1,2-Dichloroethene	<8.5 J	<5.2 J	NA	NA	NA	NA
Ethylbenzene	<8.5 J	<5.2 J	NA	<11	<17	<21
Isopropylbenzene	NA	NA	NA	NA	NA	NA
Methylene chloride	<8.5 J	<5.2 J	NA	<11 BJ	<17 BJ	<21 BJ
n-Butylbenzene	NA	NA	NA	NA	NA	NA
n-Propylbenzene	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA
p-Isopropyltoluene	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA	NA	NA
Tetrachloroethene	<8.5 J	<5.2 J	NA	<11	<17	<21
Toluene	<8.5 J	<5.2 J	NA	<11	<17	<21
Trichloroethene	<8.5 J	<5.2 J	NA	<11	<17	<21
Xylene, o	NA	NA	NA	NA	NA	NA
Xylenes (total)	23 J	<5.2 J	NA	<11	<17	<21
Xylenes, m+p	NA	NA	NA	NA	NA	NA

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GMSB-4			SDB1		SDB3
Depth	05-25'	27'	55'	4-8'	16-22'	4-8'
Sample Date	06/03/97	06/03/97	06/03/97	05/13/96	05/13/96	05/13/96
Sample Name	GMSB-4/5-25	GMSB-4/27	GMSB-4/55	SS-15	SS-16	SS-20
Material Type	Waste	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste
SVOC						
1,2,4-Trichlorobenzene	<280	<170	NA	<320	<350	<17,000
2,4-Dimethylphenol	900	<170	NA	<320	<350	<17,000
2-Methylnaphthalene	350	<170	NA	<320	<350	<17,000
2-Methylphenol	<280	<170	NA	<320	<350	<17,000
4-Methylphenol	340	<170	NA	<320	<350	<17,000
Acenaphthene	190 J	<170	NA	<320	<350	<17,000
Anthracene	<280	<170	NA	<320	<350	<17,000
Benzo(a)anthracene	110 J	<170	NA	<320	<350	<17,000
Benzo(a)pyrene	<280	<170	NA	<320	<350	<17,000
Benzo(b)fluoranthene	85 J	<170	NA	<320	<350	<17,000
Benzo(g,h,i)perylene	<280	<170	NA	<320	<350	<17,000
Benzo(k)fluoranthene	<280	<170	NA	<320	<350	<17,000
bis(2-Ethylhexyl)phthalate	<280	<170	NA	52 J	<350	<17,000
Butylbenzylphthalate	<280	<170	NA	<320	<350	<17,000
Chrysene	120 J	<170	NA	<320	<350	<17,000
Di-n-butylphthalate	460	<170	NA	<320	<350	<17,000
Dibenzofuran	160 J	<170	NA	<320	<350	<17,000
Diethylphthalate	<280	<170	NA	<320	<350	<17,000
Fluoranthene	370	<170	NA	<320	<350	<17,000
Fluorene	180 J	<170	NA	<320	<350	<17,000
Indeno(1,2,3-c,d)pyrene	<280	<170	NA	<320	<350	<17,000
n-Nitrosodiphenylamine	<280	<170	NA	<320	<350	<17,000
Naphthalene	430	<170	NA	<320	<350	<17,000
Phenanthrene	570	<170	NA	<320	<350	<17,000

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GMSB-4			SDB1		SDB3
Depth	05-25'	27'	55'	4-8'	16-22'	4-8'
Sample Date	06/03/97	06/03/97	06/03/97	05/13/96	05/13/96	05/13/96
Sample Name	GMSB-4/5-25	GMSB-4/27	GMSB-4/55	SS-15	SS-16	SS-20
Material Type	Waste	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste
SVOC (continued)						
Phenol	<280	<170	NA	<320	<350	<17,000
Pyrene	270 J	<170	NA	<320	<350	<17,000
Metals						
Aluminum	3,600,000	NA	NA	5,290,000	3,290,000	6,680,000
Antimony	15,000	NA	NA	<2,400 N	<2,900 N	2,920,000 N
Arsenic	5,320	NA	NA	3,800	1,000 B	53,200
Barium	375,000	NA	NA	18,700 BN	11,400 BN	1,960,000 N
Beryllium	<855	NA	NA	290 B	<140	1,100 B
Cadmium	3,330	NA	NA	280 B*	210 B	4,200
Calcium	22,700,000	NA	NA	1,350,000	4,780,000	43,700,000
Chromium	41,900	NA	NA	12,900	13,000	32,600
Cobalt	<8,550	NA	NA	6,100 B	3,500 B	22,300
Copper	159,000	NA	NA	26,800	17,900 N*	20,700,000 N*
Cyanide	NA	NA	NA	<110	<120	700 B
Iron	21,600,000 MBB	NA	NA	10,100,000 *	7,300,000 *	45,300,000 *
Lead	249,000	NA	NA	2,100	2,100	17,700,000
Magnesium	2,760,000	NA	NA	3,680,000	4,360,000	3,590,000
Manganese	830,000	NA	NA	162,000 *	141,000 *	1,460,000 *
Mercury	361 J	NA	NA	<50	<60	5,200
Nickel	26,000	NA	NA	37,700	23,200	141,000
Potassium	1,580,000	NA	NA	516,000 B	333,000 B	2,040,000 B
Selenium	1,550	NA	NA	<600 N	<710 N	2,200 N
Silver	<427	NA	NA	<650	<780	14,400

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GMSB-4			SDB1		SDB3
Depth	05-25'	27'	55'	4-8'	16-22'	4-8'
Sample Date	06/03/97	06/03/97	06/03/97	05/13/96	05/13/96	05/13/96
Sample Name	GMSB-4/5-25	GMSB-4/27	GMSB-4/55	SS-15	SS-16	SS-20
Material Type	Waste	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste
Metals (continued)						
Sodium	<855,000	NA	NA	58,900 B	77,500 B	106,000 B
Thallium	<427	NA	NA	2,000	1,400 B	4,300 B
Vanadium	13,700	NA	NA	17,700	11,000 B	13,800 B
Zinc	1,580,000	NA	NA	18,900 N*	18,100 N*	2,230,000 N*
PEST/PCBs						
4,4'-DDD	<56	NA	NA	<3.3	<3.6	<5.6
4,4'-DDE	<56	NA	NA	<3.3	<3.6	<5.6
Aldrin	<29	NA	NA	<1.7	<1.8	<2.9
Aroclor 1248	<290	NA	NA	<33	<36	<56
Aroclor 1260	<560	NA	NA	<33	<36	<56
PEST/PCBs (continued)						
BHC (alpha)	<29	NA	NA	<1.7	<1.8	<2.9
BHC (delta)	<29	NA	NA	<1.7	<1.8	<2.9
BHC (Lindane) (gamma)	<29	NA	NA	<1.7	<1.8	<2.9
Chlordane (alpha)	<29	NA	NA	<1.7	<1.8	<2.9
Chlordane (gamma)	<29	NA	NA	<1.7	<1.8	<2.9
Dieldrin	<56	NA	NA	<3.3	<3.6	<5.6
Endosulfan II	<56	NA	NA	<3.3	<3.6	6.7 P
Endrin	<56	NA	NA	<3.3	<3.6	<5.6
Endrin aldehyde	<56	NA	NA	<3.3	<3.6	<5.6
Endrin ketone	<56	NA	NA	<3.3	<3.6	<5.6
Heptachlor	<29	NA	NA	<1.7	<1.8	4.1 P
Heptachlor epoxide	<29	NA	NA	<1.7	<1.8	<2.9
Total Organic Carbon	43,000,000	950,000	8,200,000	NA	NA	NA

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB3 (continued)				SDB4	SDB6	
Depth	4-8'	8-14'	8-14'	12'	16-20'	4-8'	12-16'
Sample Date	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/14/96	05/14/96
Sample Name	SS-20RE	SS-17	SS-17RE	SDB3	SS-22	SS-25	SS-26
Material Type	Waste	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste	Waste
VOC							
1,1,2,2-Tetrachloroethane	<21	<14	<14	NA	<11	<21	*19,000*
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (total)	<21	2 J	<14	NA	<11	130	<16,000
1,3,5-Trimethylbenzene	NA	NA	NA	NA	NA	NA	NA
2-Butanone (MEK)	<21	<14	<14	NA	<11	<21	<16,000
2-Hexanone	<21	<14	<14	NA	<11	<21	<16,000
4-Methyl-2-pentanone (MIBK)	<21	<14	<14	NA	<11	<21	<16,000
Acetone	18 J	16 B	34 B	NA	<11 BJ	17 J	7,300 J
Benzene	<21	2 J	5 J	NA	<11	<21	<16,000
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	<21	<14	<14	NA	<11	9 J	3,200 J
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	51 B	<14 BJ	50 B	NA	<11 BJ	<56 B	<16,000 BJ
n-Butylbenzene	NA	NA	NA	NA	NA	NA	NA
n-Propylbenzene	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA
p-Isopropyltoluene	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	16 J	6 J	<10 J	NA	<11	35	<16,000
Toluene	<21	5 J	15	NA	<11	2 J	4,500 J
Trichloroethene	7 J	23	37	NA	<11	<21	<16,000
Xylene, o	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	<21	<14	<14	NA	<11	52	28,000
Xylenes, m+p	NA	NA	NA	NA	NA	NA	NA

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB3 (continued)				SDB4	SDB6	
Depth	4-8'	8-14'	8-14'	12'	16-20'	4-8'	12-16'
Sample Date	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/14/96	05/14/96
Sample Name	SS-20RE	SS-17	SS-17RE	SDB3	SS-22	SS-25	SS-26
Material Type	Waste	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste	Waste
SVOC							
1,2,4-Trichlorobenzene	NA	<11,000	NA	<13,000	<350	<580	<11,000
2,4-Dimethylphenol	NA	76,000	NA	42,000	<350	<580	<11,000
2-Methylnaphthalene	NA	8,100 J	NA	4,900 J	<350	340 J	<11,000
2-Methylphenol	NA	48,000	NA	32,000	<350	<580	<11,000
4-Methylphenol	NA	49,000	NA	32,000	<350	1,000	1,600 J
Acenaphthene	NA	<11,000	NA	<13,000	<350	<580	<11,000
Anthracene	NA	<11,000	NA	<13,000	<350	<580	<11,000
Benzo(a)anthracene	NA	<11,000	NA	<13,000	<350	<580	<11,000
Benzo(a)pyrene	NA	<11,000	NA	<13,000	<350	<580	<11,000
Benzo(b)fluoranthene	NA	<11,000	NA	<13,000	<350	<580	<11,000
Benzo(g,h,i)perylene	NA	<11,000	NA	<13,000	<350	<580	<11,000
Benzo(k)fluoranthene	NA	<11,000	NA	<13,000	<350	<580	<11,000
bis(2-Ethylhexyl)phthalate	NA	<11,000	NA	<13,000	<350	<580	<11,000 BJ
Butylbenzylphthalate	NA	<11,000	NA	<13,000	<350	<580	<11,000
Chrysene	NA	<11,000	NA	<13,000	<350	<580	<11,000
Di-n-butylphthalate	NA	<11,000	NA	3,400 JB	<350	130 J	1,300 J
Dibenzofuran	NA	3,000 J	NA	<13,000	<350	220 J	<11,000
Diethylphthalate	NA	<11,000	NA	<13,000	<350	<580	<11,000
Fluoranthene	NA	1,500 J	NA	<13,000	<350	<580	<11,000
Fluorene	NA	3,200 J	NA	1,900 J	<350	110 J	<11,000
Indeno(1,2,3-c,d)pyrene	NA	<11,000	NA	<13,000	<350	<580	<11,000
n-Nitrosodiphenylamine	NA	<11,000	NA	<13,000	<350	<580	<11,000
Naphthalene	NA	6,200 J	NA	6,900 J	<350	800	4,200 J
Phenanthrene	NA	4,800 J	NA	2,500 J	<350	700	<11,000

Footnotes on Page 26.

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Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB3 (continued)				SDB4	SDB6	
Depth	4-8'	8-14'	8-14'	12'	16-20'	4-8'	12-16'
Sample Date	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/14/96	05/14/96
Sample Name	SS-20RE	SS-17	SS-17RE	SDB3	SS-22	SS-25	SS-26
Material Type	Waste	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste	Waste
SVOC (continued)							
Phenol	NA	31,000	NA	20,000	<350	240 J	<11,000
Pyrene	NA	2,100 J	NA	1,300 J	<350	<580	<11,000
Metals							
Aluminum	NA	6,470,000	NA	NA	3,450,000	868,000	13,800,000
Antimony	NA	15,900 BN	NA	NA	<2,500 N	<4,900 N	62,100 N
Arsenic	NA	17,700	NA	NA	1,900 B	2,100 B	15,900
Barium	NA	799,000 N	NA	NA	13,300 BN	427,000 N	5,600,000 N
Beryllium	NA	740 B	NA	NA	280 B	<240	1,600
Cadmium	NA	4,100	NA	NA	<180	<360	4,800
Calcium	NA	22,500,000	NA	NA	8,700,000	10,400,000	76,400,000
Chromium	NA	30,000	NA	NA	10,500	2,600 B	39,500
Cobalt	NA	15,100	NA	NA	3,800 B	1,800 B	22,200
Copper	NA	19,000,000 N*	NA	NA	18,900 N*	35,300 N*	497,000 N*
Cyanide	NA	510 B	NA	NA	<110	<220	<140
Iron	NA	56,800,000 *	NA	NA	7,380,000 *	1710,000 *	52,500,000 *
Lead	NA	1,910,000	NA	NA	2,000	28,400	384,000
Magnesium	NA	4,210,000	NA	NA	6,920,000	935,000 B	4,720,000
Manganese	NA	862,000 *	NA	NA	149,000 *	393,000 *	2,530,000 *
Mercury	NA	1,200	NA	NA	<50	<110	730
Nickel	NA	144,000	NA	NA	93,800	<1,500	30,600
Potassium	NA	1,390,000 B	NA	NA	344,000 B	1,740,000 B	9,590,000
Selenium	NA	<4,500 N	NA	NA	<620 N	<1,200 N	1,000 BN
Silver	NA	9,600	NA	NA	<680	<1,400	3,300

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB3 (continued)				SDB4	SDB6	
Depth	4-8'	8-14'	8-14'	12'	16-20'	4-8'	12-16'
Sample Date	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/14/96	05/14/96
Sample Name	SS-20RE	SS-17	SS-17RE	SDB3	SS-22	SS-25	SS-26
Material Type	Waste	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste	Waste
Metals (continued)							
Sodium	NA	220,000 B	NA	NA	62,500 B	118,000 B	635,000 B
Thallium	NA	11,100 B	NA	NA	960 B	<1,300	<870
Vanadium	NA	15,000	NA	NA	11,200	1,100 B	18,100
Zinc	NA	2,080,000 N*	NA	NA	17,300 N*	61,600 N*	2,150,000 N*
PEST/PCBs							
4,4'-DDD	NA	14	NA	NA	<3.5	<5.7	4.4 P
4,4'-DDE	NA	<4.6	NA	NA	<3.5	<5.7	<4.3
Aldrin	NA	<2.4	NA	NA	<1.8	<2.9	<2.2
Aroclor 1248	NA	<46	NA	NA	<35	<57	<43
Aroclor 1260	NA	<46	NA	NA	<35	<57	<43
PEST/PCBs (continued)							
BHC (alpha)	NA	15 P	NA	NA	<1.8	<2.9	<2.2
BHC (delta)	NA	<2.4	NA	NA	<1.8	<2.9	<2.2
BHC (Lindane) (gamma)	NA	<2.4	NA	NA	<1.8	12 P	<2.2
Chlordane (alpha)	NA	<2.4	NA	NA	<1.8	<2.9	<2.2
Chlordane (gamma)	NA	<2.4	NA	NA	<1.8	<2.9	<2.2
Dieldrin	NA	5.7 P	NA	NA	<3.5	<5.7	<4.3
Endosulfan II	NA	<4.6	NA	NA	<3.5	<5.7	4.5
Endrin	NA	<4.6	NA	NA	<3.5	<5.7	<4.3
Endrin aldehyde	NA	<4.6	NA	NA	<3.5	<5.7	<4.3
Endrin ketone	NA	<4.6	NA	NA	<3.5	<5.7	6.7 P
Heptachlor	NA	3.1 P	NA	NA	<1.8	<2.9	<2.2
Heptachlor epoxide	NA	17 P	NA	NA	<1.8	<2.9	7.8 P
Total Organic Carbon	NA	NA	NA	NA	NA	NA	NA

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB6 (continued)	SDB7				
Depth	20'	9-12'	9-12'	16-19.5'	16-19.5'	16-19.5'
Sample Date	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96
Sample Name	SDB6	SS-27	SS-27RE	SS-28	SS-28RE	SDB7
Material Type	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste	Waste	Subsurface Soil
VOC						
1,1,2,2-Tetrachloroethane	<1.2	<29	<29	<14	<14	<1.8
1,2,4-Trimethylbenzene	110	NA	NA	NA	NA	3.6
1,2-Dichloroethene (total)	NA	<29	<29	<14	<14	NA
1,3,5-Trimethylbenzene	30	NA	NA	NA	NA	<1.8
2-Butanone (MEK)	6.1	<29	<29	<14	<14	9.6
2-Hexanone	4.4	<29	<29	<14	<14	4
4-Methyl-2-pentanone (MIBK)	3.1	<29	<29	<14	<14	<3.5
Acetone	18	<29	<29	39	13 J	37
Benzene	<1.2	4 J	<29	<14	<14	<1.8
cis-1,2-Dichloroethene	3.3	NA	NA	NA	NA	<1.8
Ethylbenzene	9.2	<29	<29	<14	<14	<1.8
Isopropylbenzene	3.9	NA	NA	NA	NA	<1.8
Methylene chloride	<1.2	<110 B	<84 B	98 B	37	<1.8
n-Butylbenzene	16	NA	NA	NA	NA	<1.8
n-Propylbenzene	7.7	NA	NA	NA	NA	<1.8
Naphthalene	56	NA	NA	NA	NA	1.9
p-Isopropyltoluene	26	NA	NA	NA	NA	<1.8
sec-Butylbenzene	6.6	NA	NA	NA	NA	<1.8
Tetrachloroethene	<1.2	<29	<29	<14	<14	<1.8
Toluene	13	<29	<29	5 J	<14	<1.8
Trichloroethene	<1.2	<29	<29	<14	<14	<1.8
Xylene, o	31	NA	NA	NA	NA	2.1
Xylenes (total)	NA	<29	<29	<14	<14	NA
Xylenes, m+p	49	NA	NA	NA	NA	3.7

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB6 (continued)	SDB7				
Depth	20'	9-12'	9-12'	16-19.5'	16-19.5'	16-19.5'
Sample Date	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96
Sample Name	SDB6	SS-27	SS-27RE	SS-28	SS-28RE	SDB7
Material Type	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste	Waste	Subsurface Soil
SVOC						
1,2,4-Trichlorobenzene	<7,900	<540	NA	<400	NA	<4,900
2,4-Dimethylphenol	29,000	<540	NA	<400	NA	<4,900
2-Methylnaphthalene	26,000	300 J	NA	<400	NA	<4,900
2-Methylphenol	21,000	<540	NA	<400	NA	<4,900
4-Methylphenol	35,000	<540	NA	<400	NA	<4,900
Acenaphthene	<7,900	<540	NA	<400	NA	<4,900
Anthracene	<7,900	<540	NA	<400	NA	1,100 J
Benzo(a)anthracene	<7,900	<540	NA	42 J	NA	1,800 J
Benzo(a)pyrene	<7,900	<540	NA	<400	NA	1,400 J
Benzo(b)fluoranthene	<7,900	<540	NA	<400	NA	940 J
Benzo(g,h,i)perylene	<7,900	<540	NA	150 J	NA	520 J
Benzo(k)fluoranthene	<7,900	<540	NA	<400	NA	13,000 J
bis(2-Ethylhexyl)phthalate	<7,900	<540	NA	80 J	NA	<4,900
Butylbenzylphthalate	<7,900	<540	NA	41 J	NA	<4,900
Chrysene	<7,900	74 J	NA	49 J	NA	1,600 J
Di-n-butylphthalate	2,800 JB	<540	NA	<400	NA	3,100 JB
Dibenzofuran	1,900 J	150 J	NA	<400	NA	<4,900
Diethylphthalate	<7,900	<540	NA	<400	NA	2,800 JB
Fluoranthene	<7,900	68 J	NA	<400	NA	2,500 J
Fluorene	1,200 J	<540	NA	<400	NA	<4,900
Indeno(1,2,3-c,d)pyrene	<7,900	<540	NA	<400	NA	680 J
n-Nitrosodiphenylamine	<7,900	<540	NA	<400	NA	<4,900
Naphthalene	64,000	200 J	NA	<400	NA	<4,900
Phenanthrene	<7,900	230 J	NA	<400	NA	2,900 J

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB6 (continued)	SDB7				
Depth	20'	9-12'	9-12'	16-19.5'	16-19.5'	16-19.5'
Sample Date	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96
Sample Name	SDB6	SS-27	SS-27RE	SS-28	SS-28RE	SDB7
Material Type	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste	Waste	Subsurface Soil
SVOC (continued)						
Phenol	20,000	<540	NA	<400	NA	<4,900
Pyrene	<7,900	71 J	NA	<400	NA	3,300 J
Metals						
Aluminum	NA	812,000	NA	4,940,000	NA	NA
Antimony	NA	<4,100 N	NA	<4,200 N	NA	NA
Arsenic	NA	1,300 B	NA	6,000	NA	NA
Barium	NA	82,100 N	NA	190,000 N	NA	NA
Beryllium	NA	410 B	NA	840 B	NA	NA
Cadmium	NA	<300	NA	4,100	NA	NA
Calcium	NA	183,000,000	NA	28,000,000	NA	NA
Chromium	NA	5,100	NA	33,600	NA	NA
Cobalt	NA	730 B	NA	4,600 B	NA	NA
Copper	NA	199,000 N*	NA	225,000 N*	NA	NA
Cyanide	NA	<190	NA	<180	NA	NA
Iron	NA	1,410,000 *	NA	28,200,000 *	NA	NA
Lead	NA	60,900	NA	79,500	NA	NA
Magnesium	NA	599,000 B	NA	2,160,000	NA	NA
Manganese	NA	60,900 *	NA	726,000 *	NA	NA
Mercury	NA	110 B	NA	100 B	NA	NA
Nickel	NA	2,000 B	NA	49,500	NA	NA
Potassium	NA	533,000 B	NA	2,270,000	NA	NA
Selenium	NA	2,400 N	NA	1,500 BN	NA	NA
Silver	NA	2,300 B	NA	1,600 B	NA	NA

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB6 (continued)	SDB7				
Depth	20'	9-12'	9-12'	16-19.5'	16-19.5'	16-19.5'
Sample Date	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96	05/14/96
Sample Name	SDB6	SS-27	SS-27RE	SS-28	SS-28RE	SDB7
Material Type	Subsurface Soil	Subsurface Soil	Subsurface Soil	Waste	Waste	Subsurface Soil
Metals (continued)						
Sodium	NA	46,900 B	NA	207,000 B	NA	NA
Thallium	NA	<1,100	NA	<1,100	NA	NA
Vanadium	NA	5,000 B	NA	10,900 B	NA	NA
Zinc	NA	33,900 N*	NA	309,000 N*	NA	NA
PEST/PCBs						
4,4'-DDD	NA	<5.4	NA	<4	NA	NA
4,4'-DDE	NA	<5.4	NA	<4	NA	NA
Aldrin	NA	<2.8	NA	<2	NA	NA
Aroclor 1248	NA	<54	NA	<40	NA	NA
Aroclor 1260	NA	<54	NA	<40	NA	NA
PEST/PCBs (continued)						
BHC (alpha)	NA	<2.8	NA	<2	NA	NA
BHC (delta)	NA	<2.8	NA	<2	NA	NA
BHC (Lindane) (gamma)	NA	<2.8	NA	<2	NA	NA
Chlordane (alpha)	NA	<2.8	NA	<2	NA	NA
Chlordane (gamma)	NA	2.8 P	NA	<2	NA	NA
Dieldrin	NA	<5.4	NA	<4	NA	NA
Endosulfan II	NA	<5.4	NA	<4	NA	NA
Endrin	NA	<5.4	NA	<4	NA	NA
Endrin aldehyde	NA	<5.4	NA	<4	NA	NA
Endrin ketone	NA	<5.4	NA	<4	NA	NA
Heptachlor	NA	<2.8	NA	<2	NA	NA
Heptachlor epoxide	NA	2.6 JP	NA	<2	NA	NA
Total Organic Carbon	NA	NA	NA	NA	NA	NA

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB8						SDB10
Depth	4-6'	4-6'	8-10'	10-22'	10-22'	14'	4-8'
Sample Date	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/14/96
Sample Name	SS-29	SS-29RE	SS-30	SS-18	SS-18RE	SDB8	SS-23
Material Type	Subsurface Soil	Subsurface Soil	Waste	Waste	Waste	Subsurface Soil	Subsurface Soil
VOC							
1,1,2,2-Tetrachloroethane	<12	<12	<64	<12	<12	NA	<74
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (total)	29	95	17 J	9 J	1 JX	NA	<74
1,3,5-Trimethylbenzene	NA	NA	NA	NA	NA	NA	NA
2-Butanone (MEK)	<12	<12	140	9 J	<12	NA	180
2-Hexanone	<12	<12	<64	<12	<12	NA	<74
4-Methyl-2-pentanone (MIBK)	<12	<12	<64	<12	<12	NA	<74
Acetone	<12 BJ	<12	460	55 B	64	NA	790
Benzene	<12	11 J	<64	2 J	<12	NA	<74
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	<12	<12	<64	<12	<12	NA	77
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	<12 BJ	66 B	77	<12 BJ	18	NA	170 B
n-Butylbenzene	NA	NA	NA	NA	NA	NA	NA
n-Propylbenzene	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA
p-Isopropyltoluene	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	<12	<12	<64	<12	<12	NA	<74
Toluene	<12	3 J	31 J	3 J	1 J	NA	28 J
Trichloroethene	29	96	<64	10 J	2 J	NA	<74
Xylene, o	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	<12	<12	28 J	5 J	1 JX	NA	620
Xylenes, m+p	NA	NA	NA	NA	NA	NA	NA

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB8						SDB10
Depth	4-6'	4-6'	8-10'	10-22'	10-22'	14'	4-8'
Sample Date	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/14/96
Sample Name	SS-29	SS-29RE	SS-30	SS-18	SS-18RE	SDB8	SS-23
Material Type	Subsurface Soil	Subsurface Soil	Waste	Waste	Waste	Subsurface Soil	Subsurface Soil
SVOC							
1,2,4-Trichlorobenzene	<520	<520	<20,000	<770	NA	<7,900	2,700 J
2,4-Dimethylphenol	<520	<520	51,000	2,500	NA	51,000	<10,000
2-Methylnaphthalene	<520	<520	9,400 J	890	NA	6,400 J	<10,000
2-Methylphenol	<520	<520	30,000	1,100	NA	21,000	<10,000
4-Methylphenol	<520	<520	98,000	2,800	NA	34,000	<10,000
Acenaphthene	<520	<520	<20,000	<770	NA	<7,900	<10,000
Anthracene	<520	<520	<20,000	150 J	NA	620 J	<10,000
Benzo(a)anthracene	200 J	290 J	<20,000	280 J	NA	2,800 J	<10,000
Benzo(a)pyrene	75 J	91 J	<20,000	<770	NA	$\boxed{3,900 J}$	<10,000
Benzo(b)fluoranthene	170 J	160 J	<20,000	140 J	NA	<7,900	<10,000
Benzo(g,h,i)perylene	100 J	69 J	<20,000	<770	NA	2,900 J	<10,000
Benzo(k)fluoranthene	74 J	87 J	<20,000	<770	NA	<7,900	<10,000
bis(2-Ethylhexyl)phthalate	<520	<520	<20,000 BJ	<770	NA	<7,900	<10,000
Butylbenzylphthalate	<520	<520	<20,000	87 J	NA	<7,900	<10,000
Chrysene	330 J	320 J	<20,000	400 J	NA	6,300 J	<10,000
Di-n-butylphthalate	<520	<520	<20,000	<770	NA	2,200 JB	<10,000
Dibenzofuran	<520	<520	4,200 J	290 J	NA	4,700 J	<10,000
Diethylphthalate	<520	<520	<20,000	<770	NA	<7,900	<10,000
Fluoranthene	160 J	140 J	<20,000	280 J	NA	1,000 J	<10,000
Fluorene	<520	<520	5,900 J	430 J	NA	3,000 J	<10,000
Indeno(1,2,3-c,d)pyrene	74 J	<520	<20,000	<770	NA	<7,900	<10,000
n-Nitrosodiphenylamine	<520	<520	3,200 J	<770	NA	<7,900	<10,000
Naphthalene	<520	<520	4,300 J	760 J	NA	5,500 J	9,300 J
Phenanthrene	100 J	100 J	5,400 J	700 J	NA	3,100 J	<10,000

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB8						SDB10
Depth	4-6'	4-6'	8-10'	10-22'	10-22'	14'	4-8'
Sample Date	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/14/96
Sample Name	SS-29	SS-29RE	SS-30	SS-18	SS-18RE	SDB8	SS-23
Material Type	Subsurface Soil	Subsurface Soil	Waste	Waste	Waste	Subsurface Soil	Subsurface Soil
SVOC (continued)							
Phenol	<520	<520	<20,000	590 J	NA	16,000	<10,000
Pyrene	550	710	3,500 J	590 J	NA	8,800	<10,000
Metals							
Aluminum	4,640,000	NA	3,970,000	2,660,000	NA	NA	6,420,000
Antimony	<3,500 N	NA	4,000 BN	<4,900 N	NA	NA	<3,300 N
Arsenic	2,300 B	NA	17,800	3,400 B	NA	NA	4,400
Barium	446,000 N	NA	832000 N	401,000 N	NA	NA	613,000 N
Beryllium	720 B	NA	650 B	280 B	NA	NA	690 B
Cadmium	1,600	NA	18,000	18,900	NA	NA	1,600
Calcium	32,600,000	NA	62,500,000	6,630,000	NA	NA	54,400,000
Chromium	12,400	NA	34,300	630,000	NA	NA	11,000
Cobalt	4,700 B	NA	7,800 B	8,200 B	NA	NA	4,100 B
Copper	74,200 N*	NA	10,100,000 N	13,800,000	NA	NA	112,000 N*
Cyanide	260 B	NA	460 B	210 B	NA	NA	<140
Iron	15,900,000 *	NA	110,000,000	23,300,000 *	NA	NA	23,900,000 *
Lead	186,000	NA	1,930,000	386,000	NA	NA	91,700
Magnesium	2,280,000	NA	9,410,000	3,250,000	NA	NA	4,440,000
Manganese	1,580,000 *	NA	1,880,000 *	314,000 *	NA	NA	1,660,000 *
Mercury	1,200	NA	2,900	730	NA	NA	80 B
Nickel	11,500	NA	54,600	43,100	NA	NA	10,200 B
Potassium	1,700,000	NA	2,400,000	801,000 B	NA	NA	3,240,000
Selenium	<880 N	NA	1,700 N	8,000 N	NA	NA	<830 N
Silver	1,000 B	NA	5,100	3,100 B	NA	NA	1,200 B

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB8						SDB10
Depth	4-6'	4-6'	8-10'	10-22'	10-22'	14'	4-8'
Sample Date	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/13/96	05/14/96
Sample Name	SS-29	SS-29RE	SS-30	SS-18	SS-18RE	SDB8	SS-23
Material Type	Subsurface Soil	Subsurface Soil	Waste	Waste	Waste	Subsurface Soil	Subsurface Soil
Metals (continued)							
Sodium	104,000 B	NA	211,000 B	455,000 B	NA	NA	188,000 B
Thallium	<940	NA	<1,000	5,100	NA	NA	<890
Vanadium	12,500 B	NA	5,800 B	235,000	NA	NA	13,100 B
Zinc	251,000 N*	NA	4,790,000 N*	1,340,000 N*	NA	NA	190,000 N*
PEST/PCBs							
4,4'-DDD	<5.2	NA	<4.3	15 P	NA	NA	<5.2
4,4'-DDE	<5.2	NA	<4.3	13 P	NA	NA	<5.2
Aldrin	<2.7	NA	7.4 P	<2.0	NA	NA	<2.7
Aroclor 1248	<52	NA	<43	<39	NA	NA	<52 JP
Aroclor 1260	<52	NA	<43	<39	NA	NA	40 JP
PEST/PCBs (continued)							
BHC (alpha)	<2.7	NA	<2.2	2.1 P	NA	NA	<2.7
BHC (delta)	<2.7	NA	<2.2	5.4	NA	NA	<2.7
BHC (Lindane) (gamma)	<2.7	NA	<2.2	<2.0	NA	NA	<2.7
Chlordane (alpha)	7.7	NA	3 P	<2.0	NA	NA	<2.7
Chlordane (gamma)	<2.7	NA	<2.2	<2.0	NA	NA	<2.7
Dieldrin	13 P	NA	18	4.6 P	NA	NA	<5.2
Endosulfan II	<5.2	NA	<4.3	<3.9	NA	NA	<5.2
Endrin	<5.2	NA	5.5 P	<3.9	NA	NA	<5.2
Endrin aldehyde	<5.2	NA	<4.3	<3.9	NA	NA	<5.2
Endrin ketone	12 P	NA	12	4.5 P	NA	NA	<5.2
Heptachlor	<2.7	NA	6.3 P	11 P	NA	NA	<2.7
Heptachlor epoxide	<2.7	NA	26 P	13 P	NA	NA	<2.7
Total Organic Carbon	NA	NA	NA	NA	NA	NA	NA

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB10 (continued)		Criteria		
Depth	8-20'	8-20'			
Sample Date	05/14/96	05/14/96			Residential
Sample Name	SS-24	SS-24RE	Residential	Residential	Drinking
Material Type	Subsurface Soil	Subsurface Soil	Direct Contact	Direct Contact	Water Protection
VOC					
1,1,2,2-Tetrachloroethane	<12	<12	53,000	53,000	170
1,2,4-Trimethylbenzene	NA	NA	110,000 C, I	110,000 C, I	2,100 I
1,2-Dichloroethene (total)	<12	<12	23,000 (iso)	23,000 (iso)	1,400 (iso)
1,3,5-Trimethylbenzene	NA	NA	94,000 C	94,000 C	1,800
2-Butanone (MEK)	<12	<12	27,000,000 C, I, AD	27,000,000 C, I, AD	260,000 I
2-Hexanone	<12	<12	2,500,000 C	2,500,000 C	20,000
4-Methyl-2-pentanone (MIBK)	<12	<12	2,700,000 C, I	2,700,000 C, I	36,000 I
Acetone	37	11 J	23,000,000 I	23,000,000 I	15,000 I
Benzene	<12	<12	180,000 I	180,000 I	100 I
cis-1,2-Dichloroethene	NA	NA	640,000 C	640,000 C	1,400
Ethylbenzene	<12	<12	140,000 C, I	140,000 C, I	1,500 I
Isopropylbenzene	NA	NA	390,000 C	390,000 C	91,000
Methylene chloride	55	<38 B	1,300,000	1,300,000	100
n-Butylbenzene	NA	NA	2,500,000	2,500,000	1,600
n-Propylbenzene	NA	NA	2,500,000 I	2,500,000 I	1,600 I
Naphthalene	NA	NA	16,000,000	16,000,000	35,000
p-Isopropyltoluene	NA	NA	NE	NE	NE
sec-Butylbenzene	NA	NA	2,500,000	2,500,000	1,600
Tetrachloroethene	<12	<12	88,000 C	88,000 C	100
Toluene	<12	<12	250,000 C, I	250,000 C, I	16,000 I
Trichloroethene	<12	<12	500,000 C	500,000 C	100
Xylene, o	NA	NA	150,000 C, I, J	150,000 C, I, J	5,600 I, J
Xylenes (total)	<12	<12	150,000 C, I	150,000 C, I	5,600 I
Xylenes, m+p	NA	NA	150,000 C, I, J	150,000 C, I, J	5,600 I, J

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB10 (continued)		Criteria		
Depth	8-20'	8-20'			
Sample Date	05/14/96	05/14/96			Residential
Sample Name	SS-24	SS-24RE	Residential	Residential	Drinking
Material Type	Subsurface Soil	Subsurface Soil	Direct Contact	Direct Contact	Water Protection
SVOC					
1,2,4-Trichlorobenzene	<33,000	NA	990,000 AD	990,000 AD	4,200
2,4-Dimethylphenol	<33,000	NA	11,000,000	11,000,000	7,400
2-Methylnaphthalene	<33,000	NA	8,100,000	8,100,000	57,000
2-Methylphenol	<33,000	NA	11,000,000 J	11,000,000 J	7,400 J
4-Methylphenol	<33,000	NA	11,000,000 J	11,000,000 J	7,400 J
Acenaphthene	<33,000	NA	41,000,000	41,000,000	300,000
Anthracene	<33,000	NA	230,000,000	230,000,000	41,000
Benzo(a)anthracene	<33,000	NA	20,000 Q	20,000 Q	NLL
Benzo(a)pyrene	<33,000	NA	2,000 Q	2,000 Q	NLL
Benzo(b)fluoranthene	<33,000	NA	20,000 Q	20,000 Q	NLL
Benzo(g,h,i)perylene	<33,000	NA	2,500,000	2,500,000	NLL
Benzo(k)fluoranthene	<33,000	NA	200,000 Q	200,000 Q	NLL
bis(2-Ethylhexyl)phthalate	<33,000	NA	2,800,000	2,800,000	NLL
Butylbenzylphthalate	<33,000	NA	310,000 C	310,000 C	310,000 C
Chrysene	<33,000	NA	2,000,000 Q	2,000,000 Q	NLL
Di-n-butylphthalate	<33,000	NA	760,000 C	760,000 C	760,000 C
Dibenzofuran	<33,000	NA	ID	ID	ID
Diethylphthalate	<33,000	NA	740,000 C	740,000 C	110,000
Fluoranthene	<33,000	NA	46,000,000	46,000,000	730,000
Fluorene	<33,000	NA	27,000,000	27,000,000	390,000
Indeno(1,2,3-c,d)pyrene	<33,000	NA	20,000 Q	20,000 Q	NLL
n-Nitrosodiphenylamine	<33,000	NA	1,700,000	1,700,000	5,400
Naphthalene	<33000	NA	16,000,000	16,000,000	35,000
Phenanthrene	<33,000	NA	1,600,000	1,600,000	56,000

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB10 (continued)		Criteria		
Depth	8-20'	8-20'			
Sample Date	05/14/96	05/14/96			Residential
Sample Name	SS-24	SS-24RE	Residential	Residential	Drinking
Material Type	Subsurface Soil	Subsurface Soil	Direct Contact	Direct Contact	Water Protection
SVOC (continued)					
Phenol	<33,000	NA	12,000,000 C, AD	12,000,000 C, AD	88,000
Pyrene	<33,000	NA	29,000,000	29,000,000	480,000
Metals					
Aluminum	741,000	NA	50,000,000 B, AD	50,000,000 B, AD	1,000 B
Antimony	<3,600 N	NA	180,000	180,000	500 M
Arsenic	3,500	NA	7,600 B	7,600 B	23,000 B
Barium	2,910,000 N	NA	37,000,000	37,000,000	1,300,000
Beryllium	<170	NA	410,000	410,000	51,000
Cadmium	8,600	NA	550,000 B	550,000 B	6,000 B
Calcium	15,000,000	NA	NE	NE	NE
Chromium	30,200	NA	2,500,000 Hexavalent	2,500,000 Hexavalent	30,000 Hexavalent
Cobalt	47,800	NA	2,600,000	2,600,000	800
Copper	128,000 N*	NA	20,000,000	20,000,000	5,800,000
Cyanide	1,400	NA	12,000 P, R	12,000 P, R	4,000 P, R
Iron	79,900,000 *	NA	160,000,000 B	160,000,000 B	6,000 B
Lead	544,000	NA	400,000	400,000	700,000
Magnesium	282,000 B	NA	1,000,000,000 B, D	1,000,000,000 B, D	8,000,000 B
Manganese	350,000 *	NA	25,000,000 B	25,000,000 B	1,000 B
Mercury	6,800	NA	160,000 INO	160,000 INO	1,700 INO
Nickel	14,400	NA	40,000,000 B	40,000,000 B	100,000 B
Potassium	244,000 B	NA	NE	NE	NE
Selenium	3,400 N	NA	2,600,000 B	2,600,000 B	4,000 B
Silver	3,400	NA	2,500,000 B	2,500,000 B	4,500 B

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	SDB10 (continued)		Criteria		
Depth	8-20'	8-20'			
Sample Date	05/14/96	05/14/96			Residential
Sample Name	SS-24	SS-24RE	Residential	Residential	Drinking
Material Type	Subsurface Soil	Subsurface Soil	Direct Contact	Direct Contact	Water Protection
Metals (continued)					
Sodium	178,000 B	NA	1,000,000,000 D	1,000,000,000 D	2,500,000
Thallium	960 B	NA	35,000 B	35,000 B	2,300 B
Vanadium	<730	NA	750,000	750,000	72,000
Zinc	772,000 N*	NA	170,000,000	170,000,000	2,400,000 B
PEST/PCBs					
4,4'-DDD	<5.3	NA	95,000	95,000	NLL
4,4'-DDE	<5.3	NA	45,000	45,000	NLL
Aldrin	<2.7	NA	1,000	1,000	NLL
Aroclor 1248	300 P	NA	T	T	NLL, J, T
Aroclor 1260	42 JP	NA	T	T	NLL, J, T
PEST/PCBs (continued)					
BHC (alpha)	<5.5 P	NA	NE	NE	NE
BHC (delta)	<2.7	NA	NE	NE	NE
BHC (Lindane) (gamma)	<2.7	NA	8,300	8,300	20 M
Chlordane (alpha)	<2.7	NA	31,000 J	31,000 J	NLL
Chlordane (gamma)	<2.7	NA	31,000 J	31,000 J	NLL
Dieldrin	<5.3	NA	1,100	1,100	NLL
Endosulfan II	<15 P	NA	1400,000 J	1400,000 J	NLL
Endrin	36	NA	65,000	65,000	NLL
Endrin aldehyde	33 P	NA	NE	NE	NE
Endrin ketone	<5.3	NA	NE	NE	NE
Heptachlor	<2.7	NA	5,600	5,600	NLL
Heptachlor epoxide	<2.7	NA	3,100	3,100	NLL
Total Organic Carbon	NA	NA	NE	NE	NE

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Depth Sample Date Sample Name Material Type	Criteria (continued) Residential Indoor Air Inhalation	Residential Ambient Air Particulate Inhalation	Residential Groundwater/ Surface Water Interface Protection
VOC			
1,1,2,2-Tetrachloroethane	4,300	10,000	1,600 X
1,2,4-Trimethylbenzene	110,000 C, I	21,000,000 J	ID
1,2-Dichloroethene (total)	42,000 (iso)	180,000 (iso)	ID
1,3,5-Trimethylbenzene	94,000 C	16,000,000 I	ID
2-Butanone (MEK)	27,000,000 C, I	29,000,000 I	44,000 I
2-Hexanone	990,000	1,100,000	NE
4-Methyl-2-pentanone (MIBK)	2,700,000 C, I	45,000,000 I	ID
Acetone	110,000,000 C, I	130,000,000	34,000 I
Benzene	1,600 I	13,000 I	4,000 I, X
cis-1,2-Dichloroethene	23,000	180,000	ID
Ethylbenzene	140,000 C, I	9,500,000 I	360 I
Isopropylbenzene	390,000 C	1,700,000	ID
Methylene chloride	45,000	210,000	19,000 X
n-Butylbenzene	ID	ID	NE
n-Propylbenzene	ID	ID	NE
Naphthalene	250,000	300,000	870
p-Isopropyltoluene	NE	NE	NE
sec-Butylbenzene	ID	ID	NE
Tetrachloroethene	11,000	180,000	900 X
Toluene	250,000 C, I	2,800,000 I	2,800 I
Trichloroethene	7,100	78,000	4,000 X
Xylene, o	150,000 C, I, J	46,000,000 I	700 I, J
Xylenes (total)	150,000 C, I	46,000,000 I	700 I
Xylenes, m+p	150,000 C, I, J	46,000,000 I	700 I, J

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Depth Sample Date Sample Name Material Type	Criteria (continued) Residential Indoor Air Inhalation	 Residential Ambient Air Particulate Inhalation	 Residential Groundwater/ Surface Water Interface Protection
SVOC			
1,2,4-Trichlorobenzene	1,100,000 C	28,000,000	1,800
2,4-Dimethylphenol	NLV	NLV	7,600
2-Methylnaphthalene	ID	ID	ID
2-Methylphenol	NLV	NLV	1,400 J
4-Methylphenol	NLV	NLV	1,400 J
Acenaphthene	190,000,000	81,000,000	4,400
Anthracene	1,000,000,000 D	1,400,000,000	ID
Benzo(a)anthracene	NLV	NLV	NLL
Benzo(a)pyrene	NLV	NLV	NLL
Benzo(b)fluoranthene	NLV	NLV	NLL
Benzo(g,h,i)perylene	NLV	NLV	NLL
Benzo(k)fluoranthene	NLV	NLV	NLL
bis(2-Ethylhexyl)phthalate	NLV	NLV	NLL
Butylbenzylphthalate	NLV	NLV	26,000 X
Chrysene	ID	ID	NLL
Di-n-butylphthalate	NLV	NLV	11,000
Dibenzofuran	ID	ID	1,700
Diethylphthalate	NLV	NLV	NE
Fluoranthene	1,000,000,000 D	740,000,000	5,500
Fluorene	580,000,000	130,000,000	5,300
Indeno(1,2,3-c,d)pyrene	NLV	NLV	NLL
n-Nitrosodiphenylamine	NLV	NLV	NE
Naphthalene	250,000	300,000	870
Phenanthrene	1,800,000	9,300	2,300

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Depth Sample Date Sample Name Material Type	Criteria (continued) Residential Indoor Air Inhalation	Residential Ambient Air Particulate Inhalation	Residential Groundwater/ Surface Water Interface Protection
SVOC (continued)			
Phenol	NLV	NLV	4,200
Pyrene	1,000,000,000 D	650,000,000	ID
Metals			
Aluminum	NLV	NLV	NE
Antimony	NLV	NLV	ID
Arsenic	NLV	NLV	70,000 B, X
Barium	NLV	NLV	G,X
Beryllium	NLV	NLV	G
Cadmium	NLV	NLV	B, GX
Calcium	NE	NE	NE
Chromium	NLV	NLV	3,300 Hexavalent
Cobalt	NLV	NLV	2,000
Copper	NLV	NLV	G
Cyanide	NLV	NLV	400 P, R
Iron	NLV	NLV	NE
Lead	NLV	NLV	G, M, X
Magnesium	NLV	NLV	NE
Manganese	NLV	NLV	B, G, X
Mercury	NLV	NLV	100 M, INO
Nickel	NLV	NLV	B, G
Potassium	NE	NE	NE
Selenium	NLV	NLV	400 B
Silver	NLV	NLV	500 B, M

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring Depth Sample Date Sample Name Material Type	Criteria (continued) Residential Indoor Air Inhalation	 Residential Ambient Air Particulate Inhalation	 Residential Groundwater/ Surface Water Interface Protection
Metals (continued)			
Sodium	NLV	NLV	NE
Thallium	NLV	NLV	4,200 B, X
Vanadium	NLV	NLV	190,000
Zinc	NLV	NLV	B, G
PEST/PCBs			
4,4'-DDD	NLV	NLV	NLL
4,4'-DDE	NLV	NLV	NLL
Aldrin	1,300,000	58,000	NLL
Aroclor 1248	3,000,000 J,T	240,000 J, T	NLL
Aroclor 1260	3,000,000 J,T	240,000 J, T	NLL
PEST/PCBs (continued)			
BHC (alpha)	NE	NE	NE
BHC (delta)	NE	NE	NE
BHC (Lindane) (gamma)	ID	ID	20 M
Chlordane (alpha)	11,000,000 J	1,200,000 J	NLL
Chlordane (gamma)	11,000,000 J	1,200,000 J	NLL
Dieldrin	140,000	19,000	NLL
Endosulfan II	ID	ID	NLL
Endrin	NLV	NLV	NLL
Endrin aldehyde	NE	NE	NE
Endrin ketone	NE	NE	NE
Heptachlor	350,000	62,000	NLL
Heptachlor epoxide	NLV	NLV	NLL
Total Organic Carbon	NE	NE	NE

Footnotes on Page 26.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Not all the constituents analyzed for are listed in this table. This table presents only those constituents that were detected in one or more samples at least once over the course of the investigation.

All results are in micrograms per kilogram (µg/kg).

Bold	Indicates a value above the Residential and Commercial I Drinking Water Protection Criteria.
Italics	Indicates a value above the Residential Indoor Inhalation Criteria.
Underline	Indicates a value above the Groundwater Surface Water Interface Protection Screening Level.
	Indicates a value above the Residential and Commercial I Ambient Air Source Volatile Soil Inhalation Criteria.
	Indicates a value above the Residential and Commercial I Direct Contact Criteria.
<	Less than detection limit.
*	Duplicate analysis was not within control limits.
B	Constituent was also detected in laboratory blank.
J	Estimated result.
MBB	This analyte is present at a reportable level in the associated method blank but is less than 5 percent of the sample amount.
N	Spike sample recovery is not within control limits.
NA	Not analyzed.
P	Greater than 25% RPD between two columns for pesticide or PCB.
SVOCs	Semi volatile organic compounds.
VOCs	Volatile organic compounds.

Criteria Footnotes:

AD	Substance causes developmental effects. Residential and Commercial I direct contact criteria are protective of both prenatal and postnatal exposure.
B	Background may be substituted if higher than the calculated cleanup criteria.
C	Value presented is a screening level based on the chemical specific generic soil saturation concentration (Csat) since the calculated risk-based criterion is greater than Csat.
D	Calculated criterion exceeds 100%, hence it is reduced to 100%.
G	GSI criterion is hardness dependent.

Table 3. Summary of Constituents Detected in Subsurface Soil and Waste Samples and Screening Level Comparison, Riverside Disposal Area, IRAP, Ford/Kingsford Site, Kingsford, Michigan.

I	Chemical may exhibit the characteristic of ignitability, as defined in 40 CFR 261.21.
ID	Insufficient data.
INO	Inorganic.
iso	Isomer specific.
J	Chemical may be present in several isomer forms. Isomer specific concentrations must be added together for comparison to criteria.
M	Calculated criterion is below the target detection limit (TDL), therefore, the criterion defaults to the TDL.
NE	Not established.
NLL	Chemical is not likely to leach under most soil conditions.
NLV	Chemical is not likely to volatilize under most soil conditions.
P	Amenable or Method OIA-1677 analysis are used to quanitfy cyanide concentrations for compliance with all groundwater criteria.
Q	Criterion for carcinogenic polycyclic aromatic hydrocarbons (PAHs) were developed using "relative potential potenicies" (RFPs) to benzo(a)pyrene.
R	Hazardous substance may exhibit the characteristic of reactivity as defined in 40 CFR 261.23.
T	Refer to Toxic Substances Control Act (TSCA) to determine applicability of TSCA cleanup standards.
X	The GSI criterion is not protective for surface water that is used as a drinking water source.

Table 4. Summary of Constituents Detected in Soil and Waste TCLP Extracts, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GMSB-4	GMSB-4	GMSB-4	GMSB-4
Depth	5'-25'	27'	109'	185'
Sample Date	06/03/97	06/03/97	06/04/97	06/09/97
Sample Name	GMSB-4/5-25 (TCLP)	GMSB-4/27 (TCLP)	GMSB-4/109 (TCLP)	GMSB-4/185 (TCLP)
SVOC				
1,4-Dichlorobenzene	<50	<50	<50	<50
2,4,5-Trichlorophenol	<250	<250	<250	<250
2,4,6-Trichlorophenol	<50	<50	<50	<50
2,4-Dinitrotoluene	<50	<50	<50	<50
2-Methylphenol	<50	<50	<50	<50
3-Methylphenol	<50	<50	<50	<50
4-Methylphenol	<50	<50	<50	<50
Hexachlorobenzene	<50	<50	<50	<50
Hexachlorobutadiene	<50	<50	<50	<50
Hexachloroethane	<50	<50	<50	<50
Nitrobenzene	<50	<50	<50	<50
Pentachlorophenol	<250	<250	<250	<250
Pyridine	<100	<100	<100	<100
Chemical Oxygen Demand	30,000	<10,000	<10,000	11,000
Total Organic Carbon	7,000	1,000	<1,000	<1,000

Results are reported in micrograms per liter (µg/L).
< Less than detection limit.
SVOC Semi-volatile organic compounds.

Table 5. Summary of Constituents Detected in Groundwater and Groundwater Grab Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GM-30			GM-31			GM-51	
Top of Screen Depth	75	75	75	105	105	105	67	67
Sample Date	10/27/98	05/12/99	05/12/99	10/24/98	05/03/99	10/09/00	10/20/98	04/18/99
Sample Name	GWGM-30	GWGM-30	GWGM-83	GWGM-31	GWGM-31	GWGM-31	GWGM-51	GWGM-51
VOC								
1,2-Dichloroethane	<1	<1	<1	<1	<1	NA	<1	<1
Benzene	<1	<1	<1	<1	<1	NA	<1	<1
Carbon disulfide	<1	<1	<1	<1	3.4	NA	<1	<1
Carbon tetrachloride	<1	<1	<1	<1	<1	NA	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1	NA	<1	<1
Toluene	1.2	<1	<1	<1	<1	NA	<1	<1
Xylenes (total)	<3	<3	<3	<3	<3	NA	<3	<3
SVOC								
2,4-Dimethylphenol	11	R	R	<5	R	<5.0	<5	<5
bis(2-Ethylhexyl)phthalate	<5	5.6	<5	<5	15	NA	<5	<5
Di-n-butylphthalate	<5	<5	<5	<5	<5	NA	<5	<5
Metals								
Arsenic	15	<5	<5	13	<5	NA	5.4	<5
Barium	280	<200	<200	<200 J	<200	NA	<200	<200
Calcium	110,000	140,000	130,000	62,000	63,000 J	NA	65,000	73,000
Calcium-DISS	NA	NA	NA	NA	NA	64,000	NA	NA
Iron	9,300	2,600	2,400	5,900 J	4,100	NA	75	380

Footnotes on Page 7.

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Table 5. Summary of Constituents Detected in Groundwater and Groundwater Grab Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GM-30			GM-31			GM-51	
Top of Screen Depth	75	75	75	105	105	105	67	67
Sample Date	10/27/98	05/12/99	05/12/99	10/24/98	05/03/99	10/09/00	10/20/98	04/18/99
Sample Name	GWGM-30	GWGM-30	GWGM-83	GWGM-31	GWGM-31	GWGM-31	GWGM-51	GWGM-51
Metals (continued)								
Iron-DISS	NA	NA	NA	NA	NA	4,800	NA	NA
Magnesium	48,000	59,000	57,000	28,000 J	29,000	NA	31,000	34,000
Magnesium-DISS	NA	NA	NA	NA	NA	29,000	NA	NA
Manganese	730	1,400	1,300	1,000	940 J	NA	70	100
Potassium	6,600	12,000	12,000	2,300	3,100	NA	2,500	2,200
Potassium-DISS	NA	NA	NA	NA	NA	2,500	NA	NA
Silver	<0.5	<0.5	<0.5	<0.5	<0.5	NA	*0.63*	<0.5
Sodium	28,000	41,000	40,000	7,900	9,800	NA	4,200	6,300
Sodium-DISS	NA	NA	NA	NA	NA	10,000 J	NA	NA
Inorganics								
Alkalinity	420,000	400,000	400,000	250,000	240,000	NA	170,000	200,000
Bicarbonate	NA	NA	NA	NA	NA	260,000	NA	NA
Chloride	63,000	46,000	43,000	40,000	40,000	36,000	7,400	15,000
Phosphorus	<100	<100	140	110	<100	NA	<100	<100
Silica	<100	9,900	9,900	<100	19,100	NA	<100	15,000
Sulfate	5,900	230,000	240,000	<5,000	<5,000	<5,000	110,000	130,000

Footnotes on Page 7.

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Table 5. Summary of Constituents Detected in Groundwater and Groundwater Grab Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GM-30			GM-31			GM-51	
Top of Screen Depth	75	75	75	105	105	105	67	67
Sample Date	10/27/98	05/12/99	05/12/99	10/24/98	05/03/99	10/09/00	10/20/98	04/18/99
Sample Name	GWGM-30	GWGM-30	GWGM-83	GWGM-31	GWGM-31	GWGM-31	GWGM-51	GWGM-51
Alcohols								
Ethanol	<1,000	<1,000	<1,000	<1,000	<1,000	NA	<1,000	3,600 J
Ethylene glycol	37,000	<20,000	<20,000	<20,000	<20,000 J	NA	<20,000	<20,000 J
Methanol	<800	<800	<800	<800	*2,400 J*	NA	<800	<800 J
n-Butanol	<1,000	<1,000	1,700 J	<1,000	<1,000	NA	<1,000	<1,000 J
Acetic Acid	290	<500	<500	340	<500	NA	250	<500
Biochemical Oxygen Demand	10,000 J	5,600	5,000	2,600 J	3,900	NA	<2,000	4,700
Chemical Oxygen Demand	<10,000	<10,000	20,000	<10,000	<10,000	NA	<10,000	<10,000
Total Organic Carbon	5,400	4,000	4,100	1,000	1,300	NA	<1,000	<1,000
Methane	27,400	8,460	8,450	6,980	5,030	NA	1,860	5,400
Density	NA	NA	NA	NA	NA	NA	NA	NA
Solids, Total Dissolved	NA	NA	NA	NA	290,000	NA	NA	NA

Footnotes on Page 7.

Table 5. Summary of Constituents Detected in Groundwater and Groundwater Grab Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GMSB-4		Criteria			
Top of Screen Depth	NA	NA	Residential Groundwater Contact	Residential Drinking Water	Residential Groundwater Volatilization to Indoor Air	Groundwater/ Surface Water Interface Protection
Sample Date	06/04/97	06/09/97				
Sample Name	GBGMSB-4/115	GBGMSB-4/183.5				
VOC						
1,2-Dichloroethane	1.2	<50	19,000 I	5 A, I	9,600 I	360 I, X
Benzene	2.3	**8.2 J**	11,000 I	5 A, I	5,600 I	200 I, X
Carbon disulfide	0.19 J	640	1,200,000 I,R,S	800 I, R	250,000 I, R	ID
Carbon tetrachloride	0.19 J	<50	4,600	5 A	370	45 X
Ethylbenzene	0.32 J	<50	170,000 I, S	74 E, I	170,000 I, S	18 I
Toluene	0.56 J	5.3 J	530,000 I, S	790 E, I	530,000 I, S	140 I
Xylenes (total)	0.34 J	<50	190,000 I, S	280 E, I	190,000 I, S	35 I
SVOC						
2,4-Dimethylphenol	4.9 J	***390***	520,000	370	NLV	380
bis(2-Ethylhexyl)phthalate	**20**	**18 J**	320 AA	6 A	NLV	32
Di-n-butylphthalate	5.1	<33	11,000 S	880	NLV	9.7
Metals						
Arsenic	NA	NA	4,300 B	50 A, B	NLV	150 B, X
Barium	NA	NA	14,000,000	2,000 A	NLV	G, X
Calcium	NA	NA	NA	NA	NA	NA
Calcium-DISS	NA	NA	NA	NA	NA	NA
Iron	NA	NA	58,000,000 B	300 B, E	NLV	NA

Footnotes on Page 7.

Table 5. Summary of Constituents Detected in Groundwater and Groundwater Grab Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Well/Boring	GMSB-4		Criteria			
Top of Screen Depth	NA	NA	Residential Groundwater Contact	Residential Drinking Water	Residential Groundwater Volatilization to Indoor Air	Groundwater/ Surface Water Interface Protection
Sample Date	06/04/97	06/09/97				
Sample Name	GBGMSB-4/115	GBGMSB-4/183.5				
Metals (continued)						
Iron-DISS	NA	NA	58,000,000 B	300 B, E	NLV	NA
Magnesium	NA	NA	1,000,000,000 B, D	400,000 B	NLV	NA
Magnesium-DISS	NA	NA	1,000,000,000 B, D	400,000 B	NLV	NA
Manganese	NA	NA	9,100,000 B	50 E,B	NLV	G, B, X
Potassium	NA	NA	NA	NA	NA	NA
Potassium-DISS	NA	NA	NA	NA	NA	NA
Silver	NA	NA	1,500,000 B	34 B	NLV	0.2 B, M
Sodium	NA	NA	1,000,000,000 D	120,000	NLV	NA
Sodium-DISS	NA	NA	1,000,000,000 D	120,000	NLV	NA
Inorganics						
Alkalinity	NA	NA	NA	NA	NA	NA
Bicarbonate	NA	NA	NA	NA	NA	NA
Chloride	NA	NA	ID	250,000 E	NLV	125,000 X
Phosphorus	NA	NA	ID, Total	63,000 Total	NLV, TOTAL	NA
Silica	NA	NA	NA	NA	NA	NA
Sulfate	NA	NA	ID	250,000 E	NLV	NA

Footnotes on Page 7.

Table 5. Summary of Constituents Detected in Groundwater and Groundwater Grab Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

			Criteria			
Well/Boring	GMSB-4				Residential	Groundwater/
Top of Screen Depth	NA	NA	Residential	Residential	Groundwater	Surface Water
Sample Date	06/04/97	06/09/97	Groundwater	Drinking	Volatilization	Interface
Sample Name	GBGMSB-4/115	GBGMSB-4/183.5	Contact	Water	to Indoor Air	Protection
Alcohols						
Ethanol	NA	NA	1,000,000,000 D, I	1,900,000 I	NLV	IP
Ethylene glycol	NA	NA	1,000,000,000 D, S	15,000	NLV	190,000 X
Methanol	NA	NA	29,000,000 S	3,700	2,500,000	480
n-Butanol	NA	NA	8,800,000 I	950 I	NLV	NA
Acetic Acid	NA	NA	180,000,000	18,000 M	NLV	18,000 M
Biochemical Oxygen Demand	<2,000	<2,000	NA	NA	NA	NA
Chemical Oxygen Demand	23,000	190,000	NA	NA	NA	NA
Total Organic Carbon	11,000	56,000 H J	NA	NA	NA	NA
Methane	10,700	36,800	ID	ID	K	ID
Density	1,000	990	NA	NA	NA	NA
Solids, Total Dissolved	NA	NA	NA	NA	NA	NA

Footnotes on Page 7.

Table 5. Summary of Constituents Detected in Groundwater and Groundwater Grab Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

Not all the compounds analyzed for are listed in this table. This table presents only those compounds that were detected in one or more samples at least once over the course of the investigation.

Results are reported in micrograms per liter (µg/L).

(shaded)	Value above the Residential & Commercial I Drinking Water Criteria (Operational Memorandum #18, June 7, 2000).
(boxed)	Value above the Groundwater Contact Criteria (Operational Memorandum #18, June 7, 2000).
Bold	Value above the Residential and Commercial I Indoor Air Inhalation Criteria (Operational Memorandum #18, June 7, 2000).
Italics	Value above the Groundwater Surface Water Interface Criteria (Operational Memorandum #18, June 7, 2000).
<	Less than detection limit.
J	Estimated result.
R	Rejected data.
NA	Not analyzed.
VOC	Volatile organic compounds.
SVOC	Semi-volatile organic compounds.

Criteria Footnotes:

A	Criterion is the State of Michigan Drinking Water Standard, Section 5 of the Safe Drinking Water Act, Act No. 399 of the Public Acts of 1976.
B	Background may be substituted if higher than the calculated cleanup criteria.
D	Calculated criterion exceeds 100%, hence it is reduced to 100%.
E	Criterion is the aesthetic drinking water value.
G	GSI value is pH or water hardness dependent.
H	Valence-specific chromium data must be compared to the corresponding valence-specific cleanup criteria.
I	Chemical may exhibit the characteristic of ignitability, as defined in 40 CFR 261.21.
J	Chemical may be present in several isomer forms. Isomer specific concentrations must be added together for comparison to criteria.
K	Hazardous substance may be flammable and/or explosive.
M	Calculated criterion is below the analytical method detection limit (MDL).
R	Chemical may exhibit the characteristic of reactivity, as defined in 40 CFR 261.23.

Table 5. Summary of Constituents Detected in Groundwater and Groundwater Grab Samples and Screening Level Comparison, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

S	Criterion defaults to the chemical-specific water solubility limit.
X	GSI criterion shown is not protective for surface water that is used as a drinking water source.
AA	Filtered groundwater samples must be collected for appropriate comparison.
NLV	Chemical is not likely to volatilize under most soil conditions.
ID	Insufficient data.
IP	In progress.
NE	Not established.

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Table 6. Estimated Cost for a Permeable Cover System Response Action, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

CAPITAL COSTS

CAPITAL COST	**Quantity**	**Unit**	**Cost per Unit**	**Total**
DIRECT CAPITAL COST				
EQUIPMENT				
Excavation (2' thick, 1.7 acres)	5,500	CY	$5.00	$27,500
Relocation of Excavated Waste	5,500	CY	$5.00	$27,500
Common Fill (24" thick, 3.8 acres)	12,300	CY	$4.00	$49,200
Topsoil (6" thick, 3.8 acres)	3,100	CY	$16.00	$49,600
Seed, Fertilizer, Mulch, Tack	5.5	Acre	$1,000	$5,500
Stormwater Controls	1	LS	$5,000	$5,000
Permanent Markers	4	Ea	$500	$2,000
SUBTOTAL EQUIPMENT COST				$166,300
LABOR AND INSTALLATION				
Mob/Demob	1	LS	$50,000	$50,000
Clearing, Grubbing & Grading	5.5	Acre	$4,300	$23,700
Excavation (2' thick, 1.7 acres)	5,500	CY	$5.50	$30,300
Excavated Waste Placement	5,500	CY	$5.50	$30,300
Common Fill Placement	12,300	CY	$4.00	$49,200
Topsoil Placement	5,500	CY	$8.00	$44,000
Seeding, Fertilizing, Mulch, etc.	5.5	Acre	$1,000	$5,500
Surveying	1	LS	$5,000	$5,000
Geotechnical Testing	1	LS	$5,000	$5,000
Stormwater Controls	1	LS	$5,000	$5,000
Permanent Markers	1	Ea	$500	$500
Verification Sampling	30	LS	$1,405	$42,200
Waste Transportation & Disposal	100	TN	$70	$7,000
SUBTOTAL LABOR AND INSTALLATION				$297,700
SUBTOTAL DIRECT CAPITAL COST				*$464,000*
INDIRECT CAPITAL COST				
Engineering and Design	15%			$69,600
Health & Safety	5%			$23,200
Construction Oversight	20%			$92,800
Contingency	25%			$116,000
Closure Report				$25,000
SUBTOTAL INDIRECT CAPITAL COST				*$326,600*
TOTAL CAPITAL COSTS				**$790,600**

OPERATIONS AND MAINTENANCE COSTS

ANNUAL O&M COST	**Quantity**	**Unit**	**Cost per Unit**	**Total**
DIRECT ANNUAL O&M COST				
Maintenance	1	LS	$3,000	$3,000
Annual Inspection	1	LS	$2,500	$2,500
Annual Inspection Report	1	LS	$5,000	$5,000
SUBTOTAL ANNUAL O&M COST				*$10,500*
INDIRECT ANNUAL O&M COST				
Project Management	10%			$1,100
Contingency	0%			$0
SUBTOTAL INDIRECT ANNUAL O&M COST				*$1,100*
TOTAL ANNUAL O&M COST				***$11,600***
PRESENT WORTH OF NEXT 30 YEARS OF O&M				**$178,000**

NET PRESENT COST OF SYSTEM **$969,000**

Table 7. Estimated Cost for a Low-Permeability Cover System Response Action, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

CAPITAL COSTS

CAPITAL COST	Quantity	Unit	Cost per Unit	Total
DIRECT CAPITAL COST				
EQUIPMENT				
Excavation (2' thick, 1.7 acres)	5,500	CY	$5.00	$27,500
Relocation of Excavated Waste	5,500	CY	$5.00	$27,500
Venting System	3.8	Acre	$7,500	$28,500
Geofabric (3.8 acres - 3 layers)	546,300	SF	$0.10	$54,600
LDPE Synthetic Liner	182,100	SF	$0.38	$69,200
Sand Drainage Layer (1' thick)	6,100	CY	$8.00	$48,800
Common Fill (18" thick, 3.8 acres)		CY	$4.00	$0
Topsoil (6" thick, 3.8 acres)	3,100	CY	$16.00	$49,600
Seed, Fertilizer, Mulch, Tack	5.5	Acre	$1,000	$5,500
Permanent Storm Water Controls	1	LS	$15,000	$15,000
Permanent Markers	4	Ea	$500	$2,000
SUBTOTAL EQUIPMENT COST				$328,200
LABOR AND INSTALLATION				
Mob/Demob	1	LS	$50,000	$50,000
Clearing, Grubbing & Grading	5.5	Acre	$4,300	$23,700
Excavation (2' thick, 1.7 acres)	5,500	CY	$5.50	$30,300
Excavated Waste Placement	5,500	CY	$5.50	$30,300
Subgrade Prep (1' thick, 3.8 acre)	6,131	CY	$4.00	$24,500
Vent Installation	3.8	Acre	$16,667	$63,300
Geofabric (3.8 acres - 3 layers)	546,300	SF	$0.14	$76,500
LDPE Synthetic Liner	182,100	SF	$0.23	$41,900
Sand Placement	6,100	CY	$8.00	$48,800
Common Fill Placement	-	CY	$4.00	$0
Topsoil Placement	3,100	CY	$8.00	$24,800
Seeding, Fertilizing, Mulch, etc.	5.5	Acre	$1,000	$5,500
Surveying	1	LS	$20,000	$20,000
Geotechnical Testing	1	LS	$15,000	$15,000
Stormwater Controls	1	LS	$25,000	$25,000
Permanent Markers	1	Ea	$500	$500
Verification Sampling	30	LS	$1,405	$42,200
Waste Transportation & Disposal	100	TN	$70	$7,000
SUBTOTAL LABOR AND INSTALLATION				$529,300

OPERATIONS AND MAINTENANCE COSTS

ANNUAL O&M COST	Quantity	Unit	Cost per Unit	Total
DIRECT ANNUAL O&M COST				
Long Term Maintenance	1	LS	$10,000	$10,000
Annual Inspection	1	LS	$2,500	$2,500
Vapor Monitoring	1	LS	$2,500	$2,500
Reporting	1	LS	$4,000	$4,000
SUBTOTAL ANNUAL O&M COST				*$19,000*
INDIRECT ANNUAL O&M COST				
Project Management	10%			$1,900
Contingency	0%			$0
SUBTOTAL INDIRECT ANNUAL O&M COST				*$1,900*
TOTAL ANNUAL O&M COST				***$20,900***
PRESENT WORTH OF NEXT 30 YEARS OF O&M				**$321,000**

Table 7. Estimated Cost for a Low-Permeability Cover System Response Action, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

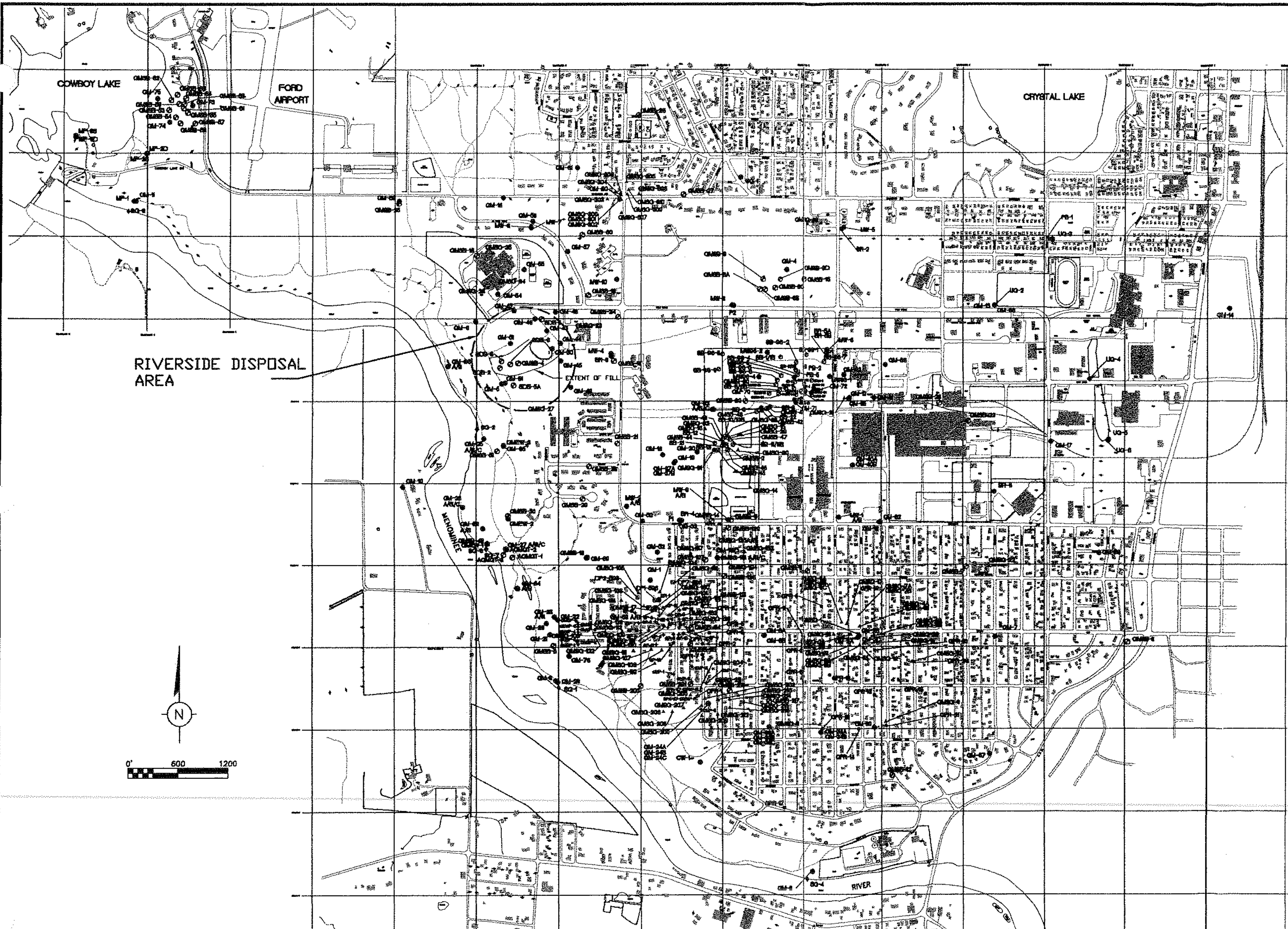
CAPITAL COSTS					**OPERATIONS AND MAINTENANCE COSTS**				
CAPITAL COST	**Quantity**	**Unit**	**Cost per Unit**	**Total**	*ANNUAL O&M COST*	**Quantity**	**Unit**	**Cost per Unit**	**Total**
SUBTOTAL DIRECT CAPITAL COST				*$857,500*					
INDIRECT CAPITAL COST									
Engineering/Design/Construction Report	15%			$128,600					
Health & Safety	2.5%			$21,400					
Construction Oversight	15%			$128,600					
Contingency	25%			$214,400					
Closure Report				$25,000					
SUBTOTAL INDIRECT CAPITAL COST				*$518,000*					
TOTAL CAPITAL COSTS				**$1,375,500**					

NET PRESENT COST OF SYSTEM **$1,697,000**

Table 8. Estimated Cost for an Excavation and Off-Site Disposal of Waste Material Response Action, Riverside Disposal Area IRAP, Ford/Kingsford Site, Kingsford, Michigan.

CAPITAL COSTS

CAPITAL COST	**Quantity**	**Unit**	**Cost per Unit**	**Total**
DIRECT CAPITAL COST				
EQUIPMENT				
Construction Storm Water Controls	1	LS	$7,500	$7,500
Stormwater Mgt	12	Month	$3,130	$37,600
Excavation (5.5 acres, 12 feet deep)	106,500	CY	$5.00	$532,500
Seed, Fertilizer, Mulch, Tack	5.5	Acre	$1,000	$5,500
SUBTOTAL EQUIPMENT COST				$583,100
LABOR AND INSTALLATION				
Mob/Demob	1	LS	$50,000	$50,000
Clearing & Grubbing	5.5	Acre	$4,300	$23,700
Construction Storm Water Controls	1	LS	$12,500	$12,500
Stormwater Mgt	12	Month	$500	$6,000
Excavation of Waste	106,500	CY	$5.50	$585,800
Waste Transportation & Disposal	159,750	TN	$70	$11,182,500
Seed, Fertilizer, Mulch, Tack	5.5	Acre	$1,000	$5,500
Verification Sampling	90	LS	$1,405	$126,500
Surveying	1	LS	$5,000	$5,000
SUBTOTAL LABOR AND INSTALLATION				$11,997,500
SUBTOTAL DIRECT CAPITAL COST				*$12,580,600*
INDIRECT CAPITAL COST				
Engineering and Design	2%			$251,600
Health & Safety	2%			$251,600
Construction Oversight	5%			$629,000
Contingency	25%			$3,145,200
Closure Report				$25,000
SUBTOTAL INDIRECT CAPITAL COST				*$4,302,400*
TOTAL CAPITAL COSTS				**$16,883,000**
		NET PRESENT COST OF SYSTEM		**$16,883,000**



NOTES

1. HORIZONTAL DATUM BASED ON MICHIGAN STATE PLANE COORDINATE SYSTEM.
   DATE OF PHOTOGRAPHY: 05/04/97
   ABRAMS AERIAL SURVEY CORPORATION # 26984.2
2. ACCURACIES NOT GUARANTEED IN OBSCURED AREAS SHOWN BY DASHED CONTOURS AND UNDERLINED ELEVATIONS

LEGEND

- MONITOR WELL LOCATION
- SOIL BORING LOCATION
- FORMER TEMPORARY MONITOR WELL LOCATION
- GAS PROBES
- STAFF GAUGE LOCATION
- GPR SOIL BORING LOCATION

G:\CAD\FORD\RIVERSIDE DISPOSAL AREA\FBASEMAP.DWG 5/24/2001 CES

NO.	DATE	REVISION DESCRIPTION	BY	CKD

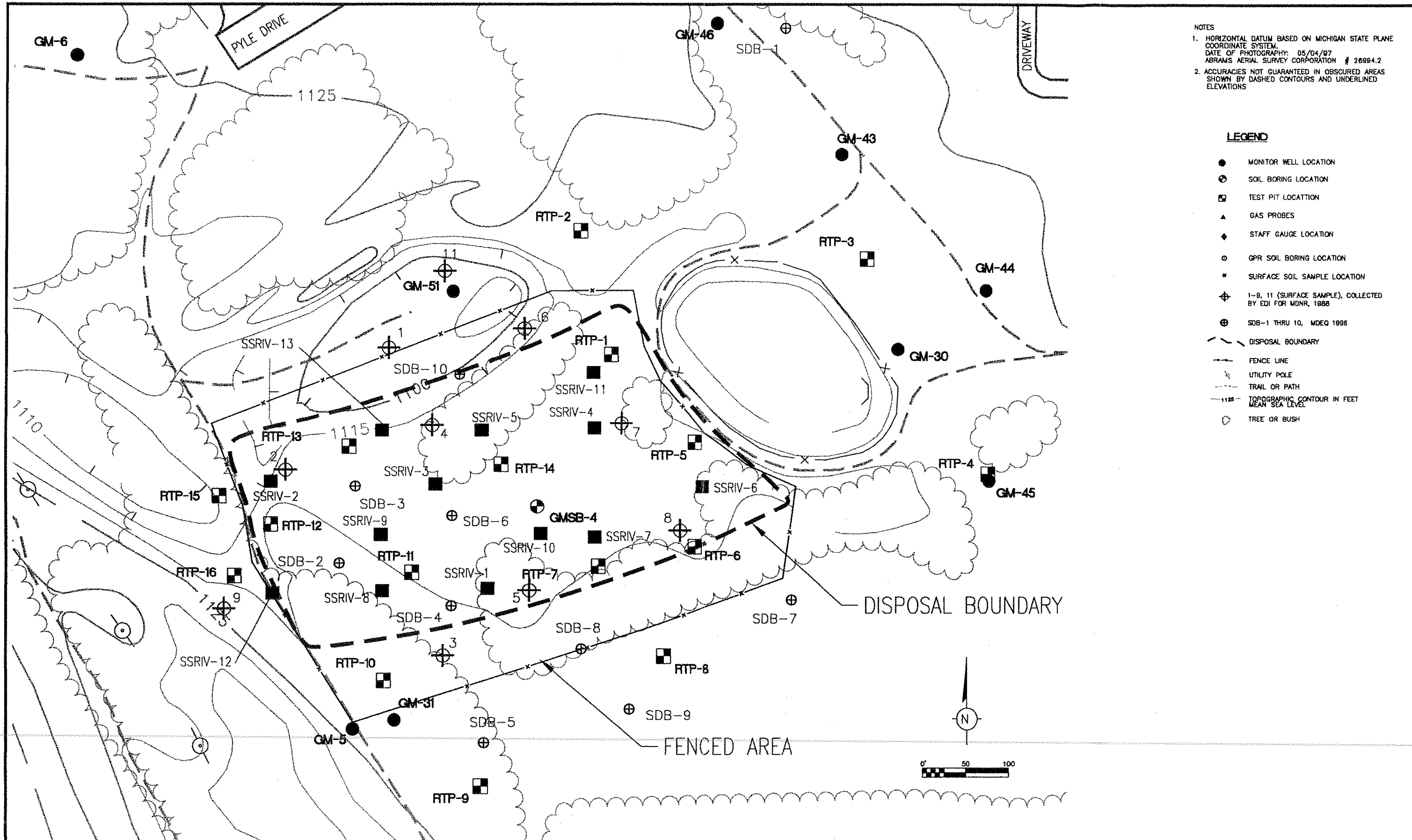
ARCADIS GERAGHTY&MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

RIVERSIDE DISPOSAL AREA
IRAP
FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

DRAWN CES | DATE 5/24/01

LOCATION OF RIVERSIDE DISPOSAL AREA

PROJECT MANAGER	DEPARTMENT MANAGER
EC	BE
LEAD DESIGN PROF. BE	CHECKED BE
PROJECT NUMBER WI00804.0011	FIGURE 1



RIVERSIDE DISPOSAL AREA/FFRSDAFIG3.DWG 5/24/2001 CES

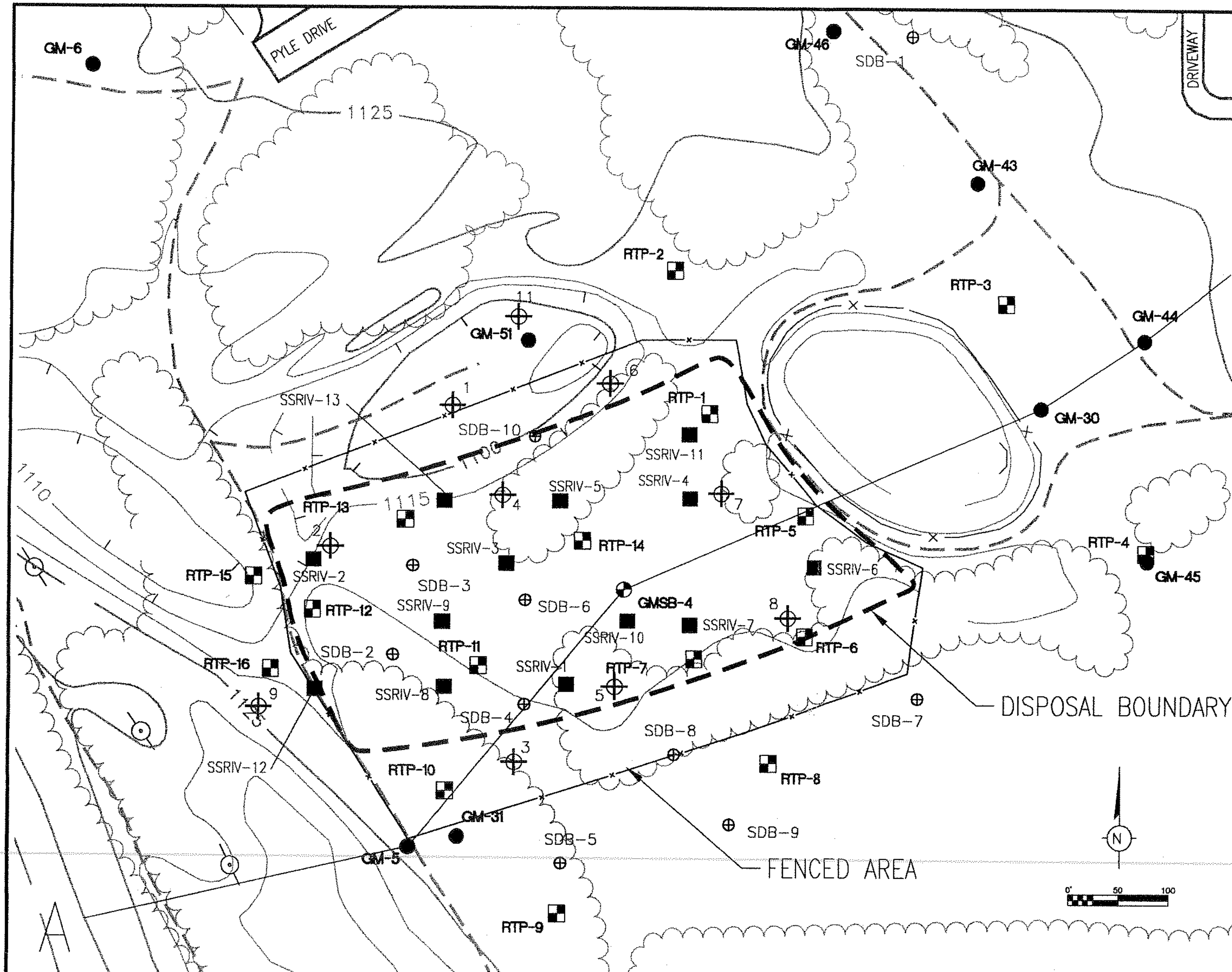
NO.	DATE	REVISION DESCRIPTION	BY / CKD

ARCADIS GERAGHTY&MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

RIVERSIDE DISPOSAL AREA
IRAP

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

DRAWN: CES	DATE: 5/24/2000	PROJECT MANAGER: EC	DEPARTMENT MANAGER: BE
RIVERSIDE DISPOSAL AREA		LEAD DESIGN PROF.: BE	CHECKED: BE
		PROJECT NUMBER: WI00770.0001	FIGURE: 2



NOTES

1. HORIZONTAL DATUM BASED ON MICHIGAN STATE PLANE COORDINATE SYSTEM.
   DATE OF PHOTOGRAPHY: 05/04/97
   ABRAMS AERIAL SURVEY CORPORATION # 26994.2
2. ACCURACIES NOT GUARANTEED IN OBSCURED AREAS SHOWN BY DASHED CONTOURS AND UNDERLINED ELEVATIONS

LEGEND

- MONITOR WELL LOCATION
- SOIL BORING LOCATION
- TEST PIT LOCATTION
- GAS PROBES
- STAFF GAUGE LOCATION
- GPR SOIL BORING LOCATION
- SURFACE SOIL SAMPLE LOCATION
- 1-9, 11 (SURFACE SAMPLE), COLLECTED BY EDI FOR MDNR, 1988
- SDB-1 THRU 10, MDEQ 1996
- DISPOSAL BOUNDARY
- FENCE LINE
- UTILITY POLE
- TRAIL OR PATH
- 1125 TOPOGRAPHIC CONTOUR IN FEET MEAN SEA LEVEL
- TREE OR BUSH

RIVERSIDE DISPOSAL AREA/FFRSDAFIG3.DWG 5/24/2001 CES

NO.	DATE	REVISION DESCRIPTION	BY	CKD

ARCADIS GERAGHTY & MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

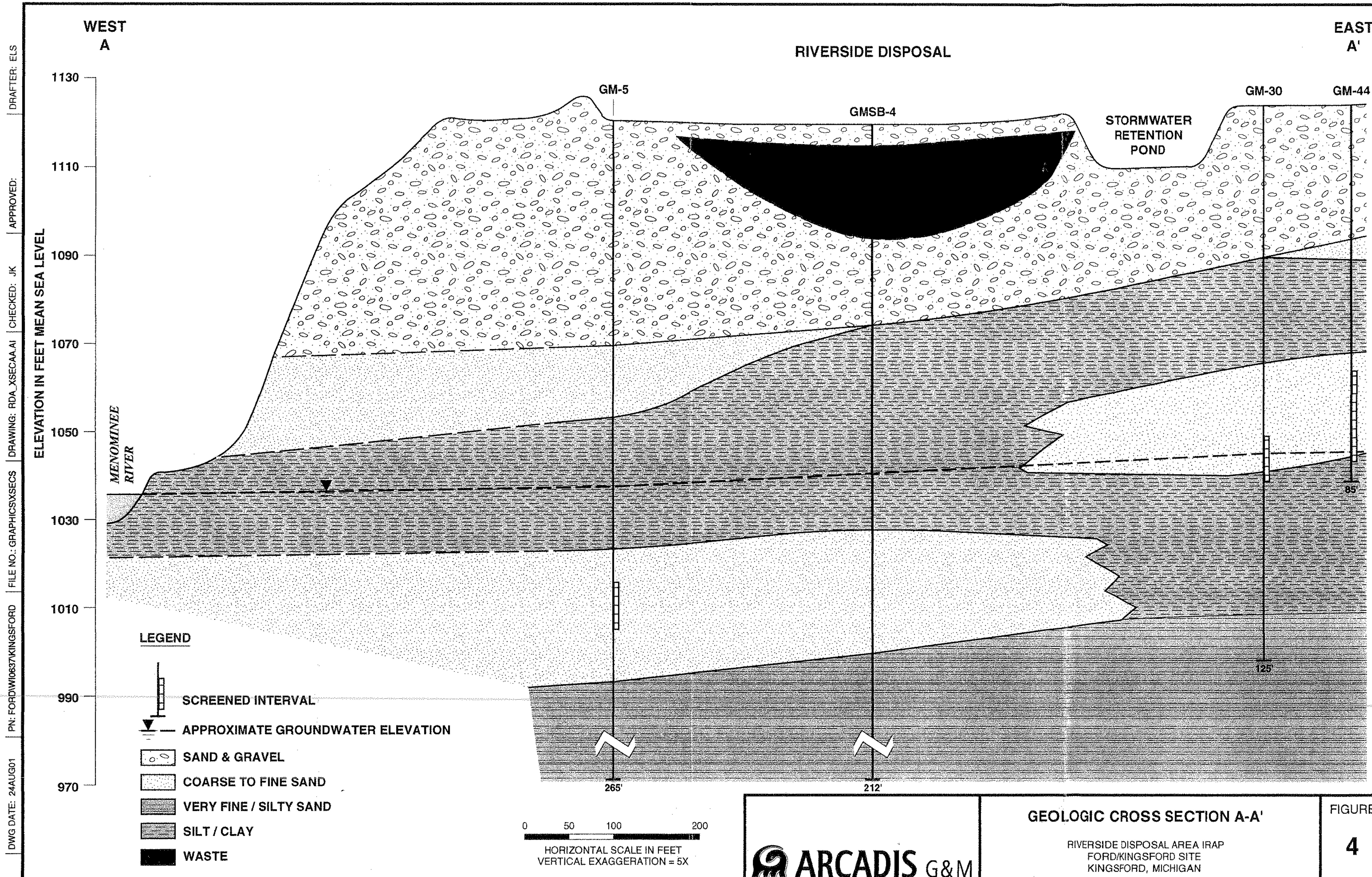
RIVERSIDE DISPOSAL AREA
IRAP

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

DRAWN	DATE
CES	5/24/2000

LOCATION OF CROSSECTION

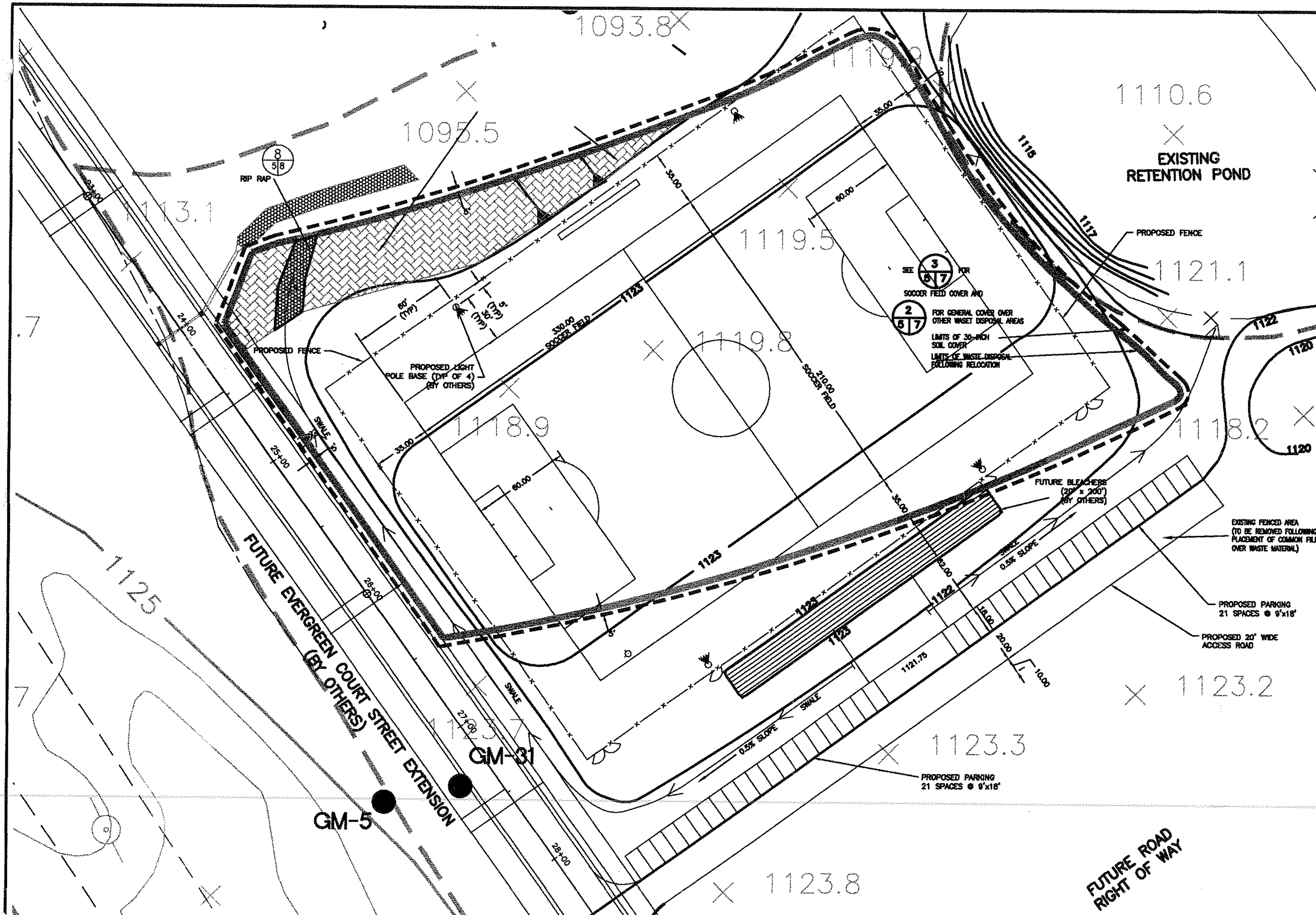
PROJECT MANAGER	DEPARTMENT MANAGER
EC	BE
LEAD DESIGN PROF.	CHECKED
BE	BE
PROJECT NUMBER	FIGURE
WI00770.0001	3



GEOLOGIC CROSS SECTION A-A'

RIVERSIDE DISPOSAL AREA IRAP
FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

FIGURE 4



NOTES

1. HORIZONTAL DATUM BASED ON MICHIGAN STATE PLANE COORDINATE SYSTEM.
   DATE OF PHOTOGRAPHY: 05/04/97
   ABRAMS AERIAL SURVEY CORPORATION # 26994.2
2. ACCURACIES NOT GUARANTEED IN OBSCURED AREAS SHOWN BY DASHED CONTOURS AND UNDERLINED ELEVATIONS

N

0' 30 60
SCALE: 1" = 30'

LEGEND

- ● MONITOR WELL LOCATION
- X 1119.8 EXISTING SPOT ELEVATION
- 1121.1 PROPOSED SPOT ELEVATION

ALL PROFESSIONAL ENGINEERING SERVICES DEPICTED ON THIS DRAWING HAVE BEEN PERFORMED FOR ARCADIS GERAGHTY & MILLER, INC. BY GMCE, INC; A FLORIDA CORPORATION QUALIFIED TO PERFORM SUCH SERVICES IN THE STATE OF MICHIGAN.

G:\CAD\RIVERSIDE-DISPOSAL-AREA\WASTEMATERIAL/FWM-PREGRADPLN.DWG 3/12/01 bjh

NO.	DATE	REVISION DESCRIPTION	BY / CKD

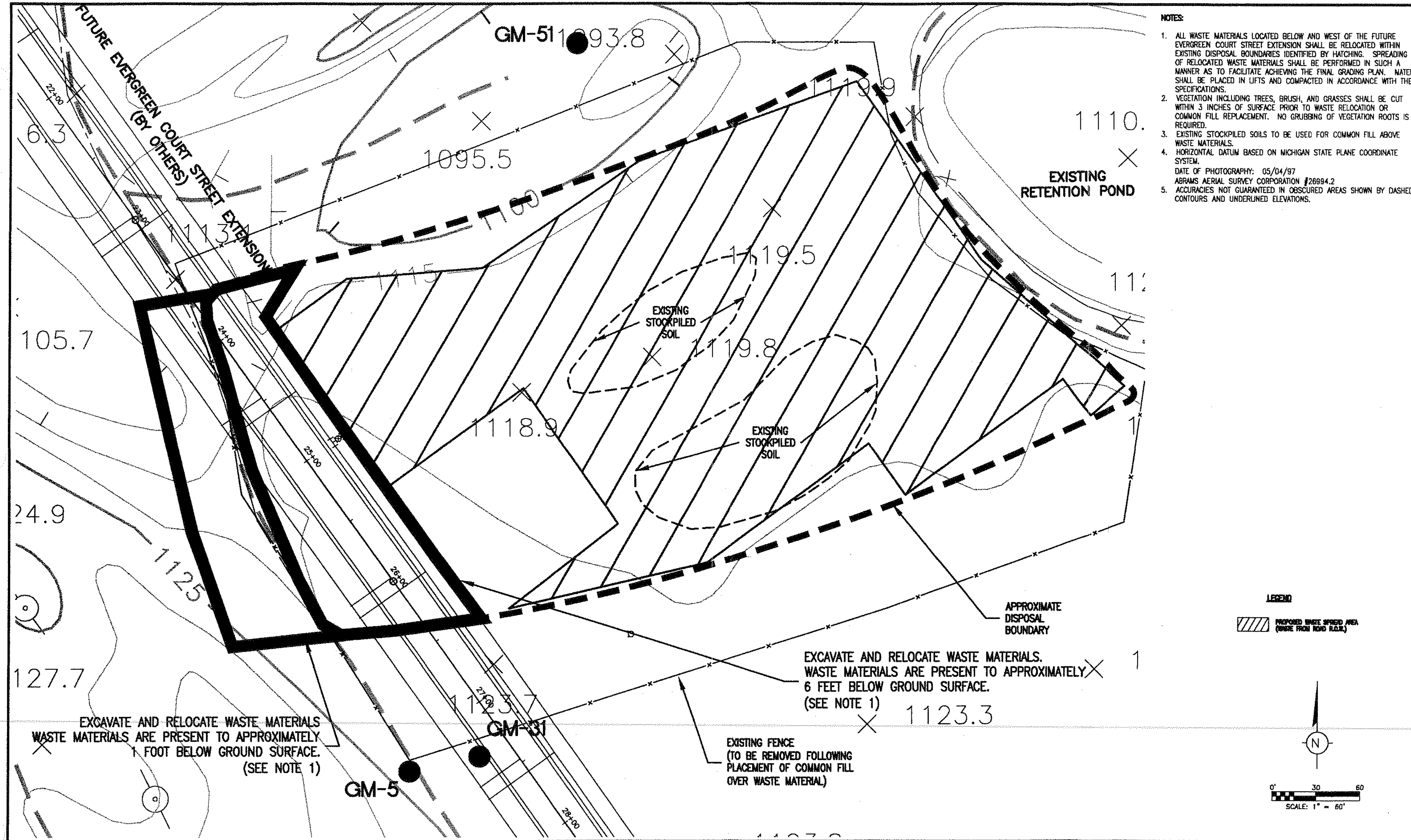
ARCADIS GERAGHTY & MILLER
3903 Northdale Boulevard, Suite 120
Tampa, Florida 33624
Tel: 813/961-1921 Fax: 813/961-2599

RIVERSIDE DISPOSAL AREA
IRAP

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

DRAWN: BJH	DATE: 5/04/01
PROJECT MANAGER: EC	DEPARTMENT MANAGER: BE
LEAD DESIGN PROF.: BE	CHECKED: BE
PROJECT NUMBER: WI00860.0011	FIGURE: 5

GRADING PLAN AND
COVER SYSTEM FOOTPRINT



NOTES:

1. ALL WASTE MATERIALS LOCATED BELOW AND WEST OF THE FUTURE EVERGREEN COURT STREET EXTENSION SHALL BE RELOCATED WITHIN EXISTING DISPOSAL BOUNDARIES IDENTIFIED BY HATCHING. SPREADING OF RELOCATED WASTE MATERIALS SHALL BE PERFORMED IN SUCH A MANNER AS TO FACILITATE ACHIEVING THE FINAL GRADING PLAN. MATERIALS SHALL BE PLACED IN LIFTS AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATIONS.
2. VEGETATION INCLUDING TREES, BRUSH, AND GRASSES SHALL BE CUT WITHIN 3 INCHES OF SURFACE PRIOR TO WASTE RELOCATION OR COMMON FILL REPLACEMENT. NO GRUBBING OF VEGETATION ROOTS IS REQUIRED.
3. EXISTING STOCKPILED SOILS TO BE USED FOR COMMON FILL ABOVE WASTE MATERIALS.
4. HORIZONTAL DATUM BASED ON MICHIGAN STATE PLANE COORDINATE SYSTEM.
   DATE OF PHOTOGRAPHY: 05/04/97
   ABRAMS AERIAL SURVEY CORPORATION #26994.2
5. ACCURACIES NOT GUARANTEED IN OBSCURED AREAS SHOWN BY DASHED CONTOURS AND UNDERLINED ELEVATIONS.

ALL PROFESSIONAL ENGINEERING SERVICES DEPICTED ON THIS DRAWING HAVE BEEN PERFORMED FOR ARCADIS GERAGHTY & MILLER, INC. BY GMCE, INC; A FLORIDA CORPORATION QUALIFIED TO PERFORM SUCH SERVICES IN THE STATE OF MICHIGAN.

G:\CAD\RIVERSIDE-DISPOSAL-AREA\WASTE MATERIAL-DRAWINGS\ISABEL2 6/29/01 CES

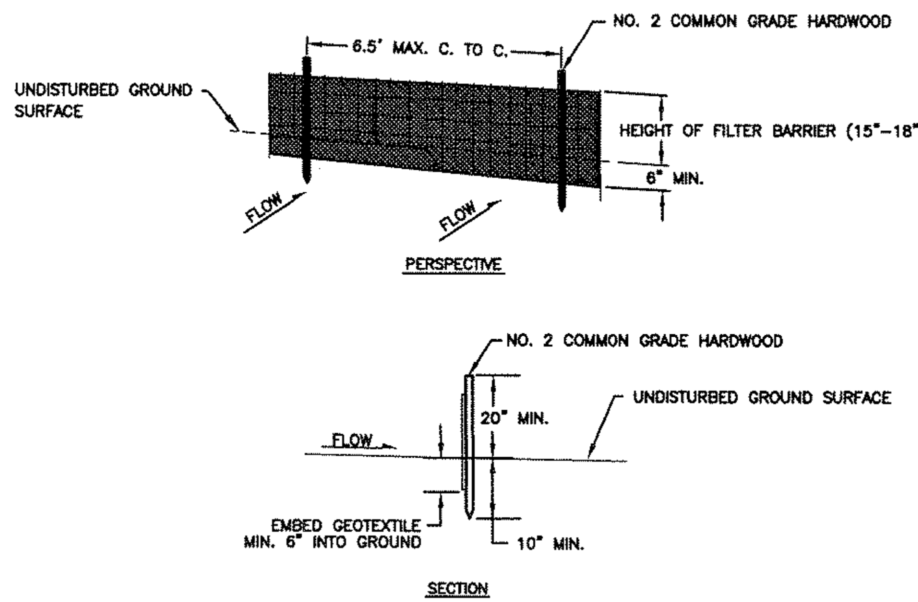
NO.	DATE	REVISION DESCRIPTION	BY/CKD

ARCADIS GERAGHTY & MILLER
3903 Northdale Boulevard, Suite 120
Tampa, Florida 33624
Tel: 813/961-1921 Fax: 813/961-2599

RIVERSIDE DISPOSAL AREA
IRAP

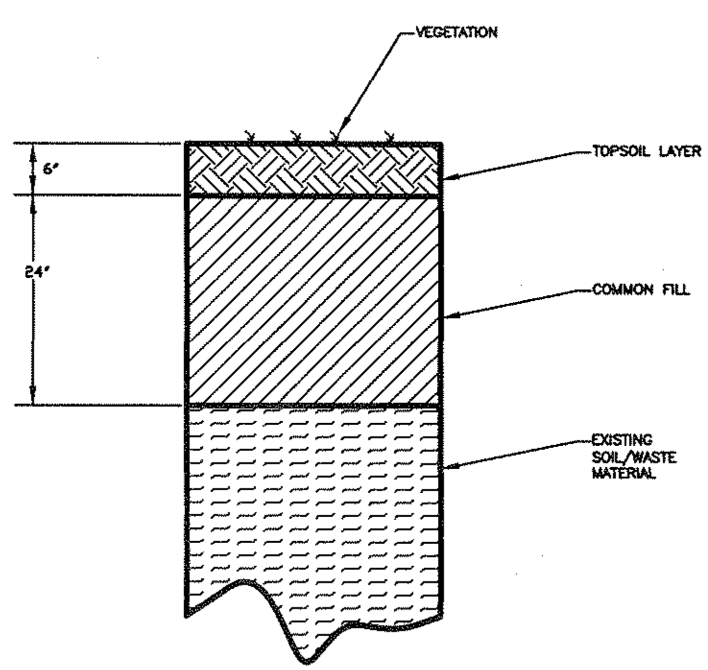
FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
CES	6/29/01	EC	BE
		LEAD DESIGN PROF.	CHECKED
		BE	BE
WASTE REMOVAL AREA		PROJECT NUMBER	FIGURE
		WI00860.001	6

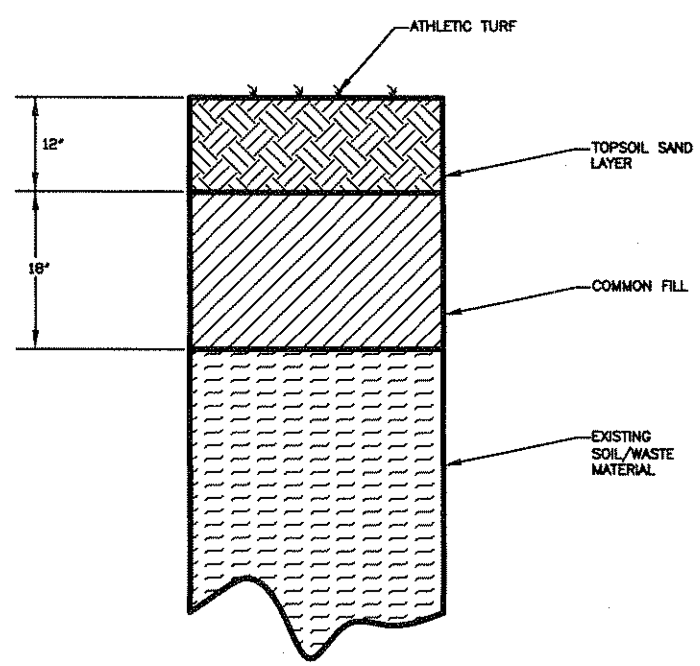


NOTE: 1. SILT FENCE SHALL BE AS SPECIFIED BY MDOT 916.02.

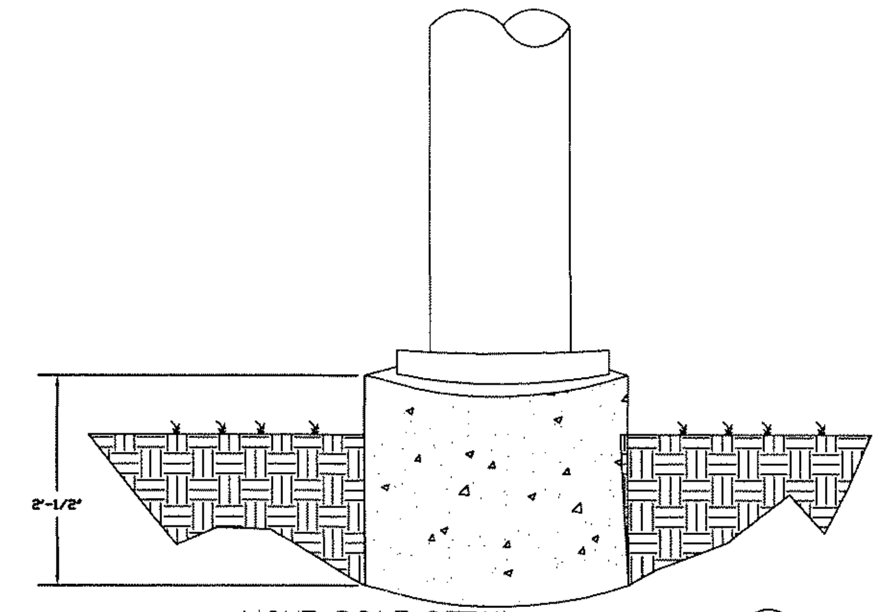
SILT FENCE DETAIL
SCALE: NONE
1 / 7|7



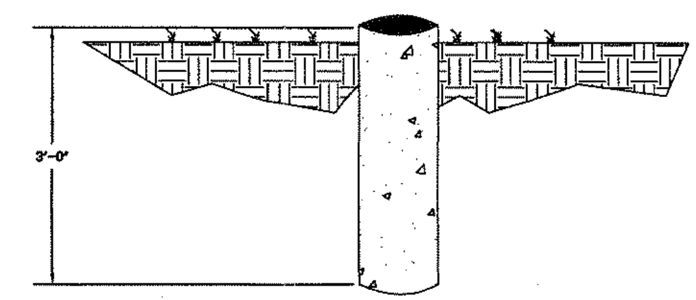
GENERAL COVER DETAIL
SCALE: NONE
2 / 5|7



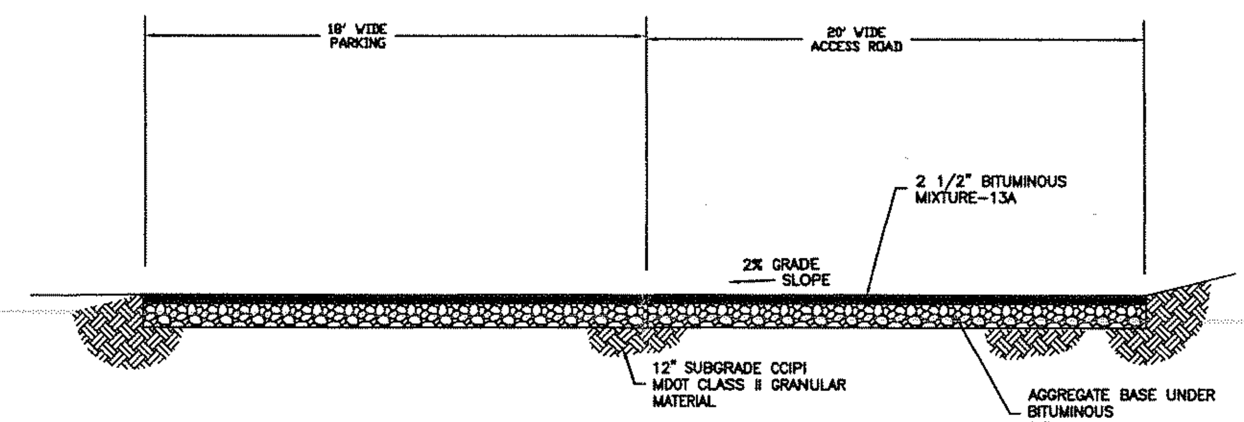
SOCCER FIELD COVER DETAIL
SCALE: NONE
3 / 5|7



LIGHT POLE DETAIL
SCALE: NONE
4 / 4|7



CONCRETE MONUMENT DETAIL
SCALE: NONE
5 / 4|7



ASPHALT ACCESS ROAD
SCALE: NONE
6 / 2|7

ALL PROFESSIONAL ENGINEERING SERVICES DEPICTED ON THIS DRAWING HAVE BEEN PERFORMED FOR ARCADIS GERAGHTY & MILLER, INC. BY GMCE, INC; A FLORIDA CORPORATION QUALIFIED TO PERFORM SUCH SERVICES IN THE STATE OF MICHIGAN.

G: /FORD/RIVERSIDE DISPOSAL AREA/SOCCER FIELDS/FIG7 5/31/2001 CES

NO.	DATE	REVISION DESCRIPTION	BY / CKD

ARCADIS GERAGHTY & MILLER
3903 Northdale Boulevard, Suite 120
Tampa, Florida 33624
Tel: 813/961-1921 Fax: 813/961-2599

RIVERSIDE DISPOSAL AREA
IRAP

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

COVER SYSTEM DETAILS

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
BJH	2/27/01	JB	JB
		LEAD DESIGN PROF. BZ	CHECKED JB
		PROJECT NUMBER WI000860.0011	FIGURE 7

G:\project\FORD\WI0637\KINGSFOR\CADD\RDA IRAP\FIG7.dwg, 09/05/2002 02:00:41 PM, jelliott

ARCADIS

Appendix A

Riverside Disposal Area Legal Description

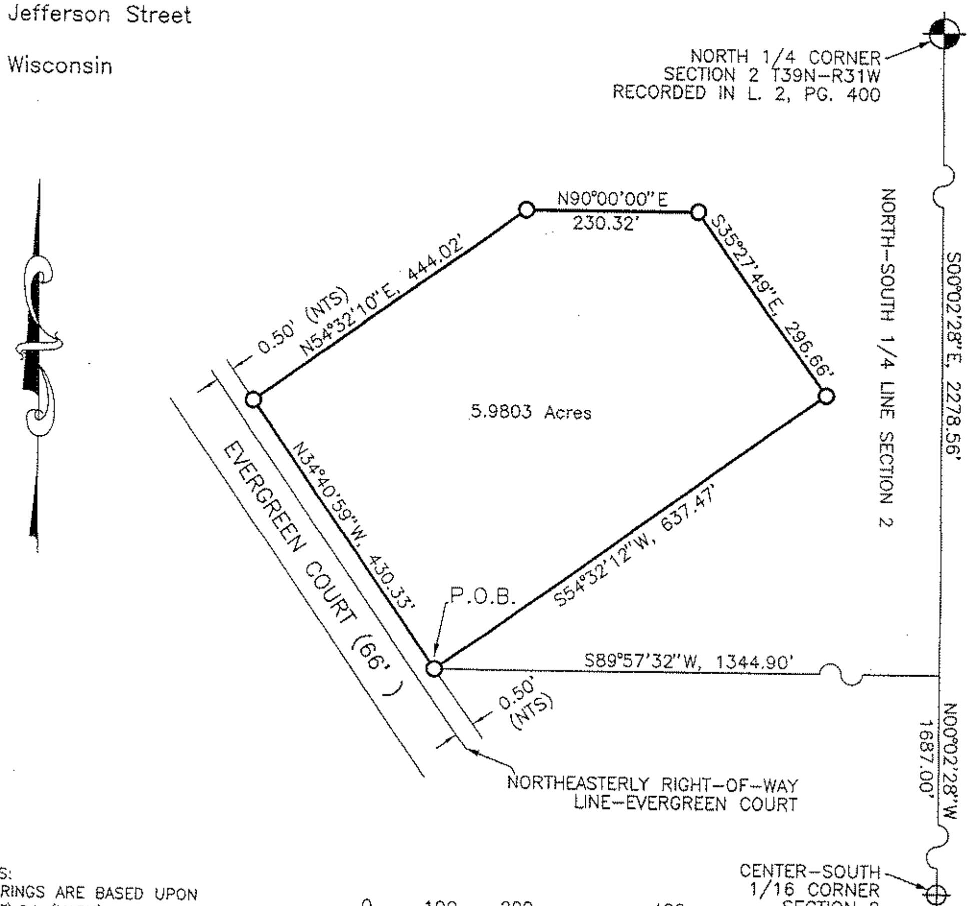
CERTIFICATE OF SURVEY

PART OF THE S1/2 OF THE NW1/4 OF SECTION 2, T39N-R31W, CITY OF KINGSFORD, DICKINSON COUNTY, MICHIGAN.

PARCEL DESCRIPTION

A parcel of land being part of the S1/2 of the NW1/4 of Section 2, T39N-R31W, City of Kingsford, Dickinson County, Michigan described as:
Commencing at the North 1/4 corner of Section 2; thence S00°02'28"E, 2278.56' along the North-South 1/4 line of Section 2; thence S89°57'32"W, 1344.90' to a point 0.50' Northeast of the Northeast right-of-way line of Evergreen Court being the Point of Beginning; thence N34°40'59"W, 430.33' parallel to the Northeast right-of-way line; thence N54°32'10"E, 444.02'; thence N90°00'00"E, 230.32'; thence S35°27'49"E, 296.66'; thence S54°32'12"W, 637.47' to the Point of Beginning containing 5.9803 acres and subject to restrictions, reservations, rights-of-way and easements of record.

ORDERED BY:
Arcadis
126 North Jefferson Street
Suite 400
Milwaukee, Wisconsin
53202



NOTES:
-BEARINGS ARE BASED UPON NAD83\94 (HARN) LAMBERT MICHIGAN NORTH ZONE STATE PLANE COORDINATE SYSTEM.

(NTS)-NOT TO SCALE

0 100 200 400

SCALE: 1" = 200'

SURVEYOR'S CERTIFICATE

I hereby certify that I have surveyed and mapped the land above platted and/or described on ________, and that the ratio of closure on the unadjusted field observations was Less than 1' in 5000', and that all the requirements of P.A. 132 of 1970 as amended have been complied with.

Sundberg, Carlson and Associates, Inc.

BY: Gerald W. Carlson DATE: 7-3-02

GERALD W. CARLSON PS No. 24589

STATE OF MICHIGAN
GERALD W. CARLSON
SURVEYOR
No.
24589
LICENSED PROFESSIONAL SURVEYOR

LEGEND		
• -Found Iron ∘ -Set 5/8" X 18" Iron ▲ -Found Concrete Monument △ -Set Concrete Monument ◻ -Other as Noted R -RECORDED M -MEASURED	DRAWN BY: SDK	JOB NO. 10092
	SCALE: 1"=200'	SHEET 1 OF 1
	DATE: 01/08/02	REVISIONS: SJB 07/03/02

STS Consultants, Ltd.
555 River Avenue
Iron River, MI 49935
906/265-2525
914 West Baraga Avenue
Marquette MI 49855
906/228-2333
WATS 800-441-0669

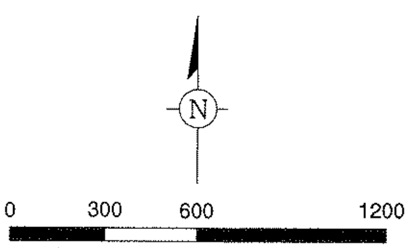
S:\GPS\TRIMDATA\GM97\GM0103\EP\LEGAL.DWG

ARCADIS

Appendix B

Aerial Photographs

SOURCE: WDOT



ARCADIS

RDA AREA AERIAL PHOTOGRAPH 1938

DWG [illegible]: 06JUN02 | PN: FORDWI0637\KINGSFOR | FILE NO.: GRAPHICS\RAP | DRA[illegible]G: 1938_AERIAL.AI | CHECKED: JK | APPROVED: | DRAFTE[illegible]S

SOURCE: ASCS

N

0 1500 3000 6000

APPROXIMATE SCALE IN FEET

ARCADIS

RDA AREA AERIAL PHOTOGRAPH 1951

DWG :: 06JUN02 | PN: FORD\WI0637\KINGSFOR | FILE NO.: GRAPHICS\RAP | DRA 3: 1951_AERIAL.AI | CHECKED: JK | APPROVED: | DRAFTER S

SOURCE: ASCS

N

0 1500 3000 6000

APPROXIMATE SCALE IN FEET

ARCADIS

RDA AREA AERIAL PHOTOGRAPH 1976

DWG ...: 06JUN02 | PN: FORD\WI0637\KINGSFOR | FILE NO.: GRAPHICS\RAP | DRA...G: 1976_AERIAL.AI | CHECKED: JK | APPROVED: | DRAFTE...S

SOURCE: ASCS

N

0 1500 3000 6000

APPROXIMATE SCALE IN FEET

ARCADIS

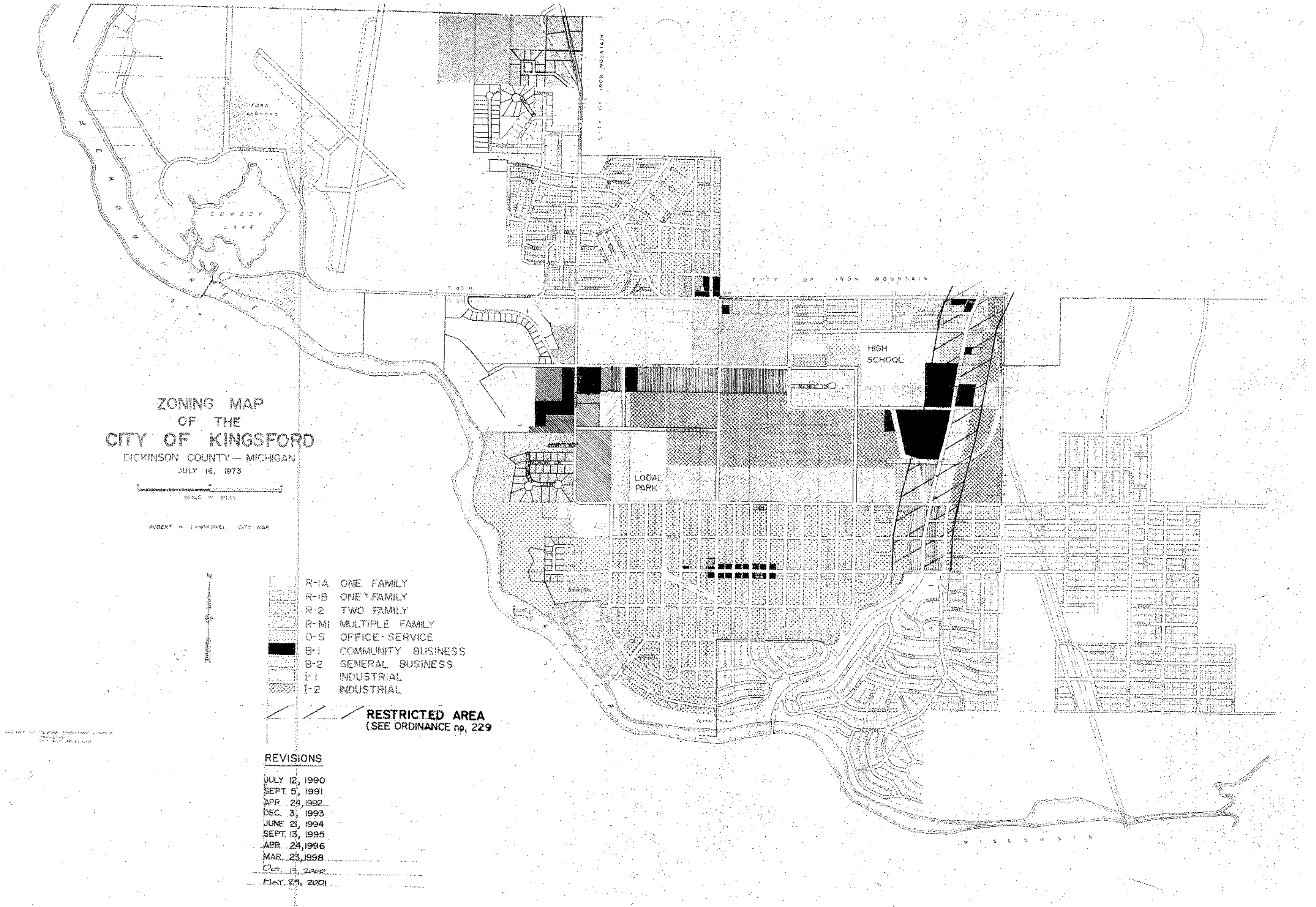
RDA AREA AERIAL PHOTOGRAPH 1980

DWG ...E: 06JUN02 | PN: FORD\WI0637\KINGSFOR | FILE NO.: GRAPHICS\RAP | DRA...G: 1980_AERIAL.AI | CHECKED: JK | APPROVED: | DRAFTE... LS

ARCADIS

Appendix C

Riverside Disposal Area Zoning Documentation


ZONING MAP
OF THE
CITY OF KINGSFORD
DICKINSON COUNTY — MICHIGAN
JULY 16, 1973
R-1A ONE FAMILY
R-1B ONE FAMILY
R-2 TWO FAMILY
R-M1 MULTIPLE FAMILY
O-S OFFICE - SERVICE
B-1 COMMUNITY BUSINESS
B-2 GENERAL BUSINESS
I-1 INDUSTRIAL
I-2 INDUSTRIAL
RESTRICTED AREA
(SEE ORDINANCE no. 229
REVISIONS
JULY 12, 1990
SEPT. 5, 1991
APR. 24, 1992
DEC. 3, 1993
JUNE 21, 1994
SEPT. 13, 1995
APR. 24, 1996
MAR. 23, 1998
Oct. 13, 2000
MAY 29, 2001
HIGH SCHOOL
LODAL PARK
CITY OF IRON MOUNTAIN
COWBOY LAKE
WISCONSIN

ARTICLE X

I-1 INDUSTRIAL DISTRICT

SECTION 1000. Intent: The I-1 Industrial Districts are designed to accommodate wholesale activities, warehouses, and industrial operations whose external, physical effects are restricted to the area of the district and in no manner affect in a detrimental way any of the surrounding districts. The I-1 District is so structured as to permit, along with any specified uses, the manufacturing, compounding, processing, packaging, assembly, and/or treatment of finished or semi-finished products from previously prepared material.

The general goals of this use district are:

1. To provide sufficient space, in appropriate locations, to meet the needs of the City for manufacturing and related uses.

2. To promote industrial development which is free from danger of fire, explosions, toxic and noxious matter, radiation, and other hazards, and from offensive noise, vibration, smoke, odor and other objectionable influences.

SECTION 1001. Principal Uses Permitted: No building or land shall be used and no building shall be erected except for one or more of the following specified uses:

1. Any use of a basic research, design and pilot or experimental product development when conducted within a completely enclosed building.

2. Any of the following uses when the manufacturing, compounding, or processing is conducted wholly within a completely enclosed building. That portion of the land used for open storage facilities for materials or equipment used in the manufacturing, compounding, or processing shall be totally obscured by a screening wall or fence on those sides abutting R-1A, R-B1, R-2, RM, OS-1, and B-1 Districts. In I District, the extent of such a wall or fence may be determined by the Planning Commission on the basis of usage. Such a wall shall not be less that four (4) feet in height and may, depending upon land usage, be required to be eight (8) feet in height, and shall be subject further to the requirements of ARTICLE XV, "GENERAL PROVISIONS". A chain link fence, with intense evergreen shrub planting shall be considered an obscuring wall (as an option).

   a. Warehousing and wholesale establishments, and trucking facilities.

   b. Machine shops and uses for the manufacture, compounding, processing, packaging, or treatment of such products as, but not limited to: foods, cosmetic, pharmaceuticals, toiletries, hardwares and tool and die.

c. The manufacture, compounding, assembling, or treatment of articles or merchandise from previously prepared materials.

d. The manufacture of pottery and figurines or other similar ceramic products using only previously pulverized clay and kilns fired only by electricity or gas.

e. Planing mills, veneer mills, and lumber yerds.

f. Laboratories - experimental, film, or testing.

g. Central dry cleaning plants or laundries.

h. All public utilities, including buildings, necessary structures, storage yards and other related uses.

3. Warehouse, storage and transfer and electric and gas service buildings and yards. Public utility buildings, except steam power plants, telephone exchange buildings, electrical transformer stations and sub-stations, and gas regulator stations. Water supply and sewage disposal plants. Water and gas tank holders. Railroad transfer and storage tracks. Railroad rights-of-way. Freight terminals.

4. Storage facilities for building materials, sand, gravel, stone, lumber, storage of contractor's equipment and supplies, provided such is enclosed within a building or within an obscuring wall or fence on those sides abutting all Residential or Business Districts, and on any yard abutting a public thoroughfare. In any "I-1" District the extent of such fence or wall may be determined by the Planning Commission on the basis of usage.

Such fence or wall shall not be less than four (4) feet in height, and may, depending on land usage, be required to be eight (8) feet in height. A chain link type fence, with heavy evergreen shrubbery inside of said fence, shall be considered to be an obscuring fence.

5. Municipal uses such as water treatment plants, and reservoirs, sewage treatment plants, and all other municipal buildings and uses, including outdoor storage.

6. Commercial Kennels.

7. Greenhouses.

8. Trade or industrial schools.

9. Freestanding non-accessory signs.

10. Other uses of a similar and no more objectionable character to the above uses.

SECTION 1002. Principal Uses Permitted Subject To Special Conditions: The following uses shall be permitted, subject to the conditions hereinafter imposed for each use and subject further to the review and approval of the City Council:

1. Auto engine and body repair, and undercoating shops when completely enclosed.

2. Metal plating, buffing and polishing, subject to appropriate measures to prevent noxious results and/or nuisances.

3. Retail uses which have an industrial character in terms of either their outdoor storage requirements or activities (such as, but not limited to: lumber yard, building materials outlet, upholsterer, cabinet maker, outdoor boat, house trailer, automobile garage or agricultural implement sales) or serve convenience needs of the industrial district.

4. Other uses of a similar character to the above uses.

SECTION 1003. Required Conditions: Any use established in the "I-1" District after effective date of this Ordinance shall be operated so as to comply with the performance standards set forth hereinafter in ARTICLE, "GENERAL PROVISIONS", Section, "Performance Standards."

ARTICLE XI

I-2 GENERAL INDUSTRIAL DISTRICT

SECTION 1100. Intent: General Industrial Districts are designed primarily for manufacturing, assembling, and fabrication activities including large scale or specialized industrial operations, whose external physical effects will be felt to some degree by surrounding districts. The I-2 District is so structured as to permit the manufacturing, processing, and compounding of semifinished or finished products from raw materials as well as from previously prepared material.

SECTION 1101. Principal Uses Permitted: No building or land shall be used and no building shall be erected except for one or more of the following specified uses:

1. Any use permitted in an I-1 District.

2. Heating and electric power generating plants, and all necessary uses.

3. Any production, processing, cleaning, servicing, testing, repair, or storage of materials, goods, or products shall conform with the performance standards set forth in ARTICLE "GENERAL PROVISIONS," Section, "Performance Standards," (except such uses as specifically excluded from the Municipality by Ordinances).

4. Junk yards, provided such are entirely enclosed within a building or within an eight (8) foot obscuring wall and provided further that one property line abuts a railroad right-of-way.

5. Any of the following production or manufacturing uses (not including storage of finished products) provided that they are located not less than six hundred (600) feet distant from any Residential District and not less than two hundred (200) feet distant from any other district.
   a. Incineration of garbage or refuse when conducted within an approvedand enclosed incinerator plant.

b. Blast furnace, steel furnace, blooming or rolling mill.

c. Manufacture of corrosive acid or alkali, cement, lime, gypsum, or plaster of paris.

d. Petroleum or other inflammable liquids, production, refining, or storage.

e. Smelting of copper, iron or zinc ore.

7. Any other use determined by the Board of Appeals, to be of the same general character as the above permitted uses. The board may impose any required setback and/or performance standards so as to insure public health, safety, and general welfare.

ARCADIS

Appendix D

Waste Management Plan

ARCADIS

Appendix D

Waste Management Plan

Interim Response Action Plan
Riverside Disposal Area
Kingsford, Michigan

PREPARED FOR

Ford Motor Company
The Kingsford Products Company

Tables

Figures

Attachments

1. Introduction

This Waste Management Plan (WMP) has been prepared for use in conjunction with implementation of the Interim Response Action Plan (IRAP) for the Riverside Disposal Area (RDA) at the Ford/Kingsford Site in Kingsford, Michigan. Waste generated at the RDA during the implementation of the IRAP and in future work conducted at the RDA will be handled in accordance with this plan. This document is organized to provide background information for the site, present the IRAP implementation waste management plan, followed by the approach for future waste management in the event that construction work that takes place after the IRAP construction has been completed. Future Work, Section 4, is presented stand-alone for ease of use. This WMP has been developed in compliance with the Public Act 451 of 1994. If any conditions or scope of work covered by the plan change, a site-specific addendum will be generated prior to the beginning of any work. All work will be performed in accordance with applicable federal, state, and local regulations.

1.1 Purpose and Scope

The objective of this WMP is to provide a framework for management of waste generated from the response activities at the RDA. It describes the methods and protocol that will be implemented for removal and disposal of waste, as set forth in the Natural Resource and Environmental Protection Act, Act 451 of 1994, Chapter 3 Waste Management and Part 91 Soil Erosion and Sedimentation Control. This document will also serve as a general WMP for intrusive activities (subsurface utility work, drilling, excavation, or construction) associated with any future work within the RDA. This WMP is to be used in conjunction with the site specific Construction Health and Safety Plan Guideline (CHASP) and the Operation and Maintenance (O&M) Plan.

Elements of this plan address the following:

- Excavation, Filling, and Grading.
- Consolidation and Disposal of Waste.
- Stormwater, Sediment, and Erosion Control Practices.
- Safety, Health, and Emergency Response.
- Waste Management Team.

The WMP defines the manner in which waste generated from the construction activities will be managed. Specifically, this plan addresses:

- Estimated volumes and types of waste generated.
- Locations of onsite areas where wastes will be stored.
- Stormwater management plan for average rainfall.
- Stormwater management plan for catastrophic event.
- Spill prevention.

2. Background

2.1 Site Description

The city of Kingsford (City) is located in southwestern Dickinson County, in the western part of Michigan's Upper Peninsula. The city is bounded by the Menominee River on the west and south, and by the City of Iron Mountain on the north and east. A site location map is included as Figure D2-1. The RDA is located approximately 600 feet south of Pyle Drive in the northwest portion of the City. The RDA is contained within property owned by the City. Although the RDA is zoned for residential use, it is currently an open field and there are no structures located on the property. A site plan is included as Figure D2-2.

Investigations conducted by ARCADIS since 1997 focused on characterization of surface soils and a determination of the potential for the waste material to be a continuing release to groundwater. The CHASP contains a brief summary of site constituents with respect to Michigan residential soil criteria. The pathways that are important for purposes of management of soil directly under the constructed soil cover are exceedences for Residential and Commercial I Direct Contact Criteria (DCC); Residential and Commercial I Drinking Water Protection Criteria (DWPC); Residential and Commercial I, Ambient Air, Particulate Soil Inhalation Criteria (PSIC); and Residential and Commercial I Groundwater Surface Water Interface Protection Criteria (GSIPC) Criteria.

2.2 Interim Response Action Summary

The primary focus of the Interim Response Action is to prevent direct contact and ambient air particulate exposure to impacted soils/waste materials, except under controlled conditions, and to allow the RDA to be used for City purposes.

The Interim Response Action for the RDA prevents direct contact and ambient air particulate exposure with impacted soils and underlying waste materials by construction of an engineered cover system and implementation of deed restrictions that maintain the integrity of the engineered cover system. Soil/wastes will be excavated from below the proposed Evergreen Court Street for placement in the RDA. Data collected at the RDA show that it is not a continuing source to groundwater, therefore the engineered cover system will consist of a permeable soil cover designed to prevent direct and ambient air contact with underlying materials. The deed restrictions will be written to allow the City to penetrate the cover system only under controlled, temporary conditions and under provisions that would restore the integrity of the cover system.

The following design elements will be used in preparing plans and specifications for implementation of the remedy:

- Soil and waste from below proposed Evergreen Court Street will be excavated and transported to the RDA for consolidation beneath the cover system.
- Common fill and topsoil will be at least 30-inches thick and cover the RDA delineated in Figure D2-2. Additional common fill may be placed as necessary to promote proper drainage.
- The topsoil will be seeded, fertilized, mulched, and tacked.
- Construction activity, present or future, must follow the site WMP and the site CHASP for the period specified in the restrictive covenant.

3. IRAP IMPLEMENTATION

3.1 Excavation, Backfilling, and Grading

3.1.1 Clearing and Grubbing

Clearing and grubbing will be performed on an incremental basis, only in areas of active construction. Proper sediment controls shall be implemented in all disturbed areas, as necessary, and disturbed areas shall be restored as soon as possible after construction is complete.

Any spoils encountered during clearing and grubbing activities will be stockpiled over the RDA and then consolidated beneath the cover system.

3.1.2 Excavation and Backfilling

Prior to excavation activities the appropriate stormwater controls must be chosen and utilized as described in Section 3.4 of this document. Proper sediment controls shall be implemented in disturbed areas, and disturbed areas shall be backfilled and restored as soon as practicable following completion of excavation. Temporary barriers will be constructed around the perimeter of the excavation. The barriers will be maintained during excavation and in the interim period between the completion of an excavation and backfilling to prevent surface runoff from entering the excavation. The excavation will not reach the groundwater depth of approximately 37 feet below land surface (ft bls).

Excavated materials from below the proposed Evergreen Court Street will be temporarily stockpiled within the RDA. Currently there is no vehicle traffic on the RDA. Stockpile locations will be selected by the construction contractor to facilitate access of construction vehicles to the excavation areas. Construction areas will be graded according to the design plans.

3.2 Solid Waste

Solid wastes will be removed from the planned excavation below proposed Evergreen Court Street (see Figure D2-2). Materials that are removed will be transferred to RDA where they will be consolidated and placed under the cover system. The following sections describe the methods that will be used to manage wastes generated from the Interim Response Action.

3.2.1 Subsurface Soils

Waste materials, and overlying soils, will be excavated from below the proposed Evergreen Court Street that is located in the western portion of the RDA as shown on Figure D2-2. Approximately 4,250 cubic yards (cy) of soil/waste materials will be removed from this area based on the anticipated depths of the excavations. The area immediately east of the proposed Evergreen Court Street will be excavated to approximately 6 ft bls. West of this excavation, the wastes pinch out to approximately 1 ft bls. The actual depth of the excavations will be based initially on visual indication that all waste has been removed from the pit followed by confirmatory soil sampling as described in Section 3.2.3. All excavated material will be consolidated in the RDA and placed beneath the cover system.

3.2.2 Waste Material

Waste material previously encountered within the RDA and an area along proposed Evergreen Court Street includes bricks, wood, charred wood, coal, metal, broken glass, and miscellaneous household items such as plastic trash bags, cloth, and vinyl flooring. If these objects are found during excavation activities, they will be consolidated into the RDA where they will be placed beneath the cover system. In the event that extracted waste material is not suitable for placement beneath the cover system, these materials will be transported to an appropriate off-site disposal facility.

3.2.3 Verification Soil Sampling

Confirmatory soil samples from waste excavation, such as the area along proposed Evergreen Court Street, will be collected from the base of the excavation to demonstrate adequate excavation according to Michigan Department of Environmental quality (MDEQ) guidelines. Soil samples will be analyzed for analytical parameters that showed exceedences of the Residential Direct Contact Criteria during the Remedial Investigation (RI) activities. These constituents are 1,1,2,2-tetrachloroethene, antimony, arsenic, copper, and lead for Direct Contact Criteria. The samples will be submitted to the laboratory to determine if additional excavation is required. Soil samples will be collected according to the ARCADIS Quality Assurance Plan for the Ford/Kingsford Site and will be analyzed through an approved contract laboratory using EPA Analytical Methods 8260B (5035) for 1,1,2,2-tetrachloroethane.

3.3 Stormwater Management

ARCADIS will adhere to the requirements of the Clean Water Act (CWA) for protection of water quality at the site. Engineering controls will be established to prevent water runoff and run-on during excavation and construction activities. Containment systems will be deployed as necessary to prevent soils and sediments associated with excavation from reaching stormwater drainage points at the site.

3.3.1 Average Annual Rainfall

The primary focus of the IRAP is to prevent direct contact to impacted soils/waste materials. Data collected at the RDA show that impacted soil within the vadose zone is not a continuing source to groundwater, therefore the engineered cover system will consist of a permeable soil cover. Under average rainfall conditions, stormwater occurring during construction activities will be allowed to infiltrate through the cover system so stormwater collection will not be necessary. Stormwater will infiltrate over the 4-acre parcel or flow to two retention basins immediately adjoining the site. If sediment is carried over from the site property to the drainage basins, it will be recovered and placed beneath the cover system. The drainage plan for the cover area will maintain storm water flow to the basins.

3.3.2 100-Year Storm Event

In the case of catastrophic rainfall equivalent to a 100-year storm event, a stormwater containment plan will be activated as described in Section 6.0. The plan would be implemented to prevent offsite migration of sediments carried over by stormwater. Stormwater will be collected at two retention ponds located immediately adjacent to the property. Stormwater will settle within the pond, and infiltrate naturally through the soils. It may be necessary to clean out sediments from the retention basin once the stormwater is drained. If the storm occurs during the cover construction, with the possibility of impacted sediment, the sediment will be recovered from the ponds and placed beneath the soil cover.

The actual holding volume of the two ponds was calculated for comparison to the rainfall volume of a 100-year storm event. The expected rainfall volume of a 100-year storm was estimated based on climatic data for the expected amount of precipitation and the area of the surrounding land that drains into the RDA. These calculations are described in Sections 4.1.2.1 and 4.1.2.2. Erosion and sediment control practices that may be used as part of the stormwater containment plan are described in Section3.4.

3.3.3 Retention Pond Characteristics

Two retention ponds are located adjacent to RDA (Figure D2-2). The east pond contributes a drainage area of 23.65 acres and the west pond contributes a drainage area of 8.36 acres. The land use of the drainage area consists of paved streets and driveways, minor residential, and predominately pasture or grassland in fair condition that drains by sheet flow directly into the retention ponds.

A review of the U.S. Department of Agriculture, Soil Conservation Service Soil Survey of Dickinson County revealed two soil types within the contributing drainage area. The soil types were identified as Pence fine sandy loam, Index Number 25B, with hydrologic soil group (HSG) "B" and Vilas loamy sand, Index Number 57B, with HSG "A."

3.3.4 Retention Pond Analysis

The drainage sub-basins of the two retention ponds were characterized based on the stormwater flow path and outfall. The soil type for the drainage sub-basin for the east retention pond includes approximately 40 percent of HSG "A" and approximately 60 percent of HSG "B." The western sub-basin soil type includes a HSG "A." Therefore, the composite curve number (CN) was determined to be 65 and 54 for the East and West sub-basins, respectively. For a conservative approach, scattered ponding in the area was not considered in the analyses.

The runoff volume (V) computations were determined for the 100-year/24-hour storm event using the Soil Conservation Service methodology. Per the MDEQ Land and Water Management Division, the amount of precipitation (P) that occurs in the two sub-basins in Dickinson County was determined to be 5.32 inches for Zone 1. These computations produced a rainfall volume of 3.67 acre-ft for the East sub-basin and 0.75 acre-ft for the West sub-basin. Runoff volume calculation spreadsheets and a contour map of the RDA are attached in Attachment A. Results of the analysis indicate that the East and West sub-basins are capable of holding the expected stormwater volume of 192,535 cubic feet (cf) per 24-hour period during a 100-year storm. The combined holding volume of the two sub-basins is approximately 468,652 cf. During a catastrophic storm event, the East sub-basin will be filled to 47 percent capacity and the West sub-basin will be filled to 25 percent capacity.

3.4 Construction Stormwater, Sediment, and Erosion Control Practices

Part 91 of Act 451 of 1994 requires a Soil and Sedimentation Control Permit prior to construction. Functional sediment and erosion controls must be constructed before commencing land disturbance activities. In individual construction areas, controls shall be constructed as soon as practicable after first disturbance of soils. Suggested erosion and sediment control practices include (but are not limited to):

- Sediment and erosion controls.
- Stormwater management practices.
- Sediment traps.
- Sediment ponds/retention ponds.

The sediment and erosion controls will consist of the following:

- Silt fence.
- Sediment ponds, basins, and dams.
- Diversion ditches.
- Check dams.
- Temporary construction entrances.

These controls are designed to prevent erosion of soils during construction activities and to protect stormwater quality after construction is complete. Controls are also in place to trap eroded material before it enters the proposed storm drainage system, and trap sediment before it leaves the site. All controls will be maintained in good condition and inspected periodically after beginning of a storm event. Each control is discussed in greater detail in the following subsections.

3.4.1 Silt Fences

Silt fences are used for sediment and erosion control during construction wherever runoff is expected in the form of sheet flow. Specifically, silt fences will be installed around soil stockpiles, along the downslope perimeter of utility trenches, and along the downslope perimeters of construction areas. Silt fences decrease flow velocity and trap sediments where sheet flow conditions exist or where flow is through tiny rills that can be converted to sheet flow. Silt fences will not be used where flow is channelized. The silt fence shall be erected on relatively level ground a minimum distance of 5 feet from the toe of a slope. The bottom of the silt fences should be buried in the ground a minimum of 6 inches to prevent runoff from passing beneath the fence. Individual panels will be overlapped, and the ends of the silt fences will bend upslope to prevent water from flowing around the fence.

3.4.2 Diversion Ditches

Diversion ditches are used to carry sediment-laden runoff into a control structure or to carry clean runoff away from disturbed areas. The ditches provide permanent runoff control at the site. They are to be constructed on grade and act to intercept and transport channelized flows. Riprap check dams constructed along the lengths of the ditches on a regular spacing decrease flow velocity and facilitate settling-out of sediments by dissipating energy. Ditches that are to remain in place for longer than 30 days will be seeded and mulched. Sediment traps collect stormwater runoff from the diversion ditches for removal of soil particles prior to onsite discharge.

3.4.3 Check Dams

Check dams are constructed in diversion ditches to decrease flow velocity and facilitate settling-out of sediments by dissipating energy. The check dams provide runoff control during construction by causing sediment to settle out within the diversion ditches and by minimizing the amount of erosion by water flowing though the ditches. This minimizes the quantity of sediment being delivered to the sediment ponds. Temporary rock check dams may also be constructed in outlet channels to trap sediment that may enter the storm drainage system. A typical check dam is approximately 2-feet high and 2-feet wide at the top. The upslope riprap face of the check dams will be covered with 6 inches of washed stone.

3.4.4 Sediment Ponds, Basins, and Dams

Two existing retention ponds are located adjacent to the RDA as shown on Figure D2-2. Stormwater from the site and the immediate area flows to these ponds by gravity. The existing stormwater drainage system will be maintained after completion of construction. Stormwater will infiltrate into the ground and remaining soils will settle out.

3.4.5 Temporary Construction Entrances

Temporary construction entrances will consist of gravel pads constructed of coarse aggregate (2- to 3-inch stone). The pads will be constructed in areas found to have relatively dry, firm soil to minimize the amount of soil or mud that adheres to the truck tires and undercarriages. In this way, the construction entrances will provide temporary soil stabilization during construction. Geotextile fabric shall be placed over the subgrade beneath the pads in wet areas. Truck and heavy equipment traffic will be routed over the pads, minimizing the tracking of soils around and off the site. Trucks will be decontaminated by steam cleaning prior to exiting the site if in contact with waste material as described in the site-specific CHASP Section 2.4.2 and summarized below.

Heavy equipment used in contaminated areas shall be decontaminated prior to moving to a clean location and before leaving the site. When decontaminating equipment, the following requirements will be implemented:

- The equipment will be inspected for gross debris. Where possible, contaminated soil deposits will be removed and containerized (or placed below the soil cover).
- After removal of gross debris, the equipment will be steam cleaned using a high-pressure washer (i.e., Hotsy).
- After steam cleaning, the equipment will be allowed to dry and will be reinspected. Any remaining visible debris will be re-cleaned through additional pressure washing.

After debris is removed according to the above procedure, the equipment will be released from the decontamination pad for use as necessary in other areas of the site. At the closeout of the exclusion zone activities or when a piece of equipment is to be demobilized from the project, the equipment will be given a final decontamination. Equipment will be inspected prior to release from the facility and inspection results will be documented in field logbooks. Decontamination wash water will be collected and sent to either the on-site water treatment system or an off-site permitted treatment/disposal system.

4. Future Work

Construction activities within the RDA that will penetrate the cover system will follow this WMP and the CHASP that was developed for the workers involved with construction activities where there is the possibility of dermal contact with impacted soils/waste materials beneath the cover system. Soils/waste materials that are excavated during future construction activities will be managed in accordance with this WMP. After future construction activities are complete, portions of the cover system that was disturbed will need to be restored to pre-construction condition. The disturbed area will be checked for settlement after construction activities. If settling has occurred, the cover system will be inspected for compliance with the specifications for the cover system. If the cover system does not meet the specifications, it will be re-constructed so that it does.

Maintenance activities, that involve penetrating the cover system, will be conducted in accordance with the site WMP and the CHASP. Any portion of the cover system, that is disturbed, will be re-covered with fill and topsoil, and then seeded and watered to establish vegetative growth or graveled and/or paved as appropriate. If at any time, impacted soils or wastes are generated from onsite activities, the WMP will be activated.

4.1 Excavation, Backfilling, and Grading

4.1.1 Clearing and Grubbing

Clearing and grubbing will be performed on an incremental basis, only in areas of active construction. Proper sediment controls shall be implemented in all disturbed areas, as necessary, and disturbed areas shall be restored as soon as possible after construction is complete. Any surface vegetation encountered during clearing and grubbing activities that occur after cover system construction will be managed as clean material as it does not have contact with waste materials.

4.1.2 Excavation and Backfilling

Prior to excavation activities the appropriate stormwater controls must be chosen and utilized as described in Sections 4.3 and 4.4 of this document. Proper sediment controls shall be implemented in disturbed areas, and disturbed areas shall be backfilled and restored as soon as practicable following completion of excavation. Temporary barriers will be constructed around the perimeter of the excavation. The barriers will be maintained during excavation and in the interim period between the completion of an excavation and backfilling to prevent surface runoff from entering the excavation. Excavated material from under the constructed cover system, (i.e., 30-inches below land surface), will be managed as in Section 4.2 Solid Waste.

Future construction will return the area to graded conditions associated with the designed cover so that drainage features and surface topography are restored.

4.2 Solid Waste

According to the IRAP, solid wastes will be removed from the planned excavation below proposed Evergreen Court Street (see Figure D2-2). Therefore, wastes are not anticipated in this area following IRAP implementation and should not be problematic in future construction. The following sections describe the methods that will be used to manage wastes generated from future activities that penetrate the cover system. The CHASP describes establishment of work zones, a decontamination area, and recommended work practices should construction activities involve waste material. Proper personnel, equipment, and material control and management are essential to minimize cross-contamination and protect human health and the environment.

4.2.1 Waste Material

Waste materials previously encountered within the RDA and an area along proposed Evergreen Court Street include bricks, wood, charred wood, coal, metal, broken glass, and miscellaneous household items such as plastic trash bags, cloth, and vinyl flooring. If these objects are found during excavation activities, they will be transported to an appropriate off-site disposal facility. Should future construction within the RDA require waste removal, confirmatory sampling will be necessary as referenced in the next section.

4.2.2 Verification Soil Sampling

Confirmatory soil samples from waste excavation will be collected from the base of the excavation to demonstrate adequate excavation according to MDEQ guidelines. Soil samples will be analyzed for analytical parameters that showed exceedences of the Residential Direct Contact Criteria during the RI activities. These constituents are 1,1,2,2-tetrachloroethene, antimony, arsenic, copper, and lead for Direct Contact Criteria. The samples will be submitted to the laboratory to determine if additional excavation is required.

Soil samples will be collected according to the ARCADIS Quality Assurance Plan for the Ford/Kingsford Site and will be analyzed through an approved contract laboratory using standard operating procedures (SOPs) published in SW-846 and EPA Methods for Chemical Analysis of Water and Wastes or standardized laboratory procedures.

4.3 Stormwater Management

Construction at the site is to be conducted according to the requirements of the CWA for protection of water quality at the site. Engineering controls will be established to prevent water runoff and run on during excavation and construction activities. Containment systems will be deployed as necessary to prevent soils and sediments associated with excavation from reaching stormwater drainage points at the site.

4.4 Construction Stormwater, Sediment, and Erosion Control Practices

Part 91 of Act 451 of 1994 requires a Soil and Sedimentation Control Permit prior to construction. Functional sediment and erosion controls must be constructed before commencing land disturbance activities. In individual construction areas, controls shall be constructed as soon as practicable after first disturbance of soils. Suggested erosion and sediment control practices include (but are not limited to):

- Sediment and erosion controls.
- Stormwater management practices.
- Sediment traps.

The sediment and erosion controls will consist of the following:

- Silt fence.
- Diversion ditches.
- Check dams.
- Temporary construction entrances.

These controls are designed to prevent erosion of soils during construction activities and to protect stormwater quality after construction is complete. Controls are also in

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place to trap eroded material before it enters the proposed storm drainage system, and trap sediment before it leaves the site. All controls will be maintained in good condition and inspected periodically after beginning of a storm event. Each control is discussed in greater detail in the following subsections.

4.4.1 Silt Fences

Silt fences are used for sediment and erosion control during construction wherever runoff is expected in the form of sheet flow. Specifically, silt fences will be installed around soil stockpiles, along the downslope perimeter of utility trenches, and along the downslope perimeters of construction areas. Silt fences decrease flow velocity and trap sediments where sheet flow conditions exist or where flow is through tiny rills that can be converted to sheet flow. Silt fences will not be used where flow is channelized. The silt fence shall be erected on relatively level ground a minimum distance of 5 feet from the toe of a slope. The bottom of the silt fences should be buried in the ground a minimum of 6 inches to prevent runoff from passing beneath the fence. Individual panels will be overlapped, and the ends of the silt fences will bend upslope to prevent water from flowing around the fence.

4.4.2 Diversion Ditches

Diversion ditches are used to carry sediment-laden runoff into a control structure or to carry clean runoff away from disturbed areas. The ditches provide permanent runoff control at the site. They are to be constructed on grade and act to intercept and transport channelized flows. Riprap check dams constructed along the lengths of the ditches on a regular spacing decrease flow velocity and facilitate settling-out of sediments by dissipating energy. Ditches that are to remain in place for longer than 30 days will be seeded and mulched. Sediment traps collect stormwater runoff from the diversion ditches for removal of soil particles prior to onsite discharge.

4.4.3 Check Dams

Check dams are constructed in diversion ditches to decrease flow velocity and facilitate settling-out of sediments by dissipating energy. The check dams provide runoff control during construction by causing sediment to settle out within the diversion ditches and by minimizing the amount of erosion by water flowing though the ditches. This minimizes the quantity of sediment being delivered to the sediment ponds. Temporary rock check dams may also be constructed in outlet channels to trap sediment that may enter the storm drainage system. A typical check dam is approximately 2-feet high and 2-feet wide at the top. The upslope riprap face of the check dams will be covered with 6 inches of washed stone.

4.4.4 Temporary Construction Entrances

Temporary construction entrances will consist of gravel pads constructed of coarse aggregate (2- to 3-inch stone). The pads will be constructed in areas found to have relatively dry, firm soil to minimize the amount of soil or mud that adheres to the truck tires and undercarriages. In this way, the construction entrances will provide temporary soil stabilization during construction. Geotextile fabric shall be placed over the subgrade beneath the pads in wet areas. Truck and heavy equipment traffic will be routed over the pads, minimizing the tracking of soils around and off the site. Trucks will be decontaminated by steam cleaning prior to exiting the site if in contact with waste material as described in the site-specific CHASP Section 2.4.2 and summarized below. The CHASP also describes establishment of work zones and a decontamination area should waste be encountered.

Heavy equipment used in contaminated areas shall be decontaminated prior to moving to a clean location and before leaving the site. When decontaminating equipment, the following requirements will be implemented:

- The equipment will be inspected for gross debris. Where possible, contaminated soil deposits will be removed and containerized (or placed below the soil cover).
- After removal of gross debris, the equipment will be steam cleaned using a high-pressure washer (i.e., Hotsy).
- After steam cleaning, the equipment will be allowed to dry and will be reinspected. Any remaining visible debris will be re-cleaned through additional pressure washing.

After debris is removed according to the above procedure, the equipment will be released from the decontamination pad for use as necessary in other areas of the site. At the closeout of the exclusion zone activities or when a piece of equipment is to be demobilized from the project, the equipment will be given a final decontamination. Equipment will be inspected prior to release from the facility and inspection results will be documented in field logbooks. Decontamination wash water will be collected and sent to either the on-site water treatment system or an off-site permitted treatment/disposal system.

5. Employee Training

The employee-training program must inform project personnel of the components and objectives of the WMP, and the measures that will be implemented to ensure that these objectives are attained. Training will address each component of the plan, and will inform personnel as to why and how control practices are to be implemented. Topics will include, at a minimum, the following:

- Spill prevention and response.
- Good housekeeping practices.
- Equipment operations training.
- Material management practices.
- Inspection and maintenance of sediment and erosion control practices.

Certain employees will receive initial training at the start of construction and periodic refresher training thereafter. Hazardous material training is discussed in the CHASP for the site and is pertinent for personnel to be working with waste material.

6. Emergency Response

The CHASP generated for the IRAP implementation at the RDA contains a detailed emergency response procedure in Section 10.0 and is applicable to this WMP for both IRAP implementation and for future work. A list of emergency contacts and phone numbers is attached as Table D6-1 of the CHASP and a map showing the route from the site to Dickinson County Memorial Hospital is included as Figure D6-1 in the CHASP.

Should a spill or leak of a hazardous substance occur, the following procedures will be followed:

- Contact the National Response Center immediately at (800) 424-8802.
- Contact the Michigan Department of Environmental Quality/Regional EPA Office within 24 hours of discovery at (906) 875-6622.
- Contact the Breitung Fire Department immediately at (906) 774-7505.
- Contact the State Fire Marshall immediately at (517) 336-6604.
- For a release that goes beyond the boundary of the property, immediately contact the local emergency planning committee (LEPC) for the area affected (from within Michigan call 800-292-4706; from outside Michigan call 517-373-7660). Submit a written report as soon as practicable after release to the state emergency response commission (SERC), in care of the MDEQ, Environmental Assistance Division, and to the LEPC.
- For an unpermitted release over a 24-hour period of a hazardous substance, contact the MDEQ, Environmental Response Division district office (or pollution emergency alerting system (PEAS) after hours) within 24 hours of discovery. From within Michigan, call 800-292-4706; from outside Michigan, call 517-373-7660.

- For an incident involving transportation of hazardous materials that results in fire, death, injury, property damage, evacuation, highway closure or flight pattern alteration, contact the U.S. Department of Transportation (DOT) at 800-424-8802. Submit written report to DOT within 30 days of discovery.

- For a release that results in one death or the hospitalization of three or more persons, contact the Michigan Occupational Safety and Health Act Hotline at 800-858-0397 within 8 hours of the incident.

- For unpermitted release to the public sewer system, surface water or groundwater from an oil storage facility or on-land facility of a polluting material, contact PEAS as soon as practicable after detection (from within Michigan call 800-292-4706; from outside Michigan call 517-373-7660). Submit written report within 10 days after release to the MDEQ, Waste Management Division chief.

For situations that involve materials other than fuel:

Where any amount of characteristic hazardous or listed hazardous waste (as defined in R 299.9203 "Hazardous Waste Rule 203"), has reached the surface water or groundwater,

or

A fire, explosion, or other release of hazardous waste or hazardous waste constituents occurs that could threaten human health or the environment.

or

A release of >1lb (or ≤1lb if not immediately cleaned up) hazardous waste to the environment from a tank system or associated secondary containment system.

- Immediately contact PEAS within 24 hours of discovery (from within Michigan call 800-292-4706; from outside Michigan call 517-373-7660). If threat to human health or environment, call the National Response Center (800-424-8802). Written report may be required.

- If liquid industrial waste spill could threaten public health, safety, welfare or the environment, or has reached surface water or groundwater, immediately call PEAS (from within Michigan call 800-292-4706; from outside Michigan call 517-373-7660). Submit written report within 30 days of incident to MDEQ, Waste Management Division district supervisor.

For situations that involve PCBs:

- Where there is a spill of PCBs, contact the U.S. EPA Region V Toxic Program Section at 312-886-6003 as soon as possible after discovery, and within 24 hours.

In the event of a release, this WMP will be amended within 14 calendar days of the event to minimize the chance of event reoccurrence.

6.1 Spill Prevention and Response

To prevent or minimize the potential for stormwater and groundwater contamination at fueling areas, the following general practices for all near-term and future construction will be implemented:

- Leaks and spills shall be contained and cleaned-up as soon as possible using dry absorbent materials, and leaking equipment shall be removed from the site and repaired or replaced.

- Fuel drums, tanks, and containers shall be stored in a bermed area or in overpack containers, spill pallets, or similar containment devices with a capacity of 110 percent of the volume of stored fuel.

- Overfill prevention devices will be installed on all fuel pumps and tanks.

7. Implementation

Implementation of this WMP during construction will be the responsibility of the Waste Management Team as provided by the construction Contractor. Waste Management Team members shall be properly trained, as discussed in Section 5.0 of this document. A list of objectives and implementation procedures will be developed for each construction task, along with a preliminary task completion schedule. The Waste Management Team shall also be responsible for ensuring stormwater and sediment and erosion control practices are in place at the appropriate time.

8. WMP Approvals

By their signature, the undersigned certify that this WMP is approved and will be utilized for operations to be conducted under this plan.

______________________________	______________________________
Contractor Project Manager	Date
______________________________	______________________________
Contractor Waste Management Team Leader	Date
______________________________	______________________________
ARCADIS Project Manager	Date

Table

Table D6-1. Emergency Phone Numbers and Directions to Dickinson County Memorial Hospital

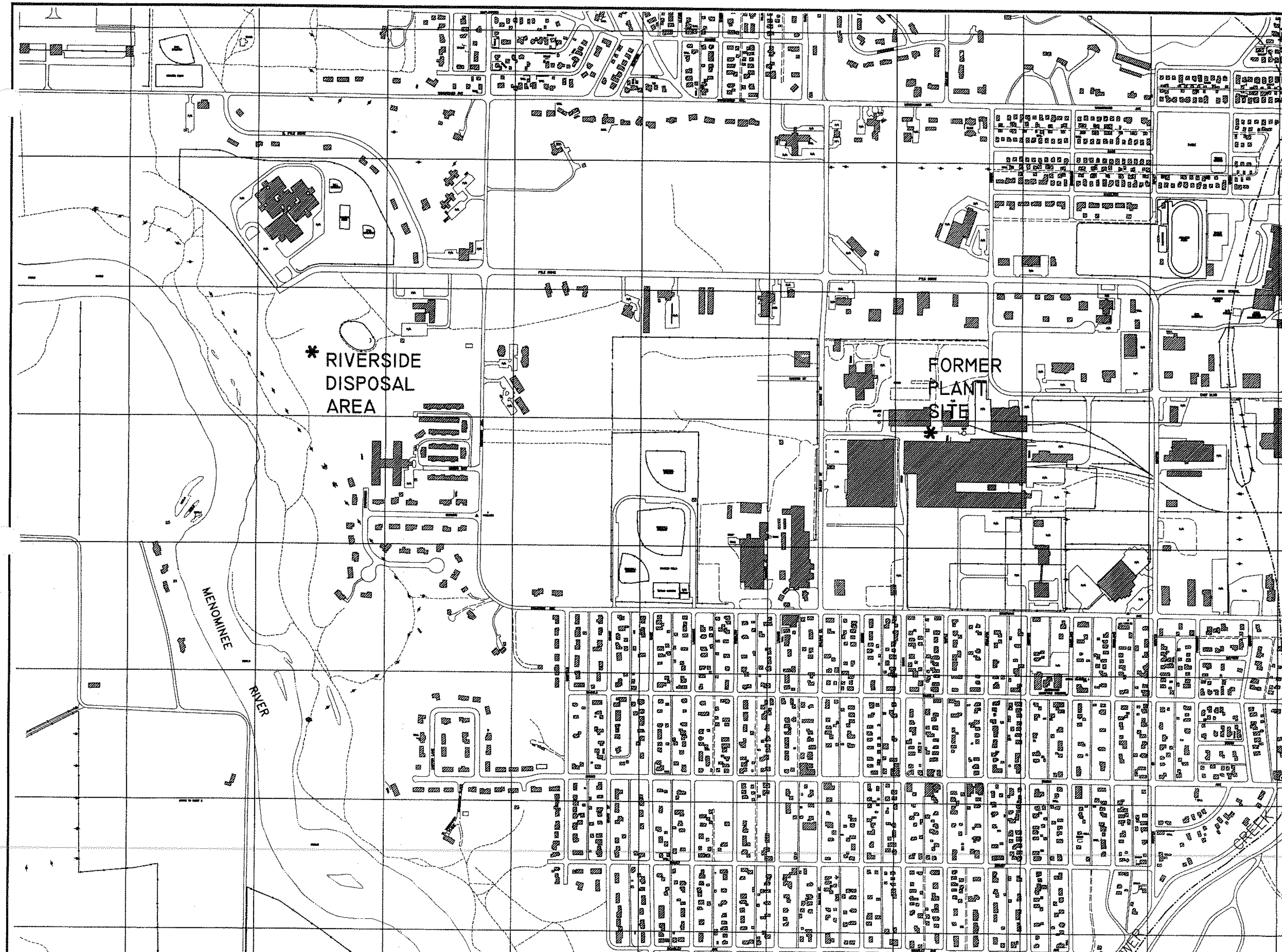
Area Code	906
Police Emergency	911
Police Non-Emergency	774-2525
Fire Emergency	911
Fire Non-Emergency	774-1265
Ambulance	911
Beacon Ambulance Service	779-5050
Rescue Squad	911
Dickinson County Sheriff	774-6262
Hospital Emergency	779-4555
Hospital Non-Emergency	774-1313
Poison Control Center	1 (800) 562-9781
Toxic Substances Center	1 (404) 452-4100
for Disease Control (CDC)	1 (202) 554-1404
CDC Hotline	1 (404) 329-2888
Contractor Project Manager	Insert Contact Numbers
Client Contacts	
Ford Motor Company	
David Miller	1 (313) 322-3761
Kingsford Products Company	1 (708) 728-4328
Daniel Musgrove	
Contractor Corporate Health & Safety	Insert Contact Numbers
Diggers Hotline	1 (800) 482-7171

Dikinson County Memorial Hospital - South US Highway 2, Iron Mountain, Michigan

Directions to Hospital: (Refer to Figure D6-1)

East on Breitung Avenue to Hydraulic Falls Road. North (left) on Hydraulic Falls Road to US Highway 2 (Stephenson Avenue). South (right) on US Highway 2 for approximately 1 mile to Dickinson Memorial Hospital.

Figures



NOTES

1. HORIZONTAL DATUM BASED ON MICHIGAN STATE PLANE COORDINATE SYSTEM. DATE OF PHOTOGRAPHY: 05/04/97 ABRAMS AERIAL SURVEY CORPORATION # 26994.2
2. ACCURACIES NOT GUARANTEED IN OBSCURED AREAS SHOWN BY DASHED CONTOURS AND UNDERLINED ELEVATIONS

G:/CAD/FORD/RIVERSIDE DISPOSAL AREA/WASTE MATERIAL – DRAWINGS/AS-BUILTS/FIG1ASBLT

NO.	DATE	REVISION DESCRIPTION	BY / CKD

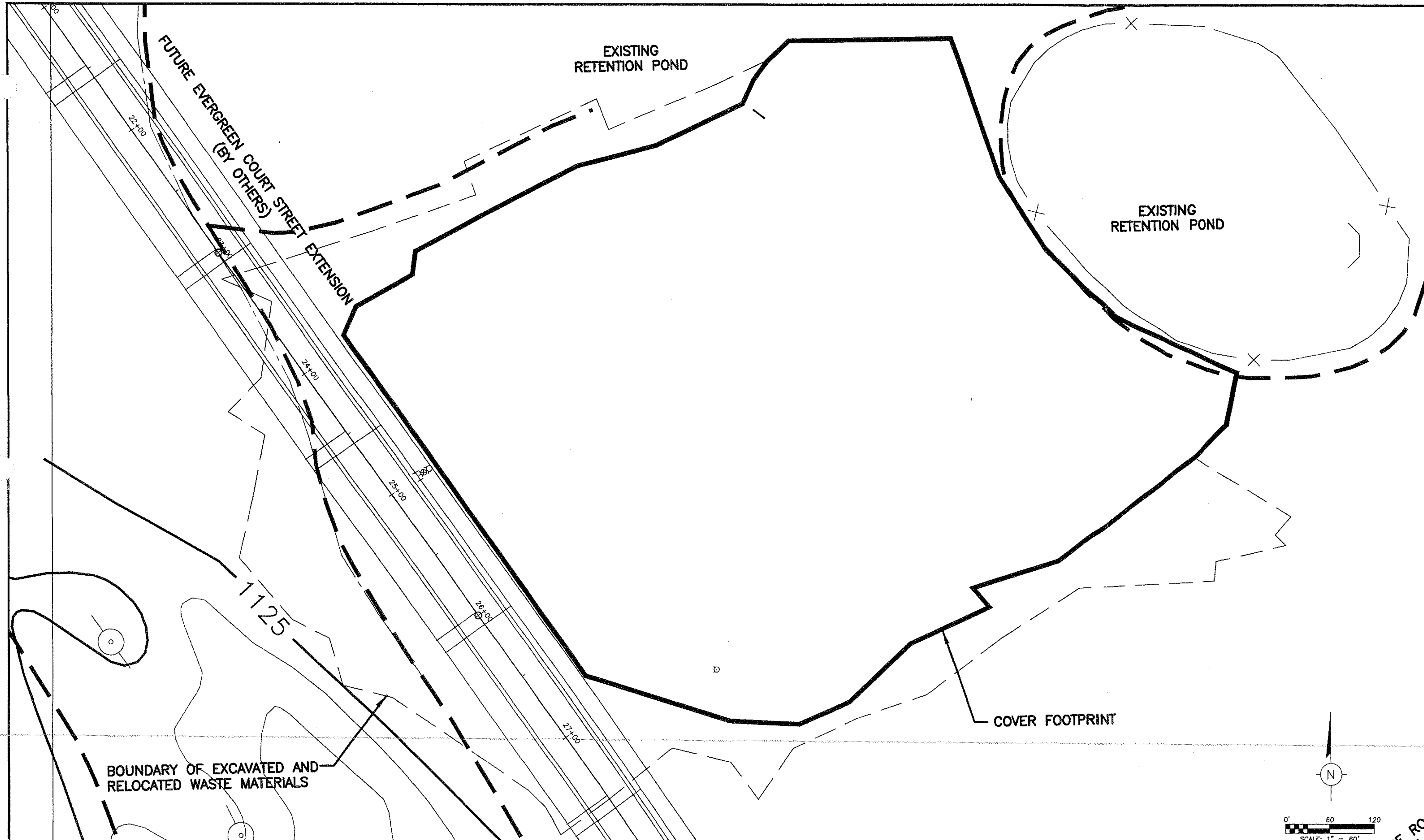
ARCADIS
3903 Northdale Boulevard, Suite 120
Tampa, Florida 33624
Tel: 813/961-1921 Fax: 813/961-2599

RIVERSIDE DISPOSAL AREA
WASTE MANAGEMENT PLAN

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

SITE LOCATION MAP

DRAWN: JMG	DATE: 06/10/02	PROJECT MANAGER: EC	DEPARTMENT MANAGER: BE
		LEAD DESIGN PROF.: BE	CHECKED: BE
		PROJECT NUMBER: WI00950.0010	FIGURE: D2-1



ALL PROFESSIONAL ENGINEERING SERVICES DEPICTED ON THIS DRAWING HAVE BEEN PERFORMED FOR ARCADIS GERAGHTY & MILLER, INC. BY GMCE, INC; A FLORIDA CORPORATION QUALIFIED TO PERFORM SUCH SERVICES IN THE STATE OF MICHIGAN.

G:\CAD\RIVERSIDE-DISPOSAL-AREA\WASTE MATERIAL-DRAWINGS\AS-BUILTS\FIG2ASBLT.DWG

NO.	DATE	REVISION DESCRIPTION	BY / CKD

ARCADIS GERAGHTY & MILLER
3903 Northdale Boulevard, Suite 120
Tampa, Florida 33624
Tel: 813/961-1921 Fax: 813/961-2599

RIVERSIDE DISPOSAL AREA
WASTE MANAGEMENT PLAN

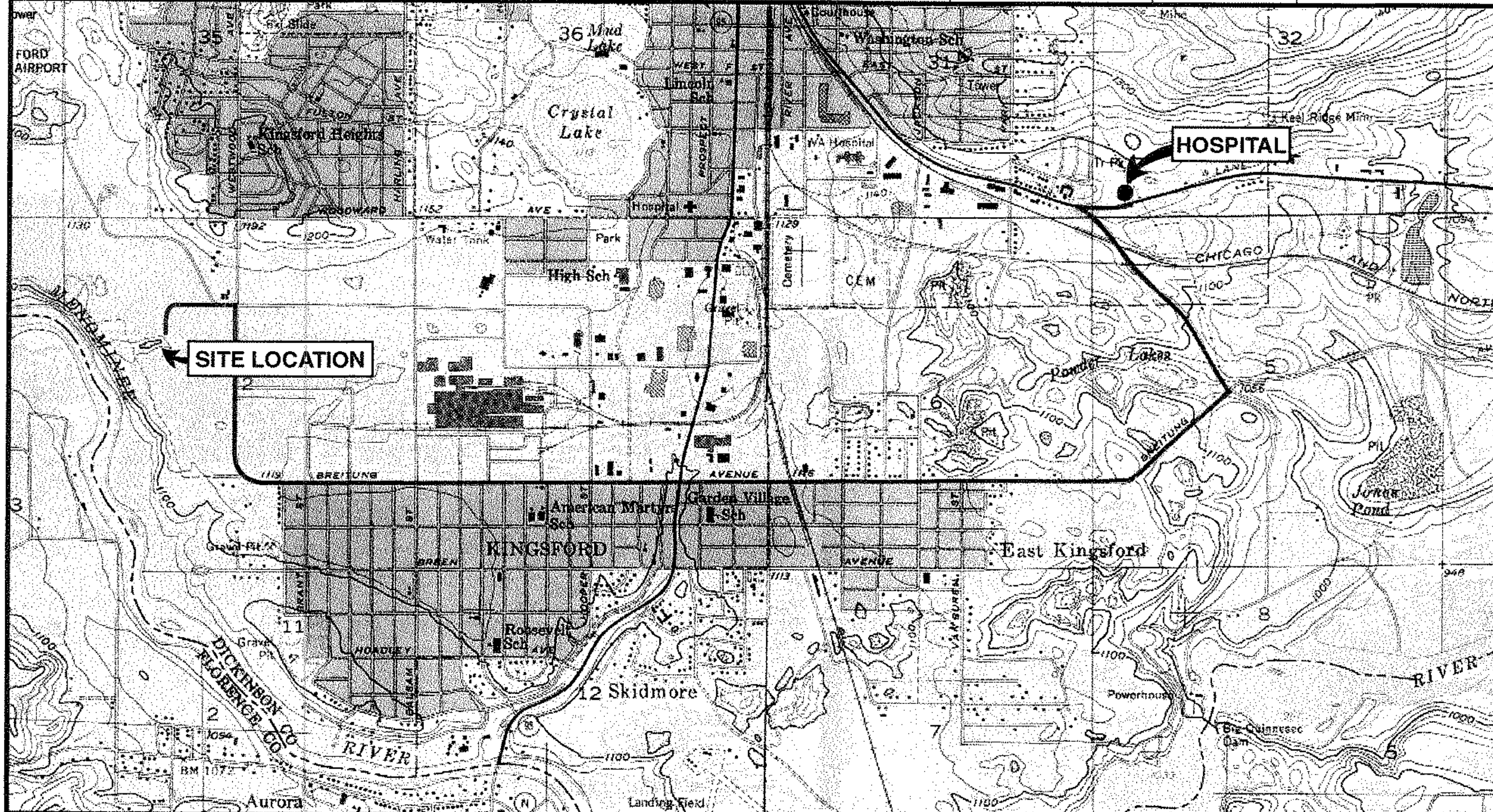
FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

DRAWN	DATE
CES	10/22/01

RDA SITE PLAN AND
COVER SYSTEM FOOTPRINT

PROJECT MANAGER	DEPARTMENT MANAGER
EC	BE
LEAD DESIGN PROF.	CHECKED
BE	BE
PROJECT NUMBER	DRAWING NUMBER
WI000860.001	D2-2

DWG DATE: 26JUN02 | PN: FORD\WI0637\KINGSFORD | FILE NO.: GRAPHICS\RDA_RAP | DRAWING: IKROUTE_HOSP2.AI | CHECKED: KM\LB\BE\IK | APPROVED: | DRAFTER: ELS



SOURCE: USGS 7.5 Minute Topographic Map, IRON MOUNTAIN, MICH.-WIS. Quadrangle, 1955, Photorevised 1982

Route to Hospital: Pyle Drive to Westwood Avenue. Right (south) to Breitung Avenue. East on Breitung Avenue to Hydraulic Falls Road. North on Hydraulic Falls Road to U.S. Highway 2 (Stephenson Avenue). South on U.S. Highway 2 to Dickinson County Memorial Hospital.
Hospital Address: 1721 Stephenson Avenue, Iron Mountain, Michigan.

0 2000 4000 8000
SCALE IN FEET

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ROUTE TO HOSPITAL

WASTE MANAGEMENT PLAN
FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

FIGURE
D6-1

Attachment A

Runoff Volume Calculations

ARCADIS
GERAGHTY & MILLER

SUBJECT: Runoff Volume Calcs.

JOB NO: WI000860.0010 TF001

BY: Sam Aref
DATE: April 26, 2001
CHKD:
DATE:

I. EAST SUB-BASIN

Weighted SCS Curve Number Calculations

Land Use	Soil Name	Hyd. Grp.	Soil Map No.	Area (ac)	CN	Weighted CN
Pavement	Pence fine sandy loam	B	25B	1.42	98	5.88
Pavement	Vilas loamy sand	A	57B	0.94	98	3.90
Residential	Pence fine sandy loam	B	25B	1.00	70	2.96
Residential	Vilas loamy sand	A	57B	0.66	54	1.51
Grass	Pence fine sandy loam	B	25B	11.78	69	34.37
Grass	Vilas loamy sand	A	57B	7.85	49	16.26
				23.65		64.88

Total contributing drainage area, (A) = 23.65 ac

Weighted Curve Number (CN) = 64.88
100-Year, 24-Hour Rainfall Depth (P) = 5.32 in. See attached figure

SCS Runoff Volume Calculations
Potential Storage Abstraction (S) = 1000/CN-10 = 5.413
Runoff Depth (Q) = (P-0.2S)^2/(P+0.8S) = 1.86 in

Weighted Rational Coefficient
C = inches runoff / inches rainfall = Q / P = 0.35

100-Year, 24-Hour Rainfall Volume
Runoff Volume (V) = A x Q = 3.67 ac-ft

II. WEST SUB-BASIN

Weighted SCS Curve Number Calculations

Land Use	Soil Name	Hyd. Grp.	Soil Map No.	Area (ac)	CN	Weighted CN
Pavement	Vilas loamy sand	A	57B	0.84	98	9.85
Residential	Vilas loamy sand	A	57B	0.00	54	0.00
Grass	Vilas loamy sand	A	57B	7.52	49	44.08
				8.36		53.92

Total contributing drainage area, (A) = 8.36 ac

Weighted Curve Number (CN) = 53.92
100-Year, 24-Hour Rainfall Depth (P) = 5.32 in. See attached figure

SCS Runoff Volume Calculations
Potential Storage Abstraction (S) = 1000/CN-10 = 8.545
Runoff Depth (Q) = (P-0.2S)^2/(P+0.8S) = 1.07 in

Weighted Rational Coefficient
C = inches runoff / inches rainfall = Q / P = 0.20

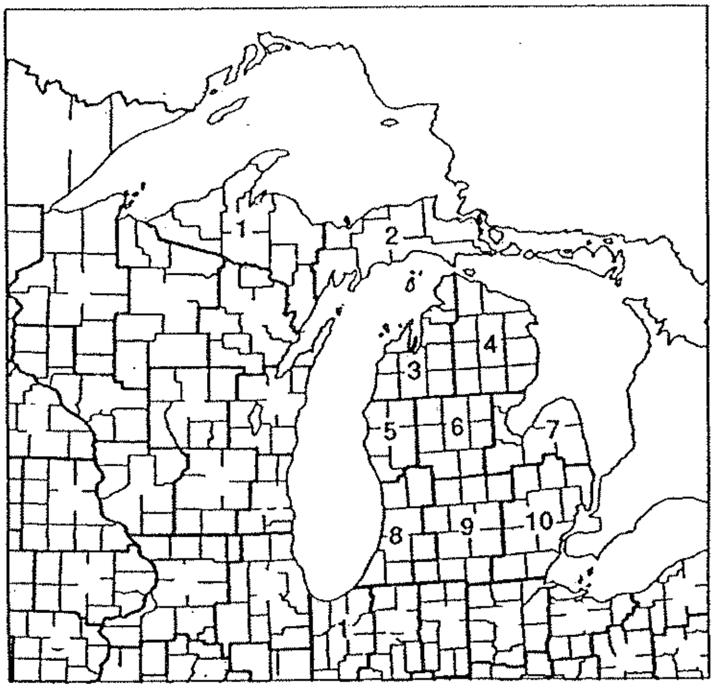
100-Year, 24-Hour Rainfall Volume
Runoff Volume (V) = A x Q = 0.75 ac-ft

Runoff curve numbers for hydrologic soil-cover complexes

(AMC-II conditions)

Land use	Treatment or practice	Hydrologic condition	Hydrologic soil group A	B	C	D
Fallow	Straight row		77	86	91	94
Row crops	Straight row	Poor	72	81	88	91
	"	Good	67	78	85	89
	Contoured	Poor	70	79	84	88
	"	Good	65	75	82	86
	" and terraced	Poor	66	74	80	82
	" " "	Good	62	71	78	81
Small grain	Straight row	Poor	65	76	84	88
	"	Good	63	75	83	87
	Contoured	Poor	63	74	82	85
	"	Good	61	73	81	84
	" and terraced	Poor	61	72	79	82
	" " "	Good	59	70	78	81
Close-seeded legumes or rotation meadow	Straight row	Poor	66	77	85	89
	"	Good	58	72	81	85
	Contoured	Poor	64	75	83	85
	"	Good	55	69	78	83
	" and terraced	Poor	63	73	80	83
	" " "	Good	51	67	76	80
Pasture or range		Poor	68	79	86	89
		Fair	49	69	79	84
		Good	39	61	74	80
	Contoured	Poor	47	67	81	88
	"	Fair	25	59	75	83
	"	Good	6	35	70	79
Meadow			30	58	71	78
Woods		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	25	55	70	77
Residential						
? acre or less lot size			77	85	90	92
¼ acre			61	75	83	87
1/3 acre			57	72	81	86
½ acre			54	70	80	85
1 acre			51	68	79	84
Open spaces (parks, golf courses, cemeteries, etc.)						
Good condition: Grass cover > 75% of area			39	61	74	80
Fair condition: " " 50-75% of area			49	69	79	84
Commercial or business area (85% impervious)			89	92	94	95
Industrial district (72% impervious)			81	88	91	93
Farmsteads			59	74	82	86
Paved areas (roads, driveways, parking lots, roofs)			98	98	98	98
Water surfaces (lakes, ponds, reservoirs, etc.)			100	100	100	100
Swamp	At least 1/3 is open water		85	85	85	85
Swamp	Vegetated		78	78	78	78

Climatic Zones for Michigan.



Rainfall amounts corresponding to the climatic zones in Table 3.1 from the Rainfall Frequency Atlas of the Midwest, Huff and Angel (1992)

Rainfall frequencies, 24-hour duration (rainfall in inches)

Zone	2-year	5-year	10-year	25-year	50-year	100-year
1	2.39	3.00	3.48	4.17	4.73	5.32
2	2.09	2.71	3.19	3.87	4.44	5.03
3	2.09	2.70	3.21	3.89	4.47	5.08
4	2.11	2.62	3.04	3.60	4.06	4.53
5	2.28	3.00	3.60	4.48	5.24	6.07
6	2.27	2.85	3.34	4.15	4.84	5.62
7	2.14	2.65	3.05	3.56	3.97	4.40
8	2.37	3.00	3.52	4.45	5.27	6.15
9	2.42	2.98	3.43	4.09	4.63	5.20
10	2.26	2.75	3.13	3.60	3.98	4.36

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Appendix E

Construction Health and Safety Plan Guideline

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Appendix E

Construction Health and Safety Plan Guideline

Interim Response Action Plan
Riverside Disposal Area
Kingsford, Michigan

PREPARED FOR

Ford Motor Company
The Kingsford Products Company

Tables

Figures

1. Introduction

This Construction Health and Safety Plan Guideline (CHASP) has been prepared for use in conjunction with an Interim Response Action Plan (IRAP) for the Riverside Disposal Area (RDA) at the Ford/Kingsford Site in Kingsford, Michigan. This document presents requirements that must be incorporated into a contractor generated Construction Health & Safety Plan (Contractor CHASP) when conducting construction activities that could potentially disturb the cover system and expose personnel to waste materials present below the cover. The Contractor will generate the Contractor CHASP as part of their work for the identified site conditions, scope of work, and necessary personnel in accordance with the guidelines presented here. The contractors may include additional content consistent with their own corporate health and safety guidelines or procedures. The responsibility of the development, implementation, and enforcement of the Contractor CHASP lies solely with the Contractor, not Ford or KPC.

The elements of the CHASP are based upon the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (October 1985) and the Michigan Occupational Safety and Health Act and its Rules. These guidelines have been supplemented by information obtained during site visits. All reasonable precautions will be taken by the selected Contractor and its subcontractors to protect the safety and health of workers and the general public. All work will be performed in accordance with applicable federal, state, and local regulations.

The objective of this CHASP is to structure and maintain safe working conditions at the site and to develop a plan of action in the case of a site emergency during field activities. The safety organization and procedures have been established based on an analysis of potential hazards, and personnel protection measures have been selected in response to these potential hazards.

Elements of this plan address the following:

- Project Organization.
- Site History and Project Description.
- Training.
- Potential Hazards of Site Contaminants.

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- Activity Hazard Analysis.
- Safety Considerations for Site Operations.
- Protective Equipment.
- Monitoring Requirements.
- Site Control Zones and Communication.
- Medical Surveillance.
- Decontamination and Waste Disposal.
- Emergency Response Plan.

2. Contractor Organization and Responsibilities

The Contractor will be responsible for its employees and their adherence to the Contractor CHASP during construction activities that have the potential to disturb the cover system and expose personnel to the waste material below the cover. The Contractor CHASP will adhere to the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (October 1985 and March 1989) prepared by the National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), US Coast Guard (USCG), and US Environmental Protection Agency (USEPA). The Contractor CHASP will also adhere to Michigan Occupational Safety and Health Act and its Rules. Trained staff will supervise the work in accordance with the health and safety requirements described herein, the current edition of the Michigan regulations for hazardous waste operations and all applicable federal, state, and local health and safety regulations.

2.1 Organizational Structure

Proper planning and careful Contractor CHASP implementation is essential to carrying out the proposed construction activities at the site. An organizational structure detailing personnel requirements and responsibilities is presented in this section. The organizational structure defines the chain of command and identifies the person responsible for directing activities related to the project. Necessary personnel for project implementation will be identified as well as their general functions and responsibilities. This structure also identifies lines of authority, responsibility, and communication among the project team and indicates the person(s) responsible for communicating with the emergency response community. A typical organization chart is shown on Figure E2-1.

An overall project manager (PM) and a project superintendent (PS) and Site Safety Officer (SSO) will be called out by the Contractor in the plan, and an alternate project manager and project superintendent will be identified. Their responsibilities include:

- Having the authority to direct all activities.

- Ensuring the implementation of the Contractor CHASP and effective loss control principles.

- Ensuring that safe work rules and practices are enforced.

- Performing on-site inspections to make certain the Contractor CHASP is being followed.

- Implementing corrective actions following audits, inspections, incident investigations, etc.

- Ensuring that resources are available for all health and safety requirements.

- Assigning trained and qualified personnel to project tasks.

- Providing the appropriate monitoring and safety equipment necessary for implementing the Contractor CHASP.

The PM and PS have the ability to authorize the following safety-related suspensions:

- Temporary suspension of field activities if the health and safety of personnel are endangered.

- Temporary suspension of an individual from field activities for infraction of the Contractor CHASP.

The PM and PS will have ready access to occupational health and safety professionals, including an industrial hygienist.

2.2 Record Keeping Requirements

The PS shall ensure that all health and safety record keeping requirements mandated by Rule 408.22101 et seq., Rule 324.52101 dt seq. under the Michigan Occupational Safety and Health Act, and any other applicable standards are met. An administrative area will be designated for maintenance of such records including Michigan Occupational Safety and Health Act (MiOSHA) certifications, exposure monitoring records, training certificates, and health and safety field logbooks. Additional records to be kept, when applicable, may include the following:

- Daily Health and Safety Meeting Form (Figure E2-2).

- Field Team Review Sheet (Figure E2-3).

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- Visitor's log and Contractor CHASP sign-off (Figure E2-4).
- Qualification and testing for respirator use and fit test.
- Emergency Medical Data Sheets (Figure E2-5).
- Calibration logs as described in Section 7.3.
- Monitoring logs for VOCs, oxygen levels, particulates, and any other monitored parameter.
- Perimeter monitoring charts, data, and calculation sheets.
- PPE log for levels of protection greater than Level D with date, type of PPE, time and duration of PPE use.
- Exposure and incident reports.
- Emergency Report Form (Figure E2-6).
- Work stoppage and work re-start reports.
- Copies of the Contractor CHASP with appropriate signatures, CHASP Approvals (Figure E2-7).

2.3 Training

It will be the responsibility of the PM, PS and SSO to ensure that properly trained personnel are assigned to each work task. Members of the project team performing tasks that could potentially result in exposure to waste materials will have satisfied the training requirements of Rule 325.52101 et seq. (MiOSHA regulation of hazardous waste site activities). MiOSHA certificates for these members should be current and available. These employees will also be subject to appropriate medical surveillance in accordance with Rule 325.52101 et seq. Site-specific training will be provided as necessary for those workers, including subcontractors, and will include a discussion of the following topics:

- Names of all health and safety related personnel and alternates.

- Health and safety organization.
- Locations where Contractor CHASP will be stored.
- Nature of anticipated hazards.
- Recognition and guidance of hazards at the site.
- Safe use of engineering controls and equipment on the site.
- Hazard communication.
- Exposure risk.
- Safe work practices.
- PPE to be used.
- Personnel and equipment decontamination procedure.
- Air monitoring.
- Emergency procedures and on-site First Aid Station and Procedures.
- Rules and regulations for vehicle use.
- Safe use of field equipment.
- Handling, storage, and transportation of hazardous materials.
- Employee rights and responsibilities.

Additionally, field personnel will be responsible for knowing and understanding the information contained in the Contractor CHASP. Attendees shall also sign a Field Team Review Sheet stating that they have been trained in, understand, and agree to comply with the provisions of the Contractor CHASP. Anyone refusing to sign the form will be prohibited from working at the site.

When a new employee has been assigned to the site, the PS and SSO must present a similar briefing before the new employee participates in any field activities. All new employees must sign the Field Team Review Sheet after receiving training and before beginning fieldwork.

2.4 Health and Safety Meeting

Prior to initiating site work, site personnel will be required to attend an orientation session given by the PS and SSO as outlined in Figure E2-2. This session will take place at the site prior to the start of work and may include, but is not limited to, the following topics:

- Site history.
- Scope of fieldwork.
- Specific hazards (toxicological data, heat stress/exposure, other physical hazards).
- Hazard recognition.
- Standard operation procedures and injury prevention, including no smoking and no hand-to-mouth contact within the exclusion zones or prior to completing decontamination.
- Decontamination (personnel and equipment).
- Emergency procedures.
- Potential respirator use.

Field personnel must attend this meeting, the minutes of which shall be documented in the site logbook and maintained as indicated in Section 2. In addition, a safety meeting will be conducted before each work day.

2.5 Health Monitoring and Surveillance

A health monitoring and surveillance program will be established to verify that the worker is physically fit to perform the necessary tasks. The monitoring program will be performed in accordance with MiOSHA requirements. An initial screening of the worker will be performed in accordance with OSHA 29 CFR 1910 guidelines prior to site placement to document current level of health and ability to wear protective gear. The initial health screening should focus on examination of the kidneys, heart, and lungs, and should include the following physical examinations:

1. Height, weight, temperature, pulse respiration, and blood pressure.

2. Head, nose, and throat.

3. Eyes. Including vision tests that measure refraction, depth perception, and color vision.

4. Ears. Requirements for this test are listed in 29 CFR 1910.95.

5. Chest (heart and lungs), including pulmonary function and electrocardiogram (EKG) testing.

6. Peripheral vascular system.

7. Abdomen and rectum (including hernia exam).

8. Spine and other components of the musculoskeletal system.

9. Genitourinary system.

10. Skin.

11. Nervous system.

The following tests should also be performed during the pre-employment examination:

- Blood (including complete blood count with differential, comprehensive metabolic panel, cadmium, mercury, and serum PCBs).

- Urine.

- Chest X-rays.

Periodic medical exams should also be part of the Contractor's Corporate Medical Monitoring Program in accordance with 29 CFR 1910. Annual exams are acceptable; however, more frequent examinations may be necessary depending on the types of chemicals the worker has been exposed to, the duration of the assignment, and the potential or actual exposure levels.

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In addition, testing is necessary to confirm that the worker is capable of completing the work tasks while wearing protective equipment. Medical records for each team must be maintained on-site as stated in Section 2.2 to include the following information:

- Qualification statement for hazardous waste work.
- Qualification for respirator use.
- Respirator fit test results.
- Emergency Medical Data Sheet (Figure E2-5).

The Contractor will provide in the Contractor CHASP the components of their active medical monitoring program, including a detailed plan of health signs and symptoms to be monitored throughout the workday. A record of these monitoring reports should be maintained on site along with each worker's health history record.

3. Background

3.1 Site Description

The City of Kingsford is located in southwestern Dickinson County, in the western part of Michigan's Upper Peninsula. The city is bounded by the Menominee River on the west and south, and by the City of Iron Mountain on the north and east. The Riverside Disposal Area (RDA) is located south of Pyle Drive in the northwest portion of the city as shown on Figure E3-1. The study area for the Ford/Kingsford site is shown on Figure E3-2.

3.2 Site History

Air photo interpretation of the area known as the Riverside Disposal Area, indicates a gravel pit/waste disposal area has been present since 1938. Filling and waste disposal in this area occurred until at least the 1970s. The waste disposed at the Riverside Disposal Area included wood debris associated with operations of the former Ford and KPC plant, which ceased operations in 1961. In addition to the debris associated with the former plant, other municipal and industrial wastes have been disposed here. Historical investigations have detected the presence of VOCs, SVOCs, and heavy metals in soil within the area of the RDA.

3.3 Interim Response Action Summary

The primary focus of the Interim Response Action was to prevent direct contact to impacted soils/waste materials, except under controlled conditions, and allow future use of the Riverside Disposal Area.

The interim response action for the Riverside Disposal Area included construction of an engineered cover system to prevent direct contact with impacted soils and underlying waste. The engineered cover system consists of a permeable soil cover designed to prevent ponding of surface water. The following elements are part of the cover system:

- A common fill layer ranging from 18 to 24 inches in thickness. The thickness of the common fill layer depended on the location within the waste area. Eighteen-inches of common fill is present in the cover area and 24-inches is present over the remaining portions of the waste area. Additional common fill may be present as necessary to promote proper drainage.

- A layer of 6 to 12 inches of topsoil or topsoil/sand mixture. The thickness of the topsoil or topsoil/sand mixture depends on the location in the waste area. The cover area presently has 12 inches of a topsoil/sand mixture and remaining portions of the waste area presently has 6 inches of topsoil. This makes a minimum of 30 inches of cover material over the entire waste area.

- The topsoil or topsoil/sand mixture was seeded, fertilized, mulched, and tacked with the appropriate vegetation for the surface use.

The cover comprises an area of approximately 123,500 square feet centered over the RDA. Waste materials previously located within the right-of-way of the extension of Evergreen Court as well as in the utility corridor have been excavated and consolidated with existing wastes beneath the cover system (Figure E3-3). Future construction activities in these right-of-ways and utility corridors are not anticipated to encounter waste materials and will not require implementation of this health and safety plan.

4. Chemical Constituent Descriptions

Laboratory analytical data compiled for soil samples within the RDA indicate that low levels of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and heavy metals have been detected in samples at concentrations above background levels. Any chemical constituent detected in the soil or waste material at the RDA facility is listed below. Exposure limits, explosive limits (if applicable), and potential exposure routes for these chemical constituents of potential concern are listed in Table E4-1. Monitoring and Contractor designation of action levels will be discussed in Section 7.

VOCs:

- Acetone
- Benzene
- 1,2-dichloroethene
- Ethylbenzene
- Methyl chloride
- Naphthalene
- 1,1,2,2-Tetrachloroethane
- Tetrachloroethene
- Toluene
- 1,2,4-Trimethylbenzene
- 1,3,5-Trimethylbenzene
- Xylenes (total)

SVOCs:

- Aldrin
- Anthracene
- Aroclor 1248
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- BHC (alpha)
- BHC (gamma)
- Bis(2-ethylhexyl)phthalate
- 2-Butanone
- Butylbenzene phthalate
- Carbon sulfide
- Chlordane (alpha)
- Chlordane (gamma)
- Cholesterol
- Chrysene
- Cis-1,2-dichloroethene

- 4-4'DDD
- 4-4'DDE
- Dibenzofuran
- Dieldrin
- Diethyl phthalate
- Di-n-butyl phthalate
- 2,4-Dimethylphenol
- Endusulfan II
- Endrin
- Endrin aldehyde
- Endrin ketone
- Fluoranthene
- Fluorene
- Heptachlor
- Heptachlor Epoxy
- 2-Hexanone
- Ideno(1,2,3-cd)pyrene
- Isopropylbenzene
- Isopropyltoluene
- Methoxychlor

- 2-Methylnaphthalene
- 2-Methyl 2-pentanone
- 2-Methylphenol
- 4-Methylphenol
- Naphthalene
- N-Butylbenzene
- N-nitrosodiphenylamine
- N-Propylbenzene
- Phenanthrene
- Phenol
- Pyrene
- Sec-butylbenzene
- 1,2,4-Trichlorobenzene
- Trichloroethene

Metals:

- Aluminum
- Antimony
- Arsenic
- Barium
- Berylium

- Cadmium
- Calcium
- Chromium
- Cobalt
- Copper
- Cyanide
- Iron
- Lead
- Magnesium
- Manganese
- Mercury
- Molybdenum
- Nickel
- Potassium
- Selenium
- Silver
- Sodium
- Thallium
- Titanium

- Vanadium

- Zinc

In addition, the presence of potentially explosive concentrations of methane gas exists throughout the site. Since methane gas is lighter than air, it will rise into the vadose zone in the absence of silt or clay layers, or become trapped below these layers. Historical investigations have shown the prevalence of methane gas in an area adjacent to RDA is trapped below silt layers at a depth of 70 feet. Provisions must be included in the Contractor CHASP for occurrence of methane gas in the vadose zone.

5. Potential Exposure Pathways and Hazard Evaluation

Attention will be given to protecting on-site personnel from the physical and chemical hazards that may be encountered during construction activities that have the potential to disturb the cover system and expose personnel to the waste material below the cover. Potential exposure pathways, physical hazards, and hazards due to typical construction activities that may be necessary in the area and have the potential to disturb the cover will be discussed in this section. An evaluation of identified potential hazards is based on site history, previously completed field activities, and the typical construction activities that may be required.

5.1 Chemical Hazards

Exposure pathways have been identified according to the NIOSH (National Institute for Occupational Safety and Health) Pocket Guide to Hazardous Chemicals (1997). These exposure pathways and other chemical hazards that may affect the health and safety of the on-site personnel are listed below.

The following potential exposure and chemical hazard pathways may be encountered during fieldwork at the site:

- Ingestion of affected surface soils or material.
- Dermal contact with affected particles, vapors, or gases.
- Inhalation of particles, vapors or gases.
- Dispersal of dust/particulates.
- Contact with contaminated storm water during construction.

These exposure pathways will be minimized by following the protocol for the designated working level of protection as described in Section 6.0 (Personnel Protection Program). Toxicological data for the major constituents detected at the site are listed in Table E4-1.

5.2 Physical Hazards

Field personnel may be exposed to physical hazards during this project. Physical hazards that may be encountered are:

- Explosive Hazards.
- Noise.
- Heat/cold stress.
- Lacerations and contusions.
- Lifting hazards.

General considerations are discussed below; specific comments are presented in Section 5.3.

5.2.1 Flammability and Explosivity of Vapors

Flammable and explosive methane vapors are known to be present, at depth, adjacent to the site. Frequent air monitoring for methane gas will be conducted during the field activities at the site, as well as measuring the lower explosive limit and oxygen concentrations within the breathing zone.

5.2.2 Construction Explosive Hazards

Other explosive hazards associated with construction activities include storage of vehicle fuel and calibration gases for measuring devices.

5.2.3 Noise Exposure

Construction crews may be exposed to loud noise levels from construction equipment. Hearing protection may be necessary.

5.2.4 Heat/Cold Stress

Workers may be required to wear protective clothing which insulates the body. A hazard may exist if workers wear protective clothing in temperatures exceeding 90°F.

In addition to heat stress, exposure to temperatures at or below freezing may result in frostbite and/or hypothermia. A monitoring program will be in place during use of protective gear.

5.2.5 Lacerations and Contusions (Cuts and Bruises)

Earthwork and excavation activities usually involve contact with moving machinery and physical objects. If the field team is cut or bruised during this project, the PS will be prepared to deal with cuts and bruises and a first aid kit will be present during all site operations.

5.2.6 Insect and Wildlife Hazards

If construction activities require workers to enter areas of overgrown vegetation, potential exposure to insect bites and ticks exist. Workers will pay special attention to the presence of wildlife and inspect themselves at the end of each field day. The first aid kit will contain medications for potential insect bites.

5.2.7 Lifting Hazards

Construction activities may involve heavy lifting. Field team members should be trained in the proper methods to lift heavy objects and cautioned against lifting objects that are too heavy for one person to handle safely.

5.2.8 Packaging and Shipping Hazards

Any samples collected from the site will be transported to subcontracted laboratories in compliance with Department of Transportation (DOT) regulations. The instructions given below will be followed to comply with DOT regulations and reduce the potential for sample breakage during transport.

- Appropriate packaging materials will be placed into shipping containers.
- The shipping containers will be classified and secured according to appropriate DOT regulations, and other relevant regulations.

5.3 Field Activities/Physical Hazards

Listed below are potential construction activities that may be performed following implementation of the IRAP as described in Section 3.3.

5.3.1 Hazard Analysis: Excavation

A 30-inch thick permeable soil cover exists over waste areas at the RDA. Should excavation to depths greater than 24 inches be necessary in the cover area, these construction activities may expose field personnel to the chemical and physical hazards listed below:

Chemical Hazards:

- Exposure to explosive vapors.
- Inhalation of vapors.
- Inhalation of dust particles.
- Dermal contact with chemical constituents in the affected soil or waste material present below the 30-inch protective cover.

Physical Hazards:

- Being hit by equipment.
- Being struck by falling objects.
- Exposure to loud noise.
- Exposure to extreme outside temperatures.

In addition, should excavations greater than 4 feet be required, field personnel could be exposed to confined space conditions. Any excavation greater than 4 feet will follow the procedures identified by the OSHA Construction Code 29 CFR 1926 for excavation sloping/shoring/benching.

5.3.2 Hazard Analysis: Restoring the 30-inch Protective Cover

Following disturbance of the cover system, construction activities will need to be conducted to repair/restore the 30-inch thick protective cover. These activities may expose field personnel to the chemical and physical hazards listed below:

Chemical Hazards:

- Exposure to explosive vapors.
- Inhalation of vapors.
- Inhalation of dust particles.
- Dermal contact with chemical constituents in the affected soil or waste material.

Physical Hazards:

- Being hit by equipment.
- Being struck by falling objects.
- Exposure to loud noise.
- Exposure to extreme outside temperatures.

5.3.3 Hazard Analysis: Collecting Soil Samples for Laboratory Analysis

A 30-inch thick permeable soil cover exists over waste areas at the RDA. Should it be necessary to collect soil samples at depths greater than 30 inches in the cover area, these activities may expose field personnel to the chemical and physical hazards listed below:

Chemical Hazards:

- Inhalation of particulates.
- Dermal contact with chemical constituents in the affected soil or waste material.

After the samples have been collected in sampling jars, the samples will be properly packaged to protect shipping personnel from potential exposure to constituents. There is no particular hazard in performing the packaging operation, yet if this operation is not done properly, unsuspecting individuals may be exposed if the containers leak or break. Preservation of water samples may involve the use of acids or bases to adjust sample pH. Precautions will be taken to avoid contact with these reagents.

5.3.4 Hazard Analysis: Geotechnical Sampling as Required During Construction

A 30-inch thick permeable soil cover exists over waste areas at the RDA. Should geotechnical borings/samples be required at depths greater than 24 inches in the cover area, these construction activities may expose field personnel to the chemical and physical hazards listed below:

Chemical Hazards:

- Inhalation of particulates.
- Dermal contact with chemical constituents in the affected soil or waste material.

Physical Hazards:

- Falling objects.
- Exposure to loud noise.
- Exposure to extreme outside temperatures.

6. Personnel Protection Program

A Personnel Protection Program will be established in the Contractor CHASP to be maintained for personnel working at the site and conducting construction activities that could potentially disturb the cover system and expose personnel to waste materials present below the cover. The Personnel Protection Program will provide necessary health and safety training to the contractor personnel assigned to perform or oversee work, health and safety, security, administrative duties, or any other related functions at the site. Site safety meetings will be held before work begins each day or as specified by the PS. Separate protocol will be followed for site visitors as described in a later section.

Personnel shall wear personal protective equipment (PPE) during any of the following conditions: (1) field activities involving the potential for exposure to contaminants, (2) site activities that may generate vapors, gases, particulates, mists, or aerosols, or (3) direct contaminant contact with skin. The type of required PPE is categorized by a level of protection as described below. Any respiratory protection plan implemented during on-site activities will be done in accordance with 29 CFR Part 1910.134.

The levels of protection and the equipment utilized are defined as follows:

6.1 Level D Protection

The following PPE shall be considered typical Level D protection:

- Coveralls.
- Leather or chemical-resistant boots with a steel toe and shank.
- Work gloves.
- Safety glasses, chemical splash goggles, or face shield (as determined by the PS).
- Hard hat.
- Hearing protection (as determined by the PS).
- Outer latex disposable boots (optional).

6.2 Level D Modified Protection

Level D Modified protection shall be used when an increased need for dermal protection is recognized but respiratory protection is not indicated. The following equipment shall be used for Level D Modified protection:

- Chemical-resistant clothing (Tyvek coveralls for particulate hazard or Saranex coveralls or rubber outer gear for liquid hazard).
- Disposable nitrile or butyl outer gloves (glove selection will be based on the site-specific contaminant hazard).
- Nitrile or latex inner gloves (glove selection will be based on the site-specific contaminant hazard).
- Polyvinyl chloride (PVC) boots (chemical-resistant) with a steel toe and shank.
- Hard hat.
- Hearing protection (as determined by the PS).
- Latex outer booties (optional).
- Safety glasses, chemical splash goggles or face shield (as determined by the PS).

6.3 Level C Protection

The following PPE shall be considered Level C protection:

- Full-face piece air-purifying cartridge respirator with organic vapor/high-efficiency particulate filter cartridges (as site conditions warrant, a different APR cartridge may be specified in site specific addenda).
- Chemical-resistant clothing (Tyvek coveralls for particulate hazard or Saranex coveralls or rubber outer gear for liquid hazard).

- Disposable nitrile or butyl outer gloves (glove selection will be based on the site-specific contaminant hazard).

- Nitrile or latex inner gloves (glove selection will be based on the site-specific contaminant hazard).

- Polyvinyl chloride (PVC) boots (chemical-resistant) with a steel toe and shank.

- Hard hat.

- Hearing protection (as required).

- Latex outer booties (optional).

- Two-way radio communications.

The use of a full-face piece air-purifying respirator is approved only if the following applies:

- Substances are identified and their concentrations measured.

- Substances have adequate warning properties.

- Individual passes a qualitative fit test for the assigned respirator.

- An appropriate cartridge is selected based on the hazard.

It is particularly important that the air monitoring is effectively implemented when personnel are wearing Level C protection. No changes to the specified level of protection shall be made without the approval of the PS.

Verbal communication on site may be impeded by background noise caused by heavy equipment or the use of PPE. Accordingly, hand held radios shall be made available. If radios are not available, all individuals shall remain within sight of the project leader and hand signals shall be used between personnel within the work zone. Communications requirements shall be reviewed during the site safety meetings.

The following hand signals shall be used in the event of an emergency where audible communication is not possible:

Hand Signal	Meaning
Hand gripping throat	Out of air, cannot breath
Gripping partner's wrist or both hands on waist	Leave area now, no debate
Hands on top of head	Need assistance
Thumbs Up	OK, I'm all right, I understand
Thumbs Down	No, Negative

6.4 Decontamination Procedures

It is the responsibility of the PS to make certain that all personnel and pieces of equipment leaving the site are properly decontaminated according to the procedures outlined in this section. All personnel exiting controlled work zones must follow decontamination procedures. Only during an emergency evacuation will personnel be allowed to leave the site before decontamination.

6.4.1 Level D Decontamination Procedures

The general decontamination procedures for workers in Level D conditions are illustrated on Figure E6-1. Gloves and outer boot covers will be washed and rinsed, if required. Steel-toed boots will also be scrubbed with decontamination solution, if required. Outer garments and Tyvek will be removed and deposited in plastic bags once they exit the hotline and prior to exiting the contamination control line. Hands and face will be washed as soon as possible.

6.4.2 Level C Decontamination Procedures

A sample decontamination procedure for workers wearing Level C Protection is illustrated on Figure E6-2. Equipment used in the exclusion zone (tools, sampling devices and containers, monitoring instruments, radios, clip boards, etc.) will be deposited on plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability of cross-contamination. Various size containers, plastic liners, and plastic drop cloths will be required for this task. Outer boots and gloves will be cleaned with the proper decontamination solution (hexane or methanol) and detergent/water. The outer gloves and boots will be rinsed and the rinse water should be contained in plastic bucket. Boots, gloves, and outer garments are removed followed by removal of respirator. Once the respirator is cleaned for storage or placed in an appropriate container, inner gloves may be removed. Workers will wash hands and face as soon as possible.

If a worker leaves the exclusion zone to change a respirator cartridge, it is not necessary to proceed through the entire contamination reduction zone. Once the worker's cartridge is exchanged, the outer glove and boot covers are donned with joints taped, the worker may return to the exclusion zone.

At a minimum, disposable items (e.g., Tyvek coveralls, inner gloves, and latex overboots) will be changed on a daily basis. Decontamination solutions will be changed daily or as conditions require.

Small equipment shall be protected from contamination by draping, masking, or otherwise covering as much of the instrument as possible with plastic, without hindering the operation of the unit. Contaminated equipment will be taken from the drop area and the protective coverings removed and disposed in the appropriate containers. Any dirt or obvious contamination will be brushed or wiped with a disposable paper wipe. As necessary, air monitoring equipment will be placed in clear plastic bags that allow reading of the scale and operation of the knobs. The sensors or probes can be partially wrapped, keeping the sensor tip and discharge port clear.

To prevent trans-location of contaminants and inadvertent exposures to personnel, heavy equipment used in contaminated areas shall be decontaminated prior to moving to a new location and before leaving the facility. When decontaminating equipment, the following requirements will be implemented:

- The equipment will be inspected for gross debris. Where possible, contaminated soil deposits will be removed and containerized.
- After removal of gross debris, the equipment will be steam cleaned using a high-pressure washer (i.e., Hotsy).
- After steam cleaning, the equipment will be allowed to dry and will be reinspected. Any remaining visible debris will be re-cleaned through additional pressure washing.

- After all debris is removed according to the above procedure, the equipment will be released from the decontamination pad for use as necessary in other areas of the site. At the close-out of the exclusion zone activities or when a piece of equipment is to be demobilized from the project, the equipment will be given a final decontamination. Equipment wash rinsate will be containerized for proper disposal.

Inspections of equipment for release from the facility will be completed by the PM or PS. Inspections will consist of visual observations, wipe sampling and cleaning solution analysis. Inspection results will be documented in field logbooks.

The stockpile areas will be cleaned using a hot water, high-pressure washer. Decontamination wash water will be collected and sent to either the on-site water treatment system or an off-site permitted treatment/disposal system.

6.5 Heat Stress Control and Monitoring

The PS will set work and break schedules depending on how heavy the workload is and the outside temperature. Generally, workers conducting activities in protective clothing need to break in the shade at least 10 minutes out of every hour during temperatures elevated above 90 degrees Fahrenheit (°F). Rest time will also include fluid replacement with electrolytes.

During conditions where the temperature, humidity, and solar radiation are high and the air movement is low, the following procedures will be implemented to prevent heat stress injury:

- Provide disposable cups and water. Urge workers to drink water regularly. Monitor for signs of heat stress.

- Make certain that adequate shelter is available to protect personnel against heat. If possible, set up a rest area in the shade.

- Workloads and/or duration of physical exertion will be less during the first days of exposure to heat and should be gradually increased to allow acclimatization.

- Heavy work will be scheduled during the cooler periods of the day (e.g., early morning), as possible.

- Alternate work and rest periods will be scheduled in heat stress conditions; in moderately hot conditions.

At the PS's discretion, monitoring activities for heat stress will be performed when workers are using protective clothing in elevated temperatures. Observation of the field team for signs and symptoms of heat stress which include:

1. pale, clammy skin progressing to hot, dry and red skin.

2. profuse perspiration.

3. cramps.

4. dizziness.

5. headaches.

6. nausea.

7. fainting.

Heat stress monitoring should be done at the discretion of the PS, when temperatures are greater than 90 °F or workers exhibit any indication of heat stress. Signs and symptoms of heat stress are summarized in Table E6-1.

6.6 Cold Stress Control and Monitoring

Persons working outdoors in temperatures at or below freezing or with increased wind chill may experience two types of cold weather-related injuries: frostbite and hypothermia. Ambient air temperature and the velocity of the wind are the two factors that influence the development of a cold weather-related injury.

Frostbite is a cold weather-related injury. Areas of the body which have high surface-area-to-volume ratios such as fingers, toes and ears, are most susceptible to frostbite. Frostbite of the extremities can be categorized into three types:

- **Frost nip or incipient frostbite:** This is characterized by skin blanching or whitening.

- **Superficial frostbite:** In this case, the skin has a waxy or white appearance and is firm to the touch, but the tissue beneath is resilient.

- **Deep frostbite:** When this occurs, the tissues are cold, pale and solid. Deep frostbite is an extremely serious injury.

Hypothermia is the second type of cold weather-related injury. Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperatures. Its symptoms are usually exhibited in five stages: 1) shivering; 2) apathy, listlessness, sleepiness, and sometimes rapid cooling of the body to less than 95°F; 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing of the extremities; and 5) death.

The term "wind chill" is used to describe the chilling effect of moving air in combination with low temperature. For instance, an air temperature of 10°F with a wind of 15 miles per hour (mph) is the equivalent in chilling effect of air at -18°F. As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Because of the effects of wind chill, there is a greater danger from cold-related injuries on cold, windy days, than on cold days where there is little or no wind.

Water conducts heat 240 times faster than air. Therefore, the body cools more quickly when damp or wet. Site personnel may become wet from: decontamination water, contact with on-site water (e.g., ponds, streams, etc.), precipitation or perspiration. Care should be taken to minimize the possibility of workers becoming damp or wet and if workers do become damp or wet, efforts should be made to minimize the time that the worker is exposed to the cold. If clothing beneath the personal protective clothing becomes damp, the PS will assess site specific weather conditions to determine if it is appropriate for site workers to remove protective clothing outdoors.

In general, the PS shall follow these procedures to reduce cold stress:

- Install heaters in the support zone and/or trailers to provide a warming area for site personnel if necessary.

- Rotate shifts of workers.

- Schedule work and rest periods.

- Monitor workers' physical conditions.

7. Air Monitoring

Air quality monitoring will be conducted for the identification and quantification of potential airborne contaminants when construction activities that could potentially disturb the cover system and expose personnel to waste materials present below the cover are performed. Both direct-reading instruments and laboratory analysis of air samples may be used for air monitoring activities. Monitoring of methane gas, oxygen, and explosive levels in the breathing zone will be emphasized. General on-site monitoring will include visual inspection of the site to look for places where vapors may gather such as confined spaces, low-lying areas, and wind barriers such as hills or tall buildings.

7.1 Air Monitoring

Standard monitoring instruments that may be used for monitoring site conditions include combustible gas indicators (CGI), photo-ionization detectors (PID), flame ionization detectors (FID), oxygen meters, colorimetric indicator tubes, and organic vapor monitors (OVA). A MIE Data-RAM, or equivalent unit, can be used to monitor total suspended particulates. The contractor will identify specific monitoring instruments in their CHASP.

Upwind vapor levels and work zone levels should be obtained prior to initiation of activities, and should be repeated at pre-specified time intervals. An initial monitoring frequency of once per hour can be used. Once site conditions are characterized, monitoring frequency may be decreased to a frequency specified in the Contractor CHASP Monitoring Plan. Site monitoring should also be completed when site conditions change, for instance, when work begins on a different portion of the site, a different contaminant is being handled, or a different type of operation is begun.

7.2 Perimeter Monitoring

A plan for perimeter monitoring should be incorporated into the Contractor CHASP to be implemented only if on-site monitoring of activities indicate the presence of hazardous vapors. This will be used to ensure that airborne contaminants are not migrating beyond the site boundaries at concentrations harmful to human health. Initially, perimeter monitoring may be limited to particulates. If action levels for onsite monitoring with regard to particulates, VOCs, or SVOCs are exceeded, an evaluation will be made as to the extent of these impacts. If such impacts are determined to extend to the perimeter of the exclusion zone, perimeter monitoring will be expanded to analysis of VOCs and SVOCs, and engineering controls implemented.

7.3 Organic Vapor Monitoring

Air quality in the breathing zone will be evaluated by collecting readings of organic vapor levels. Air monitoring readings will be collected periodically as specified in the Contractor CHASP and at the discretion of the PS. Observation of wind direction during investigation activities will be emphasized. The contractor will select the most suitable instrument for air monitoring purpose, considering the presence of methane in the atmosphere. A flame-ionized vapor analyzer requires methane filtration for an actual organic vapor reading, while a photo-ionization detector does not detect methane. To prevent confusion among work groups working at multiple locations, a single set of action levels for organic vapors will be used.

Based on the list of chemicals of concern provided in Table E4-1, the Contractor will select hazardous chemicals that require monitoring. A plan will be presented that will include the identification and quantification of the selected constituents prior to the beginning of construction activities. Draeger gas detectors can be used for gas identification and quantification. Following initial detection of gases, the Contractor CHASP will provide levels of organic vapors at which specified actions will be required. The plan will call out specific concentrations at which field personnel will change to a higher level of PPE, or at which engineering controls will be implemented. Typical action levels are provided in Table E7-1.

The PS must be responsible for monitoring, calibrating, and maintaining the instruments. Calibrations and maintenance for all instruments should be completed in accordance to the manufacturer's recommendations. Calibrations should be recorded and the following information should be recorded in the calibration logbook to be maintained according to Section 2:

- Instrument and instrument serial number.
- Calibrant gas and lot number.
- Initial reading.
- Final Reading.

- Any adjustments or maintenance.
- Name of the person performing the adjustments or maintenance.
- Date and time.

7.4 Combustible Gas/Oxygen Monitoring

The PS shall ensure that combustible gas indicator/oxygen levels (CGI/O_2) are measured prior to entry into open excavations, sumps, confined spaces, or other sites/conditions where a flammable, combustible, or oxygen-deficient atmosphere may be present. To ensure accurate measurements, the O_2 concentration should be measured before the lower explosive limit (LEL) concentration. The Contractor will present a schedule for CGI/O_2 monitoring based on known methane issues and the constituent of concern list in Table E4-1.

Action levels for LEL and O_2 will be identified in the Contractor CHASP. When used, CGI/O_2 meters must be maintained and calibrated before use in accordance with manufacturers' instructions.

8. Site Control

The purpose of site control is to minimize potential contamination of workers, protect the public from the site's hazards, and prevent vandalism when performing construction activities that could potentially disturb the cover system and expose personnel to waste materials present below the cover. Site control is essential in emergency situations. A plan for site control will include established work zones, site preparation, use of the buddy system, established and enforced decontamination procedures for personnel and equipment, site security measures, communication networks, and safe work practices.

8.1 Site Preparation

Prior to commencement of construction activities that could potentially disturb the cover system and expose personnel to waste materials present below the cover, the site must be prepared for cleanup activities. Site preparation can also be hazardous and the following steps should be taken, where necessary:

- Construct roadways to provide ease of access and a sound roadbed for heavy equipment and vehicles.
- Arrange traffic flow patterns to ensure safe and efficient operations.
- Eliminate physical hazards from the work area as much as possible, including:
  - Ignition sources in flammable hazard area.
  - Exposed underground electrical wiring and low overhead wiring that may entangle equipment.
  - Sharp or protruding edges, such as glass, nails, and torn metal which can puncture protective clothing and equipment and inflict puncture wounds.
  - Debris, holes, loose steps or flooring, protruding objects, slippery surfaces, or unsecured railings, which can cause falls, slips, and trips.
  - Unsecured objects, such as bricks and gas cylinders, near the edges of elevated surfaces such as rooftops and scaffolding, which may dislodge and fall on workers.

- Construct operation pads for mobile facilities and temporary structures.

- Construct loading docks, processing and staging areas, and decontamination pads.

- Provide adequate illumination for work activities. Equip temporary lights with guards to prevent accidental contact.

- Install all wiring and electrical equipment in accordance with the applicable code.

8.2 Work Zones

Prevention of exposure to and spread of constituents by activities at the site will be achieved through the establishment of work zones. Three work zones will be used including: 1) Exclusion Zone; 2) Contaminant Reduction Zone; and 3) Support Zone. Flagging will be used to delineate each of these three zones.

8.2.1 Exclusion Zone

The Exclusion Zone is the area where all earthwork and clearing activities are conducted and where chemical constituents and physical hazards are potentially present. Only properly trained individuals who are wearing appropriate personal protection equipment will be allowed to enter and work in this zone. Level D protection will be required for workers in this zone. The size of the Exclusion Zone incorporates the entire area where the cover system will potentially be disturbed and adequate space for movement of heavy equipment. Personnel in the Exclusion Zone should remain within sight of the PS or have radio communication with the PS.

8.2.2 Contaminant Reduction Zone

The Contaminant Reduction Zone (CRZ) is a transitional area between the Exclusion Zone and the clean area. The CRZ contains a corridor that leads from the Exclusion Zone to the Support Zone. This corridor may contain wash buckets, solid waste disposal containers, brushes, and equipment drop tarps. All decontamination activities will occur in the contaminant reduction corridor. The CRZ has a decreasing level of contamination, moving outward. The outer boundary of the CRZ is called the contamination control line, which separates the possibly low contamination area from the clean support zone. The CRZ is also the area where equipment resupply takes place, samples are prepared prior to transport to laboratory, where rest area(s) are designated for workers (including portable toilet facilities, bench/chair, liquids and shade), and storage of emergency response equipment.

8.2.3 Support Zone

The Support Zone is the area where the field team will be when not performing site work. This area is to be used for meal breaks, eating, clean equipment storage, and staging. This zone will be located in an unaffected area and as far upwind from the exclusion zone as practical. The support zone is also the location for administrative personnel and office equipment. A portable first aid and eye wash station and toilets will be located here.

8.3 General Work Rules

Fieldwork will be conducted only during daylight hours unless adequate artificial lighting is provided. The "buddy" system will be observed at all times when site personnel are required to wear respiratory protection.

Entry into and exit from the continuous work area, exclusion zones, and contamination reduction zone will be permitted only through designated access points, except during an emergency or as authorized by the PS. Personnel entering the exclusion zone must be wearing the required minimum protective clothing as specified in Section 6.0 and they must exit these areas via the Decontamination Station.

Hands and face must be thoroughly washed as soon as possible after leaving the work area and before eating or drinking. No excessive facial hair, which interferes with a satisfactory fit of the mask-to-face seal, is allowed on personnel required to wear respiratory protective equipment. The PS will determine if facial hair presents such interference.

Personnel assigned for on-site activities must be adequately trained and briefed on anticipated hazards, instruction on handling hazardous materials, if applicable, instruction on harmful plants, animals or insects, if applicable, equipment to be worn, safety practices to be followed, emergency procedures, and communications. Daily safety meetings will be held with field personnel prior to the start of work.

Field activities will comply with OSHA 28 CFR Parts 1926/1910 Safety and Health Standards for the Constructive Industry. Regular inspections of the site, materials and equipment will be made by the SHSO to certify compliance with Subpart C (29 CFR

Part 1926.20) General Safety and Health Provisions. The Contractor CHASP shall be available on the site for inspection.

8.3.1 Overhead Utilities

Any overhead wire shall be considered an energized line unless the person owning that line or the electrical utility authorities verify and provide documentation that it is not an energized line and that it has been visibly grounded.

A person shall be designated to observe excavation or other equipment and to give timely warning of all operations where it is difficult for the operator to maintain the desired clearance by visual means. Parameters for minimum clearance from energized overhead lines are presented in the following table. The only acceptable method of proving inactive or de-energized state is through an effectively implemented and documented control of a hazardous energy program. Electricity in all structures shall be considered to be on until proven inactive.

Minimum Clearance From Energized Overhead Electric Lines

Nominal System Voltage (Kilovolts)	Minimum Required Clearance (feet)
0 – 50	10
51 – 100	12
101 – 200	15
201 – 300	20
301 – 500	25
501 – 750	35
751 – 1000	45

8.3.2 Inclement Weather

Natural phenomena, e.g., heat or cold, rain, snow, ice, and lightning, can affect work activities and increase risk. Additionally, extremes in temperature and moisture could affect the function of monitoring instrumentation and PPE. It is the responsibility of the SHSO to recognize weather conditions and adjust site activities accordingly.

8.3.3 Manual Lifting

Personnel performing material handling shall abide by the following guidelines:

- **DO** design manual lifting and lowering out of the task and workplace. If manual lifting must be accomplished, perform it between knuckle and shoulder height.
- **DO** be in good physical shape. If you are not used to lifting and vigorous exercise, do not attempt to do difficult lifting or lowering tasks.
- **DO** think before acting. Place material conveniently within reach. Have handling aids available. Make sure sufficient space is cleared.
- **DO** get the load close to your body. Test the weight before trying to move it. If it is too bulky or heavy, get a mechanical lifting aid or somebody else to help, or both. Place your feet close to the load. Stand in a stable position with the feet pointing in the direction of movement. Lift mostly by straightening the legs.
- **DO NOT** twist the back or bend sideways.
- **DO NOT** lift or lower awkwardly.
- **DO NOT** hesitate to get mechanical help or help from another person.
- **DO NOT** continue lifting when the load is not of a manageable weight.

8.3.4 Portable Ladders

All portable ladders shall be used for their designated purposes only, and shall be constructed, maintained, and used in accordance with American National Standards Institute standards A-14.1 and A-14.2, OSHA 29 CFR Part 1926 Subpart X, and manufacturers' instructions. Before use, each ladder shall be inspected to verify that all parts are in good condition and all components function properly. Defective ladders shall be tagged "do not use" by the SHSO.

In general, personnel shall follow these guidelines when using portable ladders:

- Set ladders on flat, firm surfaces.

- Contact both handrails of a straight ladder with the upper support.
- To prevent slippage of a straight ladder, use another person to hold the ladder in place or tie the ladder securely to the upper support.
- Retain a ratio of 4 to 1 regarding the height of extension related to the distance of the bottom of the ladder to the well or vertical plane (1 foot out for every 4 feet up).
- Extend the handrails of a straight ladder at least 36 inches above the upper support.
- Do not use metal ladders around electrical conductors.
- Do not allow a second person to use the same ladder that you are using.
- Do not stand on the top two rungs of ladder or within 3 feet of the top of the ladder.
- Position the ladder so that no more than half of your body extends beyond either handrail during the work activity.

Review ladder raising and usage techniques as applicable under the guidance of the PS.

8.3.5 Heavy Equipment Safety

Heavy equipment can present a variety of hazards. In general, the SHSO shall observe the following procedures:

- Require subcontractors to provide equipment that meets the requirements of all relevant OSHA standards.
- Inspect equipment before use. At a minimum, guarding, hydraulics, hoisting, rigging, and overall condition should be reviewed. Correct deficiencies before equipment is used.
- Verify operator qualifications before beginning work.
- Conduct noise monitoring to ensure that personnel are adequately protected.

- Equip all equipment with operational backup alarms and a fire extinguisher.

- Review copies of all pertinent inspections before the start of work.

- Investigate any safety and health concerns arising during the course of work.

8.3.6 Driver Safety

During the performance of this work, all personnel using project vehicles shall possess a valid driver's license, passes any necessary permit, and obey all posted speed limits, traffic signs, and traffic signals.

8.3.7 Power and Hand Tools

Personnel shall use power and hand tools in accordance with the following procedures:

- Use tools only after being trained.

- Maintain tools in good condition and inspect them prior to use.

- Use electrical tools that are double-insulated or have a ground plug.

- Use tools for their intended purpose only.

- Remove unsafe tools from service.

8.3.8 Hand Protection

In addition to required PPE, field personnel shall wear protective gloves as needed when handling materials or performing other work that could result in hand injury.

8.3.9 Lockout/Tagout

In accordance with 29 CFR Part 1910.147, the site personnel shall use lockout/tagout procedures as necessary to control employee exposure to hazardous energy sources, particularly underground and aboveground utilities and services. Subcontractors shall present their lockout/tagout procedures to the PHSM.

8.3.10 Traffic Control

The PS shall coordinate all activities impacting base traffic. Unauthorized vehicles shall be controlled through the use of barricades, cones, or other warning devices.

8.3.11 Material Storage

A strategy for storage of flammable and combustible liquids, compressed gasses, and corrosives shall be presented in the Contractor CHASP.

8.3.12 Fire Prevention

To prevent the occurrence of fires on the project, the following will be completed in accordance with 29 CFR Part 1926.151:

- Electrical installations shall meet the requirements of Rule 408.41701 et seq. of the Michigan Occupational Safety and Health Act 29 CFR Part 1926, Subpart K.
- Potential sources of fire ignition shall be located away from fuel sources.
- Flammable and combustible liquids and compressed gasses shall be stored in accordance with the Construction Waste Management Plan.
- Fire extinguishers will be provided for the job-site in accordance with applicable portions of Rule 408.41851 and Rule 408.41852.

8.3.13 Inspections

Contractor will be prepared for health and safety inspections by Michigan Department of Consumer and Industry Services, Construction Safety Division or any other county or city official with authoritative power.

8.4 Site Security

The Contractor CHASP will also call out a plan to maintain site security. Site security measures are necessary during and after normal working hours to:

- Prevent exposure of unauthorized, unprotected people to the site hazards.

- Prevent vandalism and increased hazards of persons trying to dispose other waste on the site.

- Prevent theft.

- Avoid interference with safe working practices.

Security protocol provided in the Contractor CHASP will include the following provisions:

- Assign the responsibility of enforcing security measures to a person who acknowledges that responsibility.

- An identification system to identify authorized persons as well as the limitations to their approved activities.

- Post signs around the perimeter of the site.

- Secure equipment for overnight storage.

- All site visitors must be approved, signed in, and given the proper PPE.

8.5 Site Visitors

Visitors to the site will be instructed to stay outside of the barricaded or exclusion zone and remain within the support zone during the extent of their stay. Visitors will be cautioned to avoid skin contact with potentially contaminated surfaces. During visitation, hand-to-mouth transfers will be reduced with special warnings not to eat, drink, smoke, or chew gum or tobacco. The use of alcohol during site visitation is prohibited.

Authorized visitors requiring observation of the work in the exclusion zone must read the Contractor CHASP and sign a form stating that they have read and understand the safety protocol and will abide by it (Figure E2-4). All visitors entering the exclusion zone must wear appropriate personal protective gear. The Contractor CHASP should specify how site visitors will be controlled and what protective gear will be provided. Access to the site by visitors shall be restricted as follows:

- All site visitors must notify the PS or his/her designee before obtaining access to a support zone.

- Site visitors entering controlled work zones will be strictly limited. The PS must approve entry and the visitor must demonstrate medical and training clearance to enter a controlled work zone and must be given site-specific training.

- All site visitor access must be clearly documented, and visitors must comply with all provisions of the Contractor CHASP.

8.6 Disposal of Material

Disposal of materials generated on-site should be in accordance with the Waste Management Plan (WMP) developed for the IRAP.

9. Engineering Controls

A variety of external measures can be used to influence site conditions to prevent them from becoming hazardous or to reduce the risk of harm to human health when conducting construction activities that could potentially disturb the cover system and expose personnel to waste materials present below the cover. At a minimum, the following measures, or engineering controls, will be included in the Contractor CHASP.

1. Water sprayers will be used to control excessive dust conditions. The CHASP will state at what levels dust suppression will be used.

2. An oxygen analyzer will be used to monitor oxygen content in the air within the exclusion zone. If levels reduce to 19.5 percent oxygen or less in the breathing zone, work will be temporarily halted and industrial fans will be used for forced ventilation of the work area. Work cannot commence until oxygen levels in the breathing zone have normalized. In the event that oxygen concentrations increase to 23% or greater, work will be halted, but no ventilation will be applied. The work area will be allowed to ventilate naturally.

3. Ventilation of methane from the subsurface will be performed as described in the IRAP design.

Additional engineering control measures may be added to the Contractor CHASP where appropriate.

10. Emergency Procedures

On-site personnel will use the following standard emergency procedures when conducting construction activities that could potentially disturb the cover system and expose personnel to waste materials present below the cover. The PS will be notified of any on-site emergencies and be responsible for ensuring that the appropriate procedures are followed. An emergency report (Figure E2-6) will be completed and submitted to the site PS for each instance of employee injury or possible exposure.

10.1 Emergency Phone Numbers and Hospital Location

Emergency phone numbers (Table E10-1) will be posted at a conspicuous place in the support zone. Directions to Dickinson County Memorial Hospital are given in Table E10-1 and a map with the route to the hospital is presented as Figure E10-1. The PS will be responsible for making sure that all field personnel are familiar with the location of the hospital, and know where the emergency phone list and directions to the hospital are located.

10.2 Personnel Injury in the Exclusion Zone

In the event of an injury in the exclusion zone, all site personnel will assemble at the decontamination line. The PS will evaluate the nature of the injury and the affected person will be decontaminated to the extent possible prior to movement to the support zone. Appropriate first aid will be initiated, and contact will be made with the Dickinson County Memorial Hospital for an ambulance (if required) (Table E10-1). No person will re-enter the exclusion zone until the cause of injury or symptoms are determined. An injury report will be created and submitted to the established authority for action (Figure E2-6).

10.3 Personnel Injury in the Support Zone

Upon notification of an injury in the support zone, the PM and PS will assess the nature of the injury. If the cause of the injury or loss of the injured person does not affect the performance of site personnel, operations may continue, and the appropriate first aid and necessary follow-up, as stated above, will be initiated. An injury report will be created and submitted to the established authority for action (Figure E2-6). Approved first aid kits will be kept in appropriate places on the work site. The PS will be responsible for making sure personnel are familiar with the first aid kit locations. The PS will also be responsible for the maintenance of the first aid kits.

10.4 Fire/Explosion Emergency Procedures

The threat of fire/explosion on this work site is considered high because of reported concentrations of methane gas in the subsurface. In addition, fire hazards exist in the following activities:

- Equipment refueling.
- High pressure water cleaning, fuel storage, and refueling.
- Presence of solvent contamination.

The PS will check to see that each vehicle fire extinguisher is appropriate for the fire hazard present at this site. Generally, Type A, B, and C extinguishers are appropriate. The field team will be prepared to fight small fires with extinguishers. In the event of a large fire, the field team will contact the appropriate authorities and report the fire.

10.4.1 Emergency Procedures

In an emergency, the PS (or alternate PS) will assume total control and decision making on site. In the event of a chemical spill, the release reporting procedures as detailed in the Waste Management Plan will be followed and the PS will attempt to containerize the material. In the event of a fire or explosion, the PS will take the following actions:

- Notification of site personnel and appropriate authorities.
- Shutdown site activities.
- Account for site workers at decontamination corridor.
- Evacuate the site, if necessary.

Methane in the gas state is a dangerous fire and explosion hazard when exposed to heat or flame. Care will be taken to eliminate sources of potential ignition, such as smoking, and non-explosion-proof electrical and internal combustion equipment. The use of flame devices such as cutting torches or welding equipment will only be done with approval of the PS after combustible gas (gc) monitoring. In the event of a small methane fire, the field team will be prepared to control the fire using CO_2 or dry chemical.

Upon notification of an on-site fire or explosion, all site personnel shall assemble at the decontamination line. The fire department shall be alerted by calling 911 for response services. All site personnel will be moved a safe distance from the involved area.

If PPE worn by personnel fails or is otherwise altered in such a manner that the level of protection is affected, the workplace must be vacated. The person affected shall immediately leave the work zone. Re-entry shall not be permitted until the equipment has been repaired or replaced.

Field personnel must notify the PS when any on-site equipment fails to operate properly. The PS shall determine the effect of this failure on continuing operations on-site. If the failure affects the safety of personnel or prevents completion of assigned tasks, all personnel shall leave the work zone until the situation is evaluated and appropriate actions taken.

In all situations, when an onsite emergency results in evacuation, personnel shall not re-enter until:

1. The conditions resulting in emergency have been corrected.
2. The hazards have been reassessed.
3. The CHASP has been reviewed.
4. Site personnel have been briefed on any changes in the CHASP.

10.4.2 Emergency Medical Care

The following describes emergency procedures when it is suspected that a person has suffered from chemical exposure.

Dickinson County Memorial Hospital (Phone # 779-4555) will be contacted in an emergency. The hospital is located at 1721 Stephenson Avenue, Iron Mountain, Michigan, and a map of the route and alternate routes is attached as Figure E10-1. A local ambulance service is available by calling 911. First-aid equipment (including a first-aid kit, emergency eye wash and emergency shower) will be available on site.

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Skin Contact

1. Flush with water.

2. Remove clothing, if necessary.

3. Wash and rinse affected area for at least 20 minutes. Decontaminate and provide appropriate medical attention.

Inhalation

1. Move person away from area.

2. Administer CPR as needed.

3. Decontaminate and transport to hospital for medical attention (Figure E10-1).

Ingestion

1. Decontaminate and transport to hospital for medical attention.

Eye Contact

1. Irrigate with water for at least 15 minutes.

2. Decontaminate and transport to hospital for medical attention (Figure E10-1).

In the event of a serious accident/injury, the PS shall make an immediate telephone report to the PM outlining all details of the accident/injury and action(s) taken. This reporting procedure will be accomplished using the Contractor's Accident/Incident Report. The report shall include at a minimum the following information:

- Chronological history of the incident.
- Facts concerning the incident and when they became available.
- Title and names of personnel involved.

- Actions (decisions made and by whom) orders given (to whom, by whom, and when) action taken (who did what, when, where, and how).

- Possible exposure(s) of site personnel.

- History of all injuries or illnesses during or as a result of the emergency.

In the event of a spill of hazardous materials on site, the PS shall control the spill and proceed to absorb and containerize the material. In addition, the PS may conduct air monitoring to characterize exposure hazards from the incident.

Tables

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Table E4-1. Chemical Constituents of Potential Concern, Exposure Limits, and Properties, Riverside Disposal Area, Kingsford, Michigan.

	OSHA PEL	IDLH	Potential Exposure Route	Ioniation Potential	UEL/LEL
ORGANICS					
VOCs					
Acetone	250 ppm	2500 ppm	Inh, Ing, Con	9.69 eV	12.8%/2.5%
Benzene [1]	CA (0.1 ppm)	CA (500 ppm)	Inh, Abs, Ing, Con	9.24 eV	7.8%/1.2%
1,2-Dichloroethene	None	None			
Ethylbenzene	100 ppm	800 ppm	Inh, Ing, Con	8.76 eV	6.7%/0.8%
Methane	None	None	Asphyxiant		15%/5.3%
Naphthalene	10 ppm	250 ppm	Inh, Abs, Ing, Con	8.12 eV	5.9%/0.9%
1,1,2,2-Tetrachloroethane	CA 1 ppm	100 ppm	Inh, Abs, Ing, Con	11.10 eV	ND/ND
Toluene	100 ppm	500 ppm	Inh, Abs, Ing, Con	8.82 eV	7.1%/1.1%
1,2,4-Trichlorobenzene	C 5 ppm	ND	Inh, Abs, Ing, Con	ND	6.6%/302 degF
Trichloroethene (also called Trichloroethylene)	25 ppm	CA (1,000 ppm)	Inh, Abs, Ing, Con	9.45 eV	10.5%/8%
1,2,4-Trimethylbenzene	25 ppm	ND	Inh, Ing, Con	8.27 eV	6.4%/0.9%
1,3,5-Trimethylbenzene	25 ppm	NA	Inh, Ing, Con	8.39 eV	ND/ND
m-Xylene	100 ppm	900 ppm	Inh, Abs, Ing, Con	8.56 eV	7.0%/1.1%
o-Xylene	100 ppm	900 ppm	Inh, Abs, Ing, Con	8.56 eV	6.7%/0.9%
p-Xylene	100 ppm	900 ppm	Inh, Abs, Ing, Con	8.44 eV	7.0%/1.1%
SVOCs					
Acenaphthalene	None	None			
Anthracene	None	None			
Benzo(a)anthracene	None	None			

Footnotes on Page 5.

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Table E4-1. Chemical Constituents of Potential Concern, Exposure Limits, and Properties, Riverside Disposal Area, Kingsford, Michigan.

	OSHA PEL	IDLH	Potential Exposure Route	Ioniation Potential	UEL/LEL
SVOCs (continued)					
Benzo(a)pyrene	CA- 0.1 ppm	CA- 80 ppm	Inh, Con	varies	varies
Benzo(b)fluoranthene	None	None			
Benzo(g,h,i)perylene	None	None			
Benzo(k)fluoranthene	None	None			
Bis(2-ethylhexyl) phthalate	None	None			
2-Butanone	200 ppm	3000 ppm	Inh, Ing, Con	9.54 eV	11.4%/1.4%
Butylbenzene phthalate	None	None			
Carbon sulfide	None	None			
Chrysene	CA- 0.1 ppm	CA- 80 ppm	Inh, Con	varies	varies
Cis-1,2-dichloroethene	None	None			
2,4-Dimethylphenol	None	None			ND/ND
Di-n-butyl phthalate	5 ppm	4000 ppm	Inh, Ing, Con	ND	
Fluoranthene	0.5 ppm	50 ppm	Inh, Abs, Ing, Con	ND	ND/ND
Fluorene	None	None			
2-Hexanone	1.0 ppm	1600 ppm	Inh, Abs, Ing, Con	9.34 eV	8%/ND
Ideno(1,2,3-cd)pyrene	None	None			
Isopropylbenzene	None	None			
Isopropyltoluene	None	None			
Methylene chloride	CA - ND OSHA = 25 ppm	CA 2300 ppm	Inh, Abs, Ing, Con	11.32 eV	23%/13%
2-Methylnaphthalene	None	None	Ing		ND/ND
2-Methylphenol	None	None			

Footnotes on Page 5.

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Table E4-1. Chemical Constituents of Potential Concern, Exposure Limits, and Properties, Riverside Disposal Area, Kingsford, Michigan.

	OSHA PEL	IDLH	Potential Exposure Route	Ioniation Potential	UEL/LEL
4-Methylphenol	2.3 ppm	250 ppm	Inh, Abs, Ing, Con	8.97 eV	ND/1.1%
2-Methyl 2-pentanone	None	None			
N-butylbenzene	None	None			
N-nitrosodiphenylamine	CA- ND	CA- ND	Inh, Abs, Ing, Con	8.69 eV	ND/ND
N-propylbenzene	None	None			
Naphthalene	10 ppm	250 ppm	Inh, Abs, Ing, Con	8.12 eV	5.9%/0.9%
Phenanthrene	None	None			
Phenol	5 ppm	250 ppm	Inh, Abs, Ing, Con	8.50 eV	8.6%/1.6%
Pyrene	None	None			
Sec-butylbenzene	None	None			
Tetrachloroethene	None	None			
Trichloroethene	CA - ND	CA 1000 ppm	Inh, Abs, Ing, Con	9.45 eV	10.5%/8.5%
<u>Pesticides and Non-VOCs</u>					
Aldrin	CA (0.25 ppm)	CA 25 ppm	Inh, Abs, Ing, Con	ND	NA/NA
Aroclor 1248	None	None			
BHC (alpha)	None	None	full name?		
BHC (gamma)	None	None	full name?		
4-4' DDD			full name?		
4-4' DDE			full name?		
Chlordane (alpha)	CA (0.5 ppm)	CA (100 ppm)	Inh, Abs, Ing, Con	ND	NA/NA
Chlordane (gamma)	CA (0.5 ppm)	CA (100 ppm)	Inh, Abs, Ing, Con	ND	NA/NA
Cholesterol	None	None			
Dibenzofuran	None	None			

Footnotes on Page 5.

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Table E4-1. Chemical Constituents of Potential Concern, Exposure Limits, and Properties, Riverside Disposal Area, Kingsford, Michigan.

	OSHA PEL	IDLH	Potential Exposure Route	Ionation Potential	UEL/LEL
Pesticides and Non-VOCs (continued)					
Dieldrin	CA (0.25 ppm)	CA (50 ppm)	Inh, Abs, Ing, Con	ND	NA/NA
Diethyl phthalate	5 ppm	ND	Inh, Ing, Con	ND	NA/0.7%
Endusulfan II	0.1 ppm	ND	Inh, Abs, Ing, Con	ND	NA/NA
Endrin	0.1 ppm	2 ppm	Inh, Abs, Ing, Con	ND	NA/NA
Endrin aldehyde	None	None			
Endrin ketone	None	None			
Heptachlor epoxy**	CA (0.5 ppm)	CA (35 ppm)	Inh, Abs, Ing, Con	ND	NA/NA
Methoxychlor	CA - ND OSHA = 15 ppm	CA (5000 ppm)	Inh, Ing	ND	NA/NA
Inorganics (Metals)					
Aluminum	2.0 ppm	ND	Inh, Ing, Con	Varies	NA/NA
Antimony	0.5 ppm	50 ppm	Inh, Ing, Con	NA	NA/NA
Arsenic	0.002 ppm	5 ppm	Inh, Abs, Ing, Con	NA	NA/NA
Barium	0.5 ppm	50 ppm	Inh, Ing, Con	NA	NA/NA
Berylium	CA- 0.0005 ppm	4 ppm	Inh, Con	NA	NA/NA
Cadmium	CA- 0.005 ppm (OSHA)	9 ppm	Inh, Ing	NA	NA/NA
Calcium	None	None			
Chromium	0.5 ppm	25 ppm	Inh, Ing, Con	NA	NA/NA
Cobalt	0.05 ppm	20 ppm	Inh, Ing, Con	NA	NA/NA
Copper	1.0 ppm	100 ppm	Inh, Ing, Con	NA	NA/NA
Iron	5.0 ppm	ND	Inh	NA	NA/NA
Lead	0.05 ppm	100 ppm	Inh, Ing, Con	NA	NA/NA
Magnesium	15.0 ppm	750 ppm	Inh, Con	NA	NA/NA
Manganese	1 ppm	500 ppm	Inh, Ing, Con	NA	NA/NA

Footnotes on Page 5.

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Table E4-1. Chemical Constituents of Potential Concern, Exposure Limits, and Properties, Riverside Disposal Area, Kingsford, Michigan.

	OSHA PEL	IDLH	Potential Exposure Route	Ioniation Potential	UEL/LEL
Inorganics (Metals) (continued)					
Mercury	0.5 ppm (vapor) 0.1 ppm (other)	10 ppm	Inh, Abs, Ing, Con	NA	
Molybdemum	5.0 ppm	1000 ppm	Inh, Ing, Con	NA	NA/NA
Nickel	0.015 ppm	10 ppm	Inh, Ing, Con	NA	NA/NA
Potassium	None	None			
Selenium	0.2 ppm	1.0 ppm	Inh, Ing, Con	NA	NA/NA
Silver	0.01 ppm	10 ppm	Inh, Ing, Con	NA	NA/NA
Sodium	None	None			
Thallium	0.1 ppm	15 ppm	Inh, Abs, Ing, Con	NA	
Titanium	CA - ND (15 ppm OSHA)	5000 ppm	Inh	NA	
Vanadium	OSHA = C 0.5 ppm	35 ppm	Inh, Ing, Con	NA	NA/NA
Zinc	5 ppm	500 ppm	Inh	NA	

UEL	Upper Explosive Limit.
LEL	Lower Explosive Limit.
PEL	Based on 8 Hour Time-Weighted Averaged.
ppm	Part Per Million = mg/L.
ppb	Parts Per Billion = µg/L.
PCBs	Polychlorinated biphenyls.
Abs	Skin Absorption.
Ing	Ingestion
Con	Skin and/or Eye Contact
Inh	Inhalation
NA	Not Applicable
ND	Not Determined

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Table E4-1. Chemical Constituents of Potential Concern, Exposure Limits, and Properties, Riverside Disposal Area, Kingsford, Michigan.

eV	Electron Volts

OSHA level of protection criteria is listed when NIOSH exposure limit is not specified.

¹	Level of protection criteria for benzene obtained from OSHA 29 CFR 1910.1028/Benzene/Z/Toxic and Hazardous Substances.
IDLH	Immediately Dangerous to Life or Health. In the event of respitor failure, one could escape within 30 minutes without experiencing any irreversible health effects.
CA	NIOSH has recommeded the substance be treated as a potential human carcinogen. IDLH not listed. Level of protection criteria should be the lowest detectable concentration.
*	Eye protection is also necessary.
**	Listed as Heptachlor

From:

- NIOSH Pocket Guide to Chemical Hazards.
- Groundwater Chemicals Desk Reference Montgomery and Welkom.
- Dangerous Properties of Industrial Chemicals, Sat and Lewis.

Table E6-1. Signs and Symptoms of Chemical Exposure and Heat Stress that Indicate Potential Medical Emergencies, Riverside Disposal Area, Kingsford, Michigan.

Type of Hazard	Signs and Symptoms
Chemical Hazard	Behavioral changes
	Breathing difficulties
	Changes in complexion or skin color
	Coordination difficulties
	Coughing
	Dizziness
	Diarhea
	Fatigue and/or weakness
	Irritability
	Irritation of eyes, nose, respiratory tract, skin, or throat
	Headache
	Light-headedness
	Nausea
	Sneezing
	Sweating
	Tearing
	Tightness in the chest
Heat Exhaustion	Clammy skin
	Confusion
	Dizziness
	Fainting
	Fatigue
	Heat Rash
	Light-headedness
	Nausea
	Profuse sweating
	Slurred speech
	Weak pulse
Heat Stroke (may be fatal)	Confusion
	Convulsions
	Hot skin, high temperature (yet may feel chilled)
	Incoherent speech
	Staggering gait
	Sweating stops (yet residual sweat may be present)
	Unconsciousness

Table E7-1. Action Levels, Riverside Disposal Area, Kingsford, Michigan.

Instrument	Reading	Action
PID	< 10 ppm or = 10 ppm	Level D
	>10 ppm, <50 ppm	Level C
	>50 ppm	Stop Work
MIE Miniram	<1.0 mg/m^3	Continue work
	>1.0 mg/m^3 < 2.5 mg/m^3	Level C or implement dust suppression
	>2.5 mg/m^3	Stop work
Combustible Gas Indicator	<20% or = 20% LEL	Continue Work
	>20% LEL	Stop Work. Allow to ventilate
Oygen Analyzer	<19.5% or =19.5%	Stop work, raise oxygen content with forced ventilation
	> 23% or = 23%	Stop work, allow area to ventilate

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Table E10-1. Emergency Phone Numbers and Directions to Dickinson County Memorial Hospital, Riverside Disposal Area, Kingsford, Michigan.

Site Area Code	906
Police Emergency	911
Police Non-Emergency	774-2525
Fire Emergency	911
Fire Non-Emergency	774-1265
Ambulance	911
Beacon Ambulance Service	779-5050
Rescue Squad	911
Dickinson County Sheriff	774-6262
Hospital Emergency	779-4555
Hospital Non-Emergency	774-1313
Poison Control Center	1 (800) 562-9781
Toxic Substances Center	1 (404) 452-4100
for Disease Control (CDC)	1 (202) 554-1404
CDC Hotline	1 (404) 329-2888
Contractor Project Manager	1 (763) 479-1797
Mike Stevens	
Client Contacts	
Ford Motor Company	
David Miller	1 (313) 322-3761
Kingsford Products Company	1 (708) 728-4328
Daniel Musgrove	
Contractor Corporate Health & Safety	1 (763) 479-1797
Mike Stevens	
Diggers Hotline	1 (800) 482-7171

Dikinson County Memorial Hospital - South US Highway 2, Iron Mountain, Michigan

Directions to Hospital: (Figure E10-1)

East on Breitung Avenue to Hydraulic Falls Road. North (left) on Hydraulic Falls Road to US Highway 2 (Stephenson Avenue). South (right) on US Highway 2 for approximately 1 mile to Dickinson Memorial Hospital.

Figures

Figure E2-1. Project Health and Safety Organization and Reporting, Riverside Disposal Area, Kingsford, Michigan.

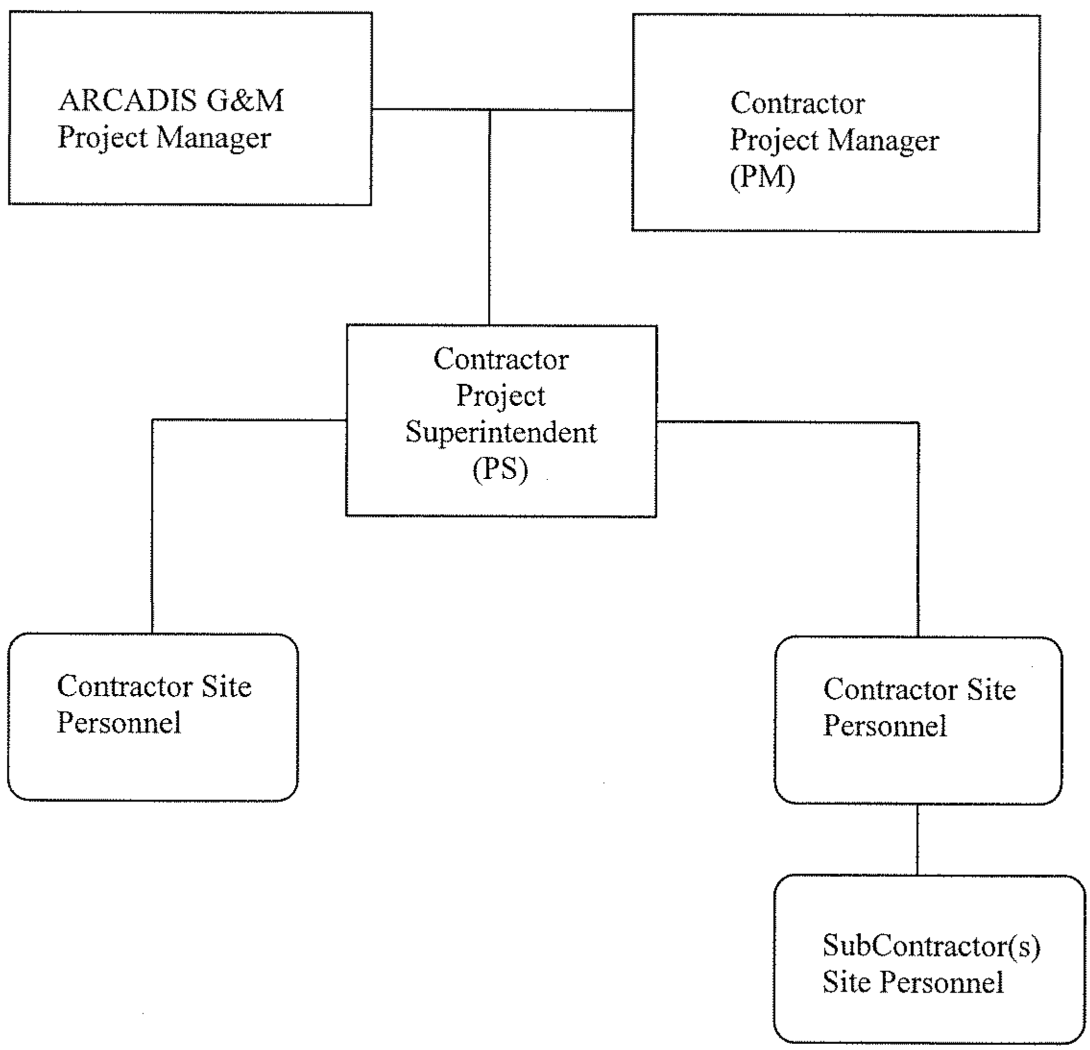

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Figure E2-2. Sample Daily Health and Safety Meeting Form, Riverside Disposal Area, Kingsford, Michigan.

SITE ____________ CITY, STATE ____________

WORK LOCATION AT SITE ____________

PREPARED BY ____________

PROJECT MANAGER ____________

TYPE OF WORK ____________

SAFETY TOPICS PRESENTED

CHEMICAL HAZARDS AND EXPOSURE ROUTES ____________

PHYSICAL HAZARDS AT SITE AND HAZARDS RELATED TO TYPE OF WORK ____________

PROTECTIVE CLOTHING/MONITORING EQUIPMENT REQUIRED ____________

____ STEEL TOE BOOTS
____ HARD HAT
____ SAFETY GLASSES/GOGGLES
____ SPECIAL EQUIPMENT
____ GLOVES (SPECIFIC TYPE)
____ TYVEK
____ RESPIRATOR (Specify Cartridge Selection)

EMERGENCY INFORMATION

AMBULANCE/PARAMEDIC PHONE (   ) HOSPITAL (   )

ROUTE TO HOSPITAL (Attach Map if Necessary) ____________

ATTENDEES

MEETING GIVEN BY ____________ DATE ____________ TIME ____________

SIGNATURES ____________

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Figure E2-3. Sample Field Team Review Sheet, Riverside Disposal Area, Kingsford, Michigan.

I have been trained in the contents of the Riverside Disposal Area Construction Health and Safety Plan and I have been advised of the locations of copies available for review. I will comply with the provisions contained therein.

NAME	DATE	NAME	DATE

Figure E2-4. Sample Visitor Log and Review of Site Health and Safety Plan, Riverside Disposal Area, Kingsford, Michigan.

The undersigned visitors of the Riverside Disposal Area site require entrance to the exclusion zone and have thoroughly read the Health and Safety Plan, understand the potential hazards and the procedures to minimize exposure to the hazards, will follow the direction of the Site Health and Safety Officer, and will abide by the Health and Safety Plan.

NAME	COMPANY	DATE	SIGNATURE

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Figure E2-5. Sample Emergency Medical Data Sheet, Riverside Disposal Area, Kingsford, Michigan.

Project: ______________________________

Name: ______________ Home Telephone ______________

Address: ______________________________

Age: ________ Height: ________ Weight: ________ Blood Type: ________

Emergency Contact: ______________________________

Drugs or other allergies: ______________________________

Particular sensitivities. ______________________________

____

Do you wear contacts? ______________________________

Provide checklist of previous illnesses. ______________________________

Have you ever had any previous exposures to hazardous chemicals? Please Detail.

____

____

What medications are you currently using? ______________________________

____

____

Do you have any medical restrictions? Please detail. ______________________________

____

____

Name, address, and phone number of personal physician. ______________________________

____

____

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Figure E2-6. Sample Emergency Report Form, Riverside Disposal Area, Kingsford, Michigan.

1. DATE ______________________________
2. TIME OF ACCIDENT ______________________________
   CLIMATIC CONDITIONS ______________________________
3. ON-SITE COORDINATOR ______________________________
4. EMPLOYEE INJURED ______________________________
5. COMPANY AFFILIATION ______________________________
6. SOCIAL SECURITY NUMBER ______________________________
7. INSURANCE COMPANY ______________________________
8. NUMBER OF WORKERS AT SITE ______________________________

NAMES OF WORKERS	COMPANY AFFILIATION
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________

9. CIRCUMSTANCES OF THE INJURY/EMERGENCY ACTION ________
   ____
   ____
10. EMERGENCY ACTIONS TAKEN ______________________________
   ____
   ____
11. WAS FIRST AID PROVIDED? ______________________________
   ____
   ____
12. WAS AN EMERGENCY PHONE CALL MADE TO THE PROJECT SAFETY OFFICER? ______________________________
   IF SO, TIME: ______________________________
13. AMBULANCE SEVICE USED ______________________________
14. HOSPITAL USED ______________________________
15. ATTENDING PHYSICIAN ______________________________
16. COMPANY REPRESENTATIVE CONTACTED ______________________________
17. CONTRACTOR REPRESENTATIVE CONTACTED ______________________________

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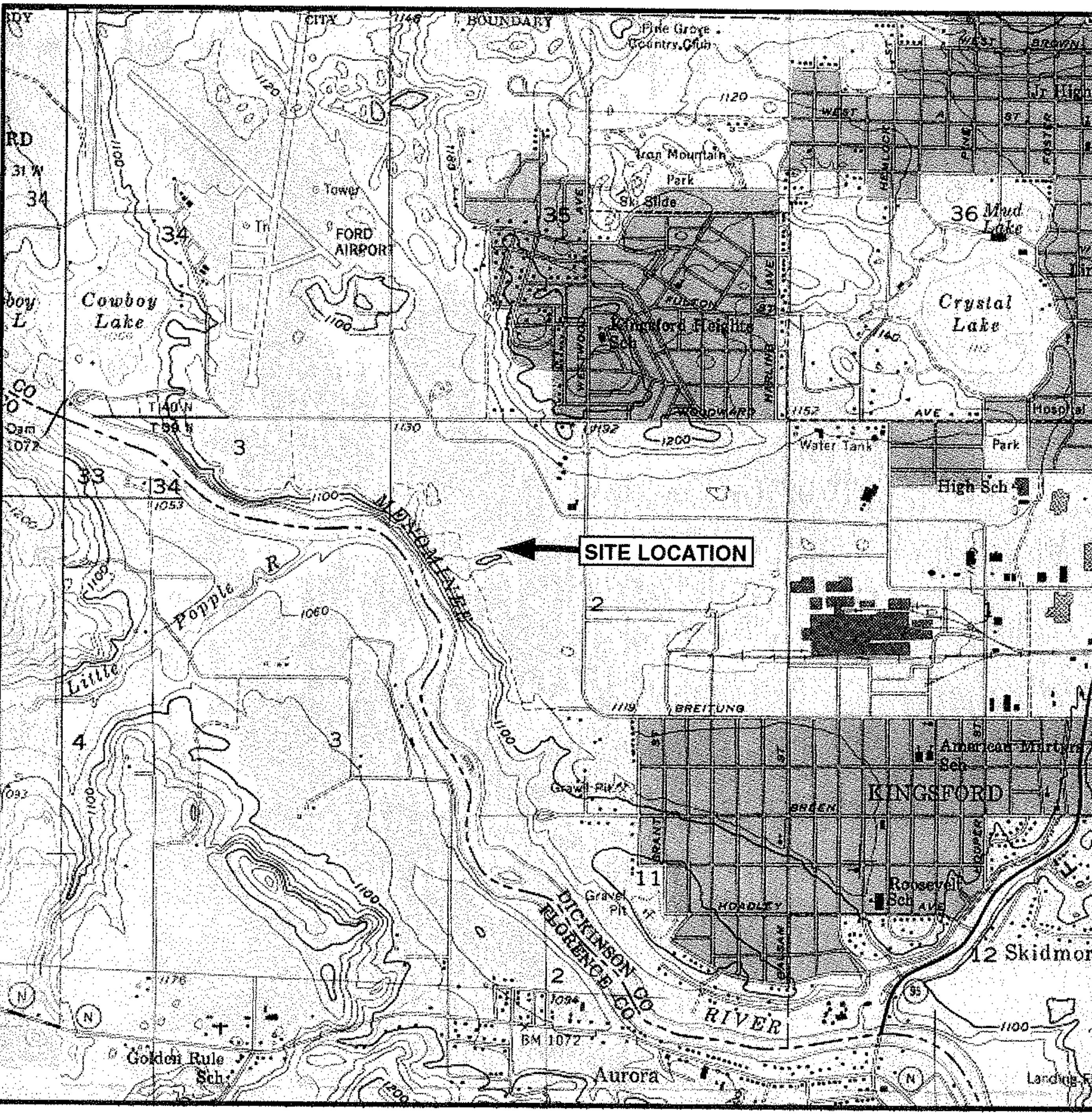
Figure E2-7. CHASP Approvals, Riverside Disposal Area, Kingsford, Michigan.

By their signature, the undersigned certify that this CHASP is approved and will be utilized for operations to be conducted under this plan.

Contractor Project Manager	Date
Contractor Project Superintendent	Date
Contractor PHSM	Date
Ford Motor Company Project Manager	Date
Kingsford Products Company Project Manager	Date
Contractor Occupational Safety and Health Representative	Date

DRAFTER: ELS | APPROVED: | CHECKED: BE | DRAWING: SITE_LOC2.AI | FILE NO.: GRAPHICS\RDA_RAP | PN: FORDWI0637\KINGSFOR | DWG DATE: 26JUN02

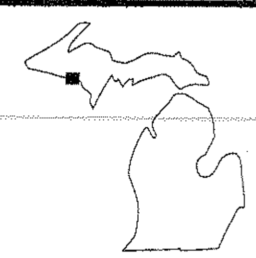


SOURCE: USGS 7.5 Minute Topographic Map, IRON MOUNTAIN, MICHIGAN Quadrangle, 1955 Photorevised 1982

N

0 1000 2000 4000

SCALE IN FEET



MICHIGAN

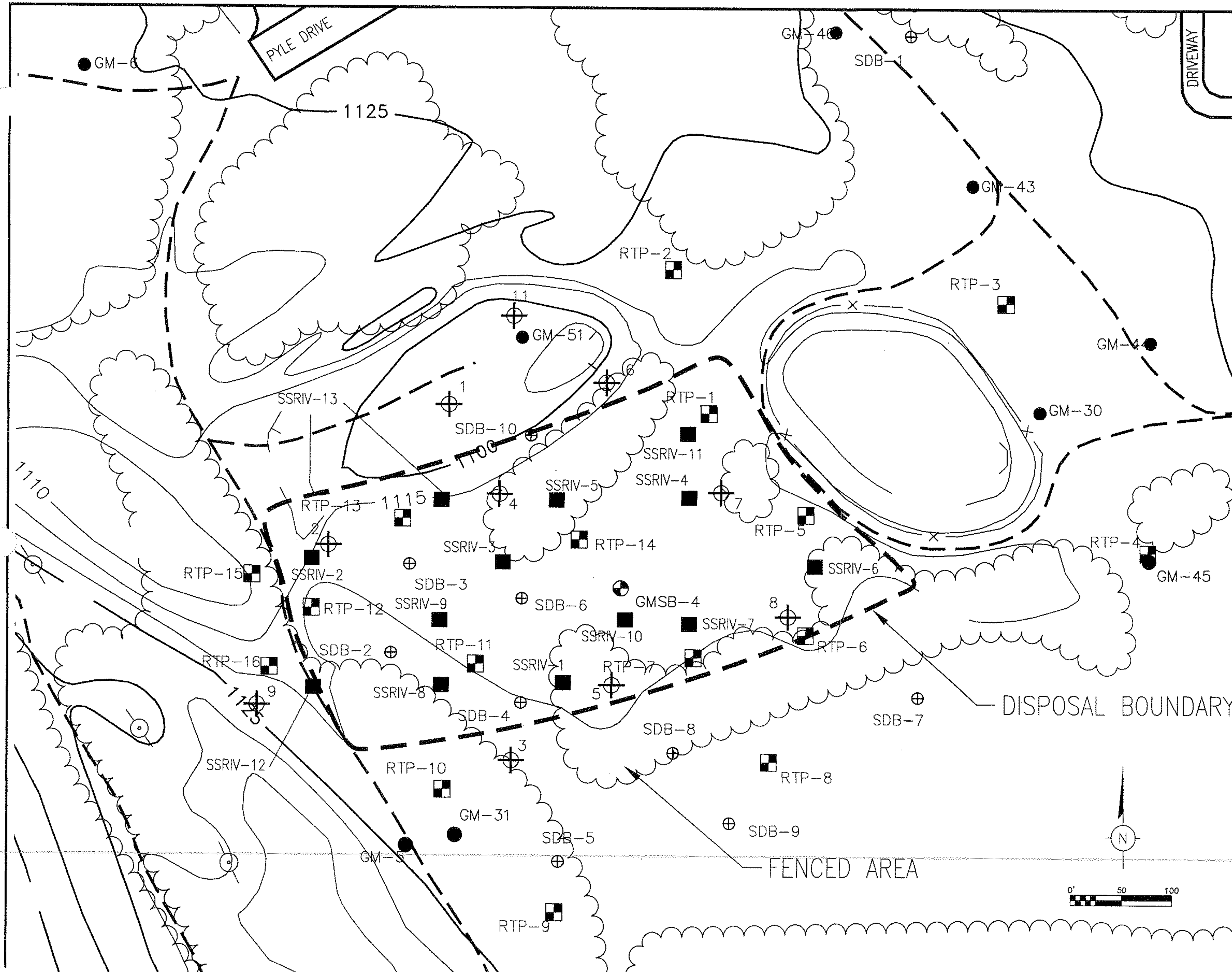
ARCADIS

SITE LOCATION MAP

HEALTH AND SAFETY PLAN
FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

FIGURE

E3-1



NOTES

1. HORIZONTAL DATUM BASED ON MICHIGAN STATE PLANE COORDINATE SYSTEM.
DATE OF PHOTOGRAPHY: 05/04/97
ABRAMS AERIAL SURVEY CORPORATION # 26994.2
2. ACCURACIES NOT GUARANTEED IN OBSCURED AREAS SHOWN BY DASHED CONTOURS AND UNDERLINED ELEVATIONS

LEGEND

- MONITOR WELL LOCATION
- SOIL BORING LOCATION
- TEST PIT LOCATTION
- GAS PROBES
- STAFF GAUGE LOCATION
- GPR SOIL BORING LOCATION
- SURFACE SOIL SAMPLE LOCATION
- 1–9, 11 (SURFACE SAMPLE), COLLECTED BY EDI FOR MDNR, 1988
- SDB–1 THRU 10, MDEQ 1996
- DISPOSAL BOUNDARY
- FENCE LINE
- UTILITY POLE
- TRAIL OR PATH
- 1125 TOPOGRAPHIC CONTOUR IN FEET MEAN SEA LEVEL
- TREE OR BUSH

RDAIRAP/FFRSDA.DWG 11/20/2001CES

NO.	DATE	REVISION DESCRIPTION	BY / CKD

ARCADIS GERAGHTY & MILLER

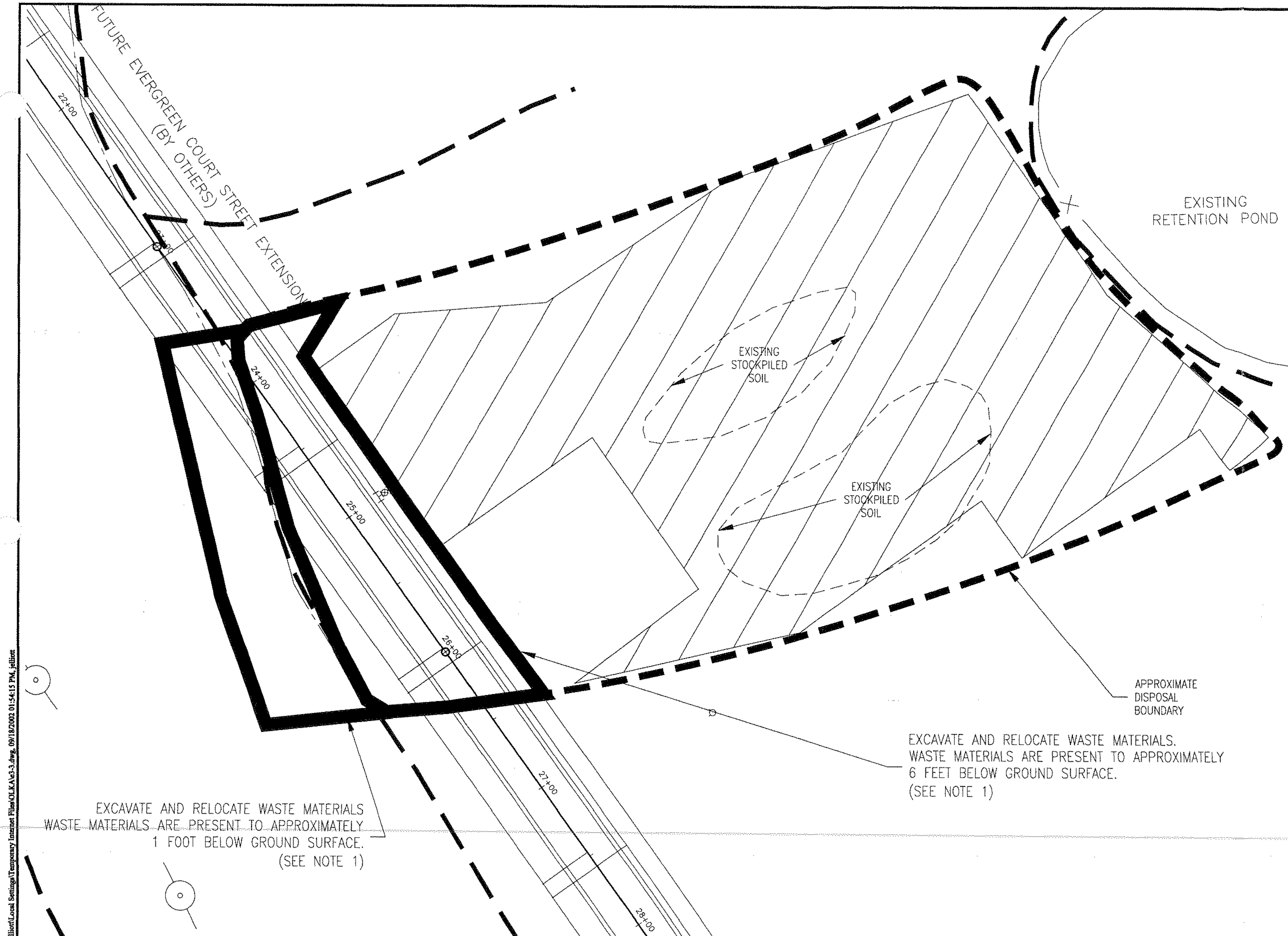
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

CONSTRUCTION HEALTH AND SAFETY PLAN

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

RIVERSIDE DISPOSAL AREA

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
CES	5/24/2001	EC	BE
		LEAD DESIGN PROF. BE	CHECKED BE
		PROJECT NUMBER WI000860.0010	FIGURE E3-2



NOTES:

1. ALL WASTE MATERIALS LOCATED BELOW AND WEST OF THE FUTURE EVERGREEN COURT STREET EXTENSION SHALL BE RELOCATED WITHIN EXISTING DISPOSAL BOUNDARIES IDENTIFIED BY HATCHING. SPREADING OF RELOCATED WASTE MATERIALS SHALL BE PERFORMED IN SUCH A MANNER AS TO FACILITATE ACHIEVING THE FINAL GRADING PLAN. MATERIALS SHALL BE PLACED IN LIFTS AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATIONS.
2. VEGETATION INCLUDING TREES, BRUSH, AND GRASSES SHALL BE CUT WITHIN 3 INCHES OF SURFACE PRIOR TO WASTE RELOCATION OR COMMON FILL REPLACEMENT. NO GRUBBING OF VEGETATION ROOTS IS REQUIRED.
3. EXISTING STOCKPILED SOILS TO BE USED FOR COMMON FILL ABOVE WASTE MATERIALS.
4. HORIZONTAL DATUM BASED ON MICHIGAN STATE PLANE COORDINATE SYSTEM.
   DATE OF PHOTOGRAPHY: 05/04/97
   ABRAMS AERIAL SURVEY CORPORATION #26994.2
5. ACCURACIES NOT GUARANTEED IN OBSCURED AREAS SHOWN BY DASHED CONTOURS AND UNDERLINED ELEVATIONS.

LEGEND

PROPOSED WASTE SPREAD AREA (WASTE FROM ROAD R.O.W.)

N

0' 30 60
SCALE: 1" = 60'

G:\CAD\RIVERSIDE-DISPOSAL-AREA\WASTE MATERIAL-DRAWINGS\E3-3

NO.	DATE	REVISION DESCRIPTION	BY/CKD

ARCADIS GERAGHTY & MILLER
3903 Northdale Boulevard, Suite 120
Tampa, Florida 33624
Tel: 813/961-1921 Fax: 813/961-2599

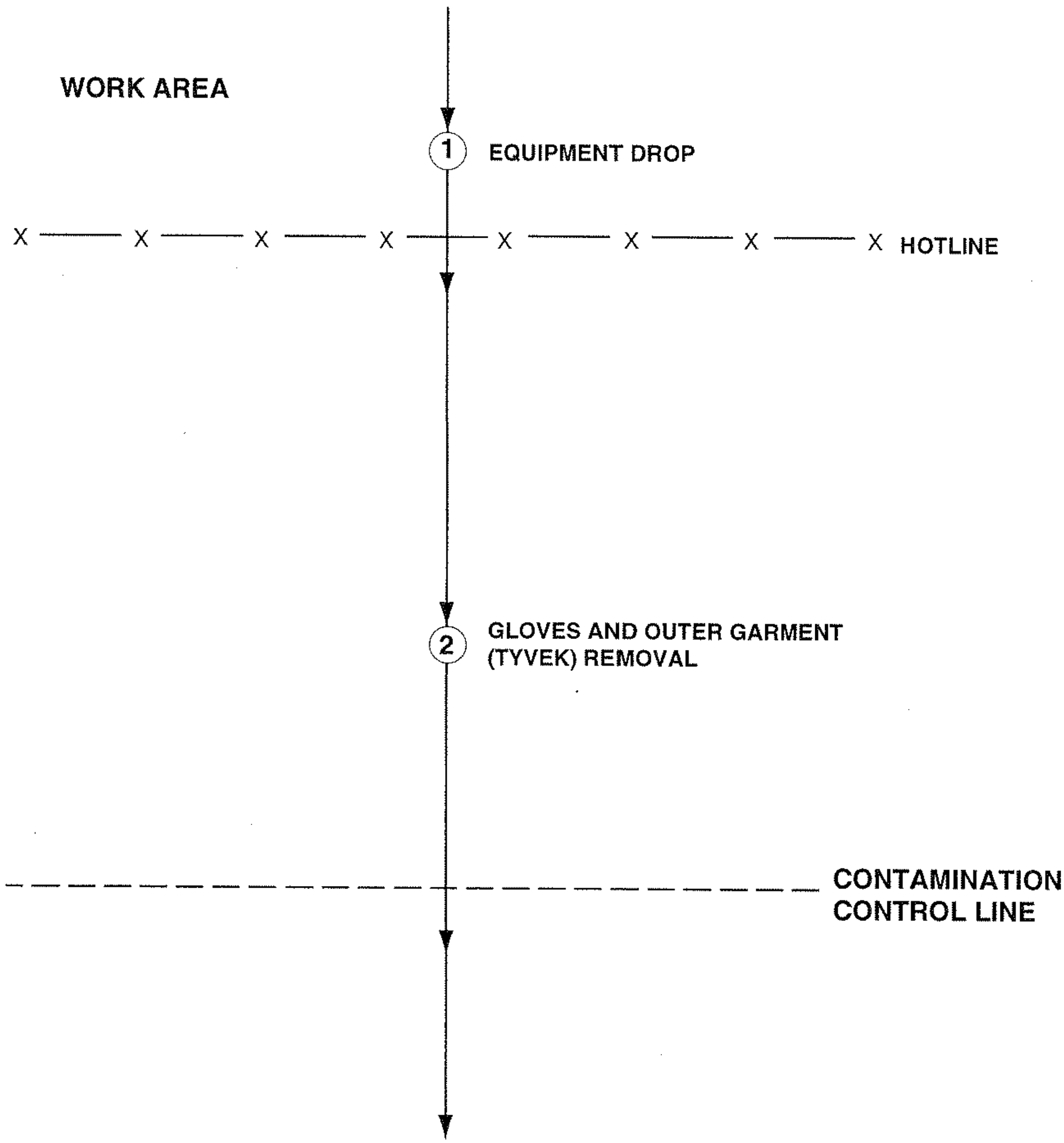
CONSTRUCTION HEALTH AND SAFETY PLAN

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

DRAWN	DATE
CES	6/29/01

WASTE EXCAVATION AND RELOCATION PLAN

PROJECT MANAGER	DEPARTMENT MANAGER
EC	BE
LEAD DESIGN PROF.	CHECKED
BE	BE
PROJECT NUMBER	DRAWING NUMBER
WI00860.001	E3-3



DWG DATE: 26JUN02 | PN: FORD\WI0637\KINGSFOR | FILE NO.: GRAPHICS\RDA_RAP | DRAWING: MOD_D2.AI | CHECKED: KML\BIK | APPROVED: | DRAFTER: ELS

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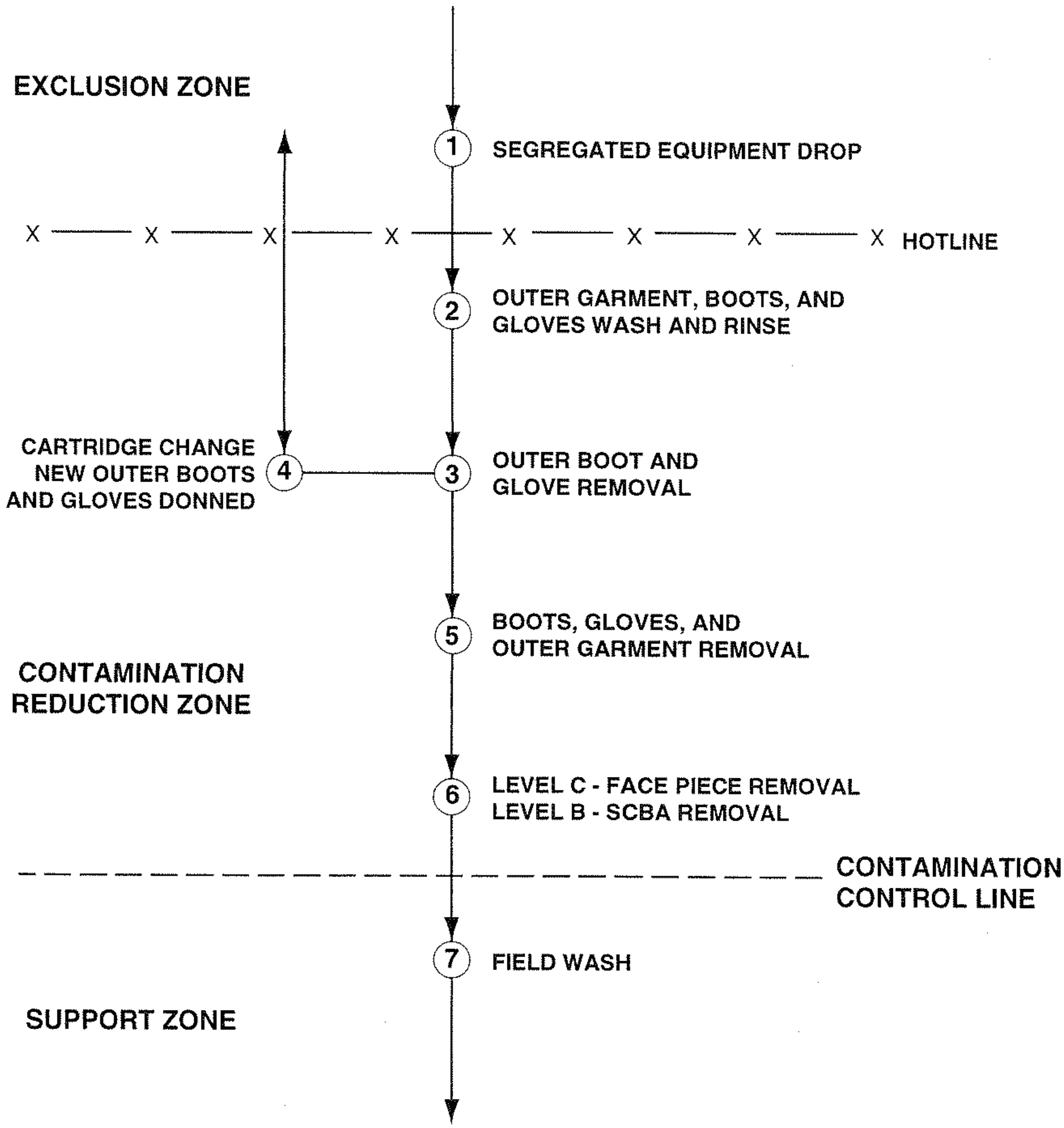
MINIMUM DECONTAMINATION LAYOUT
LEVEL D PROTECTION

HEALTH AND SAFETY PLAN
FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

FIGURE

E6-1



ARCADIS

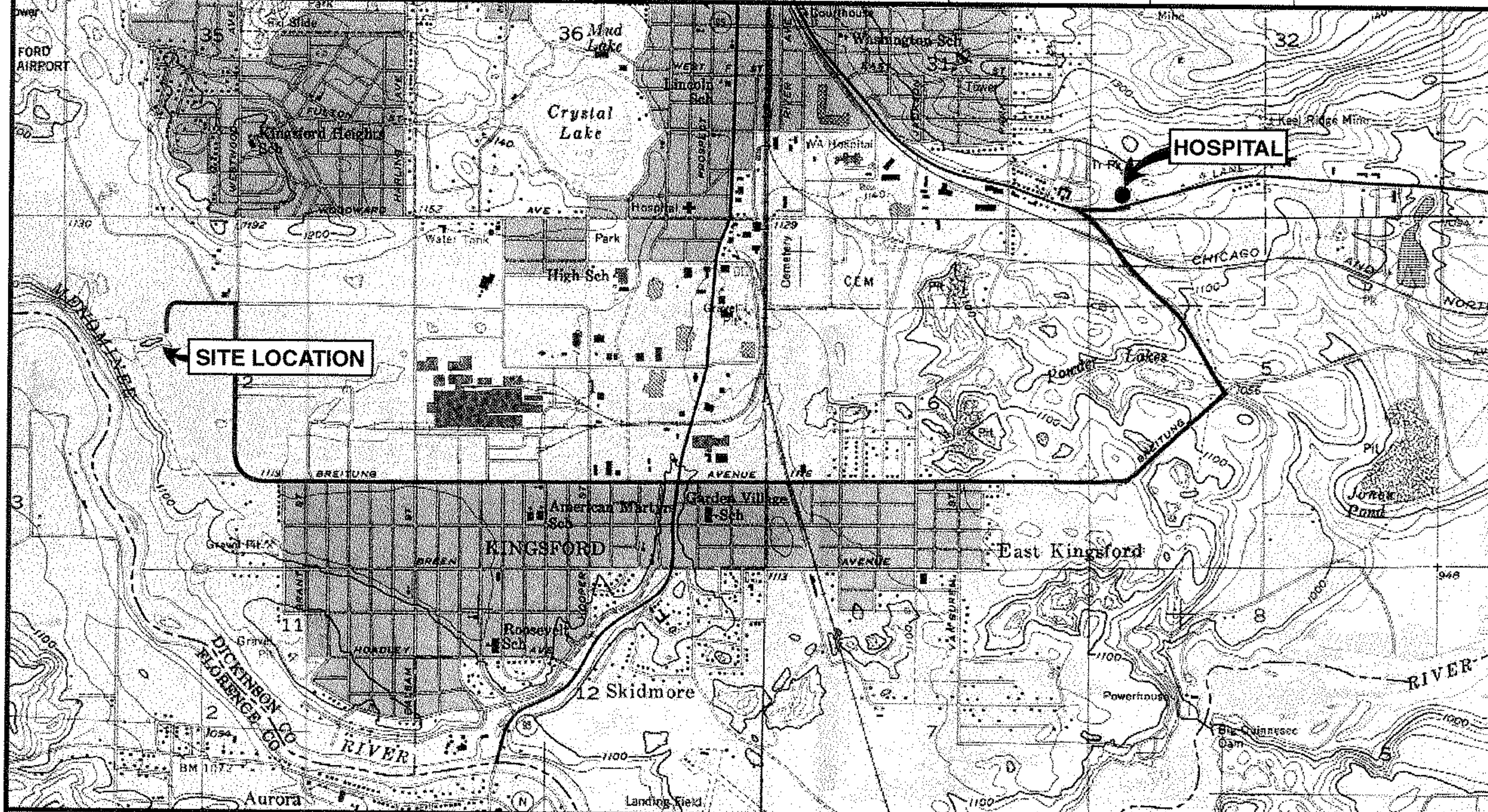
MINIMUM DECONTAMINATION LAYOUT
LEVEL C AND LEVEL B PROTECTION

HEALTH AND SAFETY PLAN
FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

FIGURE **E6-2**

DWG DATE: 26JUN02 | PN: FORD\WI0637\KINGSFOR | FILE NO.: GRAPHICS\RDA_RAP | DRAWING: LEVEL_C_B2.AI | CHECKED: KM\LB\K | APPROVED: | DRAFTER: ELS

DWG DATE: 26JUN02 | PN: FORD\WI0637\KINGSFORD | FILE NO.: GRAPHICS\RDA_RAP | DRAWING: B_13ROUTE2.AI | CHECKED: KM\LB\BE\IK | APPROVED: | DRAFTER: ELS



SOURCE: USGS 7.5 Minute Topographic Map, IRON MOUNTAIN, MICH.-WIS. Quadrangle, 1955, Photorevised 1982

Route to Hospital: Pyle Drive to Westwood Avenue. Right (south) to Breitung Avenue. East on Breitung Avenue to Hydraulic Falls Road. North on Hydraulic Falls Road to U.S. Highway 2 (Stephenson Avenue). South on U.S. Highway 2 to Dickinson County Memorial Hospital.
Hospital Address: 1721 Stephenson Avenue, Iron Mountain, Michigan.

0 2000 4000 8000
SCALE IN FEET

N

ARCADIS

ROUTE TO HOSPITAL

HEALTH AND SAFETY PLAN
FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

FIGURE
E10-1

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Appendix F

Operation and Maintenance (O&M) Plan

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Appendix F

Operation and Maintenance Plan

Interim Response Action Plan
Riverside Disposal Area
Kingsford, Michigan

PREPARED FOR

Ford Motor Company
The Kingsford Products Company

Table of Contents

Table

Figures

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Attachment

A. Example Inspection Forms, Ford/Kingsford Site, Kingsford, Michigan.

ARCADIS

Introduction

ARCADIS on the behalf of Ford Motor Company and The Kingsford Products Company, prepared this document, which provides details on the operations and maintenance activities for the Riverside Disposal Area (RDA) cover system that is located adjacent to Evergreen Court in Kingsford, Michigan (Figures F-1 and F-2). Operation and Maintenance (O&M) activities are essential for preservation of the cover system remedy.

Objectives

The objectives of this O&M Plan are to:

- Describe procedures for maintenance and monitoring of the constructed soil and vegetative cover at the RDA.
- Identify contingency plans regarding failure of the cover system.

This plan is prepared to guide field personnel on maintenance procedures for the soil cover to maximize effectiveness of the remedy. Implementation of the plan will assist in achieving the following objectives:

- Promote drainage and minimize erosion or abrasion of the cover
- Assure protection of human health and the environment

Elements of this plan address the following:

- Site Background
- Performance and Compliance Monitoring Program
- Contingency Plan
- Reporting Requirements

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Site Background

The RDA is located approximately 600 feet south of the western end of Pyle Drive and approximately 1,400 feet west of Westwood Avenue in the city of Kingsford, Dickinson County, Michigan (Figure F-1). The RDA is contained within property owned by the city of Kingsford. Although the RDA is zoned for residential use, it was an open field prior to construction of the cover system. The soil cover system is being constructed to accomplish the Remedial Objective of protection of human health and the environment from surface contact. The RDA cover system is comprised of fill, topsoil and covered by a vegetative layer. The cover thickness of the proposed cover system is 18 inches of fill and 12 inches of topsoil, while the area outside the proposed cover system is covered by 24 inches of fill and 6-inches of topsoil. The O&M activities focus on maintaining the constructed soil cover in good condition.

Performance and Compliance Monitoring Plan

Routine care of the surface cover provides a mechanism to inspect and repair minor surface disruptions as necessary. Maintenance of the cover system integrity as a whole, the barrier between waste material and the surface, is the measure of satisfactory performance. Prompt repair of minor surface issues adequately provides remedial protection while allowing for normal maintenance. The details of inspection and repair are described in the subsequent sections.

Maintenance of the Surface Cover

On-site care for the surface cover will include:

- Visual inspection of the site to identify disruptions of the surface cover such as cracking or desiccation.
- Monitoring for settlement, maintenance of the final cover depending on the results of inspection.
- Maintaining vegetation of the surface cover and adjacent areas.
- Inspection and erosion control prevention.

Table F-1 summarizes the specific O&M activities and frequencies for the RDA cover system.

Inspection

A designated Ford/Kingsford representative, who will perform and document the activities identified in this O&M Plan, will conduct on-site inspection activities. A site log book will be maintained containing all site visits, corrective action forms submitted, and any corrective actions taken. The appearance of the surface cover will be recorded on a standard inspection form. For each inspection, forms will be used to record findings, unusual conditions, and corrective action taken. Examples of the inspection forms are included in Attachment A. These example inspection forms may change in format throughout the O&M period, however the substance will remain the same. Conditions requiring corrective action will be rectified and the repair will be documented on a Corrective Action Form. Table F-1 summarizes the specific O&M inspection activities and frequencies.

Erosion Prevention

The cover system surface layer is vegetated with either grass or native plants. The edge of the cover is adjacent to Evergreen Court. Erosion control will entail the confirmed maintenance of these areas as required to prevent erosion.

The surface cover outfall, the adjacent stormwater pond and stormwater ditches must be clear of any debris or overgrown vegetation that may inhibit or block the flow of runoff, or of excessive siltation. These structures will be inspected quarterly the first year and semi-annually thereafter. In addition to the standard frequency, inspections may be conducted after extreme weather events (e.g., tornadoes, 10-year/24-hour precipitation events) as determined by Ford/Kingsford.

Inspections of the surface cover whether native vegetation or grass surface and its drainage features will include, but not be limited to the following: obstructions to flow; erosion; excessive siltation or debris; inadequate vegetation; and loose or missing riprap. Should any vegetated area show significant washout or gullying (greater than 4 inches), the eroded area will be filled when the weather conditions permit or within 30 days, whichever occurs first. If results of the inspection indicate that any drainage patterns have changed resulting in ponding or excessive run-off, the affected area will be appropriately repaired to re-establish correct flow direction. Accumulated sediment in the drainage system will be removed. If greater than 20 percent of the planned vegetated surface is devoid of vegetation, the area will be re-vegetated as weather conditions permit. If recreational surfaces show visible signs of breakdown, they will be repaired consistent with their design. Steps will be taken to verify that drainage pathways are maintained throughout the O&M period. Vegetation shall be mowed at

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least annually at the cover during the growing season. Appropriate fertilizer application suitable for the finished surface will be applied annually to maintain healthy vegetation and the intended surface barrier. Baiting for rodents and treatment for burrowing animals will also be administered if the need is observed during inspection. In the event that any of these occurrences are observed, the following will be implemented to repair the area in question. These actions may include:

- Regrading drainage ditches to clear obstructions and siltation.
- Filling to re-achieve design grades in eroded areas.
- Re-establishment of vegetation.
- Replacement of missing aggregate (where appropriate).
- Filling to eliminate eroded, cracked, or desiccated areas and to re-achieve the design grades.
- Filling or regrading problematic areas of settling to re-achieve elevations or promote surface drainage (as appropriate).

If erosion channels persist to appear in the same place several times, erosion mats and drainage swales will be utilized to prevent future events.

Cover Effectiveness

As stated previously, the purpose of the remedy is to prevent contact with waste material. The cover system provides this barrier and is therefore effective when appropriately maintained.

Maintenance Schedule

Inspections of the surface cover will be performed quarterly for the first year. After the first year, the inspection frequency may be reduced to semi-annually throughout the life of the project. Repair will be performed as necessary based on the observations reported during routine inspections of the surface cover. Annual inspection will take place for site benchmarks as indicated on Table F-1.

Contingency Plan

In the unlikely event that it is determined that there has been a release of waste to the environment and the surface cover has failed, specific actions are necessary. This section provides direction regarding this potential and is organized into two sections, Contingency Plan Response and Contingency Plan Procedures.

Contingency Plan – Response

The potential incident that might require a contingency plan response includes the release of waste that exceeds Direct Contact Criteria. The site cover is complete at grade and there are no slopes that might become unstable. In the event that greater than 2 and 1/2 feet of soil are removed, exposed soils may pose a threat to public health and safety. A contingency plan to prevent direct contact with the exposed soils would be set into place. The plan would include immediately closing off the area to the public and preventing erosion and off-site migration of exposed material.

Contingency Plan – Procedures

Should there be physical evidence that cover performance has failed, a determination will be made of the potential threat to public health and the environment. Any and all actions needed to secure, contain, and cleanup the release will be taken. In any instance of a reportable release/failure, Ford/Kingsford will notify the MDEQ. The time, date, and details of any incident that requires response implementation will be noted in the site log book. Within 15 days, a written report on the incident will be submitted to MDEQ. The report will include:

- Name, address and telephone of owner.
- Name and address of the site.
- Date, time, and type of incident.
- Name and quantity of material(s) involved.
- An assessment of actual or potential hazards to human health or the environment, where this is applicable.
- Estimated quantity and disposition of recovered material that resulted from the incident.

Identification of Materials and Assessment of Possible Hazards

The materials that could potentially be released are impacted soils and waste material. The possible hazards associated with the soils are minimal but include risks from ingestion and dermal contact.

Assessment and Control Procedures

In the unusual event of a release, the appropriate containment procedures and repairs would be implemented immediately. If appropriate, the following steps will be taken:

- Sample, and analyze soil, surface water, or sediments potentially impacted by the release.

- Evaluate the data to determine whether waste constituents have entered the environment at levels above risk-based standards.

Ford/Kingsford or their designee will take whatever measures are necessary to mitigate the release.

Reporting Requirements

Records Retainage

Ford/Kingsford or their designee shall manage records. Records shall be maintained for a minimum of 3 years.

Operation and Maintenance Records

Operation and maintenance activities for the surface cover will be recorded in the appropriate logbook or computer system. Notations should be made when the system is inspected and maintained, engineering measurements are taken, and when corrective measures are implemented. As indicated, inspection forms are included in Attachment A of this report. Corrective action measures and re-inspection forms should be completed during the period that the corrective measures take place.

Reporting

Annual O&M reports will be prepared that will include at a minimum a discussion of the surface cover monitoring activities performed during the reporting period, incidences of noncompliance and corrective actions taken, maintenance performed that is other than preventative maintenance, key personnel changes, and coordination activities. Any proposed modifications to the configuration or operation of the surface cover will be included.

Future Construction Activities

Any utility work or road construction through the RDA, or other subsurface activities that breaches the cover system will follow the Health and Safety Plan and the Waste Management Plan developed for the area. All workers involved with future utility work or road construction in the area will follow the Health and Safety Plan if there is the possibility of dermal contact with impacted soils/waste materials beneath the cover system. Any soils/waste materials that are excavated during future construction activities will need to be managed in accordance with the Waste Management Plan. After any future construction activities are complete, any portion or the cover system that was disturbed will need to be restored to their design thickness and seeded.

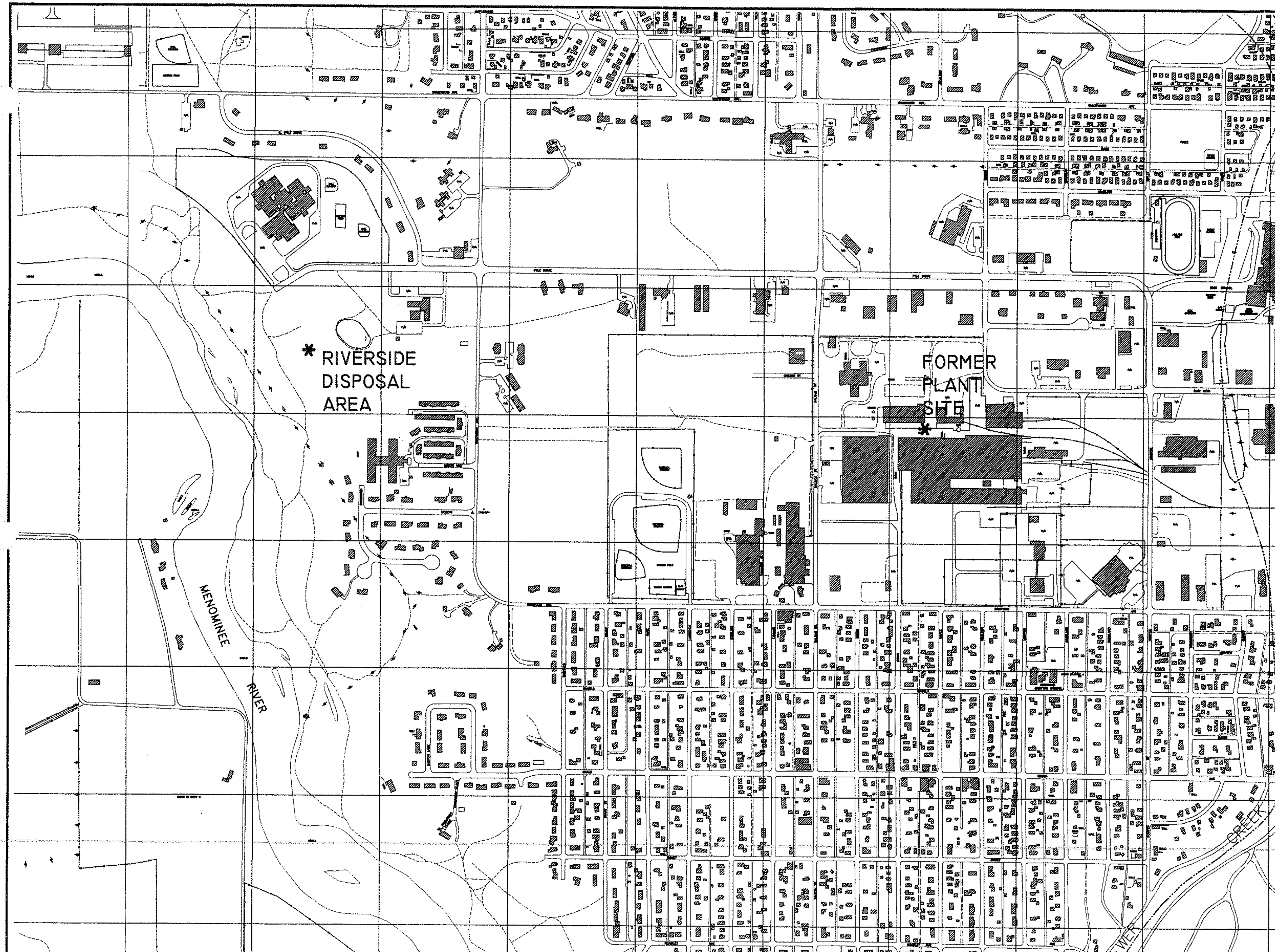
Table F-1. Facility Inspection Activities, Riverside Disposal Area, Ford/Kingsford Site, Kingsford, Michigan.

Item	Types of Problems	Frequency of Inspection	Circumstance or Trigger Level (if applicable)	Corrective Action
Benchmark	Integrity of benchmark	Annually	Evidence of damage or movement	Repair or replace benchmark
Cover Soil/ Grade	Slumping, cracking, dessication, damage, or buckling of surface	Quarterly for the first year, then semi-annually	Visual evidence of discontinuity of surface - by way of depressions or cracks	Evaluate and prepare corrective action plan and submit to MDEQ
	Rodents and burrowing animals	Quarterly for the first year, then semi-annually	Evidence of rodents or burrowing animals	Remove animals by acceptable means
Cover Perimeter Outlet/Drainage System	Excessive growth at cover perimeter (mowing required)	Quarterly for the first year, then semi-annually	Evidence of excessive growth which hinders visual inspection of cover	Mow vegetation
	Tree and scrub oak seedlings or other deep-rooted vegetation	Quarterly for the first year, then semi-annually	Evidence of growth	Remove unwanted vegetation

Table F-1. Facility Inspection Activities, Riverside Disposal Area, Ford/Kingsford Site, Kingsford, Michigan.

Item	Types of Problems	Frequency of Inspection	Circumstance or Trigger Level (if applicable)	Corrective Action
Cover Perimeter Outlet/Drainage System (continued)	Erosion, obstructions to flow, deterioration, excessive siltation, inadequate protective vegetation, loose or missing riprap	Quarterly for the first year, then semi-annually and after storm events (e.g., tornadoes, 10-year/24-hour preciptitation events)	Any obstructions to flow; silt buildup in excess of 50% of design freeboard; greater than 20% of area devoid of vegetation	Remove obstruction and/or silt. Revegetate as required
	Standing water on soil cover	Quarterly for the first year, then semi-annually	Visual evidence of water or softening asphalt	Evaluate and prepare corrective action plan and submit to MDEQ

Table



NOTES

1. HORIZONTAL DATUM BASED ON MICHIGAN STATE PLANE COORDINATE SYSTEM.
DATE OF PHOTOGRAPHY: 05/04/97
ABRAMS AERIAL SURVEY CORPORATION # 26994.2

2. ACCURACIES NOT GUARANTEED IN OBSCURED AREAS SHOWN BY DASHED CONTOURS AND UNDERLINED ELEVATIONS

G:/CAD/FORD/RIVERSIDE DISPOSAL AREA/WASTE MATERIAL – DRAWINGS/AS-BUILTS/FIG1ASBLT

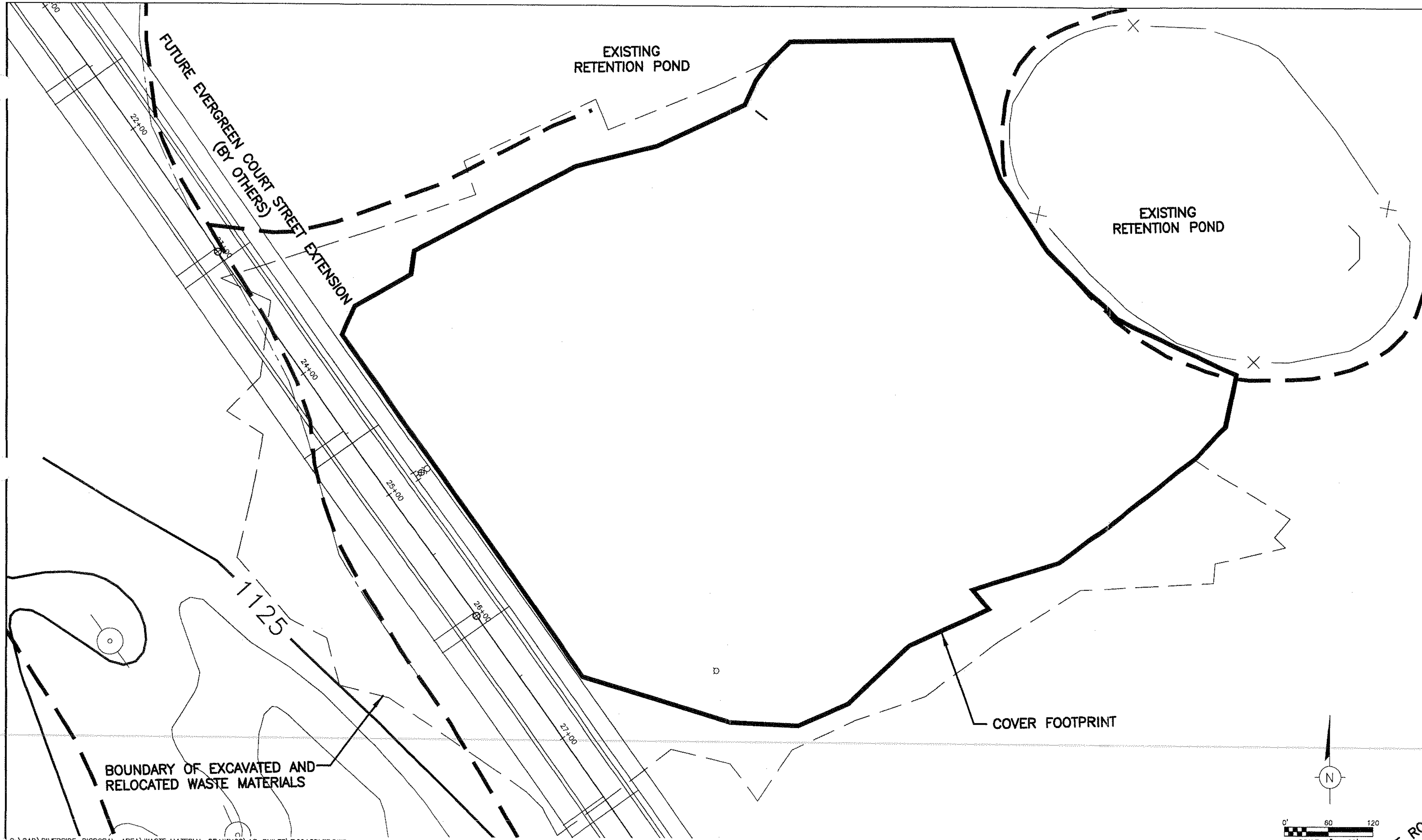
NO.	DATE	REVISION DESCRIPTION	BY / CKD

ARCADIS
3903 Northdale Boulevard, Suite 120
Tampa, Florida 33624
Tel: 813/961-1921 Fax: 813/961-2599

RIVERSIDE DISPOSAL AREA
WASTE MANAGEMENT PLAN

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

DRAWN JMG	DATE 08/05/02	PROJECT MANAGER EC	DEPARTMENT MANAGER BE
		LEAD DESIGN PROF. BE	CHECKED BE
SITE LOCATION MAP		PROJECT NUMBER WI00950.0010	FIGURE F-1



G:\CAD\RIVERSIDE-DISPOSAL-AREA\WASTE MATERIAL-DRAWINGS\AS-BUILTS\FIG2ASBLT3.DWG

ALL PROFESSIONAL ENGINEERING SERVICES DEPICTED ON THIS DRAWING HAVE BEEN PERFORMED FOR ARCADIS GERAGHTY & MILLER, INC. BY GMCE, INC; A FLORIDA CORPORATION QUALIFIED TO PERFORM SUCH SERVICES IN THE STATE OF MICHIGAN.

NO.	DATE	REVISION DESCRIPTION	BY/CKD

ARCADIS
3903 Northdale Boulevard, Suite 120
Tampa, Florida 33624
Tel: 813/961-1921 Fax: 813/961-2599

RIVERSIDE DISPOSAL AREA
WASTE MANAGEMENT PLAN

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

DRAWN	DATE
JMG	06/10/02

RDA SITE PLAN AND
COVER SYSTEM FOOTPRINT

PROJECT MANAGER	DEPARTMENT MANAGER
EC	BE
LEAD DESIGN PROF.	CHECKED
BE	BE
PROJECT NUMBER	FIGURE
WI00860.001	F-2

Attachment A

Example Inspection Forms

Example Inspection Form
Final Cover
Riverside Disposal Area
Ford/Kingsford Site
(Page 1 of 2)

Functional Group Assigned This Inspection Duty: ______________________
Inspector's Name: ____
Date of Inspection: ____
Time of Inspection: ____

Note: Perform this inspection on a quarterly basis for and after extreme weather events (e.g., tornadoes, 10-year/24-hour precipitation events) to inspect erosion.

Inspection Checklist

1. Cover: Walk the entire cover and perimeter.

- Are there any cracks or breaks in the soil cover?____________________
- Are there any signs of uneven surfaces (depressions or bumps) or breakdown?______________
- Are there any signs of excessive erosion of cover or vegetated perimeter? ________________________
- Are there any signs of burrowing animals?_________________________

2. Settlement or subsidence.

- Are there any physical signs of settlement or subsidence? ____________

Date of Inspection: ____________________

Final Cover
Riverside Disposal Area
Ford/Kingsford Site
(Page 2 of 2)

3. Stormwater Drainage Outlet

   Walk the cover perimeter outlet.

   - Is there evidence of erosion? ____________________
   - Does silt accumulation prevent run-off? ____________________
   - Are there signs of ponding? ____________________

4. Any deficiencies? ____________________

5. Comments: ____________________

6. Corrective Action Required (Complete Corrective Action Form): ____________________

7. Inspector's Signature: ____________________

Send completed form to Ford/KPC for required records maintenance.

Date of Inspection: ______________________

Example Corrective Action Form
Riverside Disposal Area
Ford/Kingsford Site

Report Number: _________________________
Date of Initial Inspection: ________________
Name of Inspector: _____________________

Note: If Corrective Action cannot be completed within 30 days of the Initial Inspection Date, a Corrective Action Plan must be prepared and maintained in the operating record.

Corrective Action Work Order

Type of problem: ____

____

Required upgrade: ____

____

Corrective action assigned to: ___________________________________ ______________
Name Date

Corrective Action Completion Report

Received on: ____________________________ By: _______________________________
Completed on: ____
Comments: ____

____

____

By: ____ ______________
Name Date

Reinspection Report

Observations: ____

____

Comments: ____

____

____

Inspector: ____
Signature Date

Send completed form to Ford/KPC for required records maintenance.

ARCADIS

Appendix G

City of Kingsford Concurrence

THE PROGRESSIVE CITY

CITY OF KINGSFORD

Phone: (906) 774-3526

P.O Box 3535
305 S. Carpenter Ave.
Kingsford, MI 49802

Fax: (906) 774-7093

September 3, 2002

Michigan Department of Environmental Quality
Environmental Response Division
P.O. Box 30473
Lansing, MI 48909-7973

To the Environmental Response Division:

The City of Kingsford, as the owner of the Riverside Disposal Area ("RDA Property"), submits this letter in concurrence with the actions proposed in the interim Response Action Plan provided by ARCADIS G&M on behalf of Ford Motor Company and The Kingsford Products Company.

If you have any questions about the City's position in this matter, please contact the City of Kingsford, at (906) 774-3526, at your earliest convenience.

Sincerely,

Anthony D. Edlebeck
Acting City Manager

James Myers
Mayor

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Appendix H

Restrictive Covenant

DECLARATION OF RESTRICTIVE COVENANT

This Restrictive Covenant has been recorded with the Dickinson County Register of Deeds for the purpose of protecting the public health, safety and welfare, and the environment.

The City of Kingsford (the "City"), located in the County of Dickinson and the State of Michigan, has received notice of approval from the Michigan Department of Environmental Quality ("MDEQ") for an Interim Response Action Plan ("IRAP") dated ______________________________, that includes land use-based cleanup criteria as defined and set forth in Section 20120a(1)(h) of Part 201 of the Natural Resources and Environmental Protection Act ("NREPA"), 1994 PA 451, as amended, MCL 324.20101 *et seq.*, for the environmental remediation associated with property located in the City of Kingsford, County of Dickinson, State of Michigan, also referred to as the Riverside Disposal Area (the "Property"). More specifically, the Property is located in the northwest 1/4 of Section 2, Township 39N, Range 31W, in southwestern Dickinson County, in the south-central part of Michigan's Upper Peninsula. Please see Exhibit A for a legal description of the Property. The property tax ID number is 38-6004702. Please see Exhibit B for a survey of the Property.

A portion of the Property has a Cover System constructed upon it. The purpose of the cover system is to prevent direct contact exposures with underlying waste materials. Please see Figure 1, which illustrates the Property, including the Cover System. The Cover System may be enhanced and/or modified from time to time, and a revised Figure 1 submitted to the MDEQ by the Owner of the property. Upon approval from MDEQ, Figure 1 will be recorded with the Register of Deeds to reflect such enhancements and/or modifications. The submission of a revised Figure 1 shall not require approval or an amendment to this Restrictive Covenant.

The City is the current owner of the Property. As used herein, the term "Owner" shall mean at any given time the then current title holder of the Property or any parcels of the Property.

NOW THEREFORE, the City hereby imposes restrictions on the Property and covenants and agrees that:

1. From and after the date hereof, the Property shall be used for recreational purposes only as set forth in the IRAP.

2. The Owner shall prohibit the use of any groundwater located beneath the Property.

3. The Owner shall prohibit the removal, disturbance or manipulation of the Cover System, all or in part, unless strictly performed in conformance with the Property's Operation and Maintenance Plan (attached as Exhibit C) or unless otherwise approved by the MDEQ.

4. The Owner shall prohibit excavation and digging activities on the Property, unless strictly performed in conformance with the Property's Waste Management Plan (attached as Exhibit D).

5. The Owner shall maintain permanent concrete markers that describe the restricted areas of the RDA and the nature of the restrictions, at the locations shown in Exhibit E.

6. The Owner shall ensure that surface and subsurface soils found on the Property are managed in accordance with the requirements of Section 20120c of NREPA and other applicable state and federal laws.

7. The Owner shall restrict activities on the Property that may interfere with the response action, operation and maintenance activities, monitoring activities, or other measures necessary to assure the effectiveness and integrity of the response action.

8. The Owner shall provide notice to the MDEQ of the Owner's intent to convey any interest in the Property fourteen (14) days prior to consummating the conveyance. A conveyance of title, an easement, or other interest in the Property shall not be consummated by the Owner without adequate and complete provision for compliance with the terms and conditions of this Covenant.

9. The Owner shall grant to the MDEQ, and its designated representatives, the right to enter the Property at reasonable times for the purpose of determining and monitoring compliance with the IRAP, including the right to take samples, inspect the operation of the response action measures, and inspect records.

The state may enforce the restrictions set forth in this Restrictive Covenant by legal action in a court of appropriate jurisdiction.

This Restrictive Covenant shall run with the land, and shall be binding upon the future owners, successors, lessees or assigns and their authorized agents, employees, or persons acting under their direction and control, and shall continue until the MDEQ or its successor approves modifications or rescission of this Restrictive Covenant. A copy of this Restrictive Covenant shall be provided to all future owners, heirs, successors, lessees, assigns and transferees by the person transferring the interest.

If any provision of this Restrictive Covenant is held to be invalid by any court of competent jurisdiction, the invalidity of such provision shall not affect the validity of any other provisions hereof. All such other provisions shall continue unimpaired in full force and effect.

The undersigned person executing this Restrictive Covenant has the express written permission of the Owner and represents and certifies that he or she is duly authorized and has been empowered to execute and deliver this Restrictive Covenant.

IN WITNESS WHEREOF, the said Owner of the above-described Property has caused this Restrictive Covenant to be executed on this ___ day of __________________, 2002.

Signed in the presence of:	The City of Kingsford, a Michigan municipal corporation
________________________________ Name:___________________________	By:_____________________________ Name:___________________________
________________________________ Name:___________________________	Its:______________________________

ACKNOWLEDGMENT

STATE OF ________________)
) SS.
COUNTY OF ______________)

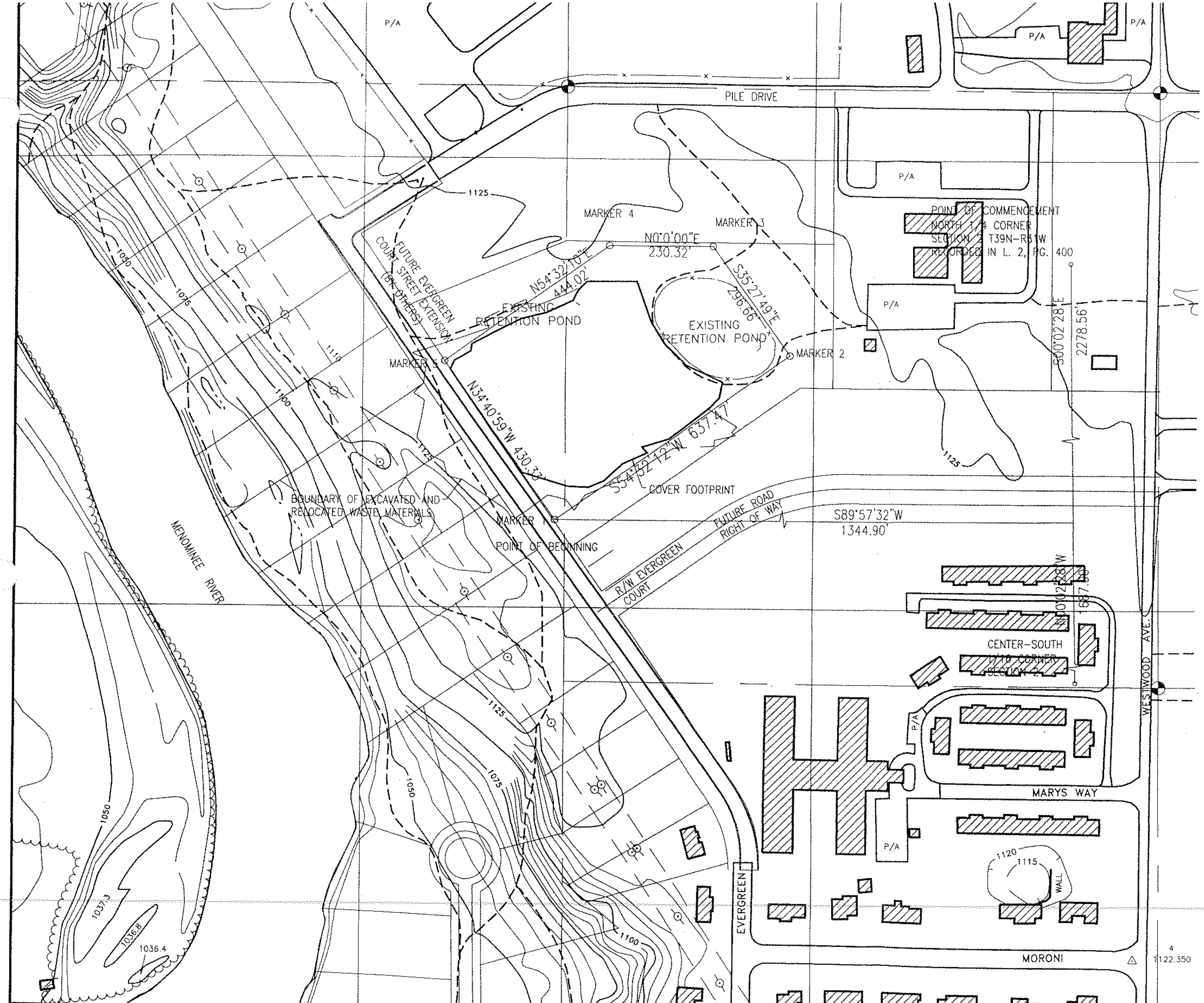
The foregoing instrument was acknowledged before me this ___ day of __________, 2002, by ________________________, the ___________________ of the City of Kingsford, Michigan, on its behalf.

____
Notary Public, ________________________________
County of ____________________________________
State of _____________________________________
My commission expires: _________________________

Prepared by and when recorded return to:
Suzanne T. Croissant
Dickinson Wright PLLC
38525 Woodward Avenue, Suite 2000
Bloomfield Hills, Michigan 48304

<u>EXHIBIT A</u>

LEGAL DESCRIPTION OF THE PROPERTY



A PARCEL OF LAND LOCATED IN THE SOUTH HALF OF THE NORTHWEST QUARTER OF SECTION 2 TOWNSHIP 39 NORTH, RANGE 31 WEST, CITY OF KINGSFORD, COUNTY OF DICKINSON, STATE OF MICHIGAN DESCRIBED AS:

COMMENCING AT THE NORTH 1/4 CORNER OF SECTION 2; THENCE S00°02'28"E, 2278.56' ALONG THE NORTH-SOUTH 1/4 LINE OF SECTION 2; THENCE S89°57'32"W, 1344.90' TO A POINT 0.50' NORTHEAST OF THE NORTHEAST RIGHT-OF-WAY LINE OF EVERGREEN COURT BEING THE POINT OF BEGINNING; THENCE N34°40'59"W, 430.33' PARALLEL TO THE NORTHEAST RIGHT-OF-WAY LINE; THENCE N54°32'10"E, 444.02'; THENCE N90°00'00"E, 230.32'; THENCE S35°27'49"E, 296.66'; THENCE S54°32'12"W, 637.47' TO THE POINT OF BEGINNING CONTAINING 5.9803 ACRES AND SUBJECT TO RESTRICTIONS, RESERVATIONS, RIGHTS-OF-WAY AND EASEMENTS OF RECORD.

ALL PROFESSIONAL ENGINEERING SERVICES DEPICTED ON THIS DRAWING HAVE BEEN PERFORMED FOR ARCADIS GERAGHTY & MILLER, INC. BY GMCE, INC; A FLORIDA CORPORATION QUALIFIED TO PERFORM SUCH SERVICES IN THE STATE OF MICHIGAN.

DRAWING CONFIDENTIAL: THIS DRAWING AND ALL INFORMATION CONTAINED THEREON IS AND SHALL REMAIN THE PROPERTY OF ARCADIS GERAGHTY & MILLER, INC. AS AN INSTRUMENT OF PROFESSIONAL SERVICE. THIS INFORMATION SHALL NOT BE USED IN WHOLE OR IN PART WITHOUT THE FULL KNOWLEDGE AND PRIOR WRITTEN CONSENT OF ARCADIS GERAGHTY & MILLER, INC.

G:\CAD\RIVERSIDE-DISPOSAL-AREA\WASTE MATERIAL-DRAWINGS\legal.DWG

NO.	DATE	REVISION DESCRIPTION	BY / CKD

ARCADIS GERAGHTY & MILLER
3903 Northdale Boulevard, Suite 120
Tampa, Florida 33624
Tel: 813/961-1921 Fax: 813/961-2599

RIVERSIDE DISPOSAL AREA

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
CES	07/16/02	EC	BE
		LEAD DESIGN PROF.	CHECKED
		BE	BE
		PROJECT NUMBER	FIGURE
		WI00925.0011	1

LEGAL DESCRIPTION
RDA COVER FOOTPRINT

EXHIBIT B

SURVEY OF THE PROPERTY

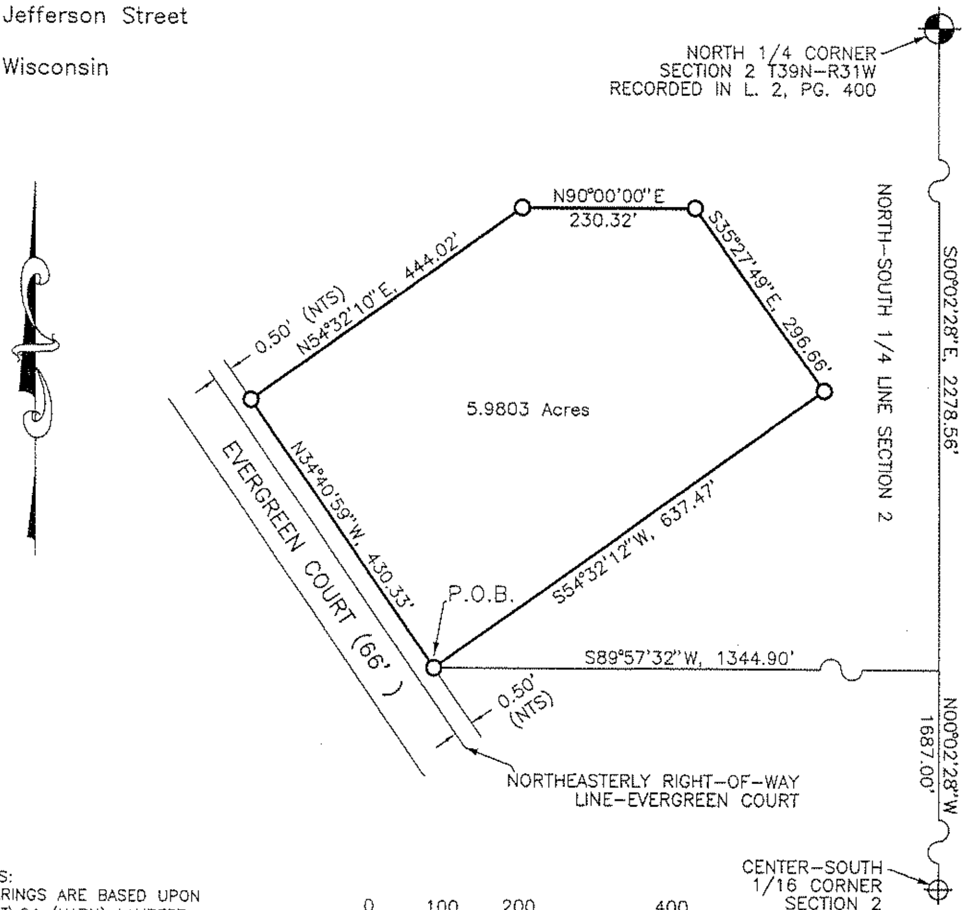
CERTIFICATE OF SURVEY

PART OF THE S1/2 OF THE NW1/4 OF SECTION 2, T39N–R31W, CITY OF KINGSFORD, DICKINSON COUNTY, MICHIGAN.

PARCEL DESCRIPTION

Parcel of land being part of the S1/2 of the NW1/4 of Section 2, T39N–R31W, City of Kingsford, Dickinson County, Michigan described as:
Commencing at the North 1/4 corner of Section 2; thence S00°02'28"E, 2278.56' along the North–South 1/4 line of Section 2; thence S89°57'32"W, 1344.90' to a point 0.50' Northeast of the Northeast right–of–way line of Evergreen Court being the Point of Beginning; thence N34°40'59"W, 430.33' parallel to the Northeast right–of–way line; thence N54°32'10"E, 444.02'; thence N90°00'00"E, 230.32'; thence S35°27'49"E, 296.66'; thence S54°32'12"W, 637.47' to the Point of Beginning containing 5.9803 acres and subject to restrictions, reservations, rights–of–way and easements of record.

ORDERED BY:
Arcadis
126 North Jefferson Street
Suite 400
Milwaukee, Wisconsin
53202



NOTES:
–BEARINGS ARE BASED UPON NAD83\94 (HARN) LAMBERT MICHIGAN NORTH ZONE STATE PLANE COORDINATE SYSTEM.

(NTS)–NOT TO SCALE

SCALE: 1" = 200'

SURVEYOR'S CERTIFICATE

I hereby certify that I have surveyed and mapped the land above platted and/or described on ______, and that the ratio of closure on the unadjusted field observations was Less than 1' in 5000', and that all the requirements of P.A. 132 of 1970 as amended have been complied with.

Sundberg, Carlson and Associates, Inc.

BY: Gerald W Carlson DATE: 7-3-02

GERALD W. CARLSON PS No. 24589

STATE OF MICHIGAN
GERALD W. CARLSON
SURVEYOR
No.
24589
LICENSED PROFESSIONAL SURVEYOR

S:\GPS\TRIMDATA\GM971\40103\EP\LEGAL.DWG

LEGEND	DRAWN BY: SDK	JOB NO. 10092	
• –Found Iron o –Set 5/8" X 18" Iron ▲ –Found Concrete Monument △ –Set Concrete Monument □ –Other as Noted R –RECORDED M –MEASURED	SCALE: 1"=200'	SHEET 1 OF 1	
	DATE: 01/08/02	REVISIONS	SJB 07/03/02

STS Consultants, Ltd.

555 River Avenue
Iron River, MI 49935
906/265–2525

914 West Baraga Avenue
Marquette MI 49855
906/228–2333

WATS 800–441–0669

EXHIBIT C

OPERATION AND MANAGEMENT PLAN FOR THE PROPERTY

EXHIBIT D

WASTE MANAGEMENT PLAN FOR THE PROPERTY

EXHIBIT E

PERMANENT MARKER DETAILS

ARCADIS G&M, Inc.
126 North Jefferson Street
Suite 400
Milwaukee
Wisconsin 53202
Tel 414 276 7742
Fax 414 276 7603
www.arcadis-us.com

Chris Austin
Michigan Department of Environmental Quality
1420 US 2 West
Crystal Falls, MI 49920

ENVIRONMENT

Subject:
Permanent Marker and Signage Details, Interim Response Action Plan, Riverside Disposal Area, Ford/Kingsford Site, Kingsford, Michigan.

Date:
6 June 2002

Contact:
Ric Studebaker

Phone:
414 277 6225

Email:
rstudebaker@arcadis-us.com

Our ref:
WI000950.0011.00001

Dear Mr. Austin:

As discussed during our June 3, 2002 telephone conversation, please find enclosed the revised figures depicting the locations and details of the permanent markers, and details of the notification signs required for the engineered cover at the subject site. Following installation of the permanent markers, the exact Northings and Eastings will be surveyed and the legal description will be finalized and appropriately sealed by a State of Michigan licensed land surveyor.

We trust this information will meet your needs. If you have any questions, or require any further information, please contact the undersigned.

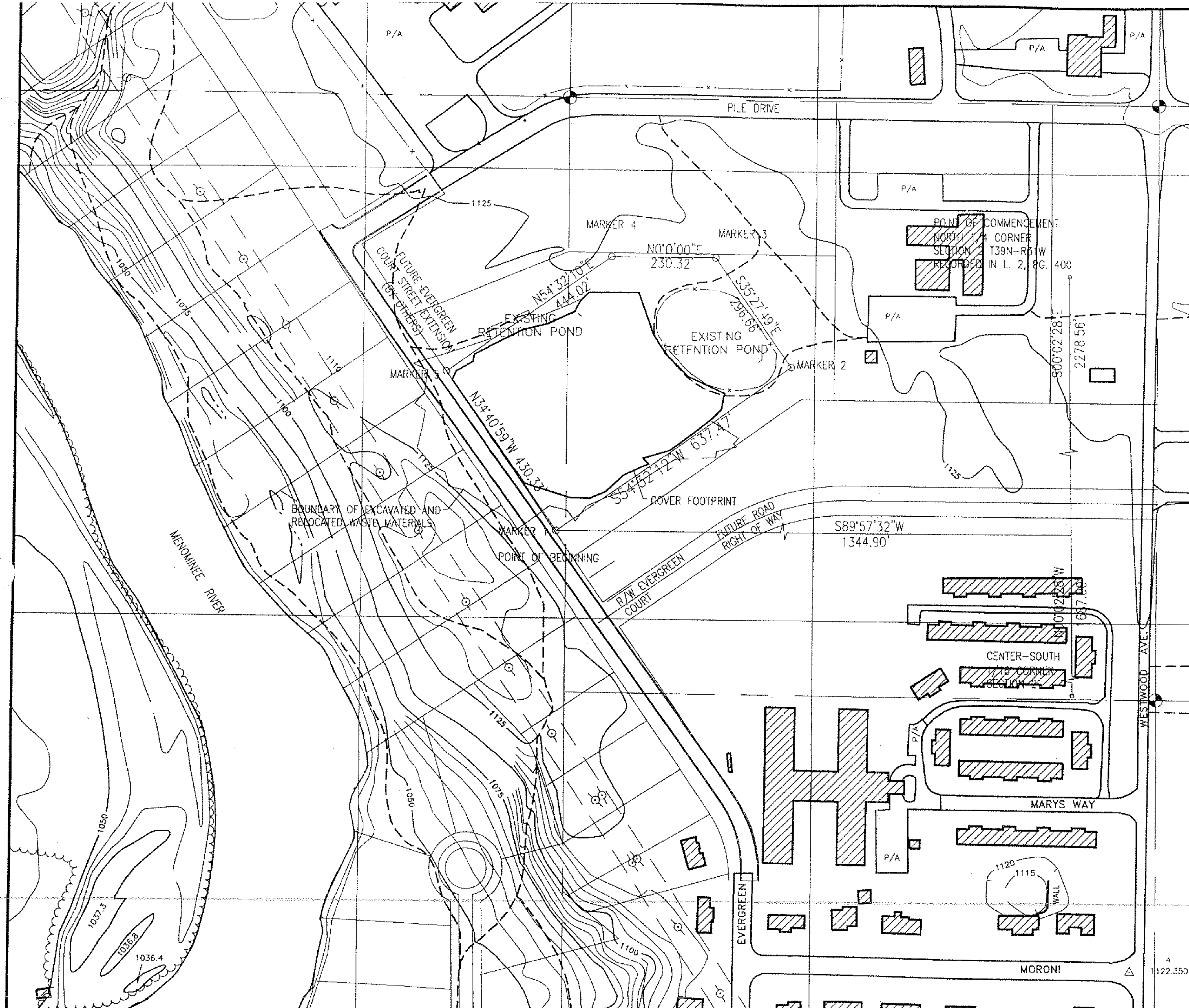
Sincerely,

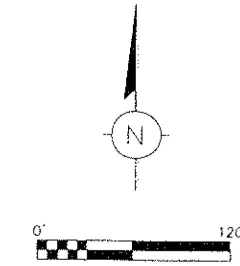
ARCADIS G&M, Inc.

Richard L. Studebaker, Jr.
Senior Engineer

Enclosure

Copies:
David Miller
Dan Musgrove





A PARCEL OF LAND LOCATED IN THE SOUTH HALF OF THE NORTHWEST QUARTER OF SECTION 2 TOWNSHIP 39 NORTH, RANGE 31 WEST, CITY OF KINGSFORD, COUNTY OF DICKINSON, STATE OF MICHIGAN DESCRIBED AS:

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G:\CAD\RIVERSIDE-DISPOSAL-AREA\WASTE MATERIAL-DRAWINGS\legal.DWG

NO.	DATE	REVISION DESCRIPTION	BY / CKD

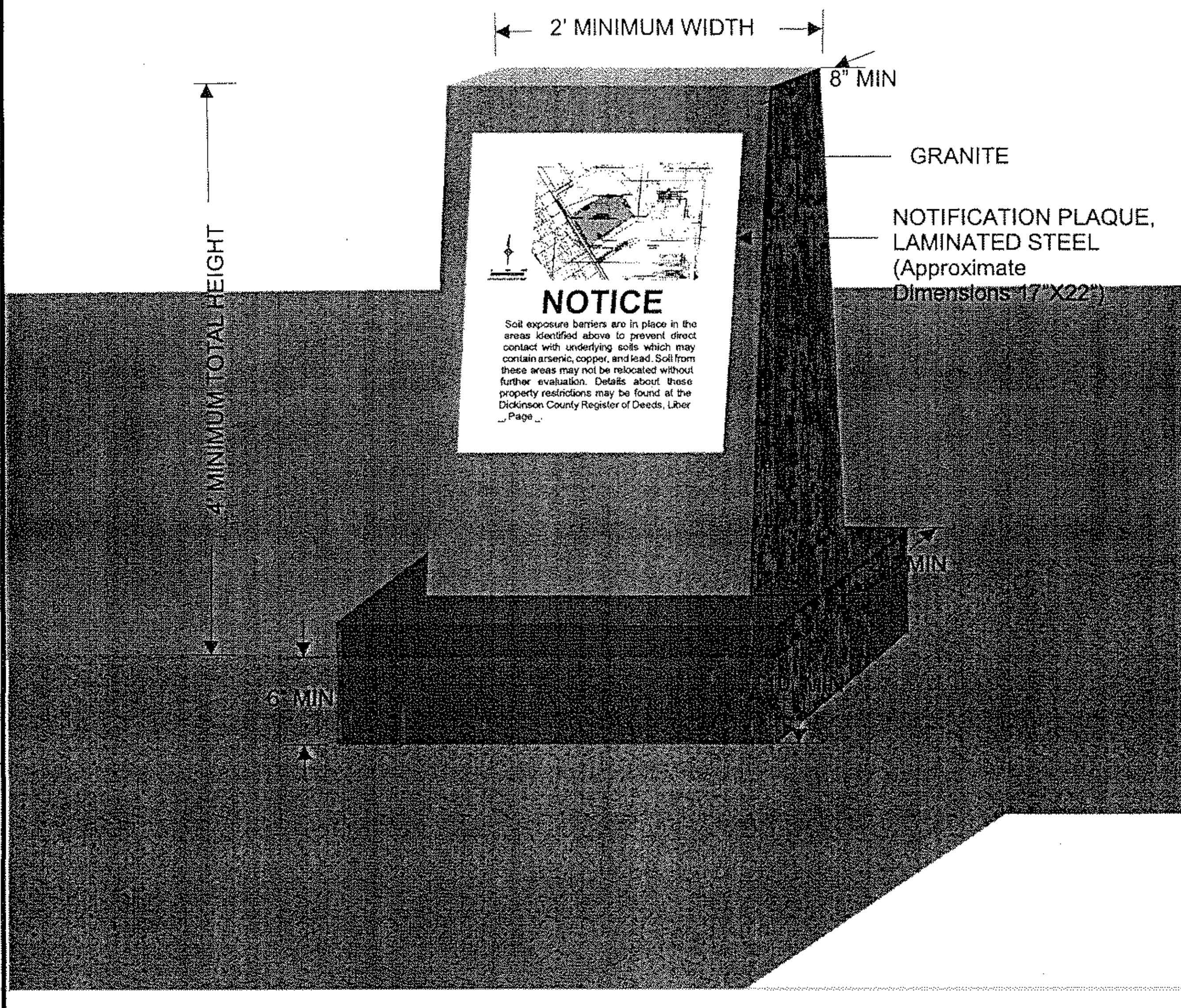
ARCADIS GERAGHTY & MILLER
3903 Northdale Boulevard, Suite 120
Tampa, Florida 33624
Tel: 813/961-1921 Fax: 813/961-2599

RIVERSIDE DISPOSAL AREA

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

LEGAL DESCRIPTION
RDA COVER FOOTPRINT

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
CES	07/16/02	EC	BE
		LEAD DESIGN PROF.	CHECKED
		BE	BE
		PROJECT NUMBER	FIGURE
		WI00925.0011	1



NOT TO SCALE

ARCADIS

PERMANENT MARKER DESIGN

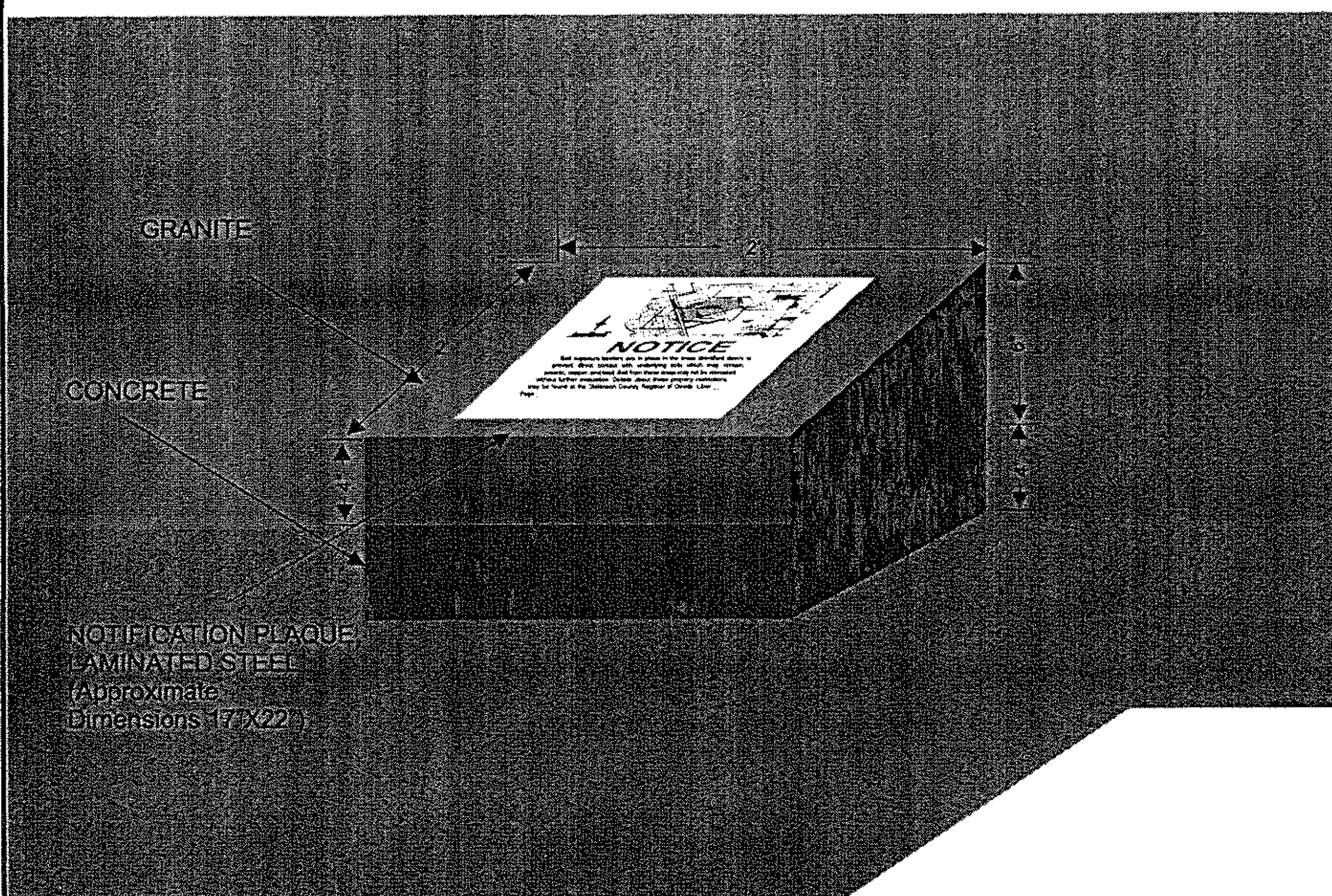
FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

FIGURE

2

DWG DATE: 08MAY02 | PN: WI0950\RDA\SOCCER FIELD\ | FILE NO.: CONSTRUCTION REPORT | DRAWING: MARKER DESIGN-REV.CDR | CHECKED: BZ | APPROVED: RS | DRAFTER: DKN

DRAFTER: DKN | APPROVED: RS | CHECKED: BZ | PN: W\0950\RDA\SOCCER FIELD\FINAL FIGURES\FINAL FIGURES 2\MARKER DESIGN-SMALL FINAL.CDR | DWG DATE: 08MAY02



NOT TO SCALE

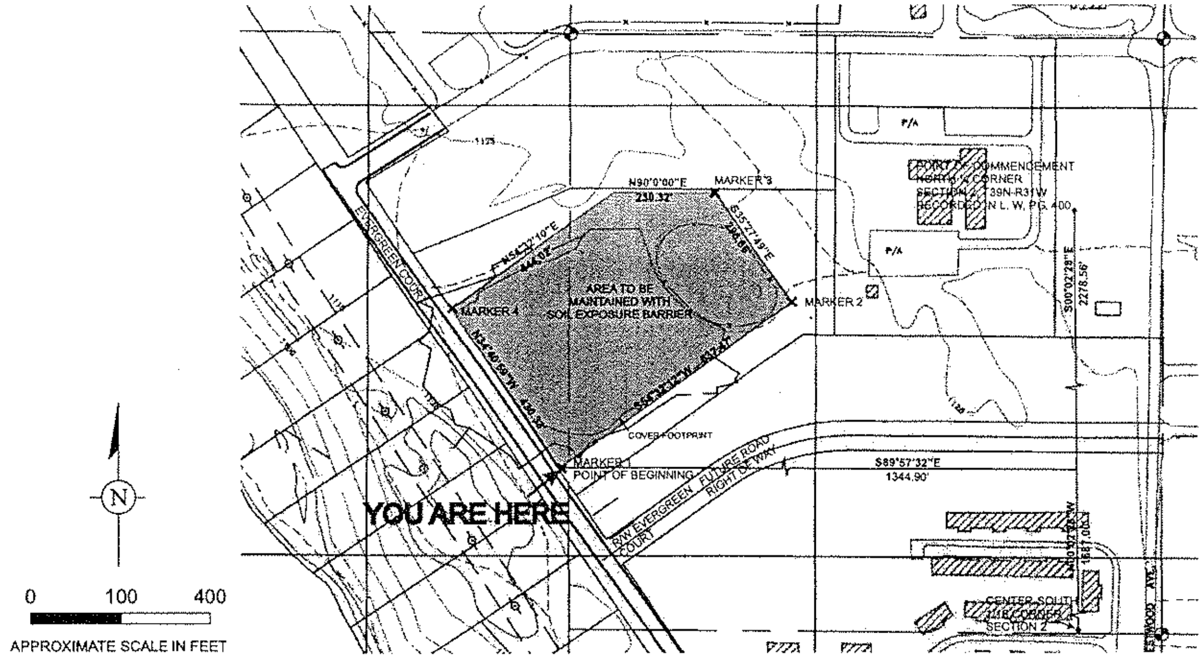
ARCADIS

SMALL MARKER DESIGN

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

FIGURE

2A

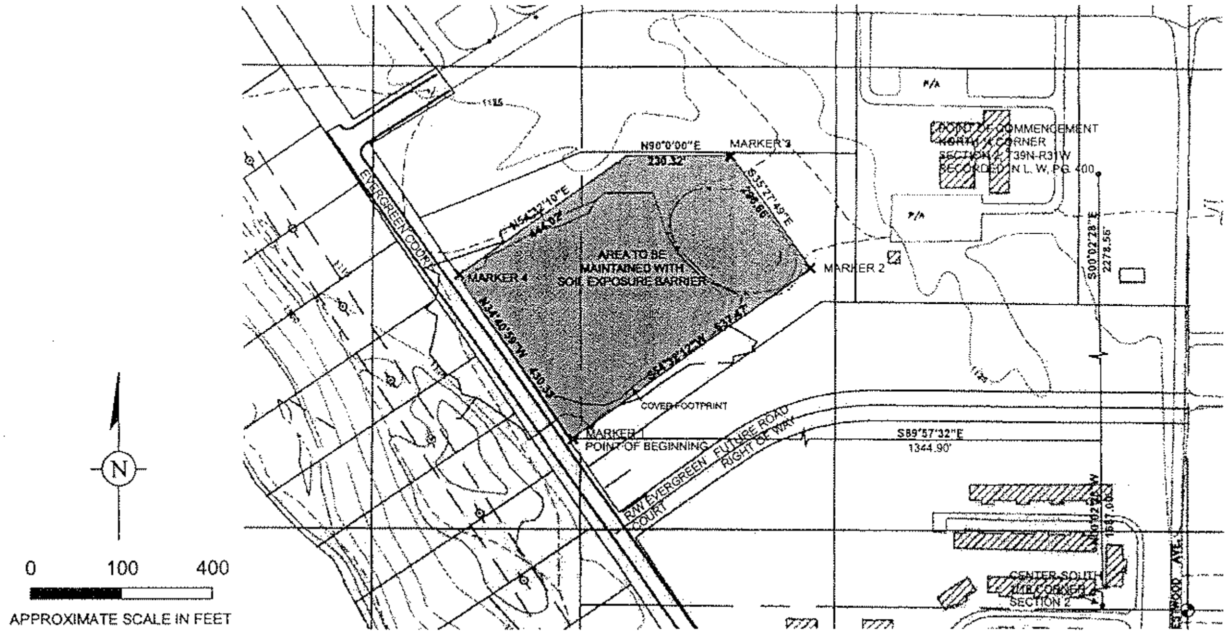


NOTICE

Soil exposure barriers are in place in the areas identified above to prevent direct contact with underlying soils which may contain arsenic, copper, and lead. Soil from these areas may not be relocated without further evaluation. Details about these property restrictions may be found at the Dickinson County Register of Deeds, Liber _, Page _.

ARCADIS	**NOTIFICATION SIGN DISPLAY** FORD/KINGSFORD SITE KINGSFORD, MICHIGAN	FIGURE 3

DRAFTER: DKN | APPROVED: RS | CHECKED: BZ | PN: WI0950\RDA\SOCCER FIELD\FINAL FIGURES\FINAL FIGURES2\MARKER DISPLAY FINAL1.CDR | DWG DATE: 08MAY02



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ARCADIS

NOTIFICATION SIGN DISPLAY

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

FIGURE

3A

DWG DATE: 08MAY02 | PN: WI0950\RDA\SOCCER FIELD\FINAL FIGURES\FINAL FIGURES2\MARKER DISPLAY-FINAL2.CDR | CHECKED: BZ | APPROVED: RS | DRAFTER: DKN

FIGURE 1

MAP OF THE PROPERTY, INCLUDING THE COVER SYSTEM

ARCADIS

Appendix I

Permanent Markers

ARCADIS G&M, Inc.
126 North Jefferson Street
Suite 400
Milwaukee
Wisconsin 53202
Tel 414 276 7742
Fax 414 276 7603
www.arcadis-us.com

Chris Austin
Michigan Department of Environmental Quality
1420 US 2 West
Crystal Falls, MI 49920

ENVIRONMENT

Subject:
Permanent Marker and Signage Details, Interim Response Action Plan, Riverside Disposal Area, Ford/Kingsford Site, Kingsford, Michigan.

Date:
6 June 2002

Contact:
Ric Studebaker

Phone:
414 277 6225

Email:
rstudebaker@arcadis-us.com

Our ref:
WI000950.0011.00001

Dear Mr. Austin:

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We trust this information will meet your needs. If you have any questions, or require any further information, please contact the undersigned.

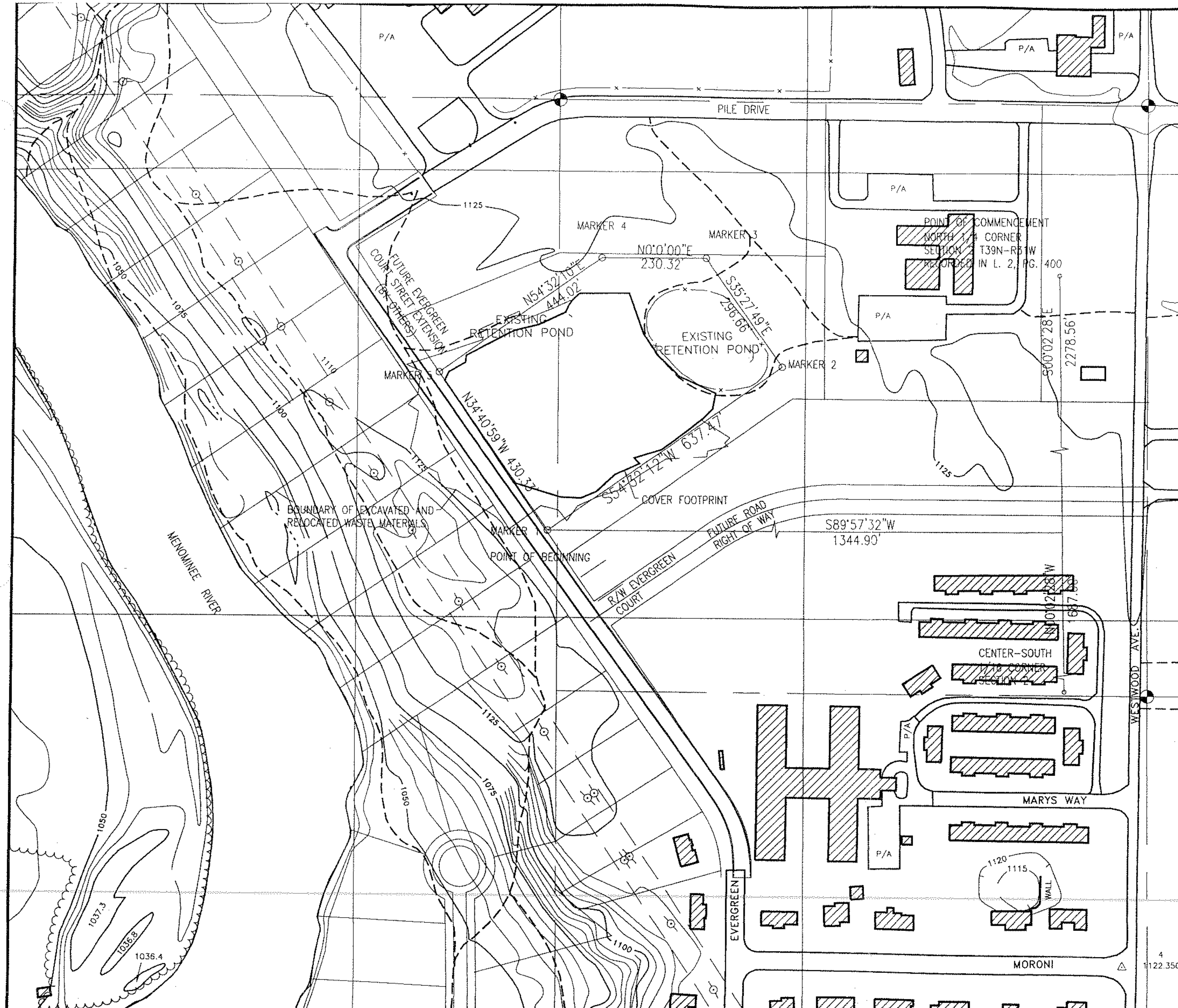
Sincerely,

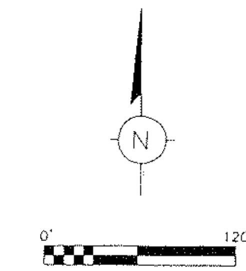
ARCADIS G&M, Inc.

Richard L. Studebaker, Jr.
Senior Engineer

Enclosure

Copies:
David Miller
Dan Musgrove





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G:\CAD\RIVERSIDE-DISPOSAL-AREA\WASTE MATERIAL-DRAWINGS\legal.DWG

NO.	DATE	REVISION DESCRIPTION	BY / CKD

ARCADIS GERAGHTY & MILLER
3903 Northdale Boulevard, Suite 120
Tampa, Florida 33624
Tel: 813/961-1921 Fax: 813/961-2599

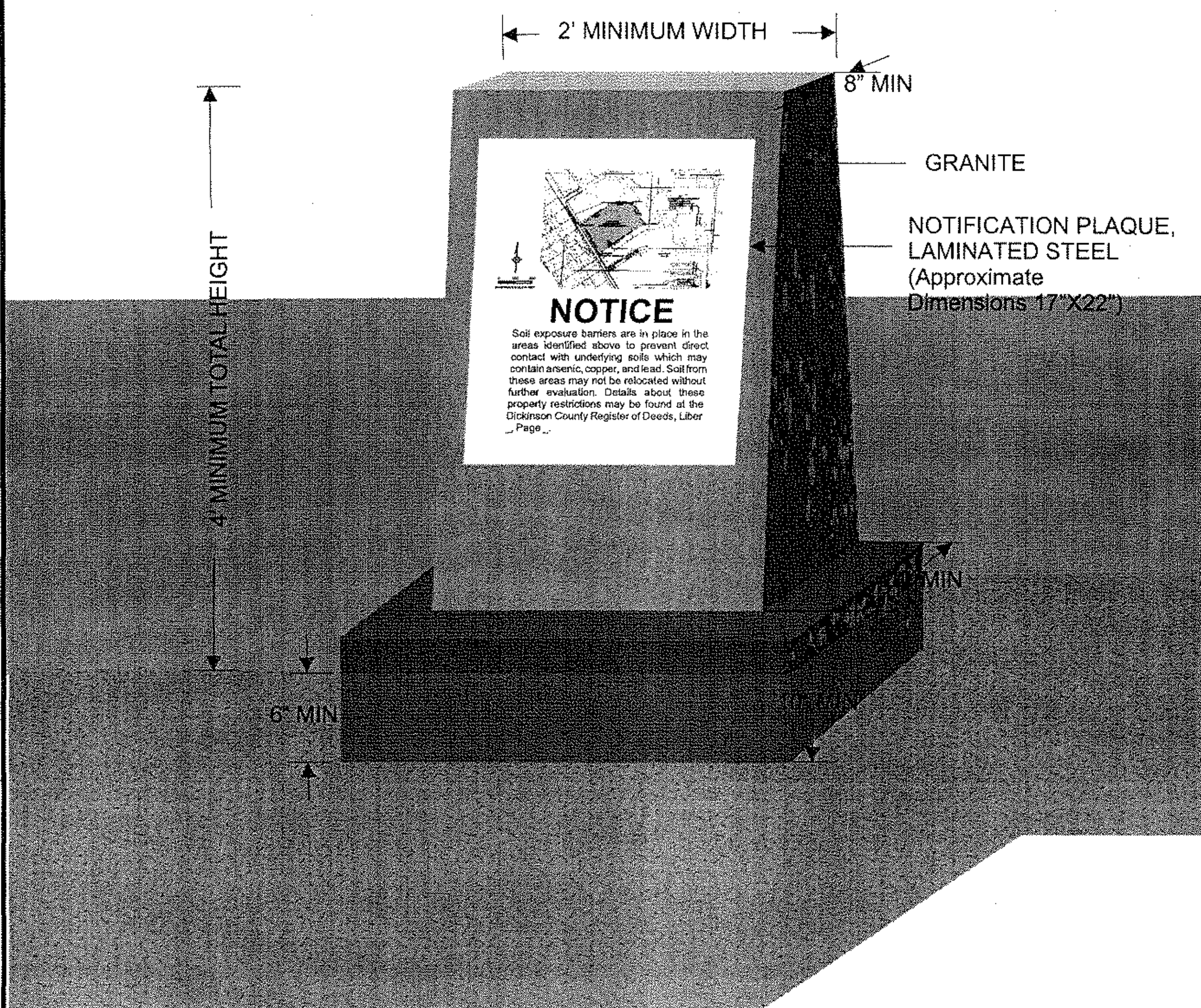
RIVERSIDE DISPOSAL AREA

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

LEGAL DESCRIPTION
RDA COVER FOOTPRINT

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
CES	07/16/02	EC	BE
		LEAD DESIGN PROF. BE	CHECKED BE
		PROJECT NUMBER WI00925.0011	FIGURE 1

DWG DATE: 08MAY02 | PN: WI0950\RDA\SOCCER FIELD\ | FILE NO.: CONSTRUCTION REPORT | DRAWING: MARKER DESIGN-REV.CDR | CHECKED: BZ | APPROVED: RS | DRAFTER: DKN



NOT TO SCALE

ARCADIS

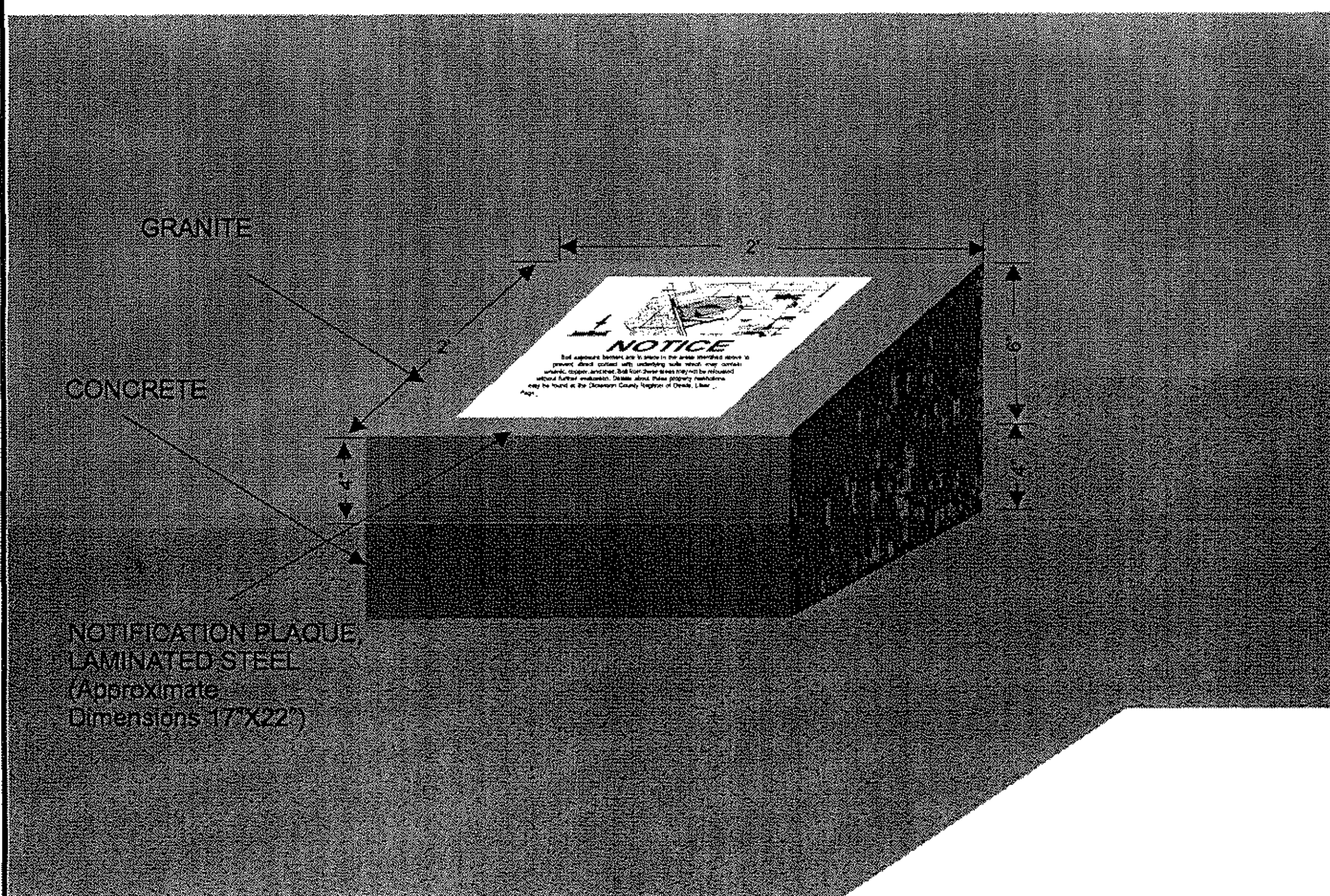
PERMANENT MARKER DESIGN

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

FIGURE

2

DWG DATE: 08MAY02 | PN: WI0950\RDA\SOCCER FIELD\FINAL FIGURES\FINAL FIGURES 2\MARKER DESIGN-SMALL FINAL.CDR | CHECKED: BZ | APPROVED: RS | DRAFTER: DKN



NOT TO SCALE

ARCADIS

SMALL MARKER DESIGN

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

FIGURE

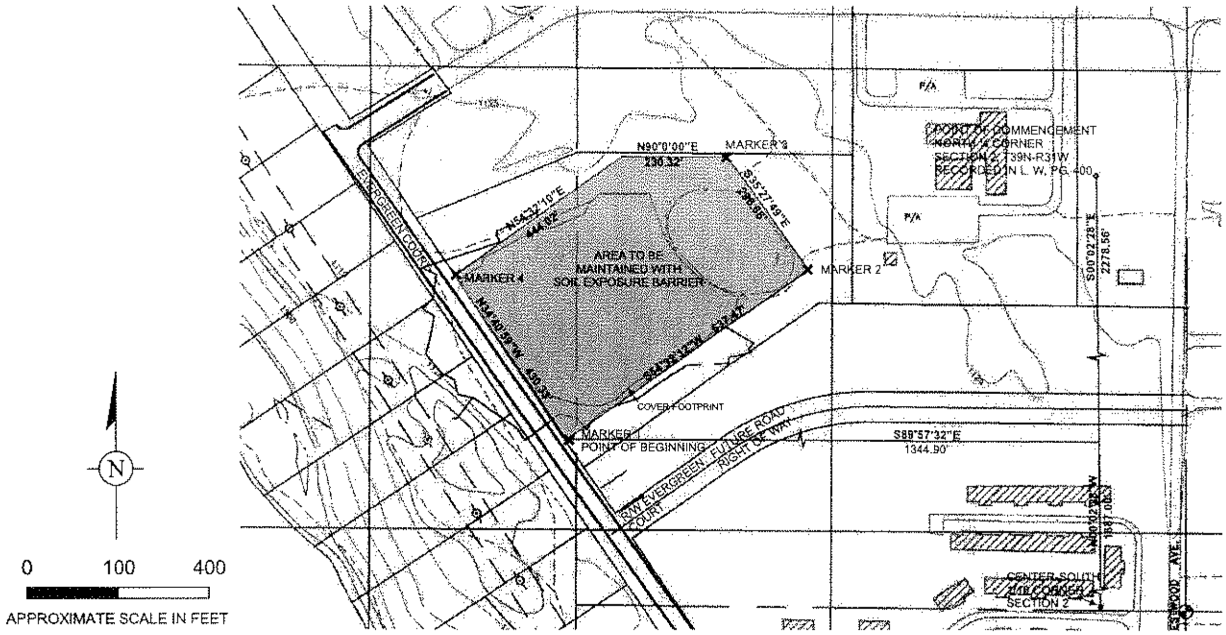
2A

NOTICE

Soil exposure barriers are in place in the areas identified above to prevent direct contact with underlying soils which may contain arsenic, copper, and lead. Soil from these areas may not be relocated without further evaluation. Details about these property restrictions may be found at the Dickinson County Register of Deeds, Liber _, Page _.

ARCADIS	NOTIFICATION SIGN DISPLAY FORD/KINGSFORD SITE KINGSFORD, MICHIGAN	FIGURE 3

DRAFTER: DKN | APPROVED: RS | CHECKED: BZ | PN: WI0950\RDA\SOCCER FIELD\FINAL FIGURES\FINAL FIGURES2\MARKER DISPLAY FINAL1.CDR | DWG DATE: 08MAY02



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ARCADIS

NOTIFICATION SIGN DISPLAY

FORD/KINGSFORD SITE
KINGSFORD, MICHIGAN

FIGURE

3A

DWG DATE: 08MAY02 | PN: WI0950\RDA\SOCCER FIELD\FINAL FIGURES\FINAL FIGURES2\MARKER DISPLAY-FINAL2.CDR | CHECKED: BZ | APPROVED: RS | DRAFTER: DKN