CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121803-JB-113

GC/MS Volatiles

Lot-Sample #...: A3L200162-023	**Work Order #...:** F665R1AA	**Matrix.....:** WG	
Date Sampled...: 12/18/03 13:35	**Date Received..:** 12/20/03		
Prep Date.....: 12/30/03	**Analysis Date..:** 12/30/03		
Prep Batch #...: 3365253			
Dilution Factor: 4	**Initial Wgt/Vol:** 5 mL	**Final Wgt/Vol..:** 5 mL	
	Method.....: SW846 8260B		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acetone	**5.7 J**	**100**	**ug/L**	**2.6**
Benzene	ND	4.0	ug/L	0.80
Bromodichloromethane	ND	4.0	ug/L	0.80
Bromoform	ND	4.0	ug/L	1.3
Bromomethane	ND	4.0	ug/L	0.64
2-Butanone	ND	100	ug/L	1.4
Carbon disulfide	ND	20	ug/L	0.84
Carbon tetrachloride	ND	4.0	ug/L	0.72
Chlorobenzene	ND	4.0	ug/L	0.64
Chloroethane	ND	4.0	ug/L	0.88
Chloroform	ND	4.0	ug/L	0.84
Chloromethane	ND	4.0	ug/L	1.0
Cyclohexane	ND	4.0	ug/L	1.4
Dibromochloromethane	ND	4.0	ug/L	1.0
1,2-Dibromo-3-chloro-propane	ND	4.0	ug/L	2.1
1,2-Dibromoethane	ND	4.0	ug/L	0.88
1,2-Dichlorobenzene	ND	4.0	ug/L	0.60
1,3-Dichlorobenzene	ND	4.0	ug/L	0.80
1,4-Dichlorobenzene	ND	4.0	ug/L	0.64
Dichlorodifluoromethane	ND	4.0	ug/L	0.92
1,1-Dichloroethane	ND	4.0	ug/L	1.0
1,2-Dichloroethane	ND	4.0	ug/L	0.88
1,1-Dichloroethene	ND	4.0	ug/L	0.88
cis-1,2-Dichloroethene	**130**	**4.0**	**ug/L**	**1.0**
trans-1,2-Dichloroethene	**1.5 J**	**4.0**	**ug/L**	**0.96**
1,2-Dichloropropane	ND	4.0	ug/L	0.72
cis-1,3-Dichloropropene	ND	4.0	ug/L	0.60
trans-1,3-Dichloropropene	ND	4.0	ug/L	0.68
Ethylbenzene	ND	4.0	ug/L	0.76
2-Hexanone	ND	200	ug/L	1.2
Isopropylbenzene	ND	20	ug/L	0.60
Methyl acetate	ND	40	ug/L	2.7
Methylene chloride	ND	20	ug/L	1.1
Methylcyclohexane	ND	4.0	ug/L	0.96
4-Methyl-2-pentanone	ND	200	ug/L	1.4
Methyl tert-butyl ether	ND	20	ug/L	0.84
Styrene	ND	4.0	ug/L	0.64

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CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121803-JB-113

GC/MS Volatiles

Lot-Sample #...: A3L200162-023 **Work Order #...:** F665R1AA **Matrix.....:** WG

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
1,1,2,2-Tetrachloroethane	ND	4.0	ug/L	0.92
Tetrachloroethene	ND	4.0	ug/L	0.48
Toluene	ND	4.0	ug/L	0.68
1,2,4-Trichloro-benzene	ND	20	ug/L	0.60
1,1,1-Trichloroethane	ND	4.0	ug/L	0.72
1,1,2-Trichloroethane	ND	4.0	ug/L	0.84
Trichloroethene	**11**	**4.0**	**ug/L**	**0.88**
Trichlorofluoromethane	ND	4.0	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	4.0	ug/L	0.92
Vinyl chloride	**1.3 J**	**4.0**	**ug/L**	**1.0**
Xylenes (total)	ND	12	ug/L	1.8

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	102	(73 - 122)
1,2-Dichloroethane-d4	94	(61 - 128)
Toluene-d8	100	(76 - 110)
4-Bromofluorobenzene	98	(74 - 116)

NOTE(S):

J Estimated result. Result is less than RL.

CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121803-JB-114

GC/MS Volatiles

Lot-Sample #...: A3L200162-024	**Work Order #...:** F665T1AA	**Matrix.....:** WG	
Date Sampled...: 12/18/03 13:47	**Date Received..:** 12/20/03		
Prep Date.....: 12/30/03	**Analysis Date..:** 12/30/03		
Prep Batch #...: 3365253			
Dilution Factor: 1.67	**Initial Wgt/Vol:** 5 mL	**Final Wgt/Vol..:** 5 mL	
	Method.....: SW846 8260B		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acetone	**1.9 J**	**42**	**ug/L**	**1.1**
Benzene	ND	1.7	ug/L	0.33
Bromodichloromethane	ND	1.7	ug/L	0.33
Bromoform	ND	1.7	ug/L	0.53
Bromomethane	ND	1.7	ug/L	0.27
2-Butanone	ND	42	ug/L	0.60
Carbon disulfide	ND	8.4	ug/L	0.35
Carbon tetrachloride	ND	1.7	ug/L	0.30
Chlorobenzene	ND	1.7	ug/L	0.27
Chloroethane	ND	1.7	ug/L	0.37
Chloroform	ND	1.7	ug/L	0.35
Chloromethane	ND	1.7	ug/L	0.43
Cyclohexane	ND	1.7	ug/L	0.57
Dibromochloromethane	ND	1.7	ug/L	0.42
1,2-Dibromo-3-chloro-propane	ND	1.7	ug/L	0.89
1,2-Dibromoethane	ND	1.7	ug/L	0.37
1,2-Dichlorobenzene	ND	1.7	ug/L	0.25
1,3-Dichlorobenzene	ND	1.7	ug/L	0.33
1,4-Dichlorobenzene	ND	1.7	ug/L	0.27
Dichlorodifluoromethane	ND	1.7	ug/L	0.38
1,1-Dichloroethane	**0.90 J**	**1.7**	**ug/L**	**0.43**
1,2-Dichloroethane	ND	1.7	ug/L	0.37
1,1-Dichloroethene	ND	1.7	ug/L	0.37
cis-1,2-Dichloroethene	**1.1 J**	**1.7**	**ug/L**	**0.42**
trans-1,2-Dichloroethene	ND	1.7	ug/L	0.40
1,2-Dichloropropane	ND	1.7	ug/L	0.30
cis-1,3-Dichloropropene	ND	1.7	ug/L	0.25
trans-1,3-Dichloropropene	ND	1.7	ug/L	0.28
Ethylbenzene	ND	1.7	ug/L	0.32
2-Hexanone	ND	84	ug/L	0.52
Isopropylbenzene	ND	8.4	ug/L	0.25
Methyl acetate	ND	17	ug/L	1.1
Methylene chloride	ND	8.4	ug/L	0.47
Methylcyclohexane	ND	1.7	ug/L	0.40
4-Methyl-2-pentanone	ND	84	ug/L	0.57
Methyl tert-butyl ether	ND	8.4	ug/L	0.35
Styrene	ND	1.7	ug/L	0.27

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CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121803-JB-114

GC/MS Volatiles

Lot-Sample #...: A3L200162-024 Work Order #...: F665T1AA Matrix.....: WG

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
1,1,2,2-Tetrachloroethane	ND	1.7	ug/L	0.38
Tetrachloroethene	**0.34 J**	**1.7**	**ug/L**	**0.20**
Toluene	ND	1.7	ug/L	0.28
1,2,4-Trichloro-benzene	ND	8.4	ug/L	0.25
1,1,1-Trichloroethane	**1.8**	**1.7**	**ug/L**	**0.30**
1,1,2-Trichloroethane	ND	1.7	ug/L	0.35
Trichloroethene	**44**	**1.7**	**ug/L**	**0.37**
Trichlorofluoromethane	ND	1.7	ug/L	0.42
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.7	ug/L	0.38
Vinyl chloride	ND	1.7	ug/L	0.43
Xylenes (total)	ND	5.0	ug/L	0.75

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	101	(73 - 122)
1,2-Dichloroethane-d4	95	(61 - 128)
Toluene-d8	100	(76 - 110)
4-Bromofluorobenzene	98	(74 - 116)

NOTE(S):

J Estimated result. Result is less than RL.

CONESTOGA ROVERS & ASSOC.,INC.

Client Sample ID: GW-17360-121803-JB-115

GC/MS Volatiles

Lot-Sample #...: A3L200162-025	**Work Order #...:** F665V1AA	**Matrix.....:** WG	
Date Sampled...: 12/18/03 14:12	**Date Received..:** 12/20/03		
Prep Date.....: 12/31/03	**Analysis Date..:** 12/31/03		
Prep Batch #...: 3365170			
Dilution Factor: 1	**Initial Wgt/Vol:** 5 mL	**Final Wgt/Vol..:** 5 mL	
	Method.....: SW846 8260B		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acetone	ND	25	ug/L	0.66
Benzene	ND	1.0	ug/L	0.20
Bromodichloromethane	ND	1.0	ug/L	0.20
Bromoform	ND	1.0	ug/L	0.32
Bromomethane	ND	1.0	ug/L	0.16
2-Butanone	ND	25	ug/L	0.36
Carbon disulfide	ND	5.0	ug/L	0.21
Carbon tetrachloride	ND	1.0	ug/L	0.18
Chlorobenzene	ND	1.0	ug/L	0.16
Chloroethane	ND	1.0	ug/L	0.22
Chloroform	**1.1**	**1.0**	**ug/L**	**0.21**
Chloromethane	ND	1.0	ug/L	0.26
Cyclohexane	ND	1.0	ug/L	0.34
Dibromochloromethane	ND	1.0	ug/L	0.25
1,2-Dibromo-3-chloro-propane	ND	1.0	ug/L	0.53
1,2-Dibromoethane	ND	1.0	ug/L	0.22
1,2-Dichlorobenzene	ND	1.0	ug/L	0.15
1,3-Dichlorobenzene	ND	1.0	ug/L	0.20
1,4-Dichlorobenzene	ND	1.0	ug/L	0.16
Dichlorodifluoromethane	ND	1.0	ug/L	0.23
1,1-Dichloroethane	**0.51 J**	**1.0**	**ug/L**	**0.26**
1,2-Dichloroethane	ND	1.0	ug/L	0.22
1,1-Dichloroethene	ND	1.0	ug/L	0.22
cis-1,2-Dichloroethene	**0.41 J**	**1.0**	**ug/L**	**0.25**
trans-1,2-Dichloroethene	ND	1.0	ug/L	0.24
1,2-Dichloropropane	ND	1.0	ug/L	0.18
cis-1,3-Dichloropropene	ND	1.0	ug/L	0.15
trans-1,3-Dichloropropene	ND	1.0	ug/L	0.17
Ethylbenzene	ND	1.0	ug/L	0.19
2-Hexanone	ND	50	ug/L	0.31
Isopropylbenzene	ND	5.0	ug/L	0.15
Methyl acetate	ND	10	ug/L	0.68
Methylene chloride	ND	5.0	ug/L	0.28
Methylcyclohexane	ND	1.0	ug/L	0.24
4-Methyl-2-pentanone	ND	50	ug/L	0.34
Methyl tert-butyl ether	ND	5.0	ug/L	0.21
Styrene	ND	1.0	ug/L	0.16

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CONESTOGA ROVERS & ASSOC.,INC.

Client Sample ID: GW-17360-121803-JB-115

GC/MS Volatiles

Lot-Sample #...: A3L200162-025 **Work Order #...:** F665V1AA **Matrix.....:** WG

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	0.23
Tetrachloroethene	**0.70 J**	**1.0**	**ug/L**	**0.12**
Toluene	ND	1.0	ug/L	0.17
1,2,4-Trichloro-benzene	ND	5.0	ug/L	0.15
1,1,1-Trichloroethane	**0.32 J**	**1.0**	**ug/L**	**0.18**
1,1,2-Trichloroethane	ND	1.0	ug/L	0.21
Trichloroethene	**9.8**	**1.0**	**ug/L**	**0.22**
Trichlorofluoromethane	ND	1.0	ug/L	0.25
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.0	ug/L	0.23
Vinyl chloride	ND	1.0	ug/L	0.26
Xylenes (total)	ND	3.0	ug/L	0.45

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	117	(73 - 122)
1,2-Dichloroethane-d4	114	(61 - 128)
Toluene-d8	96	(76 - 110)
4-Bromofluorobenzene	76	(74 - 116)

NOTE(S):

J Estimated result. Result is less than RL.

CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121803-JB-116

GC/MS Volatiles

Lot-Sample #...: A3L200162-026 Work Order #...: F665W2AA Matrix.....: WG
Date Sampled...: 12/18/03 15:02 Date Received..: 12/20/03
Prep Date.....: 12/31/03 Analysis Date..: 12/31/03
Prep Batch #...: 3365170
Dilution Factor: 1 Method.....: SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acetone	ND	25	ug/L	0.66
Benzene	ND	1.0	ug/L	0.20
Bromodichloromethane	ND	1.0	ug/L	0.20
Bromoform	ND	1.0	ug/L	0.32
Bromomethane	ND	1.0	ug/L	0.16
2-Butanone	ND	25	ug/L	0.36
Carbon disulfide	ND	5.0	ug/L	0.21
Carbon tetrachloride	ND	1.0	ug/L	0.18
Chlorobenzene	ND	1.0	ug/L	0.16
Chloroethane	ND	1.0	ug/L	0.22
Chloroform	ND	1.0	ug/L	0.21
Chloromethane	ND	1.0	ug/L	0.26
Cyclohexane	ND	1.0	ug/L	0.34
Dibromochloromethane	ND	1.0	ug/L	0.25
1,2-Dibromo-3-chloro-propane	ND	1.0	ug/L	0.53
1,2-Dibromoethane	ND	1.0	ug/L	0.22
1,2-Dichlorobenzene	ND	1.0	ug/L	0.15
1,3-Dichlorobenzene	ND	1.0	ug/L	0.20
1,4-Dichlorobenzene	ND	1.0	ug/L	0.16
Dichlorodifluoromethane	ND	1.0	ug/L	0.23
1,1-Dichloroethane	ND	1.0	ug/L	0.26
1,2-Dichloroethane	ND	1.0	ug/L	0.22
1,1-Dichloroethene	ND	1.0	ug/L	0.22
cis-1,2-Dichloroethene	**3.4**	**1.0**	**ug/L**	**0.25**
trans-1,2-Dichloroethene	ND	1.0	ug/L	0.24
1,2-Dichloropropane	ND	1.0	ug/L	0.18
cis-1,3-Dichloropropene	ND	1.0	ug/L	0.15
trans-1,3-Dichloropropene	ND	1.0	ug/L	0.17
Ethylbenzene	ND	1.0	ug/L	0.19
2-Hexanone	ND	50	ug/L	0.31
Isopropylbenzene	ND	5.0	ug/L	0.15
Methyl acetate	ND	10	ug/L	0.68
Methylene chloride	ND	5.0	ug/L	0.28
Methylcyclohexane	ND	1.0	ug/L	0.24
4-Methyl-2-pentanone	ND	50	ug/L	0.34
Methyl tert-butyl ether	ND	5.0	ug/L	0.21
Styrene	ND	1.0	ug/L	0.16
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	0.23

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CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121803-JB-116

GC/MS Volatiles

Lot-Sample #...: A3L200162-026 Work Order #...: F665W2AA Matrix.....: WG

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Tetrachloroethene	**1.0**	**1.0**	**ug/L**	**0.12**
Toluene	ND	1.0	ug/L	0.17
1,2,4-Trichloro-benzene	ND	5.0	ug/L	0.15
1,1,1-Trichloroethane	**0.38 J**	**1.0**	**ug/L**	**0.18**
1,1,2-Trichloroethane	ND	1.0	ug/L	0.21
Trichloroethene	**1.1**	**1.0**	**ug/L**	**0.22**
Trichlorofluoromethane	ND	1.0	ug/L	0.25
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.0	ug/L	0.23
Vinyl chloride	ND	1.0	ug/L	0.26
Xylenes (total)	ND	3.0	ug/L	0.45

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	123 *	(73 - 122)
1,2-Dichloroethane-d4	116	(61 - 128)
Toluene-d8	97	(76 - 110)
4-Bromofluorobenzene	76	(74 - 116)

NOTE(S):

* Surrogate recovery is outside stated control limits.

J Estimated result. Result is less than RL.

CONESTOGA ROVERS & ASSOC.,INC.

Client Sample ID: GW-17360-121803-JB-117

GC/MS Volatiles

Lot-Sample #...: A3L200162-027 **Work Order #...:** F665X1AA **Matrix.....:** WG
Date Sampled...: 12/18/03 15:47 **Date Received..:** 12/20/03
Prep Date.....: 12/30/03 **Analysis Date..:** 12/30/03
Prep Batch #...: 3365253
Dilution Factor: 1 **Initial Wgt/Vol:** 5 mL **Final Wgt/Vol..:** 5 mL
Method.....: SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acetone	**0.74 J**	**25**	**ug/L**	**0.66**
Benzene	ND	1.0	ug/L	0.20
Bromodichloromethane	ND	1.0	ug/L	0.20
Bromoform	ND	1.0	ug/L	0.32
Bromomethane	ND	1.0	ug/L	0.16
2-Butanone	ND	25	ug/L	0.36
Carbon disulfide	ND	5.0	ug/L	0.21
Carbon tetrachloride	ND	1.0	ug/L	0.18
Chlorobenzene	ND	1.0	ug/L	0.16
Chloroethane	ND	1.0	ug/L	0.22
Chloroform	ND	1.0	ug/L	0.21
Chloromethane	ND	1.0	ug/L	0.26
Cyclohexane	ND	1.0	ug/L	0.34
Dibromochloromethane	ND	1.0	ug/L	0.25
1,2-Dibromo-3-chloro-propane	ND	1.0	ug/L	0.53
1,2-Dibromoethane	ND	1.0	ug/L	0.22
1,2-Dichlorobenzene	ND	1.0	ug/L	0.15
1,3-Dichlorobenzene	ND	1.0	ug/L	0.20
1,4-Dichlorobenzene	ND	1.0	ug/L	0.16
Dichlorodifluoromethane	ND	1.0	ug/L	0.23
1,1-Dichloroethane	ND	1.0	ug/L	0.26
1,2-Dichloroethane	ND	1.0	ug/L	0.22
1,1-Dichloroethene	ND	1.0	ug/L	0.22
cis-1,2-Dichloroethene	ND	1.0	ug/L	0.25
trans-1,2-Dichloroethene	ND	1.0	ug/L	0.24
1,2-Dichloropropane	ND	1.0	ug/L	0.18
cis-1,3-Dichloropropene	ND	1.0	ug/L	0.15
trans-1,3-Dichloropropene	ND	1.0	ug/L	0.17
Ethylbenzene	ND	1.0	ug/L	0.19
2-Hexanone	ND	50	ug/L	0.31
Isopropylbenzene	ND	5.0	ug/L	0.15
Methyl acetate	ND	10	ug/L	0.68
Methylene chloride	ND	5.0	ug/L	0.28
Methylcyclohexane	ND	1.0	ug/L	0.24
4-Methyl-2-pentanone	ND	50	ug/L	0.34
Methyl tert-butyl ether	ND	5.0	ug/L	0.21
Styrene	ND	1.0	ug/L	0.16

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CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121803-JB-117

GC/MS Volatiles

Lot-Sample #...: A3L200162-027 **Work Order #...:** F665X1AA **Matrix.....:** WG

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	0.23
Tetrachloroethene	**7.2**	**1.0**	**ug/L**	**0.12**
Toluene	ND	1.0	ug/L	0.17
1,2,4-Trichloro-benzene	ND	5.0	ug/L	0.15
1,1,1-Trichloroethane	ND	1.0	ug/L	0.18
1,1,2-Trichloroethane	ND	1.0	ug/L	0.21
Trichloroethene	ND	1.0	ug/L	0.22
Trichlorofluoromethane	ND	1.0	ug/L	0.25
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.0	ug/L	0.23
Vinyl chloride	ND	1.0	ug/L	0.26
Xylenes (total)	ND	3.0	ug/L	0.45

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	100	(73 - 122)
1,2-Dichloroethane-d4	91	(61 - 128)
Toluene-d8	100	(76 - 110)
4-Bromofluorobenzene	96	(74 - 116)

NOTE(S):

J Estimated result. Result is less than RL.

CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121803-JB-118

GC/MS Volatiles

Lot-Sample #...: A3L200162-028	**Work Order #...:** F66511AA	**Matrix.....:** WG	
Date Sampled...: 12/18/03 16:07	**Date Received..:** 12/20/03		
Prep Date.....: 12/30/03	**Analysis Date..:** 12/30/03		
Prep Batch #...: 3365253			
Dilution Factor: 3.33	**Initial Wgt/Vol:** 5 mL	**Final Wgt/Vol..:** 5 mL	
	Method.....: SW846 8260B		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acetone	**5.1 J**	**83**	**ug/L**	**2.2**
Benzene	ND	3.3	ug/L	0.67
Bromodichloromethane	ND	3.3	ug/L	0.67
Bromoform	ND	3.3	ug/L	1.1
Bromomethane	ND	3.3	ug/L	0.53
2-Butanone	ND	83	ug/L	1.2
Carbon disulfide	ND	17	ug/L	0.70
Carbon tetrachloride	ND	3.3	ug/L	0.60
Chlorobenzene	ND	3.3	ug/L	0.53
Chloroethane	ND	3.3	ug/L	0.73
Chloroform	ND	3.3	ug/L	0.70
Chloromethane	ND	3.3	ug/L	0.87
Cyclohexane	ND	3.3	ug/L	1.1
Dibromochloromethane	ND	3.3	ug/L	0.83
1,2-Dibromo-3-chloro-propane	ND	3.3	ug/L	1.8
1,2-Dibromoethane	ND	3.3	ug/L	0.73
1,2-Dichlorobenzene	ND	3.3	ug/L	0.50
1,3-Dichlorobenzene	ND	3.3	ug/L	0.67
1,4-Dichlorobenzene	ND	3.3	ug/L	0.53
Dichlorodifluoromethane	ND	3.3	ug/L	0.77
1,1-Dichloroethane	ND	3.3	ug/L	0.87
1,2-Dichloroethane	ND	3.3	ug/L	0.73
1,1-Dichloroethene	ND	3.3	ug/L	0.73
cis-1,2-Dichloroethene	**0.91 J**	**3.3**	**ug/L**	**0.83**
trans-1,2-Dichloroethene	ND	3.3	ug/L	0.80
1,2-Dichloropropane	ND	3.3	ug/L	0.60
cis-1,3-Dichloropropene	ND	3.3	ug/L	0.50
trans-1,3-Dichloropropene	ND	3.3	ug/L	0.57
Ethylbenzene	ND	3.3	ug/L	0.63
2-Hexanone	ND	170	ug/L	1.0
Isopropylbenzene	ND	17	ug/L	0.50
Methyl acetate	ND	33	ug/L	2.3
Methylene chloride	ND	17	ug/L	0.93
Methylcyclohexane	ND	3.3	ug/L	0.80
4-Methyl-2-pentanone	ND	170	ug/L	1.1
Methyl tert-butyl ether	ND	17	ug/L	0.70
Styrene	ND	3.3	ug/L	0.53

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CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121803-JB-118

GC/MS Volatiles

Lot-Sample #...: A3L200162-028 Work Order #...: F66511AA Matrix.....: WG

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
1,1,2,2-Tetrachloroethane	ND	3.3	ug/L	0.77
Tetrachloroethene	**86**	**3.3**	**ug/L**	**0.40**
Toluene	ND	3.3	ug/L	0.57
1,2,4-Trichloro-benzene	ND	17	ug/L	0.50
1,1,1-Trichloroethane	ND	3.3	ug/L	0.60
1,1,2-Trichloroethane	ND	3.3	ug/L	0.70
Trichloroethene	**1.4 J**	**3.3**	**ug/L**	**0.73**
Trichlorofluoromethane	ND	3.3	ug/L	0.83
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	3.3	ug/L	0.77
Vinyl chloride	ND	3.3	ug/L	0.87
Xylenes (total)	ND	10	ug/L	1.5

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	99	(73 - 122)
1,2-Dichloroethane-d4	91	(61 - 128)
Toluene-d8	99	(76 - 110)
4-Bromofluorobenzene	96	(74 - 116)

NOTE(S):

J Estimated result. Result is less than RL.

CONESTOGA ROVERS & ASSOC.,INC.

Client Sample ID: GW-17360-121803-JB-119

GC/MS Volatiles

Lot-Sample #...: A3L200162-029 Work Order #...: F66521AA Matrix.....: WG
Date Sampled...: 12/18/03 16:52 Date Received..: 12/20/03
Prep Date.....: 12/31/03 Analysis Date..: 12/31/03
Prep Batch #...: 4002234
Dilution Factor: 1 Initial Wgt/Vol: 5 mL Final Wgt/Vol..: 5 mL
Method.....: SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acetone	**0.88 J,B**	**25**	**ug/L**	**0.66**
Benzene	ND	1.0	ug/L	0.20
Bromodichloromethane	ND	1.0	ug/L	0.20
Bromoform	ND	1.0	ug/L	0.32
Bromomethane	ND	1.0	ug/L	0.16
2-Butanone	**6.7 J**	**25**	**ug/L**	**0.36**
Carbon disulfide	ND	5.0	ug/L	0.21
Carbon tetrachloride	ND	1.0	ug/L	0.18
Chlorobenzene	ND	1.0	ug/L	0.16
Chloroethane	ND	1.0	ug/L	0.22
Chloroform	**0.68 J**	**1.0**	**ug/L**	**0.21**
Chloromethane	ND	1.0	ug/L	0.26
Cyclohexane	ND	1.0	ug/L	0.34
Dibromochloromethane	ND	1.0	ug/L	0.25
1,2-Dibromo-3-chloro-propane	ND	1.0	ug/L	0.53
1,2-Dibromoethane	ND	1.0	ug/L	0.22
1,2-Dichlorobenzene	ND	1.0	ug/L	0.15
1,3-Dichlorobenzene	ND	1.0	ug/L	0.20
1,4-Dichlorobenzene	ND	1.0	ug/L	0.16
Dichlorodifluoromethane	ND	1.0	ug/L	0.23
1,1-Dichloroethane	ND	1.0	ug/L	0.26
1,2-Dichloroethane	ND	1.0	ug/L	0.22
1,1-Dichloroethene	ND	1.0	ug/L	0.22
cis-1,2-Dichloroethene	ND	1.0	ug/L	0.25
trans-1,2-Dichloroethene	ND	1.0	ug/L	0.24
1,2-Dichloropropane	ND	1.0	ug/L	0.18
cis-1,3-Dichloropropene	ND	1.0	ug/L	0.15
trans-1,3-Dichloropropene	ND	1.0	ug/L	0.17
Ethylbenzene	ND	1.0	ug/L	0.19
2-Hexanone	ND	50	ug/L	0.31
Isopropylbenzene	ND	5.0	ug/L	0.15
Methyl acetate	ND	10	ug/L	0.68
Methylene chloride	ND	5.0	ug/L	0.28
Methylcyclohexane	ND	1.0	ug/L	0.24
4-Methyl-2-pentanone	ND	50	ug/L	0.34
Methyl tert-butyl ether	ND	5.0	ug/L	0.21
Styrene	ND	1.0	ug/L	0.16

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CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121803-JB-119

GC/MS Volatiles

Lot-Sample #...: A3L200162-029 Work Order #...: F66521AA Matrix.....: WG

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	0.23
Tetrachloroethene	**0.78 J**	**1.0**	**ug/L**	**0.12**
Toluene	ND	1.0	ug/L	0.17
1,2,4-Trichloro-benzene	ND	5.0	ug/L	0.15
1,1,1-Trichloroethane	ND	1.0	ug/L	0.18
1,1,2-Trichloroethane	ND	1.0	ug/L	0.21
Trichloroethene	ND	1.0	ug/L	0.22
Trichlorofluoromethane	ND	1.0	ug/L	0.25
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.0	ug/L	0.23
Vinyl chloride	ND	1.0	ug/L	0.26
Xylenes (total)	ND	3.0	ug/L	0.45

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	98	(73 - 122)
1,2-Dichloroethane-d4	90	(61 - 128)
Toluene-d8	98	(76 - 110)
4-Bromofluorobenzene	96	(74 - 116)

NOTE(S):

J Estimated result. Result is less than RL.

B Method blank contamination. The associated method blank contains the target analyte at a reportable level.

CONESTOGA ROVERS & ASSOC.,INC.

Client Sample ID: TB-17360-121803-JB-120

GC/MS Volatiles

Lot-Sample #...: A3L200162-030	**Work Order #...:** F66541AA	**Matrix.....:** WQ	
Date Sampled...: 12/18/03	**Date Received..:** 12/20/03		
Prep Date.....: 12/31/03	**Analysis Date..:** 12/31/03		
Prep Batch #...: 4002234			
Dilution Factor: 1	**Initial Wgt/Vol:** 5 mL	**Final Wgt/Vol..:** 5 mL	
	Method.....: SW846 8260B		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acetone	**2.8 J,B**	**25**	**ug/L**	**0.66**
Benzene	ND	1.0	ug/L	0.20
Bromodichloromethane	ND	1.0	ug/L	0.20
Bromoform	ND	1.0	ug/L	0.32
Bromomethane	ND	1.0	ug/L	0.16
2-Butanone	**1.3 J**	**25**	**ug/L**	**0.36**
Carbon disulfide	ND	5.0	ug/L	0.21
Carbon tetrachloride	ND	1.0	ug/L	0.18
Chlorobenzene	ND	1.0	ug/L	0.16
Chloroethane	ND	1.0	ug/L	0.22
Chloroform	ND	1.0	ug/L	0.21
Chloromethane	ND	1.0	ug/L	0.26
Cyclohexane	ND	1.0	ug/L	0.34
Dibromochloromethane	ND	1.0	ug/L	0.25
1,2-Dibromo-3-chloro-propane	ND	1.0	ug/L	0.53
1,2-Dibromoethane	ND	1.0	ug/L	0.22
1,2-Dichlorobenzene	ND	1.0	ug/L	0.15
1,3-Dichlorobenzene	ND	1.0	ug/L	0.20
1,4-Dichlorobenzene	ND	1.0	ug/L	0.16
Dichlorodifluoromethane	ND	1.0	ug/L	0.23
1,1-Dichloroethane	ND	1.0	ug/L	0.26
1,2-Dichloroethane	ND	1.0	ug/L	0.22
1,1-Dichloroethene	ND	1.0	ug/L	0.22
cis-1,2-Dichloroethene	ND	1.0	ug/L	0.25
trans-1,2-Dichloroethene	ND	1.0	ug/L	0.24
1,2-Dichloropropane	ND	1.0	ug/L	0.18
cis-1,3-Dichloropropene	ND	1.0	ug/L	0.15
trans-1,3-Dichloropropene	ND	1.0	ug/L	0.17
Ethylbenzene	ND	1.0	ug/L	0.19
2-Hexanone	ND	50	ug/L	0.31
Isopropylbenzene	ND	5.0	ug/L	0.15
Methyl acetate	ND	10	ug/L	0.68
Methylene chloride	ND	5.0	ug/L	0.28
Methylcyclohexane	ND	1.0	ug/L	0.24
4-Methyl-2-pentanone	ND	50	ug/L	0.34
Methyl tert-butyl ether	ND	5.0	ug/L	0.21
Styrene	ND	1.0	ug/L	0.16

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CONESTOGA ROVERS & ASSOC.,INC.

Client Sample ID: TB-17360-121803-JB-120

GC/MS Volatiles

Lot-Sample #...: A3L200162-030 **Work Order #...:** F66541AA **Matrix.....:** WQ

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	0.23
Tetrachloroethene	ND	1.0	ug/L	0.12
Toluene	ND	1.0	ug/L	0.17
1,2,4-Trichloro-benzene	ND	5.0	ug/L	0.15
1,1,1-Trichloroethane	ND	1.0	ug/L	0.18
1,1,2-Trichloroethane	ND	1.0	ug/L	0.21
Trichloroethene	ND	1.0	ug/L	0.22
Trichlorofluoromethane	ND	1.0	ug/L	0.25
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.0	ug/L	0.23
Vinyl chloride	ND	1.0	ug/L	0.26
Xylenes (total)	ND	3.0	ug/L	0.45

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	102	(73 - 122)
1,2-Dichloroethane-d4	92	(61 - 128)
Toluene-d8	98	(76 - 110)
4-Bromofluorobenzene	96	(74 - 116)

NOTE(S):

J Estimated result. Result is less than RL.

B Method blank contamination. The associated method blank contains the target analyte at a reportable level.

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7GT21AA **Matrix.....:** WATER
MB Lot-Sample #: A3L310000-170

Prep Date.....: 12/30/03 **Final Wgt/Vol..:** 5 mL
Analysis Date..: 12/30/03 **Prep Batch #...:** 3365170
Dilution Factor: 1 **Initial Wgt/Vol:** 5 mL

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Acetone	**1.3 J**	**25**	**ug/L**	**SW846 8260B**
Benzene	ND	1.0	ug/L	SW846 8260B
Bromodichloromethane	ND	1.0	ug/L	SW846 8260B
Bromoform	ND	1.0	ug/L	SW846 8260B
Bromomethane	ND	1.0	ug/L	SW846 8260B
2-Butanone	ND	25	ug/L	SW846 8260B
Carbon disulfide	ND	5.0	ug/L	SW846 8260B
Carbon tetrachloride	ND	1.0	ug/L	SW846 8260B
Chlorobenzene	ND	1.0	ug/L	SW846 8260B
Chloroethane	ND	1.0	ug/L	SW846 8260B
Chloroform	ND	1.0	ug/L	SW846 8260B
Chloromethane	ND	1.0	ug/L	SW846 8260B
Cyclohexane	ND	1.0	ug/L	SW846 8260B
Dibromochloromethane	ND	1.0	ug/L	SW846 8260B
1,2-Dibromo-3-chloro-propane	ND	1.0	ug/L	SW846 8260B
1,2-Dibromoethane	ND	1.0	ug/L	SW846 8260B
1,2-Dichlorobenzene	ND	1.0	ug/L	SW846 8260B
1,3-Dichlorobenzene	ND	1.0	ug/L	SW846 8260B
1,4-Dichlorobenzene	ND	1.0	ug/L	SW846 8260B
Dichlorodifluoromethane	ND	1.0	ug/L	SW846 8260B
1,1-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,2-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,1-Dichloroethene	ND	1.0	ug/L	SW846 8260B
cis-1,2-Dichloroethene	ND	1.0	ug/L	SW846 8260B
trans-1,2-Dichloroethene	ND	1.0	ug/L	SW846 8260B
1,2-Dichloropropane	ND	1.0	ug/L	SW846 8260B
cis-1,3-Dichloropropene	ND	1.0	ug/L	SW846 8260B
trans-1,3-Dichloropropene	ND	1.0	ug/L	SW846 8260B
Ethylbenzene	ND	1.0	ug/L	SW846 8260B
2-Hexanone	ND	50	ug/L	SW846 8260B
Isopropylbenzene	ND	5.0	ug/L	SW846 8260B
Methyl acetate	ND	10	ug/L	SW846 8260B
Methylene chloride	ND	5.0	ug/L	SW846 8260B
Methylcyclohexane	ND	1.0	ug/L	SW846 8260B
4-Methyl-2-pentanone	ND	50	ug/L	SW846 8260B
Methyl tert-butyl ether	ND	5.0	ug/L	SW846 8260B
Styrene	ND	1.0	ug/L	SW846 8260B
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	SW846 8260B
Tetrachloroethene	ND	1.0	ug/L	SW846 8260B
Toluene	ND	1.0	ug/L	SW846 8260B

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METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7GT21AA **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
1,2,4-Trichloro-benzene	**0.42 J**	**5.0**	**ug/L**	**SW846 8260B**
1,1,1-Trichloroethane	ND	1.0	ug/L	SW846 8260B
1,1,2-Trichloroethane	ND	1.0	ug/L	SW846 8260B
Trichloroethene	ND	1.0	ug/L	SW846 8260B
Trichlorofluoromethane	ND	1.0	ug/L	SW846 8260B
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.0	ug/L	SW846 8260B
Vinyl chloride	ND	1.0	ug/L	SW846 8260B
Xylenes (total)	ND	3.0	ug/L	SW846 8260B

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	116	(73 - 122)
1,2-Dichloroethane-d4	110	(61 - 128)
Toluene-d8	98	(76 - 110)
4-Bromofluorobenzene	77	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

J Estimated result. Result is less than RL.

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7G4J1AA **Matrix.....:** WATER
MB Lot-Sample #: A3L310000-253

Prep Date.....: 12/30/03 **Final Wgt/Vol...:** 5 mL
Analysis Date...: 12/30/03 **Prep Batch #...:** 3365253
Dilution Factor: 1 **Initial Wgt/Vol:** 5 mL

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Acetone	ND	25	ug/L	SW846 8260B
Benzene	ND	1.0	ug/L	SW846 8260B
Bromodichloromethane	ND	1.0	ug/L	SW846 8260B
Bromoform	ND	1.0	ug/L	SW846 8260B
Bromomethane	ND	1.0	ug/L	SW846 8260B
2-Butanone	ND	25	ug/L	SW846 8260B
Carbon disulfide	ND	5.0	ug/L	SW846 8260B
Carbon tetrachloride	ND	1.0	ug/L	SW846 8260B
Chlorobenzene	ND	1.0	ug/L	SW846 8260B
Chloroethane	ND	1.0	ug/L	SW846 8260B
Chloroform	ND	1.0	ug/L	SW846 8260B
Chloromethane	ND	1.0	ug/L	SW846 8260B
Cyclohexane	ND	1.0	ug/L	SW846 8260B
Dibromochloromethane	ND	1.0	ug/L	SW846 8260B
1,2-Dibromo-3-chloro-propane	ND	1.0	ug/L	SW846 8260B
1,2-Dibromoethane	ND	1.0	ug/L	SW846 8260B
1,2-Dichlorobenzene	ND	1.0	ug/L	SW846 8260B
1,3-Dichlorobenzene	ND	1.0	ug/L	SW846 8260B
1,4-Dichlorobenzene	ND	1.0	ug/L	SW846 8260B
Dichlorodifluoromethane	ND	1.0	ug/L	SW846 8260B
1,1-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,2-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,1-Dichloroethene	ND	1.0	ug/L	SW846 8260B
cis-1,2-Dichloroethene	ND	1.0	ug/L	SW846 8260B
trans-1,2-Dichloroethene	ND	1.0	ug/L	SW846 8260B
1,2-Dichloropropane	ND	1.0	ug/L	SW846 8260B
cis-1,3-Dichloropropene	ND	1.0	ug/L	SW846 8260B
trans-1,3-Dichloropropene	ND	1.0	ug/L	SW846 8260B
Ethylbenzene	ND	1.0	ug/L	SW846 8260B
2-Hexanone	ND	50	ug/L	SW846 8260B
Isopropylbenzene	ND	5.0	ug/L	SW846 8260B
Methyl acetate	ND	10	ug/L	SW846 8260B
Methylene chloride	ND	5.0	ug/L	SW846 8260B
Methylcyclohexane	ND	1.0	ug/L	SW846 8260B
4-Methyl-2-pentanone	ND	50	ug/L	SW846 8260B
Methyl tert-butyl ether	ND	5.0	ug/L	SW846 8260B
Styrene	ND	1.0	ug/L	SW846 8260B
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	SW846 8260B
Tetrachloroethene	ND	1.0	ug/L	SW846 8260B
Toluene	ND	1.0	ug/L	SW846 8260B

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METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7G4J1AA **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
1,2,4-Trichloro-benzene	ND	5.0	ug/L	SW846 8260B
1,1,1-Trichloroethane	ND	1.0	ug/L	SW846 8260B
1,1,2-Trichloroethane	ND	1.0	ug/L	SW846 8260B
Trichloroethene	ND	1.0	ug/L	SW846 8260B
Trichlorofluoromethane	ND	1.0	ug/L	SW846 8260B
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.0	ug/L	SW846 8260B
Vinyl chloride	ND	1.0	ug/L	SW846 8260B
Xylenes (total)	ND	3.0	ug/L	SW846 8260B

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	102	(73 - 122)
1,2-Dichloroethane-d4	86	(61 - 128)
Toluene-d8	96	(76 - 110)
4-Bromofluorobenzene	96	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7H711AA **Matrix.....:** WATER
MB Lot-Sample #: A4A020000-234

Prep Date.....: 12/31/03 **Final Wgt/Vol..:** 5 mL
Analysis Date..: 12/31/03 **Prep Batch #...:** 4002234
Dilution Factor: 1 **Initial Wgt/Vol:** 5 mL

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Acetone	**0.79 J**	**25**	**ug/L**	**SW846 8260B**
Benzene	ND	1.0	ug/L	SW846 8260B
Bromodichloromethane	ND	1.0	ug/L	SW846 8260B
Bromoform	ND	1.0	ug/L	SW846 8260B
Bromomethane	ND	1.0	ug/L	SW846 8260B
2-Butanone	ND	25	ug/L	SW846 8260B
Carbon disulfide	ND	5.0	ug/L	SW846 8260B
Carbon tetrachloride	ND	1.0	ug/L	SW846 8260B
Chlorobenzene	ND	1.0	ug/L	SW846 8260B
Chloroethane	ND	1.0	ug/L	SW846 8260B
Chloroform	ND	1.0	ug/L	SW846 8260B
Chloromethane	ND	1.0	ug/L	SW846 8260B
Cyclohexane	ND	1.0	ug/L	SW846 8260B
Dibromochloromethane	ND	1.0	ug/L	SW846 8260B
1,2-Dibromo-3-chloro-propane	ND	1.0	ug/L	SW846 8260B
1,2-Dibromoethane	ND	1.0	ug/L	SW846 8260B
1,2-Dichlorobenzene	ND	1.0	ug/L	SW846 8260B
1,3-Dichlorobenzene	ND	1.0	ug/L	SW846 8260B
1,4-Dichlorobenzene	ND	1.0	ug/L	SW846 8260B
Dichlorodifluoromethane	ND	1.0	ug/L	SW846 8260B
1,1-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,2-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,1-Dichloroethene	ND	1.0	ug/L	SW846 8260B
cis-1,2-Dichloroethene	ND	1.0	ug/L	SW846 8260B
trans-1,2-Dichloroethene	ND	1.0	ug/L	SW846 8260B
1,2-Dichloropropane	ND	1.0	ug/L	SW846 8260B
cis-1,3-Dichloropropene	ND	1.0	ug/L	SW846 8260B
trans-1,3-Dichloropropene	ND	1.0	ug/L	SW846 8260B
Ethylbenzene	ND	1.0	ug/L	SW846 8260B
2-Hexanone	ND	50	ug/L	SW846 8260B
Isopropylbenzene	ND	5.0	ug/L	SW846 8260B
Methyl acetate	ND	10	ug/L	SW846 8260B
Methylene chloride	ND	5.0	ug/L	SW846 8260B
Methylcyclohexane	ND	1.0	ug/L	SW846 8260B
4-Methyl-2-pentanone	ND	50	ug/L	SW846 8260B
Methyl tert-butyl ether	ND	5.0	ug/L	SW846 8260B
Styrene	ND	1.0	ug/L	SW846 8260B
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	SW846 8260B
Tetrachloroethene	ND	1.0	ug/L	SW846 8260B
Toluene	ND	1.0	ug/L	SW846 8260B

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METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7H711AA **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
1,2,4-Trichloro-benzene	ND	5.0	ug/L	SW846 8260B
1,1,1-Trichloroethane	ND	1.0	ug/L	SW846 8260B
1,1,2-Trichloroethane	ND	1.0	ug/L	SW846 8260B
Trichloroethene	ND	1.0	ug/L	SW846 8260B
Trichlorofluoromethane	ND	1.0	ug/L	SW846 8260B
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.0	ug/L	SW846 8260B
Vinyl chloride	ND	1.0	ug/L	SW846 8260B
Xylenes (total)	ND	3.0	ug/L	SW846 8260B

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	103	(73 - 122)
1,2-Dichloroethane-d4	90	(61 - 128)
Toluene-d8	98	(76 - 110)
4-Bromofluorobenzene	93	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

J Estimated result. Result is less than RL.

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7H8E1AA **Matrix.....:** WATER
MB Lot-Sample #: A4A020000-237

Prep Date.....: 01/02/04 **Final Wgt/Vol..:** 5 mL
Analysis Date..: 01/02/04 **Prep Batch #...:** 4002237
Dilution Factor: 1 **Initial Wgt/Vol:** 5 mL

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Acetone	ND	25	ug/L	SW846 8260B
Benzene	ND	1.0	ug/L	SW846 8260B
Bromodichloromethane	ND	1.0	ug/L	SW846 8260B
Bromoform	ND	1.0	ug/L	SW846 8260B
Bromomethane	ND	1.0	ug/L	SW846 8260B
2-Butanone	ND	25	ug/L	SW846 8260B
Carbon disulfide	ND	5.0	ug/L	SW846 8260B
Carbon tetrachloride	ND	1.0	ug/L	SW846 8260B
Chlorobenzene	ND	1.0	ug/L	SW846 8260B
Chloroethane	ND	1.0	ug/L	SW846 8260B
Chloroform	ND	1.0	ug/L	SW846 8260B
Chloromethane	ND	1.0	ug/L	SW846 8260B
Cyclohexane	ND	1.0	ug/L	SW846 8260B
Dibromochloromethane	ND	1.0	ug/L	SW846 8260B
1,2-Dibromo-3-chloro-propane	ND	1.0	ug/L	SW846 8260B
1,2-Dibromoethane	ND	1.0	ug/L	SW846 8260B
1,2-Dichlorobenzene	ND	1.0	ug/L	SW846 8260B
1,3-Dichlorobenzene	ND	1.0	ug/L	SW846 8260B
1,4-Dichlorobenzene	ND	1.0	ug/L	SW846 8260B
Dichlorodifluoromethane	ND	1.0	ug/L	SW846 8260B
1,1-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,2-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,1-Dichloroethene	ND	1.0	ug/L	SW846 8260B
cis-1,2-Dichloroethene	ND	1.0	ug/L	SW846 8260B
trans-1,2-Dichloroethene	ND	1.0	ug/L	SW846 8260B
1,2-Dichloropropane	ND	1.0	ug/L	SW846 8260B
cis-1,3-Dichloropropene	ND	1.0	ug/L	SW846 8260B
trans-1,3-Dichloropropene	ND	1.0	ug/L	SW846 8260B
Ethylbenzene	ND	1.0	ug/L	SW846 8260B
2-Hexanone	ND	50	ug/L	SW846 8260B
Isopropylbenzene	ND	5.0	ug/L	SW846 8260B
Methyl acetate	ND	10	ug/L	SW846 8260B
Methylene chloride	ND	5.0	ug/L	SW846 8260B
Methylcyclohexane	ND	1.0	ug/L	SW846 8260B
4-Methyl-2-pentanone	ND	50	ug/L	SW846 8260B
Methyl tert-butyl ether	ND	5.0	ug/L	SW846 8260B
Styrene	ND	1.0	ug/L	SW846 8260B
1,1,2,2-Tetrachloroethane	ND	1.0	ug/L	SW846 8260B
Tetrachloroethene	ND	1.0	ug/L	SW846 8260B
Toluene	ND	1.0	ug/L	SW846 8260B

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METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7H8E1AA **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
1,2,4-Trichloro-benzene	**0.46 J**	**5.0**	**ug/L**	**SW846 8260B**
1,1,1-Trichloroethane	ND	1.0	ug/L	SW846 8260B
1,1,2-Trichloroethane	ND	1.0	ug/L	SW846 8260B
Trichloroethene	ND	1.0	ug/L	SW846 8260B
Trichlorofluoromethane	ND	1.0	ug/L	SW846 8260B
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.0	ug/L	SW846 8260B
Vinyl chloride	ND	1.0	ug/L	SW846 8260B
Xylenes (total)	ND	3.0	ug/L	SW846 8260B

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	119	(73 - 122)
1,2-Dichloroethane-d4	112	(61 - 128)
Toluene-d8	99	(76 - 110)
4-Bromofluorobenzene	77	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

J Estimated result. Result is less than RL.

LABORATORY CONTROL SAMPLE DATA REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7GT21AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: A3L310000-170 F7GT21AD-LCSD
Prep Date.....: 12/30/03 **Analysis Date..:** 12/30/03
Prep Batch #...: 3365170
Dilution Factor: 1 **Final Wgt/Vol..:** 5 mL
Initial Wgt/Vol: 5 mL

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
Benzene	**10**	**9.9**	**ug/L**	**99**		**SW846 8260B**
	10	**10**	**ug/L**	**104**	**5.0**	**SW846 8260B**
Chlorobenzene	**10**	**9.6**	**ug/L**	**96**		**SW846 8260B**
	10	**10**	**ug/L**	**101**	**5.6**	**SW846 8260B**
1,1-Dichloroethene	**10**	**11**	**ug/L**	**114**		**SW846 8260B**
	10	**12**	**ug/L**	**117**	**2.2**	**SW846 8260B**
Toluene	**10**	**10**	**ug/L**	**103**		**SW846 8260B**
	10	**11**	**ug/L**	**105**	**2.6**	**SW846 8260B**
Trichloroethene	**10**	**10**	**ug/L**	**105**		**SW846 8260B**
	10	**10**	**ug/L**	**103**	**2.1**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	109	(73 - 122)
	106	(73 - 122)
1,2-Dichloroethane-d4	107	(61 - 128)
	108	(61 - 128)
Toluene-d8	106	(76 - 110)
	109	(76 - 110)
4-Bromofluorobenzene	93	(74 - 116)
	100	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7GT21AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: A3L310000-170 F7GT21AD-LCSD
Prep Date.....: 12/30/03 **Analysis Date..:** 12/30/03
Prep Batch #...: 3365170
Dilution Factor: 1 **Final Wgt/Vol..:** 5 mL
Initial Wgt/Vol: 5 mL

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Benzene	**99**	**(80 - 116)**			**SW846 8260B**
	104	**(80 - 116)**	**5.0**	**(0-20)**	**SW846 8260B**
Chlorobenzene	**96**	**(76 - 117)**			**SW846 8260B**
	101	**(76 - 117)**	**5.6**	**(0-20)**	**SW846 8260B**
1,1-Dichloroethene	**114**	**(63 - 130)**			**SW846 8260B**
	117	**(63 - 130)**	**2.2**	**(0-20)**	**SW846 8260B**
Toluene	**103**	**(74 - 119)**			**SW846 8260B**
	105	**(74 - 119)**	**2.6**	**(0-20)**	**SW846 8260B**
Trichloroethene	**105**	**(75 - 122)**			**SW846 8260B**
	103	**(75 - 122)**	**2.1**	**(0-20)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	109	(73 - 122)
	106	(73 - 122)
1,2-Dichloroethane-d4	107	(61 - 128)
	108	(61 - 128)
Toluene-d8	106	(76 - 110)
	109	(76 - 110)
4-Bromofluorobenzene	93	(74 - 116)
	100	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE DATA REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7G4J1AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: A3L310000-253 F7G4J1AD-LCSD
Prep Date.....: 12/30/03 **Analysis Date..:** 12/30/03
Prep Batch #...: 3365253
Dilution Factor: 1 **Final Wgt/Vol..:** 5 mL
Initial Wgt/Vol: 5 mL

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
Benzene	**10**	**9.2**	**ug/L**	**92**		**SW846 8260B**
	10	**9.2**	**ug/L**	**92**	**0.20**	**SW846 8260B**
Chlorobenzene	**10**	**9.3**	**ug/L**	**93**		**SW846 8260B**
	10	**9.4**	**ug/L**	**94**	**0.51**	**SW846 8260B**
1,1-Dichloroethene	**10**	**9.6**	**ug/L**	**96**		**SW846 8260B**
	10	**9.5**	**ug/L**	**95**	**0.86**	**SW846 8260B**
Toluene	**10**	**9.4**	**ug/L**	**94**		**SW846 8260B**
	10	**9.4**	**ug/L**	**94**	**0.36**	**SW846 8260B**
Trichloroethene	**10**	**8.9**	**ug/L**	**89**		**SW846 8260B**
	10	**9.0**	**ug/L**	**90**	**0.52**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	99	(73 - 122)
	100	(73 - 122)
1,2-Dichloroethane-d4	90	(61 - 128)
	89	(61 - 128)
Toluene-d8	99	(76 - 110)
	97	(76 - 110)
4-Bromofluorobenzene	96	(74 - 116)
	96	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7G4J1AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: A3L310000-253 F7G4J1AD-LCSD
Prep Date.....: 12/30/03 **Analysis Date..:** 12/30/03
Prep Batch #...: 3365253
Dilution Factor: 1 **Final Wgt/Vol..:** 5 mL
Initial Wgt/Vol: 5 mL

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Benzene	**92**	**(80 - 116)**			**SW846 8260B**
	92	**(80 - 116)**	**0.20**	**(0-20)**	**SW846 8260B**
Chlorobenzene	**93**	**(76 - 117)**			**SW846 8260B**
	94	**(76 - 117)**	**0.51**	**(0-20)**	**SW846 8260B**
1,1-Dichloroethene	**96**	**(63 - 130)**			**SW846 8260B**
	95	**(63 - 130)**	**0.86**	**(0-20)**	**SW846 8260B**
Toluene	**94**	**(74 - 119)**			**SW846 8260B**
	94	**(74 - 119)**	**0.36**	**(0-20)**	**SW846 8260B**
Trichloroethene	**89**	**(75 - 122)**			**SW846 8260B**
	90	**(75 - 122)**	**0.52**	**(0-20)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	99	(73 - 122)
	100	(73 - 122)
1,2-Dichloroethane-d4	90	(61 - 128)
	89	(61 - 128)
Toluene-d8	99	(76 - 110)
	97	(76 - 110)
4-Bromofluorobenzene	96	(74 - 116)
	96	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE DATA REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7H711AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: A4A020000-234 F7H711AD-LCSD
Prep Date.....: 12/31/03 **Analysis Date..:** 12/31/03
Prep Batch #...: 4002234
Dilution Factor: 1 **Final Wgt/Vol..:** 5 mL
Initial Wgt/Vol: 5 mL

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
Benzene	**10**	**9.5**	**ug/L**	**95**		**SW846 8260B**
	10	**9.6**	**ug/L**	**96**	**0.82**	**SW846 8260B**
Chlorobenzene	**10**	**8.8**	**ug/L**	**88**		**SW846 8260B**
	10	**9.2**	**ug/L**	**92**	**5.2**	**SW846 8260B**
1,1-Dichloroethene	**10**	**10**	**ug/L**	**104**		**SW846 8260B**
	10	**11**	**ug/L**	**107**	**2.6**	**SW846 8260B**
Toluene	**10**	**9.1**	**ug/L**	**91**		**SW846 8260B**
	10	**9.6**	**ug/L**	**96**	**5.1**	**SW846 8260B**
Trichloroethene	**10**	**8.7**	**ug/L**	**87**		**SW846 8260B**
	10	**8.7**	**ug/L**	**87**	**0.24**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	100	(73 - 122)
	101	(73 - 122)
1,2-Dichloroethane-d4	96	(61 - 128)
	95	(61 - 128)
Toluene-d8	96	(76 - 110)
	100	(76 - 110)
4-Bromofluorobenzene	96	(74 - 116)
	99	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7H711AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: A4A020000-234 F7H711AD-LCSD
Prep Date.....: 12/31/03 **Analysis Date..:** 12/31/03
Prep Batch #...: 4002234
Dilution Factor: 1 **Final Wgt/Vol..:** 5 mL
Initial Wgt/Vol: 5 mL

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Benzene	**95**	**(80 - 116)**			**SW846 8260B**
	96	**(80 - 116)**	**0.82**	**(0-20)**	**SW846 8260B**
Chlorobenzene	**88**	**(76 - 117)**			**SW846 8260B**
	92	**(76 - 117)**	**5.2**	**(0-20)**	**SW846 8260B**
1,1-Dichloroethene	**104**	**(63 - 130)**			**SW846 8260B**
	107	**(63 - 130)**	**2.6**	**(0-20)**	**SW846 8260B**
Toluene	**91**	**(74 - 119)**			**SW846 8260B**
	96	**(74 - 119)**	**5.1**	**(0-20)**	**SW846 8260B**
Trichloroethene	**87**	**(75 - 122)**			**SW846 8260B**
	87	**(75 - 122)**	**0.24**	**(0-20)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	100	(73 - 122)
	101	(73 - 122)
1,2-Dichloroethane-d4	96	(61 - 128)
	95	(61 - 128)
Toluene-d8	96	(76 - 110)
	100	(76 - 110)
4-Bromofluorobenzene	96	(74 - 116)
	99	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE DATA REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7H8E1AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: A4A020000-237 F7H8E1AD-LCSD
Prep Date.....: 01/02/04 **Analysis Date..:** 01/02/04
Prep Batch #...: 4002237
Dilution Factor: 1 **Final Wgt/Vol..:** 5 mL
Initial Wgt/Vol: 5 mL

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
Benzene	**10**	**10**	**ug/L**	**100**		**SW846 8260B**
	10	**11**	**ug/L**	**107**	**6.8**	**SW846 8260B**
Chlorobenzene	**10**	**9.8**	**ug/L**	**98**		**SW846 8260B**
	10	**11**	**ug/L**	**106**	**8.7**	**SW846 8260B**
1,1-Dichloroethene	**10**	**11**	**ug/L**	**110**		**SW846 8260B**
	10	**12**	**ug/L**	**120**	**9.0**	**SW846 8260B**
Toluene	**10**	**10**	**ug/L**	**102**		**SW846 8260B**
	10	**11**	**ug/L**	**111**	**8.4**	**SW846 8260B**
Trichloroethene	**10**	**10**	**ug/L**	**101**		**SW846 8260B**
	10	**11**	**ug/L**	**110**	**8.4**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	106	(73 - 122)
	106	(73 - 122)
1,2-Dichloroethane-d4	109	(61 - 128)
	105	(61 - 128)
Toluene-d8	107	(76 - 110)
	107	(76 - 110)
4-Bromofluorobenzene	98	(74 - 116)
	97	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F7H8E1AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: A4A020000-237 F7H8E1AD-LCSD
Prep Date.....: 01/02/04 **Analysis Date..:** 01/02/04
Prep Batch #...: 4002237
Dilution Factor: 1 **Final Wgt/Vol..:** 5 mL
Initial Wgt/Vol: 5 mL

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Benzene	**100**	**(80 - 116)**			**SW846 8260B**
	107	**(80 - 116)**	**6.8**	**(0-20)**	**SW846 8260B**
Chlorobenzene	**98**	**(76 - 117)**			**SW846 8260B**
	106	**(76 - 117)**	**8.7**	**(0-20)**	**SW846 8260B**
1,1-Dichloroethene	**110**	**(63 - 130)**			**SW846 8260B**
	120	**(63 - 130)**	**9.0**	**(0-20)**	**SW846 8260B**
Toluene	**102**	**(74 - 119)**			**SW846 8260B**
	111	**(74 - 119)**	**8.4**	**(0-20)**	**SW846 8260B**
Trichloroethene	**101**	**(75 - 122)**			**SW846 8260B**
	110	**(75 - 122)**	**8.4**	**(0-20)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	106	(73 - 122)
	106	(73 - 122)
1,2-Dichloroethane-d4	109	(61 - 128)
	105	(61 - 128)
Toluene-d8	107	(76 - 110)
	107	(76 - 110)
4-Bromofluorobenzene	98	(74 - 116)
	97	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE DATA REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F665J1AC-MS **Matrix.....:** WG
MS Lot-Sample #: A3L200162-016 F665J1AD-MSD
Date Sampled...: 12/18/03 11:07 **Date Received..:** 12/20/03
Prep Date.....: 12/30/03 **Analysis Date..:** 12/30/03
Prep Batch #...: 3365253
Dilution Factor: 1 **Initial Wgt/Vol:** 5 mL **Final Wgt/Vol..:** 5 mL

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD
Benzene	**ND**	**10**	**8.9**	**ug/L**	**89**		**SW846 8260B**
	ND	**10**	**9.7**	**ug/L**	**97**	**8.7**	**SW846 8260B**
Chlorobenzene	**ND**	**10**	**8.7**	**ug/L**	**87**		**SW846 8260B**
	ND	**10**	**9.8**	**ug/L**	**98**	**11**	**SW846 8260B**
1,1-Dichloroethene	**ND**	**10**	**10**	**ug/L**	**100**		**SW846 8260B**
	ND	**10**	**10**	**ug/L**	**102**	**2.0**	**SW846 8260B**
Toluene	**ND**	**10**	**9.1**	**ug/L**	**91**		**SW846 8260B**
	ND	**10**	**9.9**	**ug/L**	**99**	**8.5**	**SW846 8260B**
Trichloroethene	**1.2**	**10**	**9.8**	**ug/L**	**86**		**SW846 8260B**
	1.2	**10**	**11**	**ug/L**	**95**	**8.6**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	102	(73 - 122)
	103	(73 - 122)
1,2-Dichloroethane-d4	90	(61 - 128)
	95	(61 - 128)
Toluene-d8	98	(76 - 110)
	99	(76 - 110)
4-Bromofluorobenzene	96	(74 - 116)
	100	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F665J1AC-MS **Matrix.....:** WG
MS Lot-Sample #: A3L200162-016 F665J1AD-MSD
Date Sampled...: 12/18/03 11:07 **Date Received..:** 12/20/03
Prep Date.....: 12/30/03 **Analysis Date..:** 12/30/03
Prep Batch #...: 3365253
Dilution Factor: 1 **Initial Wgt/Vol:** 5 mL **Final Wgt/Vol..:** 5 mL

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Benzene	**89**	**(78 - 118)**			**SW846 8260B**
	97	**(78 - 118)**	**8.7**	**(0-20)**	**SW846 8260B**
Chlorobenzene	**87**	**(76 - 117)**			**SW846 8260B**
	98	**(76 - 117)**	**11**	**(0-20)**	**SW846 8260B**
1,1-Dichloroethene	**100**	**(62 - 130)**			**SW846 8260B**
	102	**(62 - 130)**	**2.0**	**(0-20)**	**SW846 8260B**
Toluene	**91**	**(70 - 119)**			**SW846 8260B**
	99	**(70 - 119)**	**8.5**	**(0-20)**	**SW846 8260B**
Trichloroethene	**86**	**(62 - 130)**			**SW846 8260B**
	95	**(62 - 130)**	**8.6**	**(0-20)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	102	(73 - 122)
	103	(73 - 122)
1,2-Dichloroethane-d4	90	(61 - 128)
	95	(61 - 128)
Toluene-d8	98	(76 - 110)
	99	(76 - 110)
4-Bromofluorobenzene	96	(74 - 116)
	100	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE DATA REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F69M31AC-MS **Matrix.....:** WATER
MS Lot-Sample #: A3L230162-003 F69M31AD-MSD
Date Sampled...: 12/19/03 10:52 **Date Received..:** 12/20/03
Prep Date.....: 12/31/03 **Analysis Date..:** 12/31/03
Prep Batch #...: 4002234
Dilution Factor: 1 **Initial Wgt/Vol:** 5 mL **Final Wgt/Vol..:** 5 mL

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD
Benzene	**ND**	**10**	**9.4**	**ug/L**	**94**		**SW846 8260B**
	ND	**10**	**9.9**	**ug/L**	**99**	**4.6**	**SW846 8260B**
Chlorobenzene	**ND**	**10**	**8.9**	**ug/L**	**89**		**SW846 8260B**
	ND	**10**	**9.5**	**ug/L**	**95**	**6.7**	**SW846 8260B**
1,1-Dichloroethene	**ND**	**10**	**10**	**ug/L**	**102**		**SW846 8260B**
	ND	**10**	**11**	**ug/L**	**107**	**4.6**	**SW846 8260B**
Toluene	**ND**	**10**	**9.3**	**ug/L**	**93**		**SW846 8260B**
	ND	**10**	**10**	**ug/L**	**100**	**7.4**	**SW846 8260B**
Trichloroethene	**ND**	**10**	**8.4**	**ug/L**	**84**		**SW846 8260B**
	ND	**10**	**8.5**	**ug/L**	**85**	**1.4**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	99	(73 - 122)
	98	(73 - 122)
1,2-Dichloroethane-d4	97	(61 - 128)
	97	(61 - 128)
Toluene-d8	100	(76 - 110)
	101	(76 - 110)
4-Bromofluorobenzene	97	(74 - 116)
	98	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: A3L200162 **Work Order #...:** F69M31AC-MS **Matrix.....:** WATER
MS Lot-Sample #: A3L230162-003 F69M31AD-MSD
Date Sampled...: 12/19/03 10:52 **Date Received..:** 12/20/03
Prep Date.....: 12/31/03 **Analysis Date..:** 12/31/03
Prep Batch #...: 4002234
Dilution Factor: 1 **Initial Wgt/Vol:** 5 mL **Final Wgt/Vol..:** 5 mL

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Benzene	94	(78 - 118)			**SW846 8260B**
	99	(78 - 118)	4.6	(0-20)	**SW846 8260B**
Chlorobenzene	89	(76 - 117)			**SW846 8260B**
	95	(76 - 117)	6.7	(0-20)	**SW846 8260B**
1,1-Dichloroethene	102	(62 - 130)			**SW846 8260B**
	107	(62 - 130)	4.6	(0-20)	**SW846 8260B**
Toluene	93	(70 - 119)			**SW846 8260B**
	100	(70 - 119)	7.4	(0-20)	**SW846 8260B**
Trichloroethene	84	(62 - 130)			**SW846 8260B**
	85	(62 - 130)	1.4	(0-20)	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	99	(73 - 122)
	98	(73 - 122)
1,2-Dichloroethane-d4	97	(61 - 128)
	97	(61 - 128)
Toluene-d8	100	(76 - 110)
	101	(76 - 110)
4-Bromofluorobenzene	97	(74 - 116)
	98	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE DATA REPORT

GC/MS Volatiles

Client Lot #...:	A3L200162	**Work Order #...:**	F7ALK1CE-MS	**Matrix.....:**	WATER
MS Lot-Sample #:	A3L230276-002		F7ALK1CF-MSD		
Date Sampled...:	12/22/03 15:10	**Date Received..:**	12/23/03		
Prep Date.....:	01/02/04	**Analysis Date..:**	01/02/04		
Prep Batch #...:	4002237				
Dilution Factor:	125	**Initial Wgt/Vol:**	5 mL	**Final Wgt/Vol..:**	5 mL

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD
Benzene	**ND**	**1200**	**1200**	**ug/L**	**100**		**SW846 8260B**
	ND	**1200**	**1300**	**ug/L**	**102**	**2.5**	**SW846 8260B**
Chlorobenzene	**20**	**1200**	**1200**	**ug/L**	**93**		**SW846 8260B**
	20	**1200**	**1200**	**ug/L**	**94**	**0.86**	**SW846 8260B**
1,1-Dichloroethene	**31**	**1200**	**1500**	**ug/L**	**115**		**SW846 8260B**
	31	**1200**	**1500**	**ug/L**	**114**	**0.62**	**SW846 8260B**
Toluene	**ND**	**1200**	**1300**	**ug/L**	**101**		**SW846 8260B**
	ND	**1200**	**1300**	**ug/L**	**102**	**1.1**	**SW846 8260B**
Trichloroethene	**4800**	**1200**	**5700**	**ug/L**	**77**		**SW846 8260B**
	4800	**1200**	**5500**	**ug/L**	**59 a**	**3.9**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	112	(73 - 122)
	109	(73 - 122)
1,2-Dichloroethane-d4	115	(61 - 128)
	113	(61 - 128)
Toluene-d8	109	(76 - 110)
	107	(76 - 110)
4-Bromofluorobenzene	101	(74 - 116)
	99	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

a Spiked analyte recovery is outside stated control limits.

MATRIX SPIKE SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...:	A3L200162	**Work Order #...:**	F7ALK1CE-MS	**Matrix.....:**	WATER
MS Lot-Sample #:	A3L230276-002		F7ALK1CF-MSD		
Date Sampled...:	12/22/03 15:10	**Date Received..:**	12/23/03		
Prep Date.....:	01/02/04	**Analysis Date..:**	01/02/04		
Prep Batch #...:	4002237				
Dilution Factor:	125	**Initial Wgt/Vol:**	5 mL	**Final Wgt/Vol..:**	5 mL

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Benzene	**100**	**(78 - 118)**			**SW846 8260B**
	102	**(78 - 118)**	**2.5**	**(0-20)**	**SW846 8260B**
Chlorobenzene	**93**	**(76 - 117)**			**SW846 8260B**
	94	**(76 - 117)**	**0.86**	**(0-20)**	**SW846 8260B**
1,1-Dichloroethene	**115**	**(62 - 130)**			**SW846 8260B**
	114	**(62 - 130)**	**0.62**	**(0-20)**	**SW846 8260B**
Toluene	**101**	**(70 - 119)**			**SW846 8260B**
	102	**(70 - 119)**	**1.1**	**(0-20)**	**SW846 8260B**
Trichloroethene	**77**	**(62 - 130)**			**SW846 8260B**
	59 a	**(62 - 130)**	**3.9**	**(0-20)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	112	(73 - 122)
	109	(73 - 122)
1,2-Dichloroethane-d4	115	(61 - 128)
	113	(61 - 128)
Toluene-d8	109	(76 - 110)
	107	(76 - 110)
4-Bromofluorobenzene	101	(74 - 116)
	99	(74 - 116)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

a Spiked analyte recovery is outside stated control limits.

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GCMS SEMIVOLATILE DATA

CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121703-JB-096

GC/MS Semivolatiles

Lot-Sample #...: A3L200162-007 Work Order #...: F664P1AA Matrix.....: WG
Date Sampled...: 12/18/03 13:12 Date Received..: 12/20/03
Prep Date.....: 12/22/03 Analysis Date..: 12/31/03
Prep Batch #...: 3356118
Dilution Factor: 10 Initial Wgt/Vol: 1030 mL Final Wgt/Vol..: 2 mL
Method.....: SW846 8270C

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	ND	50	ug/L	6.9
Acenaphthylene	ND	50	ug/L	4.1
Acetophenone	ND	50	ug/L	6.5
Anthracene	ND	50	ug/L	5.9
Atrazine	ND	50	ug/L	3.5
Benzo(a)anthracene	ND	40	ug/L	6.8
Benzo(a)pyrene	ND	40	ug/L	5.3
Benzo(b)fluoranthene	ND	40	ug/L	7.1
Benzo(ghi)perylene	ND	50	ug/L	7.0
Benzo(k)fluoranthene	ND	50	ug/L	6.4
Benzaldehyde	ND	100	ug/L	5.9
1,1'-Biphenyl	ND	100	ug/L	6.5
bis(2-Chloroethoxy) methane	ND	50	ug/L	10
bis(2-Chloroethyl)-ether	ND	40	ug/L	17
bis(2-Ethylhexyl) phthalate	**4.7 J**	**50**	**ug/L**	**2.0**
4-Bromophenyl phenyl ether	ND	50	ug/L	7.8
Butyl benzyl phthalate	ND	50	ug/L	2.3
Caprolactam	ND	100	ug/L	4.5
Carbazole	ND	100	ug/L	6.1
4-Chloroaniline	ND	200	ug/L	9.0
4-Chloro-3-methylphenol	ND	50	ug/L	5.5
2-Chloronaphthalene	ND	50	ug/L	7.3
2-Chlorophenol	ND	50	ug/L	13
4-Chlorophenyl phenyl ether	ND	50	ug/L	6.6
Chrysene	ND	50	ug/L	6.7
Dibenz(a,h)anthracene	ND	40	ug/L	6.8
Dibenzofuran	ND	50	ug/L	6.6
3,3'-Dichlorobenzidine	ND	40	ug/L	4.7
2,4-Dichlorophenol	ND	100	ug/L	7.0
Diethyl phthalate	ND	50	ug/L	2.5
2,4-Dimethylphenol	ND	50	ug/L	10
Dimethyl phthalate	ND	50	ug/L	2.0
Di-n-butyl phthalate	ND	50	ug/L	3.7

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CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121703-JB-096

GC/MS Semivolatiles

Lot-Sample #...: A3L200162-007 Work Order #...: F664P1AA Matrix.....: WG

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4,6-Dinitro-2-methylphenol	ND	200	ug/L	21
2,4-Dinitrophenol	ND	200	ug/L	33
2,4-Dinitrotoluene	ND	50	ug/L	4.6
2,6-Dinitrotoluene	ND	50	ug/L	7.1
Di-n-octyl phthalate	ND	50	ug/L	6.9
Fluoranthene	ND	50	ug/L	7.1
Fluorene	ND	50	ug/L	7.5
Hexachlorobenzene	ND	50	ug/L	7.7
Hexachlorobutadiene	ND	50	ug/L	15
Hexachlorocyclopenta-diene	ND	50	ug/L	11
Hexachloroethane	ND	50	ug/L	16
Indeno(1,2,3-cd)pyrene	ND	40	ug/L	6.9
Isophorone	ND	50	ug/L	8.6
2-Methylnaphthalene	ND	50	ug/L	9.3
2-Methylphenol	ND	50	ug/L	9.0
4-Methylphenol	ND	50	ug/L	7.1
Naphthalene	ND	50	ug/L	13
2-Nitroaniline	ND	200	ug/L	4.9
3-Nitroaniline	ND	200	ug/L	4.8
4-Nitroaniline	ND	200	ug/L	5.9
Nitrobenzene	ND	40	ug/L	13
2-Nitrophenol	ND	50	ug/L	9.5
4-Nitrophenol	ND	200	ug/L	35
N-Nitrosodi-n-propyl-amine	ND	50	ug/L	11
N-Nitrosodiphenylamine	ND	50	ug/L	6.4
2,2'-oxybis(1-Chloropropane)	ND	50	ug/L	18
Pentachlorophenol	ND	200	ug/L	26
Phenanthrene	ND	50	ug/L	6.8
Phenol	ND	50	ug/L	13
Pyrene	ND	50	ug/L	6.3
2,4,5-Trichloro-phenol	ND	50	ug/L	8.6
2,4,6-Trichloro-phenol	ND	40	ug/L	7.1

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	72 DIL	(32 - 112)
2-Fluorobiphenyl	77 DIL	(30 - 110)
Terphenyl-d14	71 DIL	(10 - 144)
Phenol-d5	68 DIL	(10 - 113)
2-Fluorophenol	70 DIL	(13 - 110)
2,4,6-Tribromophenol	78 DIL	(21 - 122)

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CONESTOGA ROVERS & ASSOC.,INC.

Client Sample ID: GW-17360-121703-JB-096

GC/MS Semivolatiles

Lot-Sample #...: A3L200162-007 Work Order #...: F664P1AA Matrix.....: WG

NOTE(S):

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

J Estimated result. Result is less than RL.

CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121703-JB-098

GC/MS Semivolatiles

Lot-Sample #...: A3L200162-008	**Work Order #...:** F664W1AA	**Matrix.....:** WG	
Date Sampled...: 12/18/03 13:27	**Date Received..:** 12/20/03		
Prep Date.....: 12/22/03	**Analysis Date..:** 12/31/03		
Prep Batch #...: 3356118			
Dilution Factor: 4	**Initial Wgt/Vol:** 975 mL	**Final Wgt/Vol..:** 2 mL	
	Method.....: SW846 8270C		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	ND	20	ug/L	2.8
Acenaphthylene	ND	20	ug/L	1.6
Acetophenone	ND	20	ug/L	2.6
Anthracene	ND	20	ug/L	2.4
Atrazine	ND	20	ug/L	1.4
Benzo(a)anthracene	ND	16	ug/L	2.7
Benzo(a)pyrene	ND	16	ug/L	2.1
Benzo(b)fluoranthene	ND	16	ug/L	2.8
Benzo(ghi)perylene	ND	20	ug/L	2.8
Benzo(k)fluoranthene	ND	20	ug/L	2.6
Benzaldehyde	ND	40	ug/L	2.4
1,1'-Biphenyl	ND	40	ug/L	2.6
bis(2-Chloroethoxy) methane	ND	20	ug/L	4.0
bis(2-Chloroethyl)-ether	ND	16	ug/L	6.8
bis(2-Ethylhexyl) phthalate	ND	20	ug/L	0.80
4-Bromophenyl phenyl ether	ND	20	ug/L	3.1
Butyl benzyl phthalate	ND	20	ug/L	0.92
Caprolactam	**19 J,B**	**40**	**ug/L**	**1.8**
Carbazole	ND	40	ug/L	2.4
4-Chloroaniline	ND	80	ug/L	3.6
4-Chloro-3-methylphenol	ND	20	ug/L	2.2
2-Chloronaphthalene	ND	20	ug/L	2.9
2-Chlorophenol	ND	20	ug/L	5.2
4-Chlorophenyl phenyl ether	ND	20	ug/L	2.6
Chrysene	ND	20	ug/L	2.7
Dibenz(a,h)anthracene	ND	16	ug/L	2.7
Dibenzofuran	ND	20	ug/L	2.6
3,3'-Dichlorobenzidine	ND	16	ug/L	1.9
2,4-Dichlorophenol	ND	40	ug/L	2.8
Diethyl phthalate	ND	20	ug/L	1.0
2,4-Dimethylphenol	ND	20	ug/L	4.0
Dimethyl phthalate	ND	20	ug/L	0.80
Di-n-butyl phthalate	ND	20	ug/L	1.5

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CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121703-JB-098

GC/MS Semivolatiles

Lot-Sample #...: A3L200162-008 Work Order #...: F664W1AA Matrix.....: WG

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4,6-Dinitro-2-methylphenol	ND	80	ug/L	8.4
2,4-Dinitrophenol	ND	80	ug/L	13
2,4-Dinitrotoluene	ND	20	ug/L	1.8
2,6-Dinitrotoluene	ND	20	ug/L	2.8
Di-n-octyl phthalate	ND	20	ug/L	2.8
Fluoranthene	**10 J**	**20**	**ug/L**	**2.8**
Fluorene	ND	20	ug/L	3.0
Hexachlorobenzene	ND	20	ug/L	3.1
Hexachlorobutadiene	ND	20	ug/L	6.0
Hexachlorocyclopenta-diene	ND	20	ug/L	4.4
Hexachloroethane	ND	20	ug/L	6.4
Indeno(1,2,3-cd)pyrene	ND	16	ug/L	2.8
Isophorone	ND	20	ug/L	3.4
2-Methylnaphthalene	ND	20	ug/L	3.7
2-Methylphenol	ND	20	ug/L	3.6
4-Methylphenol	ND	20	ug/L	2.8
Naphthalene	ND	20	ug/L	5.2
2-Nitroaniline	ND	80	ug/L	2.0
3-Nitroaniline	ND	80	ug/L	1.9
4-Nitroaniline	ND	80	ug/L	2.4
Nitrobenzene	ND	16	ug/L	5.2
2-Nitrophenol	ND	20	ug/L	3.8
4-Nitrophenol	ND	80	ug/L	14
N-Nitrosodi-n-propyl-amine	ND	20	ug/L	4.4
N-Nitrosodiphenylamine	ND	20	ug/L	2.6
2,2'-oxybis(1-Chloropropane)	ND	20	ug/L	7.2
Pentachlorophenol	ND	80	ug/L	10
Phenanthrene	**4.9 J**	**20**	**ug/L**	**2.7**
Phenol	ND	20	ug/L	5.2
Pyrene	**12 J**	**20**	**ug/L**	**2.5**
2,4,5-Trichloro-phenol	ND	20	ug/L	3.4
2,4,6-Trichloro-phenol	ND	16	ug/L	2.8

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	71 DIL	(32 - 112)
2-Fluorobiphenyl	74 DIL	(30 - 110)
Terphenyl-d14	86 DIL	(10 - 144)
Phenol-d5	64 DIL	(10 - 113)
2-Fluorophenol	64 DIL	(13 - 110)
2,4,6-Tribromophenol	69 DIL	(21 - 122)

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CONESTOGA ROVERS & ASSOC.,INC.

Client Sample ID: GW-17360-121703-JB-098

GC/MS Semivolatiles

Lot-Sample #...: A3L200162-008 Work Order #...: F664W1AA Matrix.....: WG

NOTE(S):

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

J Estimated result. Result is less than RL.

B Method blank contamination. The associated method blank contains the target analyte at a reportable level.

CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121703-JB-099

GC/MS Semivolatiles

Lot-Sample #...: A3L200162-009 Work Order #...: F66401AA Matrix.....: WG
Date Sampled...: 12/18/03 13:30 Date Received..: 12/20/03
Prep Date.....: 12/22/03 Analysis Date..: 12/30/03
Prep Batch #...: 3356118
Dilution Factor: 1 Initial Wgt/Vol: 1030 mL Final Wgt/Vol..: 2 mL
Method.....: SW846 8270C

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	ND	5.0	ug/L	0.69
Acenaphthylene	ND	5.0	ug/L	0.41
Acetophenone	ND	5.0	ug/L	0.65
Anthracene	ND	5.0	ug/L	0.59
Atrazine	ND	5.0	ug/L	0.35
Benzo(a)anthracene	ND	4.0	ug/L	0.68
Benzo(a)pyrene	ND	4.0	ug/L	0.53
Benzo(b)fluoranthene	ND	4.0	ug/L	0.71
Benzo(ghi)perylene	ND	5.0	ug/L	0.70
Benzo(k)fluoranthene	ND	5.0	ug/L	0.64
Benzaldehyde	ND	10	ug/L	0.59
1,1'-Biphenyl	ND	10	ug/L	0.65
bis(2-Chloroethoxy) methane	ND	5.0	ug/L	1.0
bis(2-Chloroethyl)-ether	ND	4.0	ug/L	1.7
bis(2-Ethylhexyl) phthalate	**0.97 J**	**5.0**	**ug/L**	**0.20**
4-Bromophenyl phenyl ether	ND	5.0	ug/L	0.78
Butyl benzyl phthalate	ND	5.0	ug/L	0.23
Caprolactam	**5.6 J,B**	**10**	**ug/L**	**0.45**
Carbazole	ND	10	ug/L	0.61
4-Chloroaniline	ND	20	ug/L	0.90
4-Chloro-3-methylphenol	ND	5.0	ug/L	0.55
2-Chloronaphthalene	ND	5.0	ug/L	0.73
2-Chlorophenol	ND	5.0	ug/L	1.3
4-Chlorophenyl phenyl ether	ND	5.0	ug/L	0.66
Chrysene	ND	5.0	ug/L	0.67
Dibenz(a,h)anthracene	ND	4.0	ug/L	0.68
Dibenzofuran	ND	5.0	ug/L	0.66
3,3'-Dichlorobenzidine	ND	4.0	ug/L	0.47
2,4-Dichlorophenol	ND	10	ug/L	0.70
Diethyl phthalate	ND	5.0	ug/L	0.25
2,4-Dimethylphenol	ND	5.0	ug/L	1.0
Dimethyl phthalate	ND	5.0	ug/L	0.20
Di-n-butyl phthalate	ND	5.0	ug/L	0.37

(Continued on next page)

CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121703-JB-099

GC/MS Semivolatiles

Lot-Sample #...: A3L200162-009 Work Order #...: F66401AA Matrix.....: WG

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4,6-Dinitro-2-methylphenol	ND	20	ug/L	2.1
2,4-Dinitrophenol	ND	20	ug/L	3.3
2,4-Dinitrotoluene	ND	5.0	ug/L	0.46
2,6-Dinitrotoluene	ND	5.0	ug/L	0.71
Di-n-octyl phthalate	ND	5.0	ug/L	0.69
Fluoranthene	ND	5.0	ug/L	0.71
Fluorene	ND	5.0	ug/L	0.75
Hexachlorobenzene	ND	5.0	ug/L	0.77
Hexachlorobutadiene	ND	5.0	ug/L	1.5
Hexachlorocyclopentadiene	ND	5.0	ug/L	1.1
Hexachloroethane	ND	5.0	ug/L	1.6
Indeno(1,2,3-cd)pyrene	ND	4.0	ug/L	0.69
Isophorone	ND	5.0	ug/L	0.86
2-Methylnaphthalene	ND	5.0	ug/L	0.93
2-Methylphenol	ND	5.0	ug/L	0.90
4-Methylphenol	ND	5.0	ug/L	0.71
Naphthalene	ND	5.0	ug/L	1.3
2-Nitroaniline	ND	20	ug/L	0.49
3-Nitroaniline	ND	20	ug/L	0.48
4-Nitroaniline	ND	20	ug/L	0.59
Nitrobenzene	ND	4.0	ug/L	1.3
2-Nitrophenol	ND	5.0	ug/L	0.95
4-Nitrophenol	ND	20	ug/L	3.5
N-Nitrosodi-n-propylamine	ND	5.0	ug/L	1.1
N-Nitrosodiphenylamine	ND	5.0	ug/L	0.64
2,2'-oxybis(1-Chloropropane)	ND	5.0	ug/L	1.8
Pentachlorophenol	ND	20	ug/L	2.6
Phenanthrene	ND	5.0	ug/L	0.68
Phenol	**1.3 J**	**5.0**	**ug/L**	**1.3**
Pyrene	ND	5.0	ug/L	0.63
2,4,5-Trichlorophenol	ND	5.0	ug/L	0.86
2,4,6-Trichlorophenol	ND	4.0	ug/L	0.71

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	66	(32 - 112)
2-Fluorobiphenyl	59	(30 - 110)
Terphenyl-d14	75	(10 - 144)
Phenol-d5	60	(10 - 113)
2-Fluorophenol	63	(13 - 110)
2,4,6-Tribromophenol	67	(21 - 122)

(Continued on next page)

CONESTOGA ROVERS & ASSOC., INC.

Client Sample ID: GW-17360-121703-JB-099

GC/MS Semivolatiles

Lot-Sample #...: A3L200162-009 Work Order #...: F66401AA Matrix.....: WG

NOTE(S):

J Estimated result. Result is less than RL.

B Method blank contamination. The associated method blank contains the target analyte at a reportable level.

CONESTOGA ROVERS & ASSOC.,INC.

Client Sample ID: GW-17360-121703-JB-101

GC/MS Semivolatiles

Lot-Sample #...: A3L200162-011 Work Order #...: F66461AA Matrix.....: WG
Date Sampled...: 12/18/03 16:07 Date Received..: 12/20/03
Prep Date.....: 12/22/03 Analysis Date..: 12/29/03
Prep Batch #...: 3356118
Dilution Factor: 1 Initial Wgt/Vol: 1040 mL Final Wgt/Vol..: 2 mL
Method.....: SW846 8270C

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	ND	5.0	ug/L	0.69
Acenaphthylene	ND	5.0	ug/L	0.41
Acetophenone	ND	5.0	ug/L	0.65
Anthracene	ND	5.0	ug/L	0.59
Atrazine	ND	5.0	ug/L	0.35
Benzo(a)anthracene	ND	4.0	ug/L	0.68
Benzo(a)pyrene	ND	4.0	ug/L	0.53
Benzo(b)fluoranthene	ND	4.0	ug/L	0.71
Benzo(ghi)perylene	ND	5.0	ug/L	0.70
Benzo(k)fluoranthene	ND	5.0	ug/L	0.64
Benzaldehyde	ND	10	ug/L	0.59
1,1'-Biphenyl	ND	10	ug/L	0.65
bis(2-Chloroethoxy) methane	ND	5.0	ug/L	1.0
bis(2-Chloroethyl)-ether	ND	4.0	ug/L	1.7
bis(2-Ethylhexyl) phthalate	**0.79 J**	**5.0**	**ug/L**	**0.20**
4-Bromophenyl phenyl ether	ND	5.0	ug/L	0.78
Butyl benzyl phthalate	ND	5.0	ug/L	0.23
Caprolactam	ND	10	ug/L	0.45
Carbazole	ND	10	ug/L	0.61
4-Chloroaniline	ND	20	ug/L	0.90
4-Chloro-3-methylphenol	ND	5.0	ug/L	0.55
2-Chloronaphthalene	ND	5.0	ug/L	0.73
2-Chlorophenol	ND	5.0	ug/L	1.3
4-Chlorophenyl phenyl ether	ND	5.0	ug/L	0.66
Chrysene	ND	5.0	ug/L	0.67
Dibenz(a,h)anthracene	ND	4.0	ug/L	0.68
Dibenzofuran	ND	5.0	ug/L	0.66
3,3'-Dichlorobenzidine	ND	4.0	ug/L	0.47
2,4-Dichlorophenol	ND	10	ug/L	0.70
Diethyl phthalate	ND	5.0	ug/L	0.25
2,4-Dimethylphenol	ND	5.0	ug/L	1.0
Dimethyl phthalate	ND	5.0	ug/L	0.20
Di-n-butyl phthalate	ND	5.0	ug/L	0.37

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CONESTOGA ROVERS & ASSOC.,INC.

Client Sample ID: GW-17360-121703-JB-101

GC/MS Semivolatiles

Lot-Sample #...: A3L200162-011 Work Order #...: F66461AA Matrix.....: WG

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4,6-Dinitro-2-methylphenol	ND	20	ug/L	2.1
2,4-Dinitrophenol	ND	20	ug/L	3.3
2,4-Dinitrotoluene	ND	5.0	ug/L	0.46
2,6-Dinitrotoluene	ND	5.0	ug/L	0.71
Di-n-octyl phthalate	ND	5.0	ug/L	0.69
Fluoranthene	ND	5.0	ug/L	0.71
Fluorene	ND	5.0	ug/L	0.75
Hexachlorobenzene	ND	5.0	ug/L	0.77
Hexachlorobutadiene	ND	5.0	ug/L	1.5
Hexachlorocyclopenta-diene	ND	5.0	ug/L	1.1
Hexachloroethane	ND	5.0	ug/L	1.6
Indeno(1,2,3-cd)pyrene	ND	4.0	ug/L	0.69
Isophorone	ND	5.0	ug/L	0.86
2-Methylnaphthalene	ND	5.0	ug/L	0.93
2-Methylphenol	ND	5.0	ug/L	0.90
4-Methylphenol	ND	5.0	ug/L	0.71
Naphthalene	ND	5.0	ug/L	1.3
2-Nitroaniline	ND	20	ug/L	0.49
3-Nitroaniline	ND	20	ug/L	0.48
4-Nitroaniline	ND	20	ug/L	0.59
Nitrobenzene	ND	4.0	ug/L	1.3
2-Nitrophenol	ND	5.0	ug/L	0.95
4-Nitrophenol	ND	20	ug/L	3.5
N-Nitrosodi-n-propyl-amine	ND	5.0	ug/L	1.1
N-Nitrosodiphenylamine	ND	5.0	ug/L	0.64
2,2'-oxybis(1-Chloropropane)	ND	5.0	ug/L	1.8
Pentachlorophenol	ND	20	ug/L	2.6
Phenanthrene	ND	5.0	ug/L	0.68
Phenol	**9.0**	**5.0**	**ug/L**	**1.3**
Pyrene	ND	5.0	ug/L	0.63
2,4,5-Trichloro-phenol	ND	5.0	ug/L	0.86
2,4,6-Trichloro-phenol	ND	4.0	ug/L	0.71

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	82	(32 - 112)
2-Fluorobiphenyl	66	(30 - 110)
Terphenyl-d14	71	(10 - 144)
Phenol-d5	66	(10 - 113)
2-Fluorophenol	63	(13 - 110)
2,4,6-Tribromophenol	74	(21 - 122)

(Continued on next page)

CONESTOGA ROVERS & ASSOC.,INC.

Client Sample ID: GW-17360-121703-JB-101

GC/MS Semivolatiles

Lot-Sample #...: A3L200162-011 Work Order #...: F66461AA Matrix.....: WG

NOTE(S):

J Estimated result. Result is less than RL.

METHOD BLANK REPORT

GC/MS Semivolatiles

Client Lot #...: A3L200162 **Work Order #...:** F67KM1AA **Matrix.....:** WATER
MB Lot-Sample #: A3L220000-118

Prep Date.....: 12/22/03 **Final Wgt/Vol..:** 2 mL
Analysis Date..: 12/29/03 **Prep Batch #...:** 3356118
Dilution Factor: 1 **Initial Wgt/Vol:** 1000 mL

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Acenaphthene	ND	5.0	ug/L	SW846 8270C
Acenaphthylene	ND	5.0	ug/L	SW846 8270C
Acetophenone	ND	5.0	ug/L	SW846 8270C
Anthracene	ND	5.0	ug/L	SW846 8270C
Atrazine	ND	5.0	ug/L	SW846 8270C
Benzo(a)anthracene	ND	4.0	ug/L	SW846 8270C
Benzo(a)pyrene	ND	4.0	ug/L	SW846 8270C
Benzo(b)fluoranthene	ND	4.0	ug/L	SW846 8270C
Benzo(ghi)perylene	ND	5.0	ug/L	SW846 8270C
Benzo(k)fluoranthene	ND	5.0	ug/L	SW846 8270C
Benzaldehyde	ND	10	ug/L	SW846 8270C
1,1'-Biphenyl	ND	10	ug/L	SW846 8270C
bis(2-Chloroethoxy) methane	ND	5.0	ug/L	SW846 8270C
bis(2-Chloroethyl)-ether	ND	4.0	ug/L	SW846 8270C
bis(2-Ethylhexyl) phthalate	ND	5.0	ug/L	SW846 8270C
4-Bromophenyl phenyl ether	ND	5.0	ug/L	SW846 8270C
Butyl benzyl phthalate	ND	5.0	ug/L	SW846 8270C
Caprolactam	**3.2 J**	**10**	**ug/L**	**SW846 8270C**
Carbazole	ND	10	ug/L	SW846 8270C
4-Chloroaniline	ND	20	ug/L	SW846 8270C
4-Chloro-3-methylphenol	ND	5.0	ug/L	SW846 8270C
2-Chloronaphthalene	ND	5.0	ug/L	SW846 8270C
2-Chlorophenol	ND	5.0	ug/L	SW846 8270C
4-Chlorophenyl phenyl ether	ND	5.0	ug/L	SW846 8270C
Chrysene	ND	5.0	ug/L	SW846 8270C
Dibenz(a,h)anthracene	ND	4.0	ug/L	SW846 8270C
Dibenzofuran	ND	5.0	ug/L	SW846 8270C
3,3'-Dichlorobenzidine	ND	4.0	ug/L	SW846 8270C
2,4-Dichlorophenol	ND	10	ug/L	SW846 8270C
Diethyl phthalate	ND	5.0	ug/L	SW846 8270C
2,4-Dimethylphenol	ND	5.0	ug/L	SW846 8270C
Dimethyl phthalate	ND	5.0	ug/L	SW846 8270C
Di-n-butyl phthalate	ND	5.0	ug/L	SW846 8270C
4,6-Dinitro-2-methylphenol	ND	20	ug/L	SW846 8270C
2,4-Dinitrophenol	ND	20	ug/L	SW846 8270C

(Continued on next page)

METHOD BLANK REPORT

GC/MS Semivolatiles

Client Lot #...: A3L200162 **Work Order #...:** F67KM1AA **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
2,4-Dinitrotoluene	ND	5.0	ug/L	SW846 8270C
2,6-Dinitrotoluene	ND	5.0	ug/L	SW846 8270C
Di-n-octyl phthalate	ND	5.0	ug/L	SW846 8270C
Fluoranthene	ND	5.0	ug/L	SW846 8270C
Fluorene	ND	5.0	ug/L	SW846 8270C
Hexachlorobenzene	ND	5.0	ug/L	SW846 8270C
Hexachlorobutadiene	ND	5.0	ug/L	SW846 8270C
Hexachlorocyclopenta-diene	ND	5.0	ug/L	SW846 8270C
Hexachloroethane	ND	5.0	ug/L	SW846 8270C
Indeno(1,2,3-cd)pyrene	ND	4.0	ug/L	SW846 8270C
Isophorone	ND	5.0	ug/L	SW846 8270C
2-Methylnaphthalene	ND	5.0	ug/L	SW846 8270C
2-Methylphenol	ND	5.0	ug/L	SW846 8270C
4-Methylphenol	ND	5.0	ug/L	SW846 8270C
Naphthalene	ND	5.0	ug/L	SW846 8270C
2-Nitroaniline	ND	20	ug/L	SW846 8270C
3-Nitroaniline	ND	20	ug/L	SW846 8270C
4-Nitroaniline	ND	20	ug/L	SW846 8270C
Nitrobenzene	ND	4.0	ug/L	SW846 8270C
2-Nitrophenol	ND	5.0	ug/L	SW846 8270C
4-Nitrophenol	ND	20	ug/L	SW846 8270C
N-Nitrosodi-n-propyl-amine	ND	5.0	ug/L	SW846 8270C
N-Nitrosodiphenylamine	ND	5.0	ug/L	SW846 8270C
2,2'-oxybis(1-Chloropropa	ND	5.0	ug/L	SW846 8270C
Pentachlorophenol	ND	20	ug/L	SW846 8270C
Phenanthrene	ND	5.0	ug/L	SW846 8270C
Phenol	ND	5.0	ug/L	SW846 8270C
Pyrene	ND	5.0	ug/L	SW846 8270C
2,4,5-Trichloro-phenol	ND	5.0	ug/L	SW846 8270C
2,4,6-Trichloro-phenol	ND	4.0	ug/L	SW846 8270C

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	84	(32 - 112)
2-Fluorobiphenyl	66	(30 - 110)
Terphenyl-d14	79	(10 - 144)
Phenol-d5	68	(10 - 113)
2-Fluorophenol	64	(13 - 110)
2,4,6-Tribromophenol	77	(21 - 122)

(Continued on next page)

METHOD BLANK REPORT

GC/MS Semivolatiles

Client Lot #...: A3L200162 **Work Order #...:** F67KM1AA **Matrix.....:** WATER

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

J Estimated result. Result is less than RL.

LABORATORY CONTROL SAMPLE DATA REPORT

GC/MS Semivolatiles

Client Lot #...: A3L200162 **Work Order #...:** F67KM1AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: A3L220000-118 F67KM1AD-LCSD
Prep Date.....: 12/22/03 **Analysis Date..:** 12/29/03
Prep Batch #...: 3356118
Dilution Factor: 1 **Final Wgt/Vol..:** 2 mL
Initial Wgt/Vol: 1000 mL

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
Acenaphthene	20	16	ug/L	79		SW846 8270C
	20	15	ug/L	74	7.3	SW846 8270C
1,2,4-Trichloro-benzene	20	12	ug/L	61		SW846 8270C
	20	11	ug/L	54	12	SW846 8270C
1,4-Dichlorobenzene	20	12	ug/L	60		SW846 8270C
	20	11	ug/L	56	7.8	SW846 8270C
4-Chloro-3-methylphenol	20	14	ug/L	68		SW846 8270C
	20	13	ug/L	66	3.5	SW846 8270C
2-Chlorophenol	20	14	ug/L	68		SW846 8270C
	20	13	ug/L	64	5.7	SW846 8270C
2,4-Dinitrotoluene	20	17	ug/L	84		SW846 8270C
	20	16	ug/L	80	4.6	SW846 8270C
4-Nitrophenol	20	17	ug/L	84		SW846 8270C
	20	16	ug/L	82	2.2	SW846 8270C
N-Nitrosodi-n-propyl-amine	20	18	ug/L	92		SW846 8270C
	20	17	ug/L	87	5.2	SW846 8270C
Pentachlorophenol	20	15	ug/L	74		SW846 8270C
	20	14	ug/L	71	3.8	SW846 8270C
Phenol	20	14	ug/L	70		SW846 8270C
	20	13	ug/L	66	5.4	SW846 8270C
Pyrene	20	12	ug/L	62		SW846 8270C
	20	12	ug/L	59	5.6	SW846 8270C

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	92	(32 - 112)
	88	(32 - 112)
2-Fluorobiphenyl	81	(30 - 110)
	75	(30 - 110)
Terphenyl-d14	72	(10 - 144)
	69	(10 - 144)
Phenol-d5	74	(10 - 113)
	71	(10 - 113)
2-Fluorophenol	69	(13 - 110)
	66	(13 - 110)

(Continued on next page)

LABORATORY CONTROL SAMPLE DATA REPORT

GC/MS Semivolatiles

Client Lot #...: A3L200162 **Work Order #...:** F67KM1AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: A3L220000-118 F67KM1AD-LCSD

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2,4,6-Tribromophenol	82	(21 - 122)
	76	(21 - 122)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...: A3L200162 Work Order #...: F67KM1AC-LCS Matrix.....: WATER
LCS Lot-Sample#: A3L220000-118 F67KM1AD-LCSD
Prep Date.....: 12/22/03 Analysis Date..: 12/29/03
Prep Batch #...: 3356118
Dilution Factor: 1 Final Wgt/Vol..: 2 mL
Initial Wgt/Vol: 1000 mL

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Acenaphthene	79	(39 - 118)			SW846 8270C
	74	(39 - 118)	7.3	(0-35)	SW846 8270C
1,2,4-Trichloro-benzene	61	(31 - 110)			SW846 8270C
	54	(31 - 110)	12	(0-37)	SW846 8270C
1,4-Dichlorobenzene	60	(28 - 110)			SW846 8270C
	56	(28 - 110)	7.8	(0-36)	SW846 8270C
4-Chloro-3-methylphenol	68	(29 - 124)			SW846 8270C
	66	(29 - 124)	3.5	(0-55)	SW846 8270C
2-Chlorophenol	68	(19 - 124)			SW846 8270C
	64	(19 - 124)	5.7	(0-43)	SW846 8270C
2,4-Dinitrotoluene	84	(47 - 131)			SW846 8270C
	80	(47 - 131)	4.6	(0-32)	SW846 8270C
4-Nitrophenol	84	(19 - 144)			SW846 8270C
	82	(19 - 144)	2.2	(0-34)	SW846 8270C
N-Nitrosodi-n-propyl-amine	92	(30 - 115)			SW846 8270C
	87	(30 - 115)	5.2	(0-36)	SW846 8270C
Pentachlorophenol	74	(10 - 140)			SW846 8270C
	71	(10 - 140)	3.8	(0-56)	SW846 8270C
Phenol	70	(10 - 131)			SW846 8270C
	66	(10 - 131)	5.4	(0-43)	SW846 8270C
Pyrene	62	(46 - 130)			SW846 8270C
	59	(46 - 130)	5.6	(0-31)	SW846 8270C

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	92	(32 - 112)
	88	(32 - 112)
2-Fluorobiphenyl	81	(30 - 110)
	75	(30 - 110)
Terphenyl-d14	72	(10 - 144)
	69	(10 - 144)
Phenol-d5	74	(10 - 113)
	71	(10 - 113)
2-Fluorophenol	69	(13 - 110)
	66	(13 - 110)

(Continued on next page)

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...: A3L200162 **Work Order #...:** F67KM1AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: A3L220000-118 F67KM1AD-LCSD

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2,4,6-Tribromophenol	82	(21 - 122)
	76	(21 - 122)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

SEVERN TRENT STL

END OF REPORT

APPENDIX D

WASTE DISPOSAL DOCUMENTATION

40780

NON-HAZARDOUS WASTE MANIFEST

8157631501

NO. 54522

GENERATOR:
General Motors
3126 31st St SE
Grand Rapids, MI
49548

Transporter: Wills Trucking

Vehicle No.: _____

☐ _____

☐ Woodland Meadows RDF (Wayne, MI)

DELIVER TO:

☐ Cedar Ridge RDF (Lewisburg, TN)
☐ Flat Oak RDF (Oklahoma City, OK)
☐ Evergreen RDF (Northwood, OH)
☐ Twin Bridges RDF (Danville, IN)
☐ Venice Park RDF (Lemon, MI)
☑ Chemical Waste Management (Model City, NY)
☐ Middle Peninsula (Glenns, VA)
☐ Chemical Waste Management (Lake Charles, LA)
☐ Milam RDF (East St. Louis, IL)
☐ DeerTrack Park Landfill (Watertown, WI)

Approval No.	Name of Waste Stream	Physical Description (i.e., solid, color)	Volume
6mm179	Soil	Brown	52 CM
6mm179	PPE	Plastic	1 Drum

On behalf of General Motors

Generator Signature: Budget Team Date: 8/21/03

Transporter Signature: _____ Date: 8/22/03

Destination Signature: _____ Date: _____

White: Generator Canary: Disposal Facility Pink: Carrier Gold: Generator

111-0064A

Date 8/22/03
Time 9:19:22

Data Error/Discrepancy Report

Page . . :
Program name

Report Initiation Date: 8/22/03
Five Day Resolution Period Begin Date: 8/23/03

Initiated By : WM0766RML

Receiving Ticket: 081576315 Line # 1
Profile Number : GMMI79
Generator Name : GENERAL MOTORS CORP
City : GRAND RAPIDS

Manifest : 8157631501

Federal EPA ID# : MID006020408
State: MI Zip Code : 49548-2107

TYPE OF DISCREPANCY

Manifest* :
Drum Count* :
Weight :
LDR Form* :
Analytical* :
Physical St* :

Problem (be specific) Profile Modification

Profile calls for 100% soil, 0% liquid. About 30% of the received drums have water in them, anywhere from a few inches to 9-10". Drums are marked "soil cuttings", so one would expect to find water. We may modify profile to include 0-20% water but we need generator to acknowledge it is just water and to give us permission to modify profile. TRUCK BEING HELD pending resolution Please notify gen

Assumption is correct, I agree with profile modification.

Resolved:
Time In : 9:10:44

Unresolved: X
Time Out : 0:00:00

On behalf of General Motors

Kurt D. Bliggard

Authorized Signature

Date Resolved:

** END OF REPORT **

Date 8/22/03
Time 9:19:12

Data Error/Discrepancy Report

Page . . :
Program name

Report Initiation Date: 8/22/03
Five Day Resolution Period Begin Date: 8/23/03

Initiated By : WM0766RML

Receiving Ticket: 0015976315 Line # 2
Profile Number : HMM178
Generator Name : GENERAL MOTORS CORP
City : GRAND RAPIDS State: MI

Manifest : 8157631501
Federal EPA ID# : MID006020408
Zip Code : 49548-2107

TYPE OF DISCREPANCY

Manifest* :
Drum Count* :
Weight* :
LDR Form* :
Analytical* :
Physical St* :

Problem Item specifics: Physical Off Spec

Profile calls for 100% soil, 0% free liquid.
1 drum is marked plastic sheeting and is in fact plastic sheeting and about 2" aqueous liquid. The other drum is marked PPE and appears to be plastic sheeting, some PPE, some sand-like soil moist with we believe again is water. If this waste was generated as a result of the generating the other line item, we suggest a profile mod to account for 0-100% Debris (PPE, Plastic sheeting, etc..) and of course 0-20% water. Gen must verify our assumptions are correct and agree to PMOD.TRUCK BRING HELD pending resolution. Please notify gen.

Assumptions are correct, I agree with profile modification,

Received:
Time In : 9:10:53

Unresolved: X
Time Out : 0:00:00

on behalf of General Motors

Kurt D. Blyzard
Authorized Signature

Date Resolved:

** END OF REPORT **

APPENDIX E

DATA QUALITY VALIDATION MEMORANDUMS

CONESTOGA-ROVERS
& ASSOCIATES

14496 Sheldon Road, Suite #200
Plymouth, Michigan 48170
Telephone: (734) 453-5123 Fax: (734) 453-5201
www.CRAworld.com

MEMORANDUM

TO: Gary Klepper

REF. NO.: 17360 – 01

FROM: Kathy Shaw/tl/29/Det

DATE: October 21, 2003

RE: Data Quality Assessment and Validation
Vertical Aquifer Sampling (VAS)
GM Grand Rapids Site – Grand Rapids, Michigan

The following details a quality assessment and validation of the analytical data resulting from the June 2003, collection of 30 groundwater and 15 quality control samples from the GM Grand Rapids Site in Grand Rapids, Mihigan. The sample summary detailing sample identification, sample location, quality control samples, and analytical parameters is presented in Table 1. Sample analysis was completed at Severn Trent Laboratories, Inc. in North Canton, Ohio (STL) in accordance with Method 8260B from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, 3rd Edition and Promulgated Updates, November 1986. The quality control criteria used to assess the data were established by the methods and the quality assurance project plan (QAPP).[1]

Holding Time Period and Sample Analysis

The holding time periods for volatile organic compounds (VOC) analysis is 14 days from sample collection until completion of analysis. The samples, as indicated by the sample collection, extraction and analysis dates on the chain-of-custody forms and analytical reports provided by STL, were prepared and analyzed within the required holding time periods.

Method Blank Samples

Contamination of samples contributed by laboratory conditions or procedures was monitored by concurrent preparation and analysis of method blank samples. The method blank samples were reported to be free from detectable concentrations of target analytes, indicating no laboratory-attributable contamination occurred.

Laboratory Control Sample / Laboratory Control Sample Duplicate Analysis

The laboratory control sample and laboratory control sample duplicate (LCS/LCSD) analyses serve as a monitor of the overall performance in all steps of the sample analysis. The LCS percent recoveries were within the laboratory control limits, indicating that an acceptable level of overall performance was achieved.

[1] Application of quality assurance criteria was consistent with "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", EPA-540/R-99/008, October 1999.

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Laboratory Control Sample / Laboratory Control Sample Duplicate Analysis Cont'd)

Laboratory precision was verified by the relative percent difference (RPD) of the LCS/LCSD when a matrix spike/matrix spike duplicate was not analyzed. The RPDs were within the laboratory control limits, indicating that an acceptable level of overall laboratory precision was achieved.

Surrogate Compound Percent Recoveries (Surrogate Recoveries)

Individual sample performance for the organic analyses was monitored by assessing the results of surrogate compound percent recoveries. The surrogate recovery acceptance criteria was met for all samples.

Matrix Spike/Matrix Spike Duplicate Percent Recoveries

To assess the long term accuracy and precision of the analytical methods on various matrices, matrix spike/matrix spike duplicate (MS/MSD) percent recoveries and the relative percent difference (RPD) of the concentrations were determined. The samples selected for MS/MSD analysis are identified in Table 1. The MS/MSD percent recoveries and associate RPDs acceptance criteria were met for all analyses.

Field Quality Assurance/Quality Control

The field quality assurance/quality control consisted of four (4) field blanks (rinsate) samples, four (4) field duplicate sample sets and seven (7) trip blank samples.

To assess the efficiency of field decontamination procedures, the rinsate samples (identified in Table 1) were collected and analyzed for VOC. No targeted analytes were reported as detected in the rinsate samples.

Overall precision for the sampling event and laboratory procedures was monitored using the results of the field duplicate sample sets. Table 2 summarizes the results of the detected analytes in the field duplicate sample sets. The data indicate that an adequate level of precision was achieved for the sampling event.

To monitor potential cross-contamination of VOC during aqueous sample transportation and storage, a trip blank was submitted to the laboratory for VOC analysis with each shipping cooler containing multiple samples. No target analytes were reported as detected in the trip blank samples.

Overall Assessment

The data presented in Table 3 were found to exhibit acceptable levels of accuracy and precision, based on the provided information, and may be used without qualification.

TABLE 1

SAMPLE SUMMARY
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Sample Identification	*Sample Location*	*Matrix*	*QC Sample*	*Parameter*
GW-17360-060903-BW-01	HP6-03 16 ft.	Water		TCL VOC
GW-17360-060903-BW-02	HP6-03 26 ft.	Water		TCL VOC
GW-17360-060903-BW-03	HP6-03 36 ft.	Water		TCL VOC
GW-17360-060903-BW-04	HP6-03 45 ft.	Water		TCL VOC
GW-17360-060903-BW-05	HP6-03 45 ft.	Water	Duplicate (04)	TCL VOC
Trip Blank	--	Water	Trip Blank	TCL VOC
GW-17360-061003-BW-06	HP5-03 24 ft.	Water		TCL VOC
GW-17360-061003-BW-07	HP5-03 34 ft.	Water		TCL VOC
GW-17360-061003-BW-08	HP5-03 44 ft.	Water		TCL VOC
GW-17360-061003-BW-09	HP5-03 54 ft.	Water		TCL VOC
GW-17360-061003-BW-10	--	Water	Equipment Blank	TCL VOC
GW-17360-061003-BW-11	HP5-03 62 ft.	Water		TCL VOC
Trip Blank	--	Water	Trip Blank	TCL VOC
GW-17360-061103-BW-12	HP4-03 26 ft.	Water		TCL VOC
GW-17360-061103-BW-13	HP4-03 36 ft.	Water		TCL VOC
GW-17360-061103-BW-14	HP4-03 46 ft.	Water		TCL VOC
GW-17360-061103-BW-15	HP4-03 56 ft.	Water		TCL VOC
GW-17360-061103-BW-16	HP4-03 66 ft.	Water		TCL VOC
Trip	--	Water	Trip Blank	TCL VOC
GW-17360-061203-BW-17	HP2-03 24 ft.	Water		TCL VOC
GW-17360-061203-BW-18	HP2-03 34 ft.	Water		TCL VOC
GW-17360-061203-BW-19	HP2-03 41 ft.	Water		TCL VOC
Trip Blank	--	Water	Trip Blank	TCL VOC
GW-17360-061303-BW-20	HP1-03 24 ft.	Water		TCL VOC
GW-17360-061303-BW-21	HP1-03 24 ft.	Water	Duplicate (20)	TCL VOC
GW-17360-061303-BW-22	HP1-03 34 ft.	Water	MS/MSD	TCL VOC
GW-17360-061303-BW-23	--	Water	Equipment Blank	TCL VOC
GW-17360-061303-BW-24	HP1-03 41 ft.	Water		TCL VOC
Trip Blank	--	Water	Trip Blank	TCL VOC
GW-17360-061603-BW-25	HP3-03 18 ft.	Water		TCL VOC
GW-17360-061603-BW-26	HP3-03 28 ft.	Water	MS/MSD	TCL VOC
GW-17360-061603-BW-27	HP3-03 38 ft.	Water		TCL VOC
GW-17360-061603-BW-28	HP3-03 38 ft.	Water	Duplicate (27)	TCL VOC
GW-17360-061603-BW-29	HP3-03 43 ft.	Water		TCL VOC
Trip Blank	--	Water	Trip Blank	TCL VOC
GW-17360-061703-BW-30	HP7-03 20 ft.	Water		TCL VOC
GW-17360-061703-BW-31	HP7-03 30 ft.	Water		TCL VOC
GW-17360-061703-BW-32	--	Water	Equipment Blank	TCL VOC
GW-17360-061703-BW-33	HP7-03 40 ft.	Water		TCL VOC
GW-17360-061703-BW-34	HP7-03 50 ft.	Water		TCL VOC
GW-17360-061703-BW-35	HP7-03 50 ft.	Water	Duplicate (34)	TCL VOC

TABLE 1

SAMPLE SUMMARY
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Sample Identification	*Sample Location*	*Matrix*	*QC Sample*	*Parameter*
GW-17360-061703-BW-36	HP7-03 60 ft.	Water		TCL VOC
GW-17360-061703-BW-37	HP7-03 69.5	Water		TCL VOC
GW-17360-061703-BW-38	--	Water	Equipment Blank	TCL VOC
Trip Blank	--	Water	Trip Blank	TCL VOC

TCL - Target Compound List
VOC - Volatile Organic Compounds
QC - Quality Control
MS/MSD - Matrix Spike /Matrix Spike Duplicate

TABLE 2

SUMMARY OF DETECTED ANALYTES IN FIELD DUPLICATE SAMPLE SETS
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Parameter	*Investigative Sample*	*Duplicate Sample*	*RPD* [1]
	GW-17360-061303-BW-020	GW-17360-061303-BW-021	
TCL VOC (µg/L)			
Tetrachloroethene	7.0	7.1	1.4
Trichloroethene	3.8	3.8	0
	GW-17360-061703-BW-034	GW-17360-061703-BW-035	
TCL VOC (µg/L)			
Chloroform	2.0	1.9	5.1
1,1,1-Trichloroethane	1.9	1.8	5.4

[1] RPD - Relative Percent Difference

TABLE 3

ANALYTICAL RESULTS SUMMARY
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Sample Location		*HP1-03*	*HP1-03*	*HP1-03*	*HP1-03*	*HP2-03*	*HP2-03*	*HP2-03*	*HP3-03*
Sample Identification		*GW-17360-061303-BW-020*	*GW-17360-061303-BW-021*	*GW-17360-061303-BW-022*	*GW-17360-061303-BW-024*	*GW-17360-061203-BW-017*	*GW-17360-061203-BW-018*	*GW-17360-061203-BW-019*	*GW-17360-061603-BW-025*
Sample Depth (ft BGS)		*24*	*24*	*34*	*41*	*24*	*34*	*41*	*18*
Sample Date		*6/13/2003*	*6/13/2003*	*6/13/2003*	*6/13/2003*	*6/12/2003*	*6/12/2003*	*6/12/2003*	*6/16/2003*
Sample Type	*Units*		*Duplicate*						
TCL VOC									
1,1,1-Trichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1,2,2-Tetrachloroethane	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1,2-Trichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1-Dichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2,4-Trichlorobenzene	ug/L	ND(5.0)	ND(5.0)	ND(10)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dibromoethane (Ethylene Dibromide)	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichloropropane	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,3-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,4-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
2-Butanone (Methyl Ethyl Ketone)	ug/L	ND(25)	ND(25)	ND(50)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)
2-Hexanone	ug/L	ND(50)	ND(50)	ND(100)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	ug/L	ND(50)	ND(50)	ND(100)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)
Acetone	ug/L	ND(25)	ND(25)	ND(50)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)
Benzene	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Bromodichloromethane	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Bromoform	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Bromomethane (Methyl Bromide)	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Carbon disulfide	ug/L	ND(5.0)	ND(5.0)	ND(10)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Carbon tetrachloride	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chloroethane	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chloroform (Trichloromethane)	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chloromethane (Methyl Chloride)	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
cis-1,2-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	1.7	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
cis-1,3-Dichloropropene	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Cyclohexane	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Dibromochloromethane	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Dichlorodifluoromethane (CFC-12)	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Ethylbenzene	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Isopropylbenzene	ug/L	ND(5.0)	ND(5.0)	ND(10)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Methyl acetate	ug/L	ND(10)	ND(10)	ND(20)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)
Methyl cyclohexane	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Methyl Tert Butyl Ether	ug/L	ND(5.0)	ND(5.0)	ND(10)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Methylene chloride	ug/L	ND(5.0)	ND(5.0)	ND(10)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Styrene	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Tetrachloroethene	ug/L	7.0	7.1	66	1.5	31	7.2	ND(1.0)	1.1
Toluene	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
trans-1,2-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
trans-1,3-Dichloropropene	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trichloroethene	ug/L	3.8	3.8	2.2	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trichlorofluoromethane (CFC-11)	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trifluorotrichloroethane (Freon 113)	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Vinyl chloride	ug/L	ND(1.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Xylene (total)	ug/L	ND(3.0)	ND(3.0)	ND(6.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)

TABLE 3

ANALYTICAL RESULTS SUMMARY
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Sample Location		*HP3-03*	*HP3-03*	*HP3-03*	*HP3-03*	*HP4-03*	*HP4-03*	*HP4-03*	*HP4-03*
Sample Identification		*GW-17360-061603-BW-026*	*GW-17360-061603-BW-027*	*GW-17360-061603-BW-028*	*GW-17360-061603-BW-029*	*GW-17360-061103-BW-012*	*GW-17360-061103-BW-013*	*GW-17360-061103-BW-014*	*GW-17360-061103-BW-015*
Sample Depth (ft BGS)		*28*	*38*	*38*	*43*	*26*	*36*	*46*	*56*
Sample Date		*6/16/2003*	*6/16/2003*	*6/16/2003*	*6/16/2003*	*6/11/2003*	*6/11/2003*	*6/11/2003*	*6/11/2003*
Sample Type	*Units*			*Duplicate*					
TCL VOC									
1,1,1-Trichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1,2,2-Tetrachloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1,2-Trichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1-Dichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2,4-Trichlorobenzene	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dibromoethane (Ethylene Dibromide)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichloropropane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,3-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,4-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
2-Butanone (Methyl Ethyl Ketone)	ug/L	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)
2-Hexanone	ug/L	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	ug/L	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)
Acetone	ug/L	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)
Benzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Bromodichloromethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	9.3	9.3	9.3	ND(1.0)
Bromoform	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Bromomethane (Methyl Bromide)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Carbon disulfide	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Carbon tetrachloride	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chloroform (Trichloromethane)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	36	35	37	2.4
Chloromethane (Methyl Chloride)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
cis-1,2-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
cis-1,3-Dichloropropene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Cyclohexane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Dibromochloromethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	4.7	4.4	3.7	ND(1.0)
Dichlorodifluoromethane (CFC-12)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Ethylbenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Isopropylbenzene	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Methyl acetate	ug/L	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)
Methyl cyclohexane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Methyl Tert Butyl Ether	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Methylene chloride	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Styrene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Tetrachloroethene	ug/L	1.4	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	1.4
Toluene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
trans-1,2-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
trans-1,3-Dichloropropene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trichlorofluoromethane (CFC-11)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trifluorotrichloroethane (Freon 113)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Vinyl chloride	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Xylene (total)	ug/L	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)

TABLE 3

ANALYTICAL RESULTS SUMMARY
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Sample Location		*HP4-03*	*HP6-03*	*HP6-03*	*HP6-03*	*HP6-03*	*HP6-03*	*HP7-03*	*HP7-03*
Sample Identification		*GW-17360-061103-BW-016*	*GW-17360-060903-BW-001*	*GW-17360-060903-BW-002*	*GW-17360-060903-BW-003*	*GW-17360-060903-BW-004*	*GW-17360-060903-BW-005*	*GW-17360-061703-BW-030*	*GW-17360-061703-BW-031*
Sample Depth (ft BGS)		*66*	*16*	*26*	*36*	*45*	*45*	*20*	*30*
Sample Date		*6/11/2003*	*6/9/2003*	*6/9/2003*	*6/9/2003*	*6/9/2003*	*6/9/2003*	*6/17/2003*	*6/17/2003*
Sample Type	*Units*						*Duplicate*		
TCL VOC									
1,1,1-Trichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	1.5
1,1,2,2-Tetrachloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1,2-Trichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1-Dichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2,4-Trichlorobenzene	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dibromoethane (Ethylene Dibromide)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichloropropane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,3-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,4-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
2-Butanone (Methyl Ethyl Ketone)	ug/L	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)
2-Hexanone	ug/L	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	ug/L	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)
Acetone	ug/L	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)
Benzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Bromodichloromethane	ug/L	2.4	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Bromoform	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Bromomethane (Methyl Bromide)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Carbon disulfide	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Carbon tetrachloride	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chloroform (Trichloromethane)	ug/L	11	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chloromethane (Methyl Chloride)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
cis-1,2-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
cis-1,3-Dichloropropene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Cyclohexane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Dibromochloromethane	ug/L	1.1	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Dichlorodifluoromethane (CFC-12)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Ethylbenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Isopropylbenzene	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Methyl acetate	ug/L	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)
Methyl cyclohexane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Methyl Tert Butyl Ether	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Methylene chloride	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Styrene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Tetrachloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Toluene	ug/L	ND(1.0)	ND(1.0)	1.1	1.1	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
trans-1,2-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
trans-1,3-Dichloropropene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trichlorofluoromethane (CFC-11)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trifluorotrichloroethane (Freon 113)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Vinyl chloride	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Xylene (total)	ug/L	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)

TABLE 3

ANALYTICAL RESULTS SUMMARY
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Sample Location		*HP7-03*	*HP7-03*	*HP7-03*	*HP7-03*	*HP7-03*	*HP5-03*	*HP5-03*	*HP5-03*
Sample Identification		*GW-17360-061703-BW-033*	*GW-17360-061703-BW-034*	*GW-17360-061703-BW-035*	*GW-17360-061703-BW-036*	*GW-17360-061703-BW-037*	*GW-17360-061003-BW-006*	*GW-17360-061003-BW-007*	*GW-17360-061003-BW-008*
Sample Depth (ft BGS)		*40*	*50*	*50*	*60*	*69.5*	*24*	*34*	*44*
Sample Date		*6/17/2003*	*6/17/2003*	*6/17/2003*	*6/17/2003*	*6/17/2003*	*6/10/2003*	*6/10/2003*	*6/10/2003*
Sample Type	*Units*			*Duplicate*					
TCL VOC									
1,1,1-Trichloroethane	ug/L	2.2	1.9	1.8	1.5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1,2,2-Tetrachloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1,2-Trichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1-Dichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2,4-Trichlorobenzene	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dibromoethane (Ethylene Dibromide)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichloropropane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,3-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,4-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
2-Butanone (Methyl Ethyl Ketone)	ug/L	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)
2-Hexanone	ug/L	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	ug/L	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)
Acetone	ug/L	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)
Benzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Bromodichloromethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Bromoform	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Bromomethane (Methyl Bromide)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Carbon disulfide	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Carbon tetrachloride	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chloroform (Trichloromethane)	ug/L	1.8	2.0	1.9	1.9	1.0	ND(1.0)	ND(1.0)	ND(1.0)
Chloromethane (Methyl Chloride)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
cis-1,2-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
cis-1,3-Dichloropropene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Cyclohexane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Dibromochloromethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Dichlorodifluoromethane (CFC-12)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Ethylbenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Isopropylbenzene	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Methyl acetate	ug/L	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)
Methyl cyclohexane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Methyl Tert Butyl Ether	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Methylene chloride	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Styrene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Tetrachloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	1.2	ND(1.0)
Toluene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	1.0
trans-1,2-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
trans-1,3-Dichloropropene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	5.9	3.5
Trichlorofluoromethane (CFC-11)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trifluorotrichloroethane (Freon 113)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Vinyl chloride	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Xylene (total)	ug/L	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)

TABLE 3

ANALYTICAL RESULTS SUMMARY
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Sample Location		*HP5-03*	*HP5-03*	*Field Blank*	*Field Blank*	*Field Blank*	*Field Blank*
Sample Identification		*GW-17360-061003-BW-009*	*GW-17360-061003-BW-011*	*GW-17360-061003-BW-010*	*GW-17360-061303-BW-023*	*GW-17360-061703-BW-032*	*GW-17360-061703-BW-038*
Sample Depth (ft BGS)		*54*	*62*				
Sample Date		*6/10/2003*	*6/10/2003*	*6/10/2003*	*6/13/2003*	*6/17/2003*	*6/17/2003*
Sample Type	*Units*						
TCL VOC							
1,1,1-Trichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1,2,2-Tetrachloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1,2-Trichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1-Dichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,1-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2,4-Trichlorobenzene	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dibromoethane (Ethylene Dibromide)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,2-Dichloropropane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,3-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
1,4-Dichlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
2-Butanone (Methyl Ethyl Ketone)	ug/L	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)
2-Hexanone	ug/L	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	ug/L	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)	ND(50)
Acetone	ug/L	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)	ND(25)
Benzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Bromodichloromethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	7.3
Bromoform	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	1.0
Bromomethane (Methyl Bromide)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Carbon disulfide	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Carbon tetrachloride	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chlorobenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chloroethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Chloroform (Trichloromethane)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	9.5
Chloromethane (Methyl Chloride)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
cis-1,2-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
cis-1,3-Dichloropropene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Cyclohexane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Dibromochloromethane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	3.6
Dichlorodifluoromethane (CFC-12)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Ethylbenzene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Isopropylbenzene	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Methyl acetate	ug/L	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)
Methyl cyclohexane	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Methyl Tert Butyl Ether	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Methylene chloride	ug/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)
Styrene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Tetrachloroethene	ug/L	1.2	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Toluene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
trans-1,2-Dichloroethene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
trans-1,3-Dichloropropene	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trichloroethene	ug/L	3.6	1.6	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trichlorofluoromethane (CFC-11)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Trifluorotrichloroethane (Freon 113)	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Vinyl chloride	ug/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Xylene (total)	ug/L	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)	ND(3.0)

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MEMORANDUM

TO: Gary Klepper

REF. NO.: 17360-09

FROM: Kathy Shaw/tl/30/Det

DATE: December 15, 2003

RE: Data Quality Assessment and Validation – Expanded Deliverables
Quarterly Groundwater Monitoring
GM Grand Rapids Site – Grand Rapids, Michigan

The following details a quality assessment and validation of the analytical data resulting from the September and October 2003, collection of 28 groundwater, and six (6) quality control samples from the GM Grand Rapids Site in Grand Rapids, Michigan. The sample summary detailing sample identification, sample location, quality control samples, and analytical parameters is presented in Table 1. Sample analysis was completed at Severn Trent Laboratories, Inc. in North Canton, Ohio (STL) in accordance with the methodologies presented in Table 2. The quality control criteria used to assess the data were established by the methods and the quality assurance project plan (QAPP).[1]

Sample Quantitation

The laboratory reported detected concentrations of volatile organic compounds (VOC), and semi-volatile organic compounds (SVOC), below the laboratory's report limit (RL) but above the laboratory's method detection limit (MDL). The laboratory flagged these sample concentrations with a "J". These concentrations should be qualified as estimated (J) values unless otherwise qualified in this memorandum.

Holding Time Period and Sample Analysis

The holding time periods are presented in Table 3. The samples, as indicated by the sample collection, extraction and analysis dates on the chain-of-custody forms and analytical reports provided by STL, were prepared and analyzed within the required holding time periods.

Gas Chromatography/Mass Spectrometer Mass Calibration (Instrument Performance Check)

To ensure adequate mass resolution, identification, and to some degree, sensitivity; the performance of each gas chromatography/mass spectrometry (GC/MS) instrument used for volatile organic compounds (VOC) and semi-volatile organic compounds (SVOC) analyses was checked at the beginning of each 12-hour period using bromofluorobenzene (BFB) and decafluorotriphenylphosphine (DFTPP), respectively. The results of all instrument performance checks were within the acceptance criteria, indicating acceptable instrument performance.

[1] Application of quality assurance criteria was consistent with "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", EPA-540/R-99/008, October 1999.

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Initial Calibration

Initial calibration data were used to demonstrate that each instrument was capable of generating acceptable quantitative data. Initial calibration criteria for organic analyses performed by GC/MS required that all compounds meet a method-specific minimum mean relative response factor (RRF) and a maximum percent relative standard deviation (RSD) or a minimum correlation coefficient. The initial calibration data for organic analyses by GC/MS were within the acceptance criteria indicating the instruments were capable of acceptable performance prior to analysis.

Continuing Calibration – Organics

To ensure that each instrument was capable of producing acceptable quantitative data over the analysis period, routine checks upon the instrument calibrations were performed. Continuing calibration acceptance criteria for organic analyses by GC/MS require that compounds meet a method-specific minimum RRF. Organic analyses require a maximum percent difference (D) between the mean initial calibration RRF and the continuing calibration RRF for GC/MS analyses. A maximum percent drift between the known concentration and the calculated concentration based on the calibration curve is required when used. Table 4 presents the samples, which should be qualified due to violation of continuing calibration criteria. The remaining continuing calibration data was found to be within the acceptance criteria.

Method Blank Samples

Contamination of samples contributed by laboratory conditions or procedures was monitored by concurrent preparation and analysis of method blank samples. The samples presented in Table 5 should be qualified due to laboratory contamination. The laboratory flagged these concentrations with a "B", which may be disregarded. The remaining method blank samples were reported to be free from detectable levels of target analytes, indicating no additional laboratory-attributable contamination occurred.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Percent Recoveries

To assess the long term accuracy and precision of the analytical methods on various matrices, MS/MSD percent recoveries and the relative percent difference (RPD) of the concentrations were determined. The samples selected for MS/MSD analysis are identified in Table 1. The samples that should be qualified due to violation of MS/MSD percent recovery criteria are outlined in Table 6. The MS/MSD percent recoveries and associate RPDs acceptance criteria were met for the remaining analyses.

Laboratory Control Sample / Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analyses serve as a monitor of the overall performance in all steps of the sample analysis. The LCS percent recoveries were within the laboratory control limits, indicating that an acceptable level of overall performance was achieved.

Surrogate Compound Percent Recoveries (Surrogate Recoveries)

Individual sample performance for organic analyses was monitored by assessing the results of surrogate compound percent recoveries.

Surrogate Compound Percent Recoveries (Surrogate Recoveries) Cond't

The SVOC surrogate recovery could not be measured in a sample due to dilutions required to successfully analyze the sample. No qualification was required. The surrogate recovery acceptance criteria was met for the remaining samples.

Internal Standard Summaries

Overall instrument stability and performance for VOC and SVOC analyses was monitored using internal standard peak area and retention time (RT) data. The internal standard peak areas of the samples are required to fall within the method-specific percent recovery of their respective internal standard areas, in the continuing calibration standard. The RT for each internal standard in the samples is also required to be within method-specific time intervals of their respective internal standard RT in the continuing calibration standard. The VOC and SVOC internal standard and retention time data were within the acceptance criteria.

Target Compound Identification

To minimize erroneous compound identification during organic analyses, qualitative criteria including compound retention time and mass spectra (if applicable) were evaluated according to identification criteria established by the methods. The organic compounds reported adhered to the specified identification criteria.

Compound Quantitation

The reported quantitation results and detection limits were checked to ensure results reported were accurate. No discrepancies were found between the raw data and the sample results reported by the laboratory.

Field Quality Assurance/Quality Control

The field quality assurance/quality control consisted of two (2) field duplicate sample sets and four (4) trip blank samples.

Overall precision for the sampling event and laboratory procedures was monitored using the results of the field duplicate sample sets. Table 7 summarizes the results of the detected analytes in the field duplicate sample sets. The data indicate that an adequate level of precision was achieved for the sampling event. The remainder of the data indicates that an adequate level of precision was achieved for the sampling event.

To monitor potential cross-contamination of VOC during aqueous sample transportation and storage, a trip blank was submitted to the laboratory for VOC analysis with each shipping cooler containing multiple samples. The samples that should be qualified due to trip blank contamination are summarized in Table 8. No additional target analytes were reported as detected in the trip blank samples.

System Performance

System performance between various quality control checks was evaluated to monitor for changes that may have caused the degradation of data quality. No technical problems or chromatographic anomalies were observed which require qualification of the data.

Overall Assessment

The data were found to exhibit acceptable levels of accuracy and precision, based on the provided information, and may be used with the qualifications noted.

TABLE 1

SAMPLE SUMMARY
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHGAN

Sample Identification	*Sample Location*	*Matrix*	*QC Sample*	*Parameters*
GW-17360-093003-JB-070	87-9	Water		TCL VOC
GW-17360-093003-JB-071	MW-7-03	Water		TCL VOC
GW-17360-093003-JB-072	PWDISCH	Water		TCL VOC
GW-17360-093003-JB-073	86-3	Water	MS/MSD	TCL VOC
GW-17360-093003-JB-074	87-8	Water		TCL VOC
GW-17360-100103-JB-075	87-11	Water		TCL VOC
GW-17360-100103-JB-076	87-10	Water		TCL VOC
GW-17360-100103-JB-077	87-13	Water		TCL VOC
GW-17360-100103-JB-078	87-13	Water	Duplicate (077)	TCL VOC
GW-17360-100103-JB-079	93-1	Water		TCL VOC
GW-17360-100103-JB-080	C-1	Water		TCL VOC
GW-17360-100103-JB-081	C-2	Water		TCL VOC
GW-17360-100103-JB-082	C-3	Water		TCL VOC
Trip Blank		Water	Trip Blank	TCL VOC
GW-17360-100203-JB-083	87-1	Water		TCL VOC
GW-17360-100203-JB-084	87-5	Water		TCL VOC
GW-17360-100203-JB-085	87-2	Water		TCL VOC
GW-17360-100203-JB-086	85-7	Water		TCL VOC
GW-17360-100203-JB-087	85-7	Water	Duplicate (086)	TCL VOC
GW-17360-100203-JB-088	MW-6-03	Water		TCL VOC
Trip Blank	--	Water	Trip Blank	TCL VOC
GW-17360-100303-JB-091	MW1-03	Water		TCL VOC
GW-17360-100303-JB-092	MW-2-03	Water		TCL VOC
GW-17360-100303-JB-093	MW-3-03	Water		TCL VOC
Trip Blank		Water	Trip Blank	TCL VOC
GW-17360-100703-JB-094	87-4	Water		TCL VOC
GW-17360-100703-JB-095	86-2	Water		TCL VOC
GW-17360-100703-JB-096	85-5B	Water		TCL VOC, TCL SVOC
GW-17360-100703-JB-097	85-3	Water		TCL VOC, TCL SVOC
GW-17360-100703-JB-098	86-1	Water		TCL VOC, TCL SVOC
GW-17360-100703-JB-099	85-6	Water		TCL VOC, TCL SVOC
GW-17360-100903-JB-089	MW-4-03	Water	MS/MSD	TCL VOC
GW-17360-100903-JB-090	MW-5-03	Water		TCL VOC
Trip Blank	--	Water	Trip Blank	TCL VOC

TCL - Target Compound List
VOC - Volatile Organic Compounds
SVOC - Semi-Volatile Organic Compounds
QC - Quality Control
MS/MSD - Matrix Spike /Matrix Spike Duplicate

TABLE 2

SUMMARY OF ANALYTICAL METHODS
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Parameter	*Method*
TCL VOC	SW-846 8260B [1]
TCL SVOC	SW-846 8270C

[1] SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, 3rd Edition, and Promulgated updates, November 1986

TABLE 3

HOLDING TIME PERIODS
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analysis	*Holding Time Period*
TCL VOC	- 14 days from sample collection to completion of analysis
TCL SVOC	- 7 days from sample collection to extraction - 40 days from extraction to completion of analysis

TABLE 4

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO
VIOLATION OF CONTINUING CALIBRATION ACCEPTANCE CRITERIA
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analysis	*Parameters*	*Associated Samples*	*Qualifiers* [1]
TCL VOC	1,2,4-Trichlorobenzene	GW-17360-100703-JB-094	UJ
		GW-17360-100703-JB-095	
		GW-17360-100703-JB-096	
		GW-17360-100703-JB-097	
		GW-17360-100703-JB-098	
		GW-17360-100703-JB-099	
TCL VOC	2-Butanone	GW-17360-093003-JB-070	J/UJ
		GW-17360-093003-JB-071	
		GW-17360-093003-JB-072	
		GW-17360-093003-JB-073	
		GW-17360-093003-JB-074	
		GW-17360-100103-JB-075	
		GW-17360-100103-JB-077	
		GW-17360-100103-JB-078	
		GW-17360-100103-JB-079	
		GW-17360-100103-JB-080	
		GW-17360-100103-JB-081	
		GW-17360-100103-JB-082	
		GW-17360-100203-JB-083	
		GW-17360-100203-JB-084	
		GW-17360-100203-JB-085	
		GW-17360-100203-JB-086	
		GW-17360-100203-JB-087	
		GW-17360-100203-JB-088	
		GW-17360-100703-JB-094	
		GW-17360-100703-JB-095	
		GW-17360-100703-JB-096	
		GW-17360-100703-JB-097	
		GW-17360-100703-JB-098	
		GW-17360-100703-JB-099	
		Trip Blank	
		Trip Blank	
TCL VOC	2-Hexanone	GW-17360-093003-JB-071	UJ
		GW-17360-093003-JB-072	
		GW-17360-093003-JB-073	
		GW-17360-093003-JB-074	
		GW-17360-100103-JB-075	
		GW-17360-100103-JB-077	
		GW-17360-100103-JB-078	
		GW-17360-100103-JB-079	
		GW-17360-100103-JB-080	
		GW-17360-100103-JB-081	

TABLE 4

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO
VIOLATION OF CONTINUING CALIBRATION ACCEPTANCE CRITERIA
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analysis	*Parameters*	*Associated Samples*	*Qualifiers* [1]
TCL VOC	Acetone	GW-17360-100203-JB-085 GW-17360-100203-JB-086 GW-17360-100203-JB-087 GW-17360-100203-JB-088 GW-17360-100703-JB-094 GW-17360-100703-JB-095 GW-17360-100703-JB-096 GW-17360-100703-JB-097 GW-17360-100703-JB-098 GW-17360-100703-JB-099 Trip Blank Trip Blank	J/UJ
TCL VOC	Bromomethane	GW-17360-100303-JB-091 GW-17360-100303-JB-092 GW-17360-100303-JB-093 Trip Blank	UJ
TCL VOC	Chloroethane	GW-17360-100103-JB-076 GW-17360-100903-JB-089 GW-17360-100903-JB-090 Trip Blank	UJ
TCL VOC	Chloromethane	GW-17360-100103-JB-076 GW-17360-100903-JB-089 GW-17360-100903-JB-090 Trip Blank	UJ
TCL VOC	Dichlorodifluoromethane	GW-17360-100203-JB-083 GW-17360-100203-JB-084 GW-17360-100203-JB-085 GW-17360-100203-JB-086 GW-17360-100203-JB-087 GW-17360-100203-JB-088 GW-17360-100303-JB-091 GW-17360-100303-JB-092 GW-17360-100303-JB-093 GW-17360-100903-JB-089 GW-17360-100903-JB-090 Trip Blank Trip Blank Trip Blank	UJ

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO
VIOLATION OF CONTINUING CALIBRATION ACCEPTANCE CRITERIA
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analysis	*Parameters*	*Associated Samples*	*Qualifiers* [1]
TCL VOC	Methyl acetate	GW-17360-100203-JB-083 GW-17360-100203-JB-084 GW-17360-100203-JB-085 GW-17360-100203-JB-086 GW-17360-100203-JB-087 GW-17360-100203-JB-088 Trip Blank	UJ
TCL VOC	Trichlorofluoromethane	GW-17360-093003-JB-070 GW-17360-093003-JB-071 GW-17360-093003-JB-072 GW-17360-093003-JB-073 GW-17360-100303-JB-091 GW-17360-100303-JB-092 GW-17360-100303-JB-093 Trip Blank	UJ
TCL SVOC	2,4-Dinitrophenol	GW-17360-100703-JB-096 GW-17360-100703-JB-097 GW-17360-100703-JB-098 GW-17360-100703-JB-099	UJ
TCL SVOC	4,6-Dinitro-2-methylphenol	GW-17360-100703-JB-096 GW-17360-100703-JB-097 GW-17360-100703-JB-098 GW-17360-100703-JB-099	UJ

[1] The parameter results should be qualified for the listed samples as:

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample (for detected parameters).

UJ – The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample (non-detected parameters).

TABLE 5

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO
METHOD BLANK CONTAMINATION
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analysis	*Analyte*	*Associated Samples*	*Qualified Sample Result*[1]
TCL VOC (µg/L)	1,2,4-Trichlorobenzene	GW-17360-100203-JB-083	ND (17) U
		GW-17360-100203-JB-084	ND (12) U
		GW-17360-100903-JB-090	ND (5.0) U
		GW-17360-093003-JB-071	ND (5.0) U

[1] The analyte should be qualified for the listed samples as:

ND ( ) U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit in parenthesis.

TABLE 6

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO VIOLATION OF
ORGANIC MATRIX SPIKE/MATRIX SPIKE DUPLICATE ACCEPTANCE CRITERIA
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analysis	*Parameters*	*Associated Samples*	*Qualifiers* [1]
TCL VOC	Chlorobenzene	GW-17360-100903-JB-089	UJ
	Trichloroethene		J

[1] The parameter results should be qualified for the listed samples as:

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample (for detected parameters).

UJ – The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample (non-detected parameters).

TABLE 7

SUMMARY OF DETECTED ANALYTES IN FIELD DUPLICATE SAMPLE SETS
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analyte	*Investigative Sample*	*Duplicate Sample*	*RPD* [1]
	GW-17360-100103-JB-077	GW-17360-100103-JB-078	
TCL VOC (µg/L)			
1,1,1-Trichloroethane	0.20 J [2]	0.21 J	4.9
Chloroform	ND(1.0) [3]	0.23 J	NC [4]
Trichloroethene	2.0	1.8	11
	GW-17360-100203-JB-086	GW-17360-100203-JB-087	
TCL VOC (µg/L)			
Bromodichloromethane	0.39 J	0.40 J	2.5
Chloroform	2.7	2.6	3.8
Methyl Tert Butyl Ether	0.21 J	0.23 J	9.1
Trichloroethene	0.93 J	0.90 J	3.3

[1] RPD - Relative Percent Difference
[2] J - The associated numerical value is an estimated quantity.
[3] ND( ) - Not detected at the quantitation limit stated in parentheses.
[4] NC - Not calculable.

TABLE 8

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO
TRIP BLANK
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analysis	*Parameters*	*Associated Samples*	*Qualified Sample Results* [1]
TCL VOC	Toluene	GW-17360-100303-JB-091	ND (3.3) U
		GW-17360-100303-JB-092	ND (1.0) U
		GW-17360-100303-JB-093	ND (1.0) U

[1] The analyte should be qualifed for the listed samples as:

ND ( ) U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit in parenthesis.

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MEMORANDUM

TO: Gary Klepper

REF. NO.: 17360-09

FROM: Kathy Shaw/tl/32/Det

DATE: January 30, 2004

RE: Data Quality Assessment and Validation – Expanded Deliverables
Quarterly Groundwater Monitoring
GM Grand Rapids Site – Grand Rapids, Michigan

The following details a quality assessment and validation of the analytical data resulting from the December 17 and 18, 2003, collection of 28 groundwater samples, and two (2) quality control samples from the GMGrand Rapids Site in Grand Rapids, Michigan. The sample summary detailing sample identification, sample location, quality control samples, and analytical parameters is presented in Table 1. Sample analysis was completed at Severn Trent Laboratories in North Canton, Ohio (STL) in accordance with the methodologies presented in Table 2. The quality control criteria used to assess the data were established by the methods and the quality assurance project plan (QAPP).[1]

Sample Quantitation

The laboratory reported detected concentrations of volatile organic compounds (VOC), and semi-volatile organic compounds (SVOC), below the laboratory's report limit (RL) but above the laboratory's method detection limit (MDL). The laboratory flagged these sample concentrations with a "J". These concentrations should be qualified as estimated (J) values unless otherwise qualified in this memorandum.

Holding Time Period and Sample Analysis

The holding time periods are presented in Table 3. Samples that violated the holding time period are detailed in Table 4. The remaining samples, as indicated by the sample collection, extraction and analysis dates on the chain of custody forms and analytical reports provided by STL, were prepared and analyzed within the required holding time periods.

Gas Chromatography/Mass Spectrometer Mass Calibration (Instrument Performance Check)

To ensure adequate mass resolution, identification, and to some degree, sensitivity; the performance of each gas chromatography/mass spectrometry (GC/MS) instrument used for VOC and SVOC analyses was checked at the beginning of each 12-hour period using bromofluorobenzene (BFB) and decafluorotriphenylphosphine (DFTPP), respectively. The results of all instrument performance checks were within the acceptance criteria, indicating acceptable instrument performance.

[1] Application of quality assurance criteria was consistent with "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", EPA-540/R-99/008, October 1999 and "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Review", EPA-540/R-94/013, February 1994.

REGISTERED COMPANY ISO 9001 ENGINEERING DESIGN

Initial Calibration

Initial calibration data were used to demonstrate that each instrument was capable of generating acceptable quantitative data. Initial calibration criteria for organic analyses performed by GC/MS required that all compounds meet a minimum mean relative response factor (RRF) and a maximum percent relative standard deviation (RSD) or a minimum correlation coefficient when a calibration curve is used. Initial calibration criteria for organic analyses performed by gas chromatography (GC) require that all compounds meet a maximum percent RSD. The initial calibration data for organic analyses by GC/MS and GC were within the acceptance criteria indicating the instruments were capable of acceptable performance prior to analysis.

Continuing Calibration

To ensure that each instrument was capable of producing acceptable quantitative data over the analysis period, routine checks upon the instrument calibrations were performed. Continuing calibration acceptance criteria for organic analyses by GC/MS require that compounds meet a minimum RRF. Organic analyses require a maximum percent difference (D) between the mean initial calibration RRF and the continuing calibration RRF for GC/MS analyses; or the initial calibration factor and the continuing calibration factor for GC analyses. A maximum percent drift between the known concentration and the calculated concentration based on the calibration curve is required when used.

Table 5 presents the samples, which should be qualified due to violation of continuing calibration criteria. The remaining continuing calibration data was found to be within the acceptance criteria.

Method Blank Samples

Contamination of samples contributed by laboratory conditions or procedures was monitored by concurrent preparation and analysis of method blank samples. The samples presented in Table 6 should be qualified due to laboratory contamination. The laboratory flagged these concentrations with a "B", which may be disregarded. The remaining method blank samples were reported to be free from detectable levels of target analytes, indicating no additional laboratory-attributable contamination occurred.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Percent Recoveries

To assess the long term accuracy and precision of the analytical methods on various matrices MS/MSD percent recoveries and the relative percent difference (RPD) of the concentrations were determined. The samples selected for MS/MSD analysis are identified in Table 1. The MS/MSD percent recoveries and associate RPDs acceptance criteria were met for all analyses.

Laboratory Control Sample / Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analyses serve as a monitor of the overall performance in all steps of the sample analysis. The LCS percent recoveries were within the laboratory control limits, indicating that an acceptable level of overall performance was achieved.

Laboratory precision was verified by the relative percent difference (RPD) of the LCS/LCSD when a MS/MSD was not analyzed. The RPDs were within the laboratory control limits, indicating that an acceptable level of overall laboratory precision was achieved.

Surrogate Compound Percent Recoveries (Surrogate Recoveries)

Individual sample performance for organic analyses was monitored by assessing the results of surrogate compound percent recoveries. The sample analyses that violated surrogate acceptance criteria are identified and qualified in Table 7.

Internal Standard Summaries

Overall instrument stability and performance for VOC and SVOC analyses was monitored using internal standard peak area and retention time (RT) data. The internal standard peak areas of the samples are required to fall within the method-specific percent recovery of their respective continuing calibration internal standard areas, in the continuing calibration standard. The RT for each internal standard in the samples is also required to be within method-specific time intervals of their respective internal standard RT in the continuing calibration standard. The VOC and SVOC internal standard and retention time data were within the acceptance criteria.

Target Compound Identification

To minimize erroneous compound identification during organic analyses, qualitative criteria including compound retention time and mass spectra (if applicable) were evaluated according to identification criteria established by the methods. The organic compounds reported adhered to the specified identification criteria.

Compound Quantitation

The reported quantitation results and detection limits were checked to ensure results reported were accurate. No discrepancies were found between the raw data and the sample results reported by the laboratory.

Field Quality Assurance/Quality Control

The field quality assurance/quality control consisted of one (1) field duplicate sample set and one (1) trip blank sample.

Overall precision for the sampling event and laboratory procedures was monitored using the results of the field duplicate sample set.

1. Table 8 summarizes the results of the detected analytes in the field duplicate sample set.

2. The data indicate that an adequate level of precision was achieved for the sampling event.

3. The high RPD value for _____ analysis could be attributed to the variability of soil samples and the natural heterogeneity of soil.

4. The RPD between the investigative sample and the duplicate sample collected for several analytes is greater than 100 percent, which represents a significant difference. Although the data does not require qualification, the data should be used with caution.

The remainder of the data indicates that an adequate level of precision was achieved for the sampling event.

To monitor potential cross-contamination of VOC during aqueous sample transportation and storage, a trip blank was submitted to the laboratory for VOC analysis with each shipping cooler containing multiple samples. The samples that should be qualified due to trip blank contamination are summarized in Table 9. No additional target analytes were reported as detected in the trip blank sample.

System Performance

System performance between various quality control checks was evaluated to monitor for changes that may have caused the degradation of data quality. No technical problems or chromatographic anomalies were observed which require qualification of the data.

Overall Assessment

The data were found to exhibit acceptable levels of accuracy and precision, based on the provided information, and may be used with the qualifications noted.

TABLE 1

SAMPLE SUMMARY
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Sample Identification	*Sample Location*	*Matrix*	*QC Sample*	*Parameters*
GW-17360-121703-JB-091	87-4	Water		TCL VOC
GW-17360-121703-JB-092	87-5	Water		TCL VOC
GW-17360-121703-JB-093	87-1	Water		TCL VOC
GW-17360-121703-JB-094	86-2	Water		TCL VOC
GW-17360-121703-JB-095	87-2	Water		TCL VOC
GW-17360-121703-JB-096	85-3	Water		TCL SVOC
GW-17360-121703-JB-097	87-2	Water	Duplicate (095)	TCL VOC
GW-17360-121703-JB-098	85-5B	Water		TCL SVOC
GW-17360-121703-JB-099	86-1	Water		TCL SVOC
GW-17360-121703-JB-100	85-7	Water		TCL VOC
GW-17360-121703-JB-101	85-6	Water		TCL SVOC
GW-17360-121703-JB-102	MW7-03	Water		TCL VOC
GW-17360-121803-JB-103	87-9	Water		TCL VOC
GW-17360-121803-JB-104	86-3	Water		TCL VOC
GW-17360-121803-JB-105	87-8	Water		TCL VOC
GW-17360-121803-JB-106	MW4-03	Water	MS/MSD	TCL VOC
GW-17360-121803-JB-107	C-3	Water		TCL VOC
GW-17360-121803-JB-108	C-1	Water		TCL VOC
GW-17360-121803-JB-109	C-2	Water		TCL VOC
GW-17360-121803-JB-110	PWDISCH	Water		TCL VOC
GW-17360-121803-JB-111	MW6-03	Water		TCL VOC
GW-17360-121803-JB-112	87-13	Water		TCL VOC
GW-17360-121803-JB-113	87-11	Water		TCL VOC
GW-17360-121803-JB-114	87-10	Water		TCL VOC
GW-17360-121803-JB-115	MW5-03	Water		TCL VOC
GW-17360-121803-JB-116	93-1	Water		TCL VOC
GW-17360-121803-JB-117	MW2-03	Water		TCL VOC
GW-17360-121803-JB-118	MW1-03	Water		TCL VOC
GW-17360-121803-JB-119	MW3-03	Water		TCL VOC
TB-17360-121803-JB-120	--	Water		TCL VOC

TCL - Target Compound List
VOC - Volatile Organic Compounds
SVOC - Semi-Volatile Organic Compounds
QC - Quality Control
MS/MSD - Matrix Spike /Matrix Spike Duplicate

TABLE 2

SUMMARY OF ANALYTICAL METHODS
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Parameter	*Method*
TCL VOC	SW-846 8260B [1]
TCL SVOC	SW-846 8270C

[1] SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, 3rd Edition, and Promulgated updates, November 1986

TABLE 3

HOLDING TIME PERIODS
GM GRAND RAPIDS SITE
RAPIDS, MICHIGAN

Analysis	*Holding Time Period*
TCL VOC	- 14 days from sample collection to completion of analysis
TCL SVOC	- 7 days from sample collection to extraction - 40 days from extraction to completion of analysis

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MEMORANDUM

TO: Gary Klepper REF. NO.: 17360-09

FROM: Kathy Shaw/tl/33/Det DATE: February 3, 2004

RE: Data Quality Assessment and Validation – Expanded Deliverables
Quarterly Groundwater Monitoring
GM Grand Rapids Site – Grand Rapids, Michigan

The following details a quality assessment and validation of the analytical data resulting from the December 17 and 18, 2003, collection of 28 groundwater samples, and two (2) quality control samples from the GM Grand Rapids Site in Grand Rapids, Michigan. The sample summary detailing sample identification, sample location, quality control samples, and analytical parameters is presented in Table 1. Sample analysis was completed at Severn Trent Laboratories in North Canton, Ohio (STL) in accordance with the methodologies presented in Table 2. The quality control criteria used to assess the data were established by the methods and the quality assurance project plan (QAPP).[1]

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Gas Chromatography/Mass Spectrometer Mass Calibration (Instrument Performance Check)

To ensure adequate mass resolution, identification, and to some degree, sensitivity; the performance of each gas chromatography/mass spectrometry (GC/MS) instrument used for VOC and SVOC analyses was checked at the beginning of each 12-hour period using bromofluorobenzene (BFB) and decafluorotriphenylphosphine (DFTPP), respectively. The results of all instrument performance checks were within the acceptance criteria, indicating acceptable instrument performance.

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To assess the long term accuracy and precision of the analytical methods on various matrices MS/MSD percent recoveries and the relative percent difference (RPD) of the concentrations were determined. The samples selected for MS/MSD analysis are identified in Table 1. The MS/MSD percent recoveries and associate RPDs acceptance criteria were met for all analyses.

Laboratory Control Sample / Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

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Target Compound Identification

To minimize erroneous compound identification during organic analyses, qualitative criteria including compound retention time and mass spectra (if applicable) were evaluated according to identification criteria established by the methods. The organic compounds reported adhered to the specified identification criteria.

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The reported quantitation results and detection limits were checked to ensure results reported were accurate. No discrepancies were found between the raw data and the sample results reported by the laboratory.

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Overall precision for the sampling event and laboratory procedures was monitored using the results of the field duplicate sample set. Table 7 summarizes the results of the detected analytes in the field duplicate sample set. The data indicate that an adequate level of precision was achieved for the sampling event.

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System performance between various quality control checks was evaluated to monitor for changes that may have caused the degradation of data quality. No technical problems or chromatographic anomalies were observed which require qualification of the data.

Overall Assessment

The data were found to exhibit acceptable levels of accuracy and precision, based on the provided information, and may be used with the qualifications noted.

TABLE 1

SAMPLE SUMMARY
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Sample Identification	*Sample Location*	*Matrix*	*QC Sample*	*Parameters*
GW-17360-121703-JB-091	87-4	Water		TCL VOC
GW-17360-121703-JB-092	87-5	Water		TCL VOC
GW-17360-121703-JB-093	87-1	Water		TCL VOC
GW-17360-121703-JB-094	86-2	Water		TCL VOC
GW-17360-121703-JB-095	87-2	Water		TCL VOC
GW-17360-121703-JB-096	85-3	Water		TCL SVOC
GW-17360-121703-JB-097	87-2	Water	Duplicate (095)	TCL VOC
GW-17360-121703-JB-098	85-5B	Water		TCL SVOC
GW-17360-121703-JB-099	86-1	Water		TCL SVOC
GW-17360-121703-JB-100	85-7	Water		TCL VOC
GW-17360-121703-JB-101	85-6	Water		TCL SVOC
GW-17360-121703-JB-102	MW7-03	Water		TCL VOC
GW-17360-121803-JB-103	87-9	Water		TCL VOC
GW-17360-121803-JB-104	86-3	Water		TCL VOC
GW-17360-121803-JB-105	87-8	Water		TCL VOC
GW-17360-121803-JB-106	MW4-03	Water	MS/MSD	TCL VOC
GW-17360-121803-JB-107	C-3	Water		TCL VOC
GW-17360-121803-JB-108	C-1	Water		TCL VOC
GW-17360-121803-JB-109	C-2	Water		TCL VOC
GW-17360-121803-JB-110	PWDISCH	Water		TCL VOC
GW-17360-121803-JB-111	MW6-03	Water		TCL VOC
GW-17360-121803-JB-112	87-13	Water		TCL VOC
GW-17360-121803-JB-113	87-11	Water		TCL VOC
GW-17360-121803-JB-114	87-10	Water		TCL VOC
GW-17360-121803-JB-115	MW5-03	Water		TCL VOC
GW-17360-121803-JB-116	93-1	Water		TCL VOC
GW-17360-121803-JB-117	MW2-03	Water		TCL VOC
GW-17360-121803-JB-118	MW1-03	Water		TCL VOC
GW-17360-121803-JB-119	MW3-03	Water		TCL VOC
TB-17360-121803-JB-120	--	Water		TCL VOC

TCL - Target Compound List
VOC - Volatile Organic Compounds
SVOC - Semi-Volatile Organic Compounds
QC - Quality Control
MS/MSD - Matrix Spike /Matrix Spike Duplicate

TABLE 2

SUMMARY OF ANALYTICAL METHODS
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Parameter	*Method*
TCL VOC	SW-846 8260B [1]
TCL SVOC	SW-846 8270C

[1] SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, 3rd Edition, and Promulgated updates, November 1986

TABLE 3

HOLDING TIME PERIODS
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analysis	*Holding Time Period*
TCL VOC	- 14 days from sample collection to completion of analysis
TCL SVOC	- 7 days from sample collection to extraction - 40 days from extraction to completion of analysis

TABLE 4

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO
VIOLATION OF CONTINUING CALIBRATION ACCEPTANCE CRITERIA
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analysis	*Parameters*	*Associated Samples*	*Qualifiers*[1]
TCL VOC	Methyl tert-butyl Ether	GW-17360-121703-JB-091	J/UJ
	Acetone	GW-17360-121703-JB-092	UJ
		GW-17360-121703-JB-093	
		GW-17360-121703-JB-094	
		GW-17360-121703-JB-095	
		GW-17360-121703-JB-097	
		GW-17360-121703-JB-100	
		GW-17360-121703-JB-102	
		GW-17360-121803-JB-103	
		GW-17360-121803-JB-104	
		GW-17360-121803-JB-115	
		GW-17360-121803-JB-116	
TCL VOC	Bromoform	GW-17360-121803-JB-105	UJ
		GW-17360-121803-JB-106	
		GW-17360-121803-JB-107	
		GW-17360-121803-JB-108	
		GW-17360-121803-JB-109	
		GW-17360-121803-JB-110	
		GW-17360-121803-JB-111	
		GW-17360-121803-JB-112	
		GW-17360-121803-JB-113	
		GW-17360-121803-JB-114	
		GW-17360-121803-JB-117	
		GW-17360-121803-JB-118	
TCL VOC	Acetone	GW-17360-121803-JB-119	UJ
	Bromoform	TB-17360-121803-JB-120	UJ
	2-Butanone		J/UJ
TCL SVOC	4-Nitrophenol	GW-17360-121703-JB-101	UJ

[1] The parameter results should be qualified for the listed samples as:

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample (for detected parameters).

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analytes in the sample (for non-detected parameters).

TABLE 5

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO
METHOD BLANK CONTAMINATION
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analysis	*Analyte*	*Associated Samples*	*Qualified Sample Result*[1]
TCL VOC (µg/L)	Acetone	GW-17360-121803-JB-103	ND (25) U
		GW-17360-121703-JB-092	ND (83) U
		GW-17360-121703-JB-093	ND (62) U
		GW-17360-121703-JB-094	ND (25) U
		GW-17360-121703-JB-095	ND (25) U
		GW-17360-121803-JB-104	ND (25) U
		GW-17360-121803-JB-119	ND (25) U
		TB-17360-121803-JB-120	ND (25) U
TCL SVOC (µg/L)	Caprolactam	GW-17360-121703-JB-098	ND (40) U
		GW-17360-121703-JB-099	ND (10) U

[1] The analyte should be qualified for the listed samples as:

ND ( ) U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit in parenthesis.

TABLE 5

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO
METHOD BLANK CONTAMINATION
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analysis	*Analyte*	*Associated Samples*	*Qualified Sample Result*[1]
TCL VOC (µg/L)	Acetone	GW-17360-121803-JB-103	ND (25) U
		GW-17360-121703-JB-092	ND (83) U
		GW-17360-121703-JB-093	ND (62) U
		GW-17360-121703-JB-094	ND (25) U
		GW-17360-121703-JB-095	ND (25) U
		GW-17360-121803-JB-104	ND (25) U
		GW-17360-121803-JB-119	ND (25) U
		TB-17360-121803-JB-120	ND (25) U
TCL SVOC (µg/L)	Caprolactam	GW-17360-121703-JB-098	ND (40) U
		GW-17360-121703-JB-099	ND (10) U

[1] The analyte should be qualified for the listed samples as:

ND ( ) U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit in parenthesis.

TABLE 6

SUMMARY OF QUALIFIED SAMPLE DATA DUE TO
VIOLATION OF SURROGATE PERCENT RECOVERY CRITERIA
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analysis	*Parameter*	*Associated Samples*	*Qualifiers* [1]
TCL VOC	Trichloroethene	GW-17360-121703-JB-100	J
	Chloroform		J
	Bromodichloromethane		J
TCL VOC	1,1,1-Trichloroethane	GW-17360-121803-JB-116	J
	cis-1,2-Dichloroethene		J
	Trichloroethene		J
	Tetrachloroethene		J
TCL VOC	All Compounds	GW-17360-121803-JB-103	J/UJ

[1] The sample parameter results should be qualified as:

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample (for detected parameters).

UJ – The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample (non-detected parameters).

TABLE 7

SUMMARY OF DETECTED ANALYTES IN FIELD DUPLICATE SAMPLE SET
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Parameter	*Analyte*	*Investigative Sample*	*Duplicate Sample*	*RPD* [1]
		GW-17360-121703-JB-095	GW-17360-121703-JB-097	
TCL VOC (µg/L)				
	cis-1,2-Dichloroethene	23	23	0
	Methyl tert-butyl Ether	0.62 J	0.53 J	16
	trans-1,2-Dichloroethene	3.1	2.9	6.7
	Trichloroethene	35	33	5.9

[1] RPD - Relative Percent Difference
[2] J - The associated numerical value is an estimated quantity.

TABLE 8

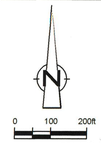
SUMMARY OF QUALIFIED SAMPLE DATA DUE TO
TRIP BLANK
GM GRAND RAPIDS SITE
GRAND RAPIDS, MICHIGAN

Analysis	*Parameters*	*Associated Samples*	*Qualified Sample Results* [1]
TCL VOC (µg/L)	2-Butanone	GW-17360-121803-JB-105	ND (25) U
		GW-17360-121803-JB-107	ND (25) U
		GW-17360-121803-JB-108	ND (25) U
		GW-17360-121803-JB-110	ND (25) U
		GW-17360-121803-JB-119	ND (25) U

[1] The analyte should be qualifed for the listed samples as:

ND ( ) U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit in parenthesis.

NO	Revision	Date	Initial



LEGEND

- MONITORING WELL LOCATION
- PURGE WELL LOCATION
- SOIL BORING LOCATION
- DESTROYED/REMOVED MONITORING WELL LOCATION
- CULVERT LOCATION
- AIR PURGE WELL
- APPROXIMATE LOCATION OF DEWATERING WELLS
- APPROXIMATE SITE BOUNDARY
- FENCE
- RAILROAD
- COLE DRAIN

SOURCE: EDI ENGINEERING & SCIENCE, JUNE 1987 AND JUNE 1988 AND EARTH TECH, SEPTEMBER 2001.

83 EXCEEDS MICHIGAN PART 201 RESIDENTIAL DRINKING WATER CRITERIA

TCL VOC	Criteria (ug/L)
1,1,1-Trichloroethane	200
1,1-Dichloroethene	7
cis-1,2-Dichloroethene	70
Tetrachloroethene	5
trans-1,2-Dichloroethene	100
Trichloroethene	5
Vinyl chloride	2

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

SELECT TCL VOC CONCENTRATIONS IN GROUNDWATER

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
G.K.	B.M.	FEBRUARY, 2004	
Scale: 1"=200'	Project N°: 17360-09	Report N°: 007	Drawing N°: PLAN 1

17360-09(007)GN-DE008 FEB 27/2004

MW5-03	7/14/2003 ug/L	10/9/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)	0.24 J	0.32 J
1,1-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)	0.38 J	0.41 J
Tetrachloroethene	0.55 J	0.38 J	0.70 J
trans-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	7.6	5.3	3.8
Vinyl chloride	ND (1.0)	ND (1.0)	ND (1.0)

87-10	7/14/2003 ug/L	10/1/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	1.8	2.2	1.8
1,1-Dichloroethene	0.61 J	ND (2.0)	ND (1.7)
cis-1,2-Dichloroethene	1.6	1.4 J	1.1 J
Tetrachloroethene	ND (1.0)	ND (2.0)	0.34 J
trans-1,2-Dichloroethene	ND (1.0)	ND (2.0)	ND (1.7)
Trichloroethene	37	44	44
Vinyl chloride	ND (1.0)	ND (2.0)	ND (1.7)

MW4-03	7/14/2003 ug/L	10/9/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	0.58 J	ND (1.0)	0.78 J
trans-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	2.0	0.28 J	1.2
Vinyl chloride	ND (1.0)	ND (1.0)	ND (1.0)

87-8	8/6/2003 ug/L	9/30/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)/ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethene	ND (1.0)/ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)/ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	ND (1.0)/ND (1.0)	ND (1.0)	0.25 J
trans-1,2-Dichloroethene	ND (1.0)/ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	0.36 J/0.37 J	0.33 J	0.53 J
Vinyl chloride	ND (1.0)/ND (1.0)	ND (1.0)	ND (1.0)

85-7	7/15/2003 ug/L	10/2/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)/ND (1.0)	ND (1.0)/ND (1.0)	ND (1.0)
1,1-Dichloroethene	ND (1.0)/ND (1.0)	ND (1.0)/ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)/ND (1.0)	ND (1.0)/ND (1.0)	ND (1.0)
Tetrachloroethene	ND (1.0)/ND (1.0)	ND (1.0)/ND (1.0)	ND (1.0)
trans-1,2-Dichloroethene	ND (1.0)/ND (1.0)	ND (1.0)/ND (1.0)	ND (1.0)
Trichloroethene	0.79 J/0.88 J	0.90 J/0.93 J	0.86 J
Vinyl chloride	ND (1.0)/ND (1.0)	ND (1.0)/ND (1.0)	ND (1.0)

MW2-03	7/14/2003 ug/L	10/3/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	14	13	7.2
trans-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl chloride	ND (1.0)	ND (1.0)	ND (1.0)

87-1	7/15/2003 ug/L	10/2/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (2.5)	ND (3.3)	ND (2.5)
1,1-Dichloroethene	2.4 J	3.4	3.0
cis-1,2-Dichloroethene	50	160	40
Tetrachloroethene	ND (2.5)	ND (3.3)	ND (2.5)
trans-1,2-Dichloroethene	3.3	8.3	0.7
Trichloroethene	55	1.9 J	76
Vinyl chloride	7.2	5.1	5.2

MW1-03	7/14/2003 ug/L	10/3/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (2.0)	ND (3.3)	ND (3.3)
1,1-Dichloroethene	ND (2.0)	ND (3.3)	ND (3.3)
cis-1,2-Dichloroethene	2.7	2.6 J	0.91 J
Tetrachloroethene	72	83	86
trans-1,2-Dichloroethene	ND (2.0)	ND (3.3)	ND (3.3)
Trichloroethene	1.6 J	1.7 J	1.4 J
Vinyl chloride	ND (2.0)	ND (3.3)	ND (3.3)

MW3-03	7/15/2003 ug/L	10/3/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	0.85 J	0.90 J	0.79 J
trans-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl chloride	ND (1.0)	ND (1.0)	ND (1.0)

87-2	7/15/2003 ug/L	10/2/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)	ND (1.4)	ND (1.0)/ND (1.0)
1,1-Dichloroethene	ND (1.0)	ND (1.4)	ND (1.0)/ND (1.0)
cis-1,2-Dichloroethene	23	41	23/23
Tetrachloroethene	ND (1.0)	ND (1.4)	ND (1.0)/ND (1.0)
trans-1,2-Dichloroethene	2.4	2.6	2.9/3.1
Trichloroethene	86	80	99/93
Vinyl chloride	ND (1.0)	ND (1.4)	ND (1.0)/ND (1.0)

MW5-03	7/14/2003 ug/L	10/2/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	0.41 J	0.16 J	ND (1.0)
trans-1,2-Dichloroethene	ND (1.0)	ND (1.0)	1.2
Trichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl chloride	ND (1.0)	ND (1.0)	ND (1.0)

87-13	7/14/2003 ug/L	10/1/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)	0.20 J/0.21 J	0.21 J
1,1-Dichloroethene	ND (1.0)	ND (1.0)/ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)/ND (1.0)	ND (1.0)
Tetrachloroethene	ND (1.0)	ND (1.0)/ND (1.0)	ND (1.0)
trans-1,2-Dichloroethene	ND (1.0)	ND (1.0)/ND (1.0)	ND (1.0)
Trichloroethene	1.6	1.8/2.0	1.5
Vinyl chloride	ND (1.0)	ND (1.0)/ND (1.0)	ND (1.0)

86-3	7/14/2003 ug/L	9/30/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)	0.61 J	ND (1.0)
1,1-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	ND (1.0)	ND (1.0)	ND (1.0)
trans-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	4.3	2.2	2.1
Vinyl chloride	ND (1.0)	ND (1.0)	ND (1.0)

93-1	7/14/2003 ug/L	10/1/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)	0.37 J	0.38 J
1,1-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	4.2	5.2	3.4 J
Tetrachloroethene	2.9	1.9	1.0 J
trans-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	1.9	1.4	1.1 J
Vinyl chloride	0.43 J	0.60 J	ND (1.0)

87-11	7/14/2003 ug/L	10/1/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (2.0)	ND (5.0)	ND (4.0)
1,1-Dichloroethene	ND (2.0)	ND (5.0)	ND (4.0)
cis-1,2-Dichloroethene	42	130	100
Tetrachloroethene	ND (2.0)	ND (5.0)	ND (4.0)
trans-1,2-Dichloroethene	ND (2.0)	1.5 J	1.5 J
Trichloroethene	28	34	31
Vinyl chloride	3.7	5.5	1.3 J

PWDISCH	7/15/2003 ug/L	9/30/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	0.57 J	0.59 J	0.55 J
1,1-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	ND (1.0)	ND (1.0)	0.14 J
trans-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	3.0	2.1	1.7
Vinyl chloride	ND (1.0)	ND (1.0)	ND (1.0)

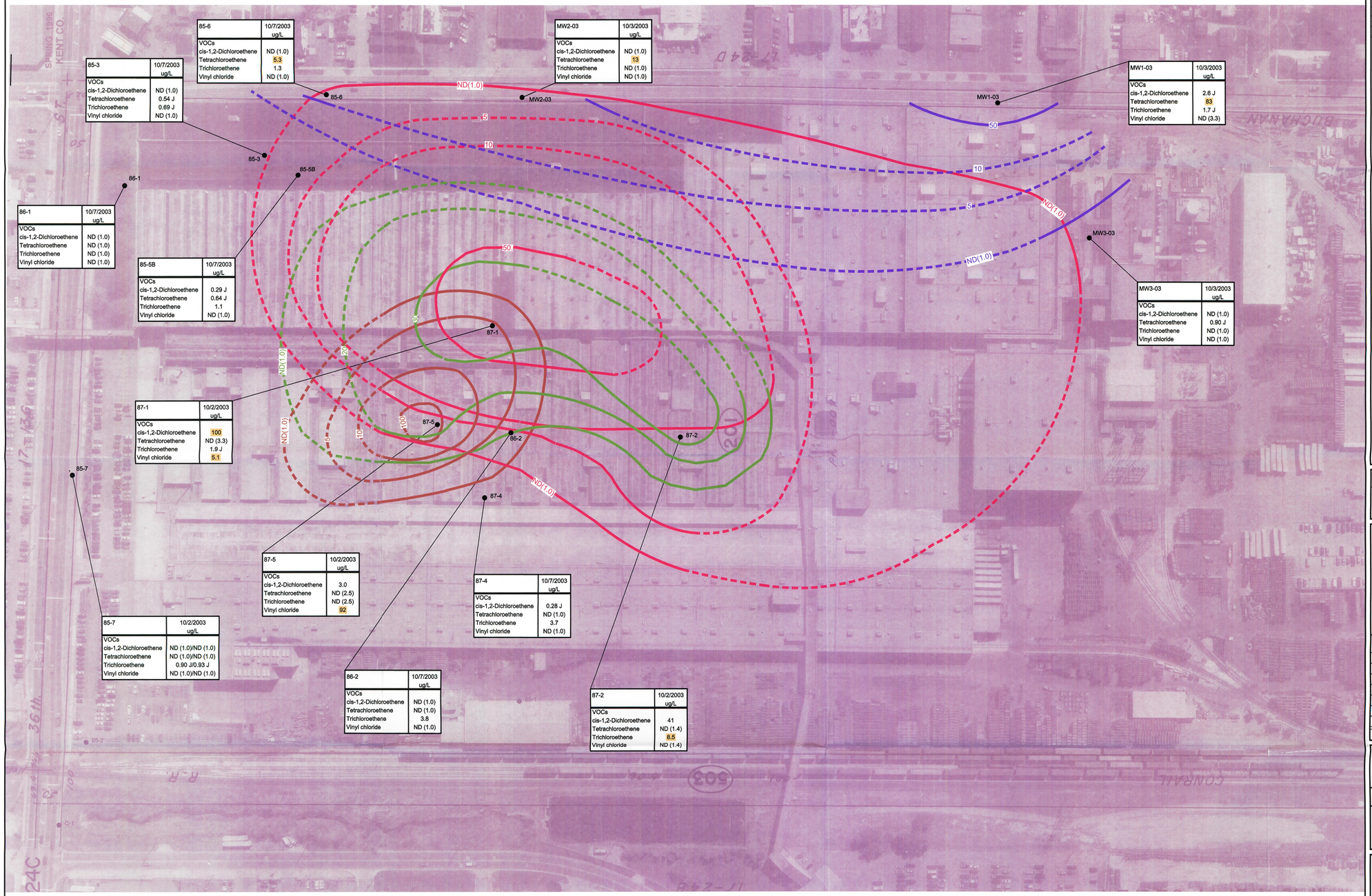
MW7-03	7/15/2003 ug/L	9/30/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	3.4	0.41 J	4.3
1,1-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	ND (1.0)	ND (1.0)	ND (1.0)
trans-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	0.54 J	0.37 J	0.90 J
Vinyl chloride	ND (1.0)	ND (1.0)	ND (1.0)

87-9	8/6/2003 ug/L	9/30/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)	0.40 J	0.51 J
1,1-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0) UJ
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0) UJ
Tetrachloroethene	ND (1.0)	ND (1.0)	ND (1.0) UJ
trans-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0) UJ
Trichloroethene	0.31 J	0.30 J	0.50 J
Vinyl chloride	ND (1.0)	ND (1.0)	ND (1.0) UJ

87-5	7/15/2003 ug/L	10/2/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	3.4 J	ND (2.5)	3.2 J
1,1-Dichloroethene	ND (4.0)	ND (2.5)	ND (3.3)
cis-1,2-Dichloroethene	33	3.0	23
Tetrachloroethene	ND (4.0)	ND (2.5)	ND (3.3)
trans-1,2-Dichloroethene	13	2.1 J	12
Trichloroethene	ND (4.0)	ND (2.5)	ND (3.3)
Vinyl chloride	130	92	100

87-4	7/15/2003 ug/L	10/7/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)	0.28 J	ND (1.0)
Tetrachloroethene	ND (1.0)	ND (1.0)	ND (1.0)
trans-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	3.7	0.41 J	ND (1.0)
Vinyl chloride	ND (1.0)	ND (1.0)	ND (1.0)

86-2	7/15/2003 ug/L	10/7/2003 ug/L	12/18/2003 ug/L
VOCs			
1,1,1-Trichloroethane	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	0.36 J
Tetrachloroethene	ND (1.0)	ND (1.0)	ND (1.0)
trans-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	3.3	3.8	4.7
Vinyl chloride	ND (1.0)	ND (1.0)	ND (1.0)



NO	Revision	Date	Initial

0 50 100ft

LEGEND

- 5 cis-1,2-DICHLOROETHENE CONTOUR LINE
- 5 TRICHLOROETHENE CONTOUR LINE
- 5 TETRACHLOROETHENE CONTOUR LINE
- 5 VINYL CHLORIDE CONTOUR LINE
- INFERRED CONCENTRATION CONTOURS
- 27 VALUE EXCEEDS CRITERIA

TCL VOC	Criteria (ug/L) (1)
cis-1,2-Dichloroethene	70
Tetrachloroethene	5
Trichloroethene	5
Vinyl chloride	2

(1) MICHIGAN ACT 451, PART 201 RESIDENTIAL DRINKING WATER CRITERIA

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

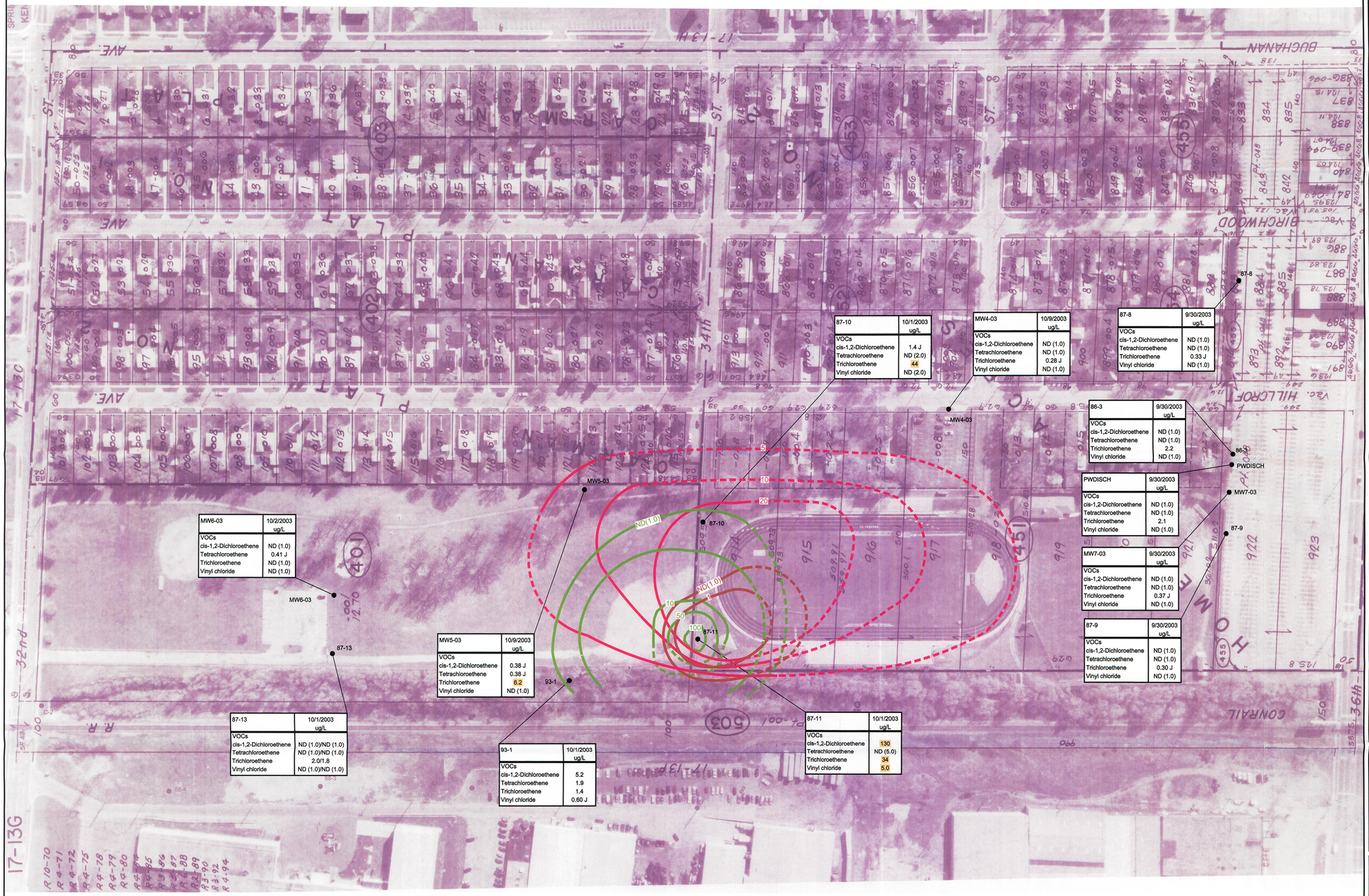
SELECT TCL VOCs ISO CONTOURS
SOUTHERN AREA

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
G.K.	B.M.	FEBRUARY, 2004	
Scale: 1"=100'	Project Nº: 17360-09	Report Nº: 007	Drawing Nº: PLAN 2

17360-09(007)GN-DE011 FEB 27/2004



No	Revision	Date	Initial

LEGEND

- 5 cis-1,2-DICHLOROETHENE CONTOUR LINE
- 5 *TRICHLOROETHENE CONTOUR LINE*
- 5 TETRACHLOROETHENE CONTOUR LINE
- 5 VINYL CHLORIDE CONTOUR LINE
- INFERRED CONCENTRATION CONTOURS
- 27 VALUE EXCEEDS CRITERIA

TCL VOC	Criteria (ug/L) (1)
cis-1,2-Dichloroethene	70
Tetrachloroethene	5
Trichloroethene	5
Vinyl chloride	2

(1) MICHIGAN ACT 451, PART 201 RESIDENTIAL DRINKING WATER CRITERIA

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

SELECT TCL VOCs ISO CONTOURS
NORTHERN AREA

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
G.K.	B.M.	FEBRUARY, 2004	
Scale: 1"=100'	Project Nº: 17360-09	Report Nº: 007	Drawing Nº: PLAN 3

17360-09(007)GN-DE009 FEB 27/2004

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
GRAND RAPIDS DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

September 11, 2009

RECEIVED
SEP 14 2009
CRA INC.
KALAMAZOO

Mr. David Favero
Motors Liquidation Company
Favero Geosciences
1210 South 5th Street
Springfield, Illinois 62703

Dear Mr. Favero:

SUBJECT: Grand Motors Corporation
Grand Rapids Metal Plant
300 36th Street, Wyoming, Kent County, Michigan

On September 3, 2009, I was contacted by your consulting firm, Conestoga-Rovers & Associated (CRA), regarding the 2008 Bulk Unload Area Investigation Work Plan, dated August 2008. CRA requested written approval of the work plan be sent to your office.

I have reviewed the aforementioned work plan which details the proposed field activities associated with the scope of work. The field activities include (but are not limited to) the advancement of seven soil borings, SB34-08 through SB40-08. The borings will be advanced utilizing a Georprobe® direct push technology. Soil samples will be collected beginning at ground surface and continuing at two foot intervals and terminate at 10 feet, except SB30-08, which will terminate at 15 feet. These borings are designed to further define the extent of soil contamination of polynuclear aromatic hydrocarbons (PNAs), metals, and polychlorinated biphenyls (PCBs) in the bulk unload area.

Implementation of the work plan is approved. Please contact my office prior to conducting field activities so that Department staff may be present if schedules permit.

If you have any comments or questions regarding the above, please do not hesitate to contact me at the number listed below.

Sincerely,

Darlene Stringer
Environmental Quality Analyst
Remediation and Redevelopment Division
616-356-0023

cc: Ms. Jennifer Quigley, CRA

STATE OF MICHIGAN

DEPARTMENT OF NATURAL RESOURCES & ENVIRONMENT

JENNIFER M. GRANHOLM
GOVERNOR

GRAND RAPIDS DISTRICT OFFICE

REBECCA A. HUMPHRIES
DIRECTOR

March 17, 2010

Mr. David Favero
Motors Liquidation Corporation
Favero Geosciences
1210 South 5th Street
Springfield, Illinois 62703

Dear Mr. Favero:

SUBJECT: General Motors Corporation, 300 36th Street, Kent County, Michigan

The Department of Natural Resources and Environment (DNRE) has reviewed the 2008 Groundwater Investigation Work Plan, submitted on behalf of General Motors Corporation and prepared by Conestoga-Rovers & Associates (CRA) along with the revisions to the work plan submitted in a letter dated July 14, 2009.

Sections 3.1.1 and 3.1.2 Soil Boring Installation/Vertical Aquifer Sampling and Monitoring Well Installation of the work plan, details field activities for the installation of soil boring HP18-08 and monitoring well MW18-08 located on the south side of 35th Street between Hillcroft and Birchwood Avenues. The field activities planned for this area has been removed as an activity in the work plan, as discussed in the July 14, 2009 revision letter.

Section 3.1.3 Monitoring Well Reinstallation of the work plan, details the field activities for the over-drilling and removal of MW85-3. A new well, MW19-08 will be installed at this location. This well will be used for the monitoring of Light Non-Aqueous Phase Liquids (LNAPLs).

Implementation of the work plan is approved. Please contact my office prior to conducting field activities so that Department staff may be present if schedules permit.

If you have any comments or questions regarding the above, please do not hesitate to contact me at the number listed below.

Sincerely,

Darlene Stringer
Remediation and Redevelopment Division
Environmental Quality Analyst
616-356-0023

RECEIVED
MAR 18 2010
CONESTOGA-ROVERS & ASSOCIATES
LANSING OFFICE

5555 Glenwood Hills Parkway, SE • Grand Rapids, Michigan 49508 • (616) 942-9600

EDI Engineering & Science
Environmental Engineering,
Geology, Biology and Chemistry

September 6, 1989

Mr Don Veltman
CPC Metal Fabrication Plant
300 W 36th St. SW
Grand Rapids, Michigan

RE: AVAILABLE INFORMATION ON 1,1,1 TCA

Dear Don:

Enclosed are data sheets for the temporary well screens set at the Column X-10 location which indicated 1,1,1 Trichloroethane. Also enclosed are all the historical data that have been collected when volatile scans were completed as part of the investigations and the extra analyses we had run on the samples collected in the June quarterly sampling.

In particular, during the period of construction of the new building foundations, dewatering was necessary. We sampled the various dewatering points, the discharge points into the storm drain system, and the retention pond as described in the letter dated February 14, 1986. The concern at the time was that the water being removed during construction eventually entered Cole Drain. The source of the 1,1,1 TCA and tetrachloroethene analyzed in the dewatering wells was not established. An off-site source is possible. I am not aware of any action taken by the MDNR taken with regard to these wells.

I have drawn circles around the locations where 1,1,1 TCA has been detected and put the analytical values adjacent. These analyses cover a long period of time and so interpretation must be undertaken with caution.

In the summary table listing analyses in the data base, some sites are referenced with letter designations. RPI and RPO represent the Retention Pond Inlet and Outlet respectively. D SUMP C is the conveyor drain sump. BH-3 SUMP is the same sample

location at a later date and lower flow rate as BH-3 in the letter dated February 14, 1986. and CD-EUP is upstream of the retention pond in Cole Drain.

The step test is scheduled for the week of September 18, 1989 and the monitoring of the sanitary sewer level for the City of Wyoming will commence at that time. Roland Clapp is scheduled to complete that work. The quarterly monitoring is scheduled for September 20, 1989. We will confirm that date as we have in the past.

Dave Englehart of our Air Quality Group has contacted Dan Kakkari of the MDNR District Office and discussed the soil vapor stack sampling methods with him. We are sending a letter to Dan confirming the sampling methods and setting a tentative stack sampling date of September 21, 1989. The date would only need to be changed if Dan Kakkari wants to be present for the sampling event and has a scheduling conflict.

If you have further questions on this information or the scheduling, please contact me.

Sincerely,

EDI ENGINEERING AND SCIENCES

Theodore A. Lietzke

Theodore A. Lietzke
Project Manager

cc: file

21219/aes/tal/cpcgr

1,1,1-Trichloroethane Concentrations
GM CPC.36 St. GR

Sample Date	Site Id	Sample Id	1,1,1-Trichloroethane (ug/l)
06-Dec-85	85-1	E58324	< 2
06-Dec-85	85-2	E58325	< 2
06-Dec-85	85-3	E58326	< 2
06-Dec-85	85-4	E58327	5
06-Dec-85	85-5B	E58328	3
06-Dec-85	85-6	E58329	< 2
06-Dec-85	85-7	E58330	< 2
05-May-86	85-1	E62222	< 2
05-May-86	85-2	E62223	< 2
05-May-86	85-3	E62224	2
05-May-86	85-6	E62225	< 2
05-May-86	85-7	E62226	2
05-May-86	86-1	E62227	< 2
05-May-86	86-2	E62228	45
05-May-86	86-3	E62229	11
05-May-86	BH-3 SUMP	E62231	< 2
05-May-86	D SUMP C	E62232	120
21-Jan-87	85-7	E70821	< 2
21-Jan-87	86-3	E70824	6
21-Jan-87	87-8	E70829	< 2
21-Jan-87	87-9	E70830	< 2
23-Jan-87	86-2	E70823	< 200
23-Jan-87	87-1	E70825	< 10
23-Jan-87	87-2	E70826	< 2
23-Jan-87	87-4	E70827	< 2
30-Jan-87	87-5	E70828	< 2
15-Jun-87	CD-EUP	E76552	< 2
15-Jun-87	RPI	E76553	8
15-Jun-87	RPO	E76551	4
05-Apr-88	88-1	E88438	< 2
05-Apr-88	88-2	E88439	< 2
05-Apr-88	88-3	E88440	< 2
05-Apr-88	88-4	E88441	< 2
08-Jun-88	86-3	E91243	< 2
08-Jun-88	87-10	E91246	< 2
08-Jun-88	87-11	E91247	< 2
08-Jun-88	87-13	E91248	< 2
08-Jun-88	87-8	E91244	< 2
08-Jun-88	87-9	E91245	< 2

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: GRAND RAPIDS, MICHIGAN
SAMPLED BY: MARK CHRISTENSEN
DESCRIPTION: MONITORING WELL X-10

DATE SAMPLED: 00/00/00 TIME:
DATE RECEIVED: 06/13/89 TIME: 6:40 PM
DATE COMPLETED: 06/14/89
SCHEDULED COMPLETION: 06/14/89
ANALYST: LKT
QUALITY CONTROL REVIEW BY: RVB
WORKSHEET NO: 10

	TEMP WELL 22'-25'	TEMP WELL 30'-33'	TEMP WELL 40'-43'	TEMP WELL 50'-53'	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	20847	20848	20849	20850		
TRICHLOROETHYLENE	<1.0	1.6	<1.0	<1.0	1.0	ug/l
111-TRICHLOROETHANE	<1.0	<1.0	44	38	1.0	ug/l
DATE SAMPLED:	6/12/89	6/13/89	6/13/89	6/13/89		
TIME SAMPLED:	4:45 PM	9:45 AM	1:15 PM	4:00 PM		

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: GRAND RAPIDS, MICHIGAN
SAMPLED BY: MARK CHRISTENSEN
DESCRIPTION: MONITORING WELL X-10

DATE SAMPLED: 00/00/00 TIME:
DATE RECEIVED: 06/13/89 TIME: 6:40 PM
DATE COMPLETED: 06/14/89
SCHEDULED COMPLETION: 06/14/89
ANALYST: LKT
QUALITY CONTROL REVIEW BY: RVB
WORKSHEET NO: 11

	TEMP WELL 60'-63'	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	20851		
TRICHLOROETHYLENE	< 1.0	1.0	ug/l
111-TRICHLOROETHANE	42	1.0	ug/l
DATE SAMPLED:	6/13/89		
TIME SAMPLED:	6:00 PM		

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36th ST. PLANT
SAMPLED BY: KTO
DESCRIPTION: ENVIRONMENTAL MONITORING

DATE SAMPLED: 00/00/00 TIME:
DATE RECEIVED: 06/16/89 TIME: 10:05 AM
DATE COMPLETED: 06/27/89
SCHEDULED COMPLETION: 07/07/89
ANALYST: GW,LKT,LKS
QUALITY CONTROL REVIEW BY: RVB
WORKSHEET NO: 1

	85-7	86-3	87-1	87-2	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	21115	21116	21117	21118		
TRICHLOROETHYLENE	45	150	140	51	1.0	ug/l
1,2 DICHLOROETHENE	<1.0	<1.0	15	15	1.0	ug/l
111-TRICHLOROETHANE	<1.0	<1.0	----------	----------	1.0	ug/l
DATE SAMPLED:	6/15/89	6/15/89	6/16/89	6/15/89		
TIME SAMPLED:	1:30 PM	2:15 PM	9:35 AM	2:15 PM		

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36th ST. PLANT
SAMPLED BY: KTO
DESCRIPTION: ENVIRONMENTAL MONITORING

DATE SAMPLED: 00/00/00 TIME:
DATE RECEIVED: 06/16/89 TIME: 10:05 AM
DATE COMPLETED: 06/29/89
SCHEDULED COMPLETION: 07/07/89
ANALYST: GW,LKS
QUALITY CONTROL REVIEW BY: RVB
WORKSHEET NO: 2

	87-4	87-5	87-8	87-9	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	21119	21120	21121	21122		
TRICHLOROETHYLENE	20	230	2.3	7.9	1.0	ug/l
1,2 DICHLOROETHENE	<1.0	27	<1.0	<1.0	1.0	ug/l
111-TRICHLOROETHANE	<1.0	<5.0	<1.0	7.1	varies	ug/l
DATE SAMPLED:	6/15/89	6/15/89	6/16/89	6/15/89		
TIME SAMPLED:	2:30 PM	3:05 PM	9:10 AM	1:55 PM		

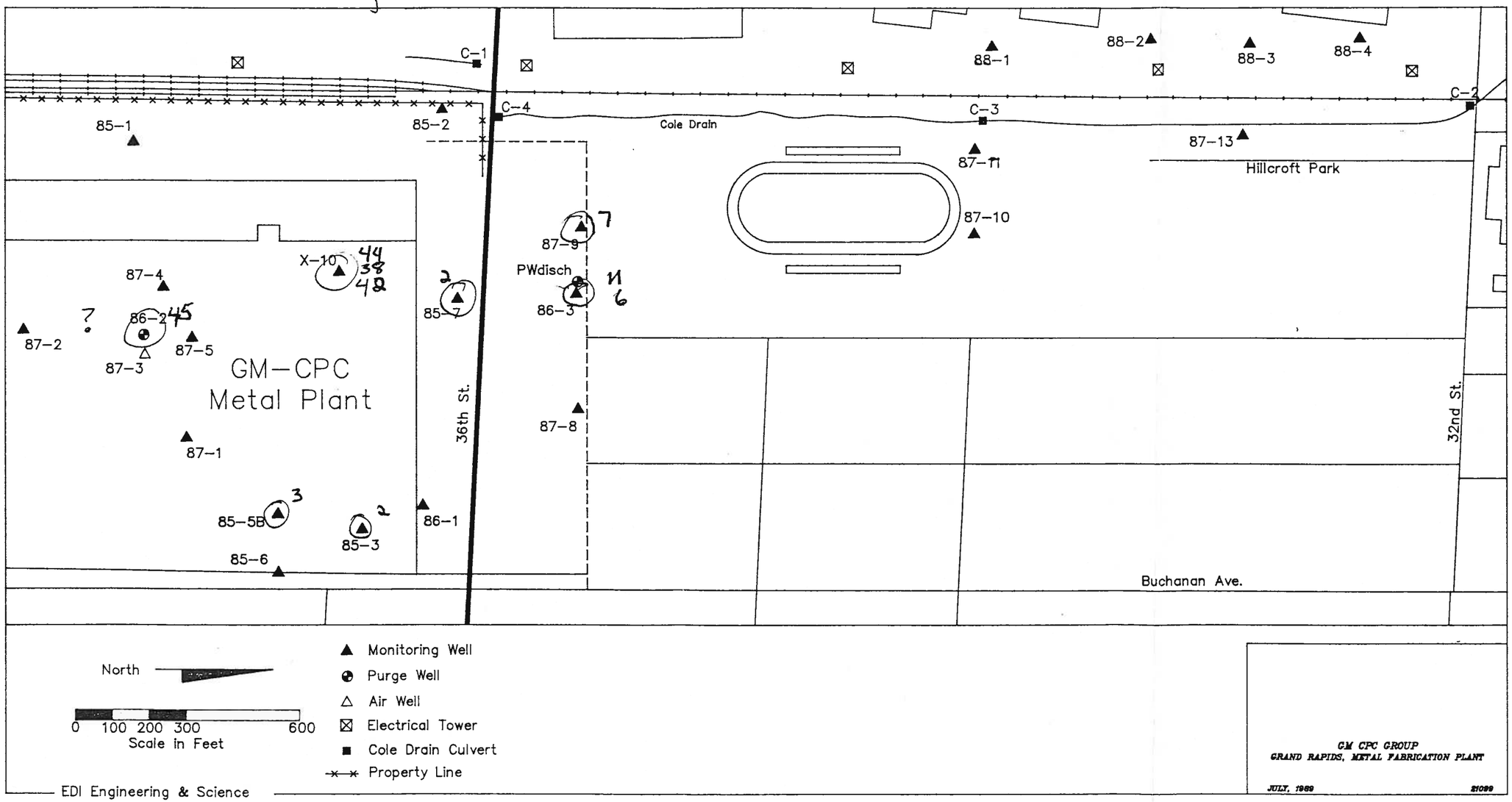
ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: CPC GRAND RAPIDS
PROJECT NO.: 25554
LOCATION: 36th ST. PLANT
SAMPLED BY: KTO
DESCRIPTION: ENVIRONMENTAL MONITORING

DATE SAMPLED: 00/00/00 TIME:
DATE RECEIVED: 06/16/89 TIME: 10:05 AM
DATE COMPLETED: 06/27/89
SCHEDULED COMPLETION: 07/07/89
ANALYST: GW,LKT,LKS
QUALITY CONTROL REVIEW BY: RVB
WORKSHEET NO: 3

	87-10	87-11	87-13	C-1	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	21123	21124	21125	21126		
TRICHLOROETHYLENE	42	190	7.6	<1.0	1.0	ug/l
1,2 DICHLOROETHENE	10	70	<1.0	<1.0	1.0	ug/l
111-TRICHLOROETHANE	----------	----------	----------	----------		
DATE SAMPLED:	06/16/89	06/16/89	06/16/89	06/15/89		
TIME SAMPLED:	8:10 AM	8:30 AM	8:50 AM	2:45 PM		

1, 1, 1 TCA (ug/l)


C-1
C-4
C-3
C-2
Cole Drain
85-1
85-2
88-1
88-2
88-3
88-4
87-13
87-11
87-10
Hillcroft Park
87-9
PWdisch
86-3
X-10
44
38
42
87-4
87-2
86-2
45
87-5
87-3
GM—CPC
Metal Plant
87-1
85-7
2
36th St.
87-8
32nd St.
85-5B
3
85-3
2
86-1
85-6
Buchanan Ave.
North
0 100 200 300 600
Scale in Feet
Monitoring Well
Purge Well
Air Well
Electrical Tower
Cole Drain Culvert
Property Line
EDI Engineering & Science
GM CPC GROUP
GRAND RAPIDS, METAL FABRICATION PLANT
JULY, 1989
21099

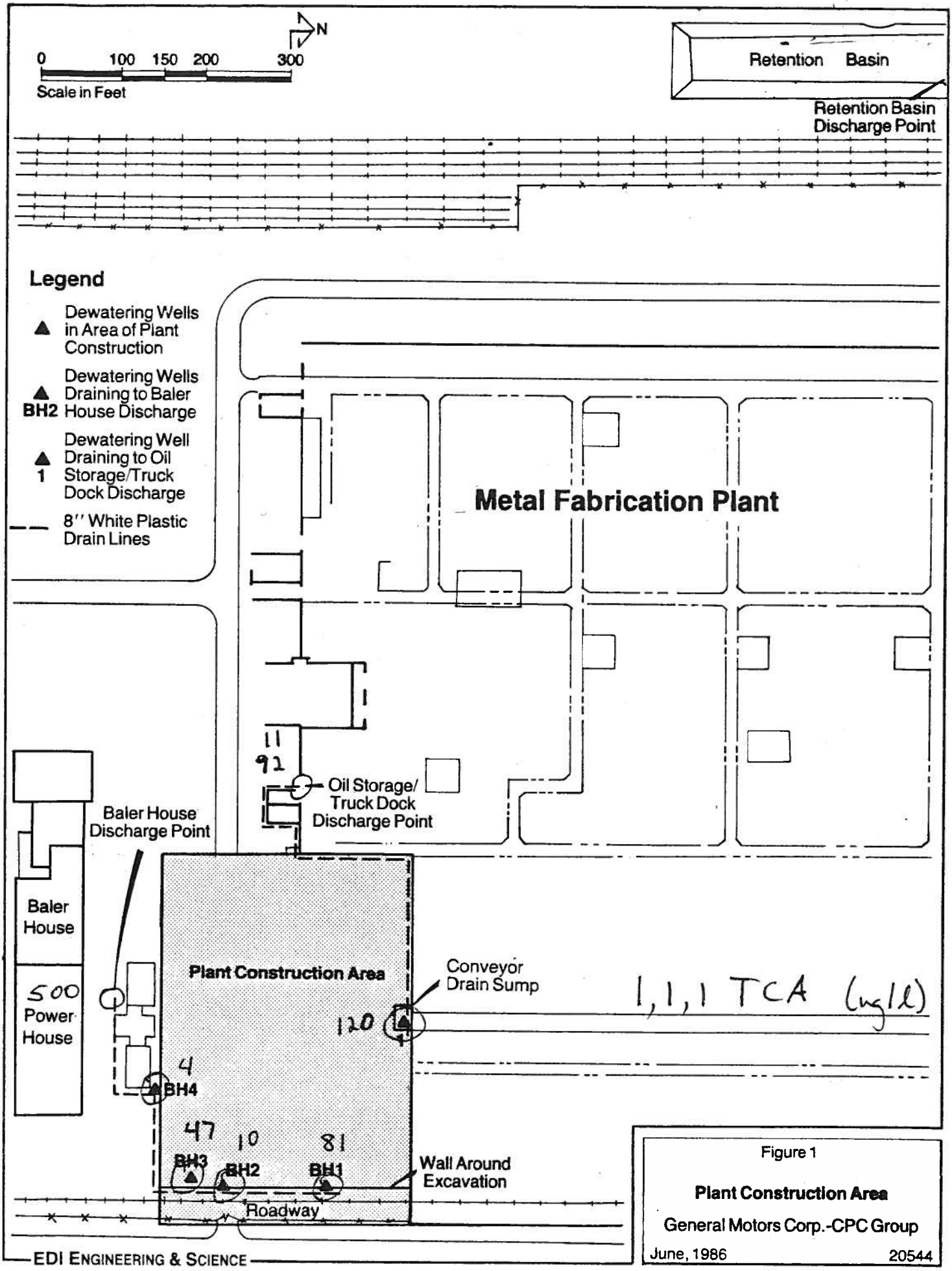


Figure 1

Plant Construction Area

General Motors Corp.-CPC Group

June, 1986 20544

EDI ENGINEERING & SCIENCE

5555 Glenwood Hills Parkway, SE, Post Office Box 874, Grand Rapids, Michigan 49588-0874

October 27, 1998

Mr. James Chan
General Motors Corporation
Argonaut "A" Building
Mail Code 482-302-205
485 West Milwaukee
Detroit, MI 48202

RE: **Results of Soil and Groundwater Sampling Performed in 17 Bay of General Motors Grand Rapids Metal Fabrication Plant**

Telephone
616.942.9600
Facsimile
616.942.6499

Dear Mr. Allen:

At the request of General Motors (GM), Earth Tech, Inc. (Earth Tech) completed soil boring and sample collection activities, reviewed the analytical results, and prepared this report for the GM Grand Rapids Metal Fabrication Plant. The objective of this work is to determine if the soil that will be excavated from 17 Bay is suitable for use at a GM site or requires disposal.

This report summarizes the drilling and sample collection activities, presents the analytical results in comparison to relevant criteria, and presents a map of the soil boring locations and the approximate excavation area.

SOIL BORING ACTIVITES

Fourteen soil borings were drilled in 17 Bay from August 3 through August 12, 1998. The borings were installed by coring or hammering through approximately 1 foot of concrete then drilling to depth using Macropore Geoprobe® samplers. The location of each boring within the bay is presented in Figure 1. The boring logs are presented in Attachment 1. Eight of the borings (17-1, 17-2, 17-3, 17-4, 17-7, 17-8, 17-12, and 17-14) were drilled to a depth of 25 feet. Boring 17-13 had refusal and was terminated approximately 20 feet below ground surface. Soil samples were collected from each 5-foot interval in these borings.

Two borings (17-10A and 17-11) were drilled to a depth of 30 feet below ground surface. Boring 17-10A was the second attempt at drilling boring 10. The original attempt had refusal at 16 feet below ground surface and, consequently, was abandoned. Soil samples were collected from the following intervals in boring 10A: 0 to 7.5 feet, 7.5 to 12.5 feet, 12.5 to 17.5 feet, 17.5 to 22.5 feet, and 22.5 to 30 feet. Boring 17-11 was initiated in the main conveyor pit; therefore, sample collection started 12 feet below ground surface.

The remaining three borings (17-5, 17-6, and 17-9) were drilled to a depth of 35 feet. Soil samples were collected at intervals of 0 to 7.5 feet, 7.5 to 15 feet, 15 to 20 feet, 20 to 27.5 feet, and 27.5 to 35 feet.

SAMPLE COLLECTION ACTIVITIES

A portion of the soil collected from each interval was combined to create a composite sample for the boring. The soil composite samples were then submitted to CT&E Environmental Services, Inc. (CT&E) for analysis of inorganic, metal, semivolatile parameters.

Approximately 25 grams of soil from each interval was preserved in the field with methanol and submitted to CT&E for analysis of volatile organic compounds (VOCs). Prior to the VOC analysis, CT&E combined aliquots of methanol from each individual interval from a boring to create a composite VOC sample for the boring.

Composite samples from borings 17-1, 17-3, 17-12, and 17-14 were also collected and submitted to CT&E for waste characterization parameters including: TCLP metals, TCLP volatiles, TCLP semivolatiles, ignitability, corrosivity, and reactivity.

Groundwater samples were collected from borings 17-5 and 17-10A using a Geoprobe® 2-foot mill slot screen and peristaltic pump. Approximately 1.5 gallons of water were purged from each boring prior to collection of the sample. Groundwater was encountered at approximately 22 feet below ground surface in 17-5 and 21 feet in 17-10A. The groundwater sample was collected between 23 and 25 feet in 17-5 and 22 and 24 feet in 17-10A. The groundwater samples were submitted to CT&E for analysis of VOCs.

ANALYTICAL RESULTS

The analytical results are presented in comparison to relevant criteria in the attached tables. The tables are formatted so that all detectable concentrations are in bold print. Detectable concentrations that exceed specific criteria are highlighted by boxing and/or shading.

Table 1 presents the soil analytical results for inorganic, VOC, and semivolatile parameters. These results are compared to the GM Inert Guideline Criteria, the Part 201 Generic Residential Soil Direct Contact Criteria, and the Part 201 Generic Residential Protection of Drinking Water (i.e., 20x groundwater) Criteria.

The analytical results for the metals analyses are presented in Table 2. The metals results are compared to the GM Inert Guideline Criteria, the Part 201 Generic Residential Soil Direct Contact Criteria, and the Part 201 Statewide Default Background Criteria.

Table 3 presents the groundwater analytical results from the samples collected from borings 17-5 and 17-10A. The groundwater results are compared to the Part 201 Generic Residential Drinking Water Criteria.

The results of the waste characterization analyses are presented in Table 4.

DATA SUMMARY

A review of the soil analytical results for inorganic, VOC, and semivolatile parameters presented in Table 1 indicates that all of the samples had detectable concentrations of some of the analyzed parameters. Table 1 also shows that the samples collected from borings 17-1, 17-4, and 17-11 did not have any detectable concentrations that exceeded the criteria that the results were compared to. However, the remaining samples each had at least one parameter that exceeded the GM Inert Guideline Criteria and/or the Part 201 Generic Residential Protection of Drinking Water (i.e., 20x groundwater) Criteria. None of the detected parameters were detected at concentrations that exceeded the Part 201 Generic Residential Soil Direct Contact Criteria.

The only detected parameter to exceed the drinking water protection and the GM guideline criteria was fluoride. The concentration of fluoride detected in the samples from borings 17-2, 17-3, 17-5, 17-6, 17-7, 17-8, 17-10A, 17-12, and 17-13 exceed both criteria.

The samples from borings 17-2, 17-12, 17-13, and 17-14 had at least one detectable concentration of a Polynuclear Aromatic Hydrocarbon compound (PNA) that exceeded the GM guideline criteria.

The compound bis(2-ethylhexyl)phthalate was detected in the samples from borings 17-5 and 17-10A at concentrations that exceeded the GM guideline criteria.

The VOC trichloroethylene was detected in borings 17-8, 17-9, 17-12, and 17-13 at levels that exceeded the GM criteria.

As indicated above, Table 2 summarizes the metals analytical results. None of the detected metals were found at concentrations that exceeded the Part 201 Generic Residential Soil Direct

Contact Criteria. However, the detected concentrations of aluminum, arsenic, copper, iron, lead, manganese, nickel, and zinc exceeded the GM guideline criteria in all of the soil boring samples. Additionally, the samples from borings 17-9, 17-12, 17-13, and 17-14 were found to have concentrations of silver that exceeded the GM guideline criterion.

The selenium analytical results from samples 17-1, 17-4, 17-6, 17-7, 17-9, 17-10A, 17-12, and 17-13 were found to exceed both the GM guideline criteria and the Part 201 Statewide Default Background Criteria.

The groundwater results presented in Table 3 indicate that cis-1,2-dichloroethylene (1,2-DCE) and trichloroethylene (TCE) were detected in the sample from 17-5 and toluene was detected in the sample from 17-10A. The concentrations of 1,2-DCE (2.0 ug/L) in 17-5 and toluene (2.0 ug/L) in 17-10A do not exceed the respective criteria. However, the concentration of TCE detected in 17-5 exceeds the drinking water criterion. The concentrations are similar to previously collected samples in nearby permanent monitoring wells.

The analytical results for the waste characterization parameters presented in Table 4 indicate that none of the composite samples that were analyzed for these parameters are considered hazardous.

CONCLUSIONS

Nine of the soil samples were found to exceed the Part 201 Generic Residential Protection of Drinking Water (i.e., 20x groundwater) and the GM Inert Guideline Criteria. However, none of these results exceeded the Part 201 Generic Residential Soil Direct Contact Criteria.

Eight soil samples were found to exceed the Part 201 Statewide Default Background Criteria and the GM Inert Guideline Criteria. The default background criterion for selenium is 0.41 mg/kg. The soil sample from boring 17-1 had 1.1 mg/kg of selenium detected. However, the TCLP analysis for selenium was non-detect for the sample from 17-1. Consequently, using the default background criterion may not be appropriate at this site. Additionally, the Part 201 Generic Residential Soil Direct Contact Criteria is more than three orders of magnitude greater than the highest detected concentration of selenium.

None of the four samples that were analyzed for the waste characterization parameters were found to be hazardous.

Based on the analytical results and the comparisons of the detected parameters to the Part 201 criteria, it appears that soil could be transferred to another GM facility or disposed of at a municipal solid waste landfill. Attachment 2 contains a review of waste characterization issues under RCRA which provides documentation for the disposal options for the 17 Bay soils.

If you have any questions regarding the results of the 17 Bay soil and groundwater study, please contact us at (616) 942-9600.

Very truly yours,

Earth Tech, Inc.

Todd J. Colon
Project Environmental Scientist

Theodore A. Lietzke
Project Manager

Enclosures

cc: Tobe Allen, GM Grand Rapids Metal Fabrication Plant

DATA TABLES

Qualifier Codes
Grand Rapids Metal Plant
General Motors Corporation

CODE	DEFINITION
Note:	Bolded values indicate an exceedence of the detection limit.
Note:	Shaded values indicate an exceeedance of Part 201 - 20 Times Groundwater Criteria for Table 1; Part 201 - Statewide Default Background Levels for Table 2, and Part 201 Residential Drinking Water Criteria for Table 3. Part 201 Criteria from the MDEQ-ERD Operational Memorandum #8, Revision 4, as revised June 1998.
Note:	Boxed values indicate an exceedance of the GM Inert Guidelines.
B	Analyte was found in associated blank as well as sample.
D	Compound identified in an analysis at a secondary dilution factor.
ID	Inadequate data to develop criterion.
N	This compound is tentatively identified based on a mass spectral library search.
NA	Not available.
NC	Non Corrosive
NI	Non Ignitable
NLL	Chemical in not likely to leach under most soil conditions.
(A)	Criterion is the State of Michigan Drinking Water Standard established pursuant to Section 5 of the Safe Drinking Water Act.
(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
(D)	Calculated criterion exceeds 100%, hence it is reduced to 100%.
(E)	Criterion is the aesthetic drinking water value.
(F)	Criterion is based on adverse impacts to plant life.
(H)	Valence-specific chromium data must be compared to the corresponding valence-specific cleanup criteria.
(J)	Chemical may be present in several isomers forms.
(M)	Calculated criterion is below the analytical method detection limit, there for the criterion defaults to the MDL.
(N)	The concentrations of all potential sources of nitrate-nitrogen must be added together and compared to nitrate criteria.
(P)	Criterion is based on the EPA action level for releasable cyanide.
(Q)	Criteria for carcinogenic polycyclic aromatic hydrocarbons were developed using (relative potential impotencies) to benzo(a)pyrene.
(R)	Chemical may exhibit the characteristic of reactivity.
(S)	Criterion is based on the chemical-specific water solubility limit.
(T)	Refer to the Toxic Substances Control Act to determine the applicability of TSCA cleanup standards.
(U)	Chemical may exhibit the characteristic of corrosively.
(W)	Concentrations of trihalomethanes in groundwater must be added together to determine compliance with the State of Michigan Drinking Water Standard of 100
(Z)	An aesthetic drinking water criterion is in process. This criterion may not be protective of adverse aesthetic impacts.

Table 1
Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification: / Sample Identification: / Date Sampled: / Sampled By: / Analyzed By: / Comments:		Part 201 Residential Direct Contact Criteria	Part 201 20 Times Ground Water Criteria	GM Inert Guildline Criteria	SB17-01 83670-5907 8/3/98 ETCO CT&E Composite	SB17-02 83670-5914 8/3/98 ETCO CT&E Composite	SB17-03 83670-5920 8/4/98 ETCO CT&E Composite	SB17-07 83670-5927 8/4/98 ETCO CT&E Composite	SB17-06 83685-5970 8/5/98 ETCO CT&E Composite	SB17-08 83685-5964 8/5/98 ETCO CT&E Composite
Non-Metallic Inorganic	***Units***									
Chloride	mg/kg	500(F)	5000	500	< 200	< 200	< 200	< 200	< 200	< 200
Cyanide, total	mg/kg	250(P,R)	4(R)	0.1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Fluoride	mg/kg	25000	40	38	33	87	70	55	54	49
Nitrogen, nitrate	mg/kg	ID(N)	200(N)	NA	12	5.7	5	7.6	3.3	6.5
Nitrogen, nitrite	mg/kg	ID(N)	20(N)	NA	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Sulfate	mg/kg	ID	5000	5000	110	< 30	< 30	35	< 0.03	54
Physical Property	***Units***									
Percent solids	%	NA	NA	NA	93.5	96.8	94	95.5	90.5	92.6
Volatile Organic	***Units***									
Dichlorodifluoromethane	mg/kg	1000(C)	93	20	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Chloromethane	mg/kg	200	1.3	0.06	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Vinyl chloride	mg/kg	1.2	0.04	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Bromomethane	mg/kg	150	0.2	0.2	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Chloroethane	mg/kg	670	4.4	0.18	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Benzyl chloride	mg/kg	15	0.1	0.004	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Trichlorofluoromethane	mg/kg	560(C)	52	40	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,1-Dichloroethylene	mg/kg	110	0.14	0.14	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Methylene chloride	mg/kg	340	0.1	0.1	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
2-Butanone	mg/kg	27000(C)	260	8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Butylbenzene, tertiary	mg/kg	1200	1.6	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
trans-1,2-Dichloroethylene	mg/kg	1400(C)	2	2	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Methyl-t-butyl ether	mg/kg	850	4.8(Z)	7.6	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,1-Dichloroethane	mg/kg	7900(C)	18	14	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
2,2-Dichloropropane	mg/kg	NA	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
cis-1,2-Dichloroethylene	mg/kg	640(C)	1.4	1.4	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Chloroform	mg/kg	420	2(W)	0.12	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Bromochloromethane	mg/kg	NA	NA	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,1,1-Trichloroethane	mg/kg	460(C)	4	2.4	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,1-Dichloropropene	mg/kg	NA	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Carbon tetrachloride	mg/kg	20	0.1	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Methyl isobutyl ketone	mg/kg	2700(C)	36	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,2-Dichloroethane	mg/kg	28	0.1	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Ethyl ether	mg/kg	7400(C)	74	20	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzene	mg/kg	88	0.1	0.002	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Acetone	mg/kg	11000	15	10	< 0.1	< 0.1	< 0.1	B 0.14	B 0.14	< 0.1
Dibromomethane	mg/kg	2000(C)	1.6	1.4	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Trichloroethylene	mg/kg	160	0.1	0.06	< 0.025	< 0.025	< 0.025	0.04	0.051	0.069
1,2-Dichloropropane	mg/kg	38	0.1	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Dibromochloromethane	mg/kg	31	2(W)	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Tetrachloroethylene	mg/kg	50	0.1	0.014	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Toluene	mg/kg	250(C)	16	2.2	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,1,2-Trichloroethane	mg/kg	45	0.1	0.012	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,3-Dichloropropane	mg/kg	NA	NA	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Dichlorobromomethane	mg/kg	41	2(W)	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2-Dibromoethane	mg/kg	0.03	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Chlorobenzene	mg/kg	260(C)	2	1.4	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,1,1,2-Tetrachloroethane	mg/kg	99	0.66	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Ethylbenzene	mg/kg	140(C)	1.5	0.62	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,3-Dichloropropene	mg/kg	14(J)	0.094	3.6	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
m,p-Xylene	mg/kg	150(C)	5.6	6	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
o-Xylene	mg/kg	150(C)	5.6	6	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Carbon disulfide	mg/kg	280(C,R)	16	14	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Styrene	mg/kg	85	2.7	0.02	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
2-Hexanone	mg/kg	10000(C)	20	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Isopropyl benzene	mg/kg	400(C)	90	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Bromoform	mg/kg	320	2(W)	0.08	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,1,2,2-Tetrachloroethane	mg/kg	13	0.086	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2,3-Trichloropropane	mg/kg	830(C)	0.84	0.8	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Bromobenzene	mg/kg	41	0.53	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025

Table 1
Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Sample Identification:		Part 201	Part 201	GM	SB17-01	SB17-02	SB17-03	SB17-07	SB17-06	SB17-08
Sample Identification:		Part 201	Part 201	GM	83670-5907	83670-5914	83670-5920	83670-5927	83685-5970	83685-5964
Date Sampled:		Residential	20 Times	Inert	8/3/98	8/3/98	8/4/98	8/4/98	8/5/98	8/5/98
Sampled By:		Direct	Ground	Guildline	ETCO	ETCO	ETCO	ETCO	ETCO	ETCO
Analyzed By:		Contact	Water	Criteria	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E
Comments:		Criteria	Criteria		Composite	Composite	Composite	Composite	Composite	Composite
Volatile Organic, continued	***Units***									
Propylbenzene, normal	mg/kg	1200	1.6	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
2-Chlorotoluene	mg/kg	2200	3	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
4-Chlorotoluene	mg/kg	NA	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2,4-Trimethylbenzene	mg/kg	110(C)	33(Z)	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,3,5-Trimethylbenzene	mg/kg	94(C)	33(Z)	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Butylbenzene, secondary	mg/kg	1000	1.6	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
p-Isopropyl toluene	mg/kg	NA	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,3-Dichlorobenzene	mg/kg	200(C)	17	3.6	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,4-Dichlorobenzene	mg/kg	110	1.6	0.33	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Butylbenzene, normal	mg/kg	1200	1.6	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2-Dichlorobenzene	mg/kg	210(C)	13	12	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2-Dibromo-3-chloropropane	mg/kg	NA	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2,4-Trichlorobenzene	mg/kg	1100(C)	4.1	0.14	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Hexachloro-1,3-butadiene	mg/kg	130	19	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Naphthalene	mg/kg	15000	17	0.58	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2,3-Trichlorobenzene	mg/kg	NA	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Trichlorotrifluoroethane	mg/kg	560(C)	560(C)	4000	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acrylonitrile	mg/kg	4.7	0.032	0.001	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hexane	mg/kg	10000(C)	60	NA	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Tetrahydrofuran	mg/kg	3600	10(M)	4	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
C Volatile Organic	***Units***									
Ethyl glycol	mg/kg	10000(C)	300	200	< 10	< 10	< 10	< 10	< 10	< 10
Isopropanol	mg/kg	7000	9.4	8	< 10	< 10	< 10	< 10	< 10	< 10
Isobutyl alcohol	mg/kg	8900(C)	46	40	< 10	< 10	< 10	< 10	< 10	< 10
Methanol	mg/kg	3100(C)	74	80	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Propanediol	mg/kg	10000(C)	3000	NA	< 10	< 10	< 10	< 10	< 10	< 10
PCB's	***Units***									
PCB: aroclor 1016	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1221	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1232	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1242	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1248	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1254	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1260	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1262	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1268	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Pesticides	***Units***									
Aldrin	mg/kg	0.58	NLL	0.0017	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
a-BHC	mg/kg	1.6	0.025	0.0017	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
b-BHC	mg/kg	5.5	0.085	0.0017	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Lindane	mg/kg	7.6	0.022(M)	0.0017	< 0.025	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
d-BHC	mg/kg	NA	NA	NA	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chlordane	mg/kg	17(J)	NIL(J)	0.0017	< 0.02	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
4,4'-DDD	mg/kg	41	NLL	0.0033	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
4'-DDE	mg/kg	29	NLL	0.0033	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
4'-DDT	mg/kg	29	NLL	0.0033	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dieldrin	mg/kg	0.62	NLL	0.0033	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
a-Endosulfan	mg/kg	NA	NLL	97 (J)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Endosulfan	mg/kg	NA	NLL	97 (J)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Endosulfan Sulfate	mg/kg	NA	NLL	97 (J)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Endrin	mg/kg	72	NLL	0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Endrin aldehyde	mg/kg	NA	NA	NA	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Heptachlor	mg/kg	2.2	NLL	0.0017	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Heptachlor epoxide	mg/kg	1.1	NLL	0.0017	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Toxaphene	mg/kg	2.3	2.6	0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17
Methoxychlor	mg/kg	2100	130	0.8	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Table 1
Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:					SB17-01	SB17-02	SB17-03	SB17-07	SB17-06	SB17-08
Sample Identification:		Part 201	Part 201	GM	83670-5907	83670-5914	83670-5920	83670-5927	83685-5970	83685-5964
Date Sampled:		Residential	20 Times	Inert	8/3/98	8/3/98	8/4/98	8/4/98	8/5/98	8/5/98
Sampled By:		Direct	Ground	Guildline	ETCO	ETCO	ETCO	ETCO	ETCO	ETCO
Analyzed By:		Contact	Water	Criteria	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E
Comments:		Criteria	Criteria		Composite	Composite	Composite	Composite	Composite	Composite
GC/MS Semi-Volatile Orgains	*Units*									
Chloronaphthalene	mg/kg	27000	36	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Bis(2-chloroethyl)ether	mg/kg	2.3	0.33(M)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Hexachlorobenzene	mg/kg	6.2	1.8	0.05	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2-Chlorophenol	mg/kg	680	0.9	0.2	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Hexachlorocyclopentadiene	mg/kg	81(C)	36	0.05	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Bis(2-chloroisopropyl)ether	mg/kg	NA	NA	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
n-Nitrosodi-n-propylamine	mg/kg	0.37	0.33(M)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Hexachloroethane	mg/kg	180	17	0.05	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Nitrobenzene	mg/kg	51	0.33(M)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
4-Methylphenol	mg/kg	5500	74	0.76	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Isophorone	mg/kg	2400(C)	18	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Bis(2-chloroethoxy)methane	mg/kg	NA	NA	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
4-Methylphenol	mg/kg	NA	NA	NA	< 0.66	< 0.66	< 0.66	< 0.66	< 0.66	< 0.66
Dimethyl phthalate	mg/kg	790(C)	790(C)	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2-Nitrophenol	mg/kg	1200	0.4	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Diethyl phthalate	mg/kg	740(C)	110	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	0.64
4-Dimethylphenol	mg/kg	21000	7.4	0.62	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
N-Nitrosodiphenylamine	mg/kg	520	3.4	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2,4-Dichlorophenol	mg/kg	4200	2.6	0.4	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Di-n-butyl phthalate	mg/kg	NA	760(C)	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
4-Chloroaniline	mg/kg	NA	NA	NA	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Butyl benzyl phthalate	mg/kg	310000(C)	310(C)	20	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
p-Chloro-m-cresol	mg/kg	2200	5.6	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Bis(2-ethyl hexyl)phthalate	mg/kg	700	NLL	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Di-n-octyl phthalate	mg/kg	7600	100000	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2-Methylnaphthalene	mg/kg	15000	5.2	0.2	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Phenol	mg/kg	12000(C)	88	22	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2,4,6-Trichlorophenol	mg/kg	900	11	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2,4,5-Trichlorophenol	mg/kg	42000	160	14	< 1.7	< 1.7	< 1.7	< 1.7	< 0.33	< 1.7
Acenaphthene	mg/kg	76000	300	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Acenaphthylene	mg/kg	1500	2.9	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2-Nitroaniline	mg/kg	1200	0.4	NA	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Fluorene	mg/kg	51000	390	6	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Phenanthrene	mg/kg	1500	12	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2,6-Dinitrotoluene	mg/kg	NA	NA	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Anthracene	mg/kg	420000	41	40	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
3-Nitroaniline	mg/kg	NA	NA	NA	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Fluoranthene	mg/kg	51000	720	6	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
1,2,3,4-Tetrachlorobenzene	mg/kg	NA	NA	NA	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
4,6-Dinitro-2-methylphenol	mg/kg	NA	NA	NA	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Pyrene	mg/kg	32000	470	2000	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
4-Nitrophenol	mg/kg	NA	NA	NA	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Benzo(a)anthracene	mg/kg	14(Q)	NLL(Q)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Chrysene	mg/kg	1400(Q)	NLL(Q)	0.33	< 0.33	0.34	< 0.33	< 0.33	< 0.33	< 0.33
Carbazole	mg/kg	130	8.6	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Benzo(b)fluoranthene	mg/kg	14(Q)	NLL(Q)	0.33	< 0.33	0.92	< 0.33	< 0.33	< 0.33	< 0.33
2,4-Dinitrotoluene	mg/kg	15	15	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Benzo(k)fluoranthene	mg/kg	140(Q)	NLL(Q)	0.33	< 0.33	0.59	< 0.33	< 0.33	< 0.33	< 0.33
Benzo(a)pyrene	mg/kg	1.4(Q)	NLL(Q)	0.33	< 0.33	0.57	< 0.33	< 0.33	< 0.33	< 0.33
Indeno(1,2,3-cd)pyrene	mg/kg	14(Q)	NLL(Q)	0.33	< 0.33	0.48	< 0.33	< 0.33	< 0.33	< 0.33
4-Chlorodiphenyl ether	mg/kg	NA	NA	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Dibenz(a,h)anthracene	mg/kg	1.4(Q)	NLL(Q)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2-Nitroaniline	mg/kg	NA	NA	NA	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Benzo(ghi)perylene	mg/kg	1500	NLL	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
4,6-Dinitro-o-cresol	mg/kg	150	1.7(M)	1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
1,2,4,5-Tetrachlorobenzene	mg/kg	140000	1500	0.008	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
4-Bromodiphenyl ether	mg/kg	NA	NA	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
1,3,5-Trichlorobenzene	mg/kg	NA	NA	NA	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33

Table 1
Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

...ie Identification:					SB17-01	SB17-02	SB17-03	SB17-07	SB17-06	SB17-08
Sample Identification:		Part 201	Part 201	GM	83670-5907	83670-5914	83670-5920	83670-5927	83685-5970	83685-5964
...ate Sampled:		Residential	20 Times	Inert	8/3/98	8/3/98	8/4/98	8/4/98	8/5/98	8/5/98
...mpled By:		Direct	Ground	Guildline	ETCO	ETCO	ETCO	ETCO	ETCO	ETCO
...nalyzed By:		Contact	Water	Criteria	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E
Comments:		Criteria	Criteria		Composite	Composite	Composite	Composite	Composite	Composite
...C/MS Semi-Volatile Orgains, Con't.	*Units*									
...B (BP-6)	mg/kg	1.1	NLL	0.00008	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
...exabromobenzene	mg/kg	1200	0.4	0.2	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
Aniline	mg/kg	1700	3	1.7	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
...irex	mg/kg	NA	NA	NA	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
...benzofuran	mg/kg	ID	ID	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
...enzyl alcohol	mg/kg	5800(C)	200	200	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Pentachlorobenzene	mg/kg	190(C)	29	0.12	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
...ntachlorophenol	mg/kg	8.1	3.2	0.0017	< 1.7	< .33	< 1.7	< 1.7	< 1.7	< 1.7
...ntachloronitrobenzene	mg/kg	3200	37	NA	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
...nzoic acid	mg/kg	1000000(D)	640	600	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3
3,3'-Dichlorobenzidine	mg/kg	5.7	2(M)	2	<2	<2	<2	<2	<2	<2

Table 1
Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:					SB17-04	SB17-05	SB17-09	SB17-12	SB17-10A	SB17-13
Sample Identification:		Part 201	Part 201	GM	83716-6301	83716-6294	83767-6458	83767-6456	83767-6452	83767-6455
Date Sampled:		Residential	20 Times	Inert	8/6/98	8/6/98	8/7/98	8/7/98	8/10/98	8/10/98
Sampled By:		Direct	Ground	Guildline	ETCO	ETCO	ETCO	ETCO	ETCO	ETCO
Analyzed By:		Contact	Water	Criteria	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E
Comments:		Criteria	Criteria		Composite	Composite	Composite	Composite	Composite	Composite
Non-Metallic Inorganic	***Units***									
Chloride	mg/kg	500(F)	5000	500	< 200	< 200	< 200	< 200	< 200	< 200
Cyanide, total	mg/kg	250(P,R)	4(R)	0.1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Fluoride	mg/kg	25000	40	38	35	60	0.43	58	47	55
Nitrogen, nitrate	mg/kg	ID(N)	200(N)	NA	4.1	5.6	8	4.8	2.7	7
Nitrogen, nitrite	mg/kg	ID(N)	20(N)	NA	< 0.3	< 0.3	< 0.2	0.2	< 0.2	0.2
Sulfate	mg/kg	ID	5000	5000	81	< 40	< 40	77	< 40	< 40
Physical Property	***Units***									
Percent solids	%	NA	NA	NA	96.2	90	90.3	91.9	90.8	96.9
Volatile Organic	***Units***									
Dichlorodifluoromethane	mg/kg	1000(C)	93	20	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Chloromethane	mg/kg	200	1.3	0.06	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Vinyl chloride	mg/kg	1.2	0.04	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Bromomethane	mg/kg	150	0.2	0.2	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Chloroethane	mg/kg	670	4.4	0.18	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Benzyl chloride	mg/kg	15	0.1	0.004	< 0.1	< 0.1	< 0.025	< 0.025	< 0.025	< 0.025
Trichlorofluoromethane	mg/kg	560(C)	52	40	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,1-Dichloroethylene	mg/kg	110	0.14	0.14	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Methylene chloride	mg/kg	340	0.1	0.1	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
2-Butanone	mg/kg	27000(C)	260	8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Butylbenzene, tertiary	mg/kg	1200	1.6	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
trans-1,2-Dichloroethylene	mg/kg	1400(C)	2	2	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Methyl-t-butyl ether	mg/kg	850	4.8(Z)	7.6	< 0.1	< 0.1	< 0.025	< 0.025	< 0.1	< 0.025
1,1-Dichloroethane	mg/kg	7900(C)	18	14	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
2,2-Dichloropropane	mg/kg	NA	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
cis-1,2-Dichloroethylene	mg/kg	640(C)	1.4	1.4	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Chloroform	mg/kg	420	2(W)	0.12	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Bromochloromethane	mg/kg	NA	NA	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,1,1-Trichloroethane	mg/kg	460(C)	4	2.4	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,1-Dichloropropene	mg/kg	NA	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Carbon tetrachloride	mg/kg	20	0.1	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Methyl isobutyl ketone	mg/kg	2700(C)	36	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,2-Dichloroethane	mg/kg	28	0.1	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Ethyl ether	mg/kg	7400(C)	74	20	< 0.1	< 0.1	< .025	< 0.025	< 0.025	< 0.025
Benzene	mg/kg	88	0.1	0.002	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Acetone	mg/kg	11000	15	10	B 0.19	B 0.13	< 0.1	< 0.1	< 0.1	< 0.1
Dibromomethane	mg/kg	2000(C)	1.6	1.4	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Trichloroethylene	mg/kg	160	0.1	0.06	< 0.025	0.044	0.092	0.062	0.03	0.096
1,2-Dichloropropane	mg/kg	38	0.1	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Dibromochloromethane	mg/kg	31	2(W)	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Tetrachloroethylene	mg/kg	50	0.1	0.014	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Toluene	mg/kg	250(C)	16	2.2	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,1,2-Trichloroethane	mg/kg	45	0.1	0.012	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,3-Dichloropropane	mg/kg	NA	NA	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Dichlorobromomethane	mg/kg	41	2(W)	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2-Dibromoethane	mg/kg	0.03	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Chlorobenzene	mg/kg	260(C)	2	1.4	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,1,1,2-Tetrachloroethane	mg/kg	99	0.66	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Ethylbenzene	mg/kg	140(C)	1.5	0.62	< 0.025	< 0.025	< 0.025	< 0.025	0.028	< 0.025
1,3-Dichloropropene	mg/kg	14(J)	0.094	3.6	< 0.1	< 0.1	< 0.1	< 0.025	< 0.025	< 0.025
m,p-Xylene	mg/kg	150(C)	5.6	6	< 0.05	< 0.05	< 0.05	< 0.05	0.051	< 0.05
o-Xylene	mg/kg	150(C)	5.6	6	< 0.025	< 0.025	< 0.025	< 0.025	0.046	< 0.025
Carbon disulfide	mg/kg	280(C,R)	16	14	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Styrene	mg/kg	85	2.7	0.02	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
2-Hexanone	mg/kg	10000(C)	20	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Isopropyl benzene	mg/kg	400(C)	90	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Bromoform	mg/kg	320	2(W)	0.08	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,1,2,2-Tetrachloroethane	mg/kg	13	0.086	0.01	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2,3-Trichloropropane	mg/kg	830(C)	0.84	0.8	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Bromobenzene	mg/kg	41	0.53	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025

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Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:					SB17-04	SB17-05	SB17-09	SB17-12	SB17-10A	SB17-13
Sample Identification:		Part 201	Part 201	GM	83716-6301	83716-6294	83767-6458	83767-6456	83767-6452	83767-6455
Date Sampled:		Residential	20 Times	Inert	8/6/98	8/6/98	8/7/98	8/7/98	8/10/98	8/10/98
Sampled By:		Direct	Ground	Guildline	ETCO	ETCO	ETCO	ETCO	ETCO	ETCO
Analyzed By:		Contact	Water	Criteria	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E
Comments:		Criteria	Criteria		Composite	Composite	Composite	Composite	Composite	Composite
Volatile Organic, continued	***Units***									
Propylbenzene, normal	mg/kg	1200	1.6	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
2-Chlorotoluene	mg/kg	2200	3	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
4-Chlorotoluene	mg/kg	NA	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2,4-Trimethylbenzene	mg/kg	110(C)	33(Z)	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,3,5-Trimethylbenzene	mg/kg	94(C)	33(Z)	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Butylbenzene, secondary	mg/kg	1000	1.6	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
p-Isopropyl toluene	mg/kg	NA	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,3-Dichlorobenzene	mg/kg	200(C)	17	3.6	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,4-Dichlorobenzene	mg/kg	110	1.6	0.33	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Butylbenzene, normal	mg/kg	1200	1.6	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2-Dichlorobenzene	mg/kg	210(C)	13	12	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2-Dibromo-3-chloropropane	mg/kg	NA	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2,4-Trichlorobenzene	mg/kg	1100(C)	4.1	0.14	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Hexachloro-1,3-butadiene	mg/kg	130	19	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Naphthalene	mg/kg	15000	17	0.58	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
1,2,3-Trichlorobenzene	mg/kg	NA	NA	NA	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Trichlorotrifluoroethane	mg/kg	560(C)	560(C)	4000	< 0.1	< 0.1	< 0.1	< 0.025	< 0.1	< 0.1
Acrylonitrile	mg/kg	4.7	0.032	0.001	< 0.1	< 0.1	< 0.025	< 0.1	< 0.1	-
Hexane	mg/kg	10000(C)	60	NA	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1
Tetrahydrofuran	mg/kg	3600	10(M)	4	< 0.1	< 0.1	< 0.025	< 0.1	< 0.1	< 0.1
VOC Volatile Organic	***Units***									
Ethyl glycol	mg/kg	10000(C)	300	200	< 10	< 10	< 10	< 10	< 10	< 10
Isopropanol	mg/kg	7000	9.4	8	< 10	< 10	< 10	< 10	< 10	< 10
Methylbutyl alcohol	mg/kg	8900(C)	46	40	< 10	< 10	< 10	< 10	< 10	< 10
Methanol	mg/kg	3100(C)	74	80	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Propanediol	mg/kg	10000(C)	3000	NA	< 10	< 10	< 10	< 10	< 10	< 10
PCB's	***Units***									
PCB: aroclor 1016	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1221	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1232	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1242	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1248	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1254	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1260	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1262	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
PCB: aroclor 1268	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Pesticides	***Units***									
Aldrin	mg/kg	0.58	NLL	0.0017	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
a-BHC	mg/kg	1.6	0.025	0.0017	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
b-BHC	mg/kg	5.5	0.085	0.0017	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Lindane	mg/kg	7.6	0.022(M)	0.0017	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
d-BHC	mg/kg	NA	NA	NA	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chlordane	mg/kg	17(J)	NIL(J)	0.0017	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
4,4'-DDD	mg/kg	41	NLL	0.0033	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
4,4'-DDE	mg/kg	29	NLL	0.0033	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
4,4'-DDT	mg/kg	29	NLL	0.0033	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dieldrin	mg/kg	0.62	NLL	0.0033	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
a-Endosulfan	mg/kg	NA	NLL	97 (J)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
b-Endosulfan	mg/kg	NA	NLL	97 (J)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Endosulfan Sulfate	mg/kg	NA	NLL	97 (J)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Endrin	mg/kg	72	NLL	0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Endrin aldehyde	mg/kg	NA	NA	NA	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Heptachlor	mg/kg	2.2	NLL	0.0017	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Heptachlor epoxide	mg/kg	1.1	NLL	0.0017	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Toxaphene	mg/kg	2.3	2.6	0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17
Methoxychlor	mg/kg	2100	130	0.8	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05

Table 1
Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:					SB17-04	SB17-05	SB17-09	SB17-12	SB17-10A	SB17-13
Sample Identification:		Part 201	Part 201	GM	83716-6301	83716-6294	83767-6458	83767-6456	83767-6452	83767-6455
Date Sampled:		Residential	20 Times	Inert	8/6/98	8/6/98	8/7/98	8/7/98	8/10/98	8/10/98
Sampled By:		Direct	Ground	Guildline	ETCO	ETCO	ETCO	ETCO	ETCO	ETCO
Analyzed By:		Contact	Water	Criteria	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E
Comments:		Criteria	Criteria		Composite	Composite	Composite	Composite	Composite	Composite
GC/MS Semi-Volatile Orgains	***Units***									
Chloronaphthalene	mg/kg	27000	36	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Bis(2-chloroethyl)ether	mg/kg	2.3	0.33(M)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Hexachlorobenzene	mg/kg	6.2	1.8	0.05	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2-Chlorophenol	mg/kg	680	0.9	0.2	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Hexachlorocyclopentadiene	mg/kg	81(C)	36	0.05	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Bis(2-chloroisopropyl)ether	mg/kg	NA	NA	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
n-Nitrosodi-n-propylamine	mg/kg	0.37	0.33(M)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Hexachloroethane	mg/kg	180	17	0.05	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Nitrobenzene	mg/kg	51	0.33(M)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2-Methylphenol	mg/kg	5500	74	0.76	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Isophorone	mg/kg	2400(C)	18	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Bis(2-chloroethoxy)methane	mg/kg	NA	NA	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
4-Methylphenol	mg/kg	NA	NA	NA	< 0.66	< 0.66	< 0.66	< 0.66	< 0.66	< 0.66
Dimethyl phthalate	mg/kg	790(C)	790(C)	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2-Nitrophenol	mg/kg	1200	0.4	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Diethyl phthalate	mg/kg	740(C)	110	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
4-Dimethylphenol	mg/kg	21000	7.4	0.62	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
N-Nitrosodiphenylamine	mg/kg	520	3.4	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2,4-Dichlorophenol	mg/kg	4200	2.6	0.4	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Di-n-butyl phthalate	mg/kg	NA	760(C)	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
4-Chloroaniline	mg/kg	NA	NA	NA	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Butyl benzyl phthalate	mg/kg	310000(C)	310(C)	20	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
p-Chloro-m-cresol	mg/kg	2200	5.6	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Bis(2-ethyl hexyl)phthalate	mg/kg	700	NLL	0.33	< 0.33	1.3	< 0.33	< 0.33	1.5	< 0.33
Di-n-octyl phthalate	mg/kg	7600	100000	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2-Methylnaphthalene	mg/kg	15000	5.2	0.2	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Phenol	mg/kg	12000(C)	88	22	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2,4,6-Trichlorophenol	mg/kg	900	11	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2,4,5-Trichlorophenol	mg/kg	42000	160	14	< 1.7	< 1.7	< 0.33	< 0.33	< 0.33	< 0.33
Acenaphthene	mg/kg	76000	300	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Acenaphthylene	mg/kg	1500	2.9	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2-Nitroaniline	mg/kg	1200	0.4	NA	< 1.7	< 1.7	< 1.3	< 1.3	< 1.3	< 1.3
Fluorene	mg/kg	51000	390	6	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Phenanthrene	mg/kg	1500	12	0.33	< 0.33	< 0.33	< 0.33	0.34	< 0.33	0.58
2,6-Dinitrotoluene	mg/kg	NA	NA	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Anthracene	mg/kg	420000	41	40	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
3-Nitroaniline	mg/kg	NA	NA	NA	< 1.7	< 1.7	< 1.3	< 1.3	< 1.3	< 1.3
Fluoranthene	mg/kg	51000	720	6	< 0.33	< 0.33	< 0.33	0.65	< 0.33	0.93
1,2,3,4-Tetrachlorobenzene	mg/kg	NA	NA	NA	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
4,6-Dinitrophenol	mg/kg	NA	NA	NA	< 1.7	< 1.7	< 1.3	< 1.3	< 1.3	< 1.3
Pyrene	mg/kg	32000	470	2000	< 0.33	< 0.33	< 0.33	0.54	< 0.33	0.79
4-Nitrophenol	mg/kg	NA	NA	NA	< 1.7	< 1.7	< 1.3	< 1.3	< 1.3	< 1.3
Benzo(a)anthracene	mg/kg	14(Q)	NLL(Q)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	0.43
Chrysene	mg/kg	1400(Q)	NLL(Q)	0.33	< 0.33	< 0.33	< 0.33	0.33	< 0.33	0.46
Carbazole	mg/kg	130	8.6	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Benzo(b)fluoranthene	mg/kg	14(Q)	NLL(Q)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	0.4
2,4-Dinitrotoluene	mg/kg	15	15	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Benzo(k)fluoranthene	mg/kg	140(Q)	NLL(Q)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	0.44
Benzo(a)pyrene	mg/kg	1.4(Q)	NLL(Q)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	0.43
Indeno(1,2,3-cd)pyrene	mg/kg	14(Q)	NLL(Q)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
4-Chlorodiphenyl ether	mg/kg	NA	NA	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Dibenz(a,h)anthracene	mg/kg	1.4(Q)	NLL(Q)	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
2-Nitroaniline	mg/kg	NA	NA	NA	< 1.7	< 1.7	< 1.3	< 1.3	< 1.3	< 1.3
Benzo(ghi)perylene	mg/kg	1500	NLL	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
4,6-Dinitro-o-cresol	mg/kg	150	1.7(M)	1.7	< 1.7	< 1.7	< 1.3	< 1.3	< 1.3	< 1.3
1,2,4,5-Tetrachlorobenzene	mg/kg	140000	1500	0.008	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
4-Bromodiphenyl ether	mg/kg	NA	NA	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
1,3,5-Trichlorobenzene	mg/kg	NA	NA	NA	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33

Table 1
Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

...e Identification:					SB17-04	SB17-05	SB17-09	SB17-12	SB17-10A	SB17-13
Sample Identification:		Part 201	Part 201	GM	83716-6301	83716-6294	83767-6458	83767-6456	83767-6452	83767-6455
...te Sampled:		Residential	20 Times	Inert	8/6/98	8/6/98	8/7/98	8/7/98	8/10/98	8/10/98
...mpled By:		Direct	Ground	Guildline	ETCO	ETCO	ETCO	ETCO	ETCO	ETCO
...alyzed By:		Contact	Water	Criteria	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E
Comments:		Criteria	Criteria		Composite	Composite	Composite	Composite	Composite	Composite
...MS Semi-Volatile Orgains, Con't.	*Units*									
...B (BP-6)	mg/kg	1.1	NLL	0.00008	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
...exabromobenzene	mg/kg	1200	0.4	0.2	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
Aniline	mg/kg	1700	3	1.7	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
...irex	mg/kg	NA	NA	NA	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
...benzofuran	mg/kg	ID	ID	NA	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
...nzyl alcohol	mg/kg	5800(C)	200	200	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Pentachlorobenzene	mg/kg	190(C)	29	0.12	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
...ntachlorophenol	mg/kg	8.1	3.2	0.0017	< 1.7	< 1.7	< 0.33	< 0.33	< 0.33	< 0.33
...ntachloronitrobenzene	mg/kg	3200	37	NA	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33	N< 0.33
...nzoic acid	mg/kg	1000000(D)	640	600	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3
3,3'-Dichlorobenzidine	mg/kg	5.7	2(M)	2	<2	<2	< 1.3	< 1.3	< 1.3	< 1.3

Table 1
Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:					SB17-11	SB17-14
Sample Identification:		Part 201	Part 201	GM	83816-6598	83816-6599
Date Sampled:		Residential	20 Times	Inert	8/12/98	8/12/98
Sampled By:		Direct	Ground	Guildline	ETCO	ETCO
Analyzed By:		Contact	Water	Criteria	CT&E	CT&E
Comments:		Criteria	Criteria		Composite	Composite
Non-Metallic Inorganic	***Units***					
Chloride	mg/kg	500(F)	5000	500	< 200	< 200
Cyanide, total	mg/kg	250(P,R)	4(R)	0.1	< 0.2	< 0.2
Fluoride	mg/kg	25000	40	38	37	35
Nitrogen, nitrate	mg/kg	ID(N)	200(N)	NA	1.3	6.5
Nitrogen, nitrite	mg/kg	ID(N)	20(N)	NA	< 0.2	0.2
Sulfate	mg/kg	ID	5000	5000	< 39	< 40
Physical Property	***Units***					
Percent solids	%	NA	NA	NA	87.9	92.2
Volatile Organic	***Units***					
Dichlorodifluoromethane	mg/kg	1000(C)	93	20	< 0.025	< 0.025
Chloromethane	mg/kg	200	1.3	0.06	< 0.025	< 0.025
Vinyl chloride	mg/kg	1.2	0.04	0.01	< 0.025	< 0.025
Bromomethane	mg/kg	150	0.2	0.2	< 0.025	< 0.025
Chloroethane	mg/kg	670	4.4	0.18	< 0.025	< 0.025
Benzyl chloride	mg/kg	15	0.1	0.004	< 0.1	< 0.1
Trichlorofluoromethane	mg/kg	560(C)	52	40	< 0.025	< 0.025
1,1-Dichloroethylene	mg/kg	110	0.14	0.14	< 0.025	< 0.025
Methylene chloride	mg/kg	340	0.1	0.1	< 0.25	< 0.25
2-Butanone	mg/kg	27000(C)	260	8	< 0.1	< 0.1
Butylbenzene, tertiary	mg/kg	1200	1.6	NA	< 0.025	< 0.025
trans-1,2-Dichloroethylene	mg/kg	1400(C)	2	2	< 0.025	< 0.025
Methyl-t-butyl ether	mg/kg	850	4.8(Z)	7.6	< 0.1	< 0.025
1,1-Dichloroethane	mg/kg	7900(C)	18	14	< 0.025	< 0.025
2,2-Dichloropropane	mg/kg	NA	NA	NA	< 0.025	< 0.025
cis-1,2-Dichloroethylene	mg/kg	640(C)	1.4	1.4	< 0.025	< 0.025
Chloroform	mg/kg	420	2(W)	0.12	< 0.025	< 0.025
Bromochloromethane	mg/kg	NA	NA	0.01	< 0.025	< 0.025
1,1,1-Trichloroethane	mg/kg	460(C)	4	2.4	< 0.025	< 0.025
1,1-Dichloropropene	mg/kg	NA	NA	NA	< 0.025	< 0.025
Carbon tetrachloride	mg/kg	20	0.1	0.01	< 0.025	< 0.025
Methyl isobutyl ketone	mg/kg	2700(C)	36	0.2	< 0.1	< 0.1
1,2-Dichloroethane	mg/kg	28	0.1	0.01	< 0.025	< 0.025
Ethyl ether	mg/kg	7400(C)	74	20	< 0.1	< 0.1
Benzene	mg/kg	88	0.1	0.002	< 0.025	< 0.025
Acetone	mg/kg	11000	15	10	< 0.1	< 0.1
Dibromomethane	mg/kg	2000(C)	1.6	1.4	< 0.025	< 0.025
Trichloroethylene	mg/kg	160	0.1	0.06	0.039	0.054
1,2-Dichloropropane	mg/kg	38	0.1	0.01	< 0.025	< 0.025
Dibromochloromethane	mg/kg	31	2(W)	0.01	< 0.025	< 0.025
Tetrachloroethylene	mg/kg	50	0.1	0.014	< 0.025	< 0.025
Toluene	mg/kg	250(C)	16	2.2	< 0.025	0.033
1,1,2-Trichloroethane	mg/kg	45	0.1	0.012	< 0.025	< 0.025
1,3-Dichloropropane	mg/kg	NA	NA	0.01	< 0.025	< 0.025
Dichlorobromomethane	mg/kg	41	2(W)	0.01	< 0.025	< 0.025
1,2-Dibromoethane	mg/kg	0.03	NA	NA	< 0.025	< 0.025
Chlorobenzene	mg/kg	260(C)	2	1.4	< 0.025	< 0.025
1,1,1,2-Tetrachloroethane	mg/kg	99	0.66	0.01	< 0.025	< 0.025
Ethylbenzene	mg/kg	140(C)	1.5	0.62	< 0.025	< 0.025
1,3-Dichloropropene	mg/kg	14(J)	0.094	3.6	< 0.1	< 0.1
m,p-Xylene	mg/kg	150(C)	5.6	6	< 0.05	< 0.05
o-Xylene	mg/kg	150(C)	5.6	6	< 0.025	< 0.025
Carbon disulfide	mg/kg	280(C,R)	16	14	< 0.1	< 0.1
Styrene	mg/kg	85	2.7	0.02	< 0.025	< 0.025
2-Hexanone	mg/kg	10000(C)	20	0.1	< 0.1	< 0.1
Isopropyl benzene	mg/kg	400(C)	90	NA	< 0.025	< 0.025
Bromoform	mg/kg	320	2(W)	0.08	< 0.025	< 0.025
1,1,2,2-Tetrachloroethane	mg/kg	13	0.086	0.01	< 0.025	< 0.025
1,2,3-Trichloropropane	mg/kg	830(C)	0.84	0.8	< 0.025	< 0.025
Bromobenzene	mg/kg	41	0.53	NA	< 0.025	< 0.025

Table 1
Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:					SB17-11	SB17-14
Sample Identification:		Part 201	Part 201	GM	83816-6598	83816-6599
Date Sampled:		Residential	20 Times	Inert	8/12/98	8/12/98
Sampled By:		Direct	Ground	Guildline	ETCO	ETCO
Analyzed By:		Contact	Water	Criteria	CT&E	CT&E
Comments:		Criteria	Criteria		Composite	Composite
Volatile Organic, continued	***Units***					
Propylbenzene, normal	mg/kg	1200	1.6	NA	< 0.025	< 0.025
2-Chlorotoluene	mg/kg	2200	3	NA	< 0.025	< 0.025
4-Chlorotoluene	mg/kg	NA	NA	NA	< 0.025	< 0.025
1,2,4-Trimethylbenzene	mg/kg	110(C)	33(Z)	NA	< 0.025	< 0.025
1,3,5-Trimethylbenzene	mg/kg	94(C)	33(Z)	NA	< 0.025	< 0.025
Butylbenzene, secondary	mg/kg	1000	1.6	NA	< 0.025	< 0.025
p-Isopropyl toluene	mg/kg	NA	NA	NA	< 0.025	< 0.025
1,3-Dichlorobenzene	mg/kg	200(C)	17	3.6	< 0.025	< 0.025
1,4-Dichlorobenzene	mg/kg	110	1.6	0.33	< 0.025	< 0.025
Butylbenzene, normal	mg/kg	1200	1.6	NA	< 0.025	< 0.025
1,2-Dichlorobenzene	mg/kg	210(C)	13	12	< 0.025	< 0.025
1,2-Dibromo-3-chloropropane	mg/kg	NA	NA	NA	< 0.025	< 0.025
1,2,4-Trichlorobenzene	mg/kg	1100(C)	4.1	0.14	< 0.025	< 0.025
Hexachloro-1,3-butadiene	mg/kg	130	19	NA	< 0.025	< 0.025
Naphthalene	mg/kg	15000	17	0.58	< 0.025	< 0.025
1,2,3-Trichlorobenzene	mg/kg	NA	NA	NA	< 0.025	< 0.025
Trichlorotrifluoroethane	mg/kg	560(C)	560(C)	4000	< 0.1	< 0.1
Acrylonitrile	mg/kg	4.7	0.032	0.001	< 0.1	< 0.1
Hexane	mg/kg	10000(C)	60	NA	< 0.1	< 0.1
Tetrahydrofuran	mg/kg	3600	10(M)	4	< 0.1	< 0.1
Semi Volatile Organic	***Units***					
Ethyl glycol	mg/kg	10000(C)	300	200	< 10	< 10
Isopropanol	mg/kg	7000	9.4	8	< 10	< 10
Methyl butyl alcohol	mg/kg	8900(C)	46	40	< 10	< 10
Methanol	mg/kg	3100(C)	74	80	< 10	< 10
1,2-Propanediol	mg/kg	10000(C)	3000	NA	< 10	< 10
PCB's	***Units***					
PCB: aroclor 1016	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33
PCB: aroclor 1221	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33
PCB: aroclor 1232	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33
PCB: aroclor 1242	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33
PCB: aroclor 1248	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33
PCB: aroclor 1254	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33
PCB: aroclor 1260	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33
PCB: aroclor 1262	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33
PCB: aroclor 1268	mg/kg	(J,T)	NLL	NA	< 0.33	< 0.33
Pesticides	***Units***					
Aldrin	mg/kg	0.58	NLL	0.0017	< 0.02	< 0.02
a-BHC	mg/kg	1.6	0.025	0.0017	< 0.02	< 0.02
b-BHC	mg/kg	5.5	0.085	0.0017	< 0.02	< 0.02
Lindane	mg/kg	7.6	0.022(M)	0.0017	< 0.02	< 0.02
d-BHC	mg/kg	NA	NA	NA	< 0.02	< 0.02
Chlordane	mg/kg	17(J)	NLL(J)	0.0017	< 0.025	< 0.025
4,4'-DDD	mg/kg	41	NLL	0.0033	< 0.02	< 0.02
4,4'-DDE	mg/kg	29	NLL	0.0033	< 0.02	< 0.02
4,4'-DDT	mg/kg	29	NLL	0.0033	< 0.02	< 0.02
Dieldrin	mg/kg	0.62	NLL	0.0033	< 0.02	< 0.02
a-Endosulfan	mg/kg	NA	NLL	97 (J)	< 0.02	< 0.02
Endosulfan	mg/kg	NA	NLL	97 (J)	< 0.02	< 0.02
Endosulfan Sulfate	mg/kg	NA	NLL	97 (J)	< 0.02	< 0.02
Endrin	mg/kg	72	NLL	0.04	< 0.02	< 0.02
Endrin aldehyde	mg/kg	NA	NA	NA	< 0.02	< 0.02
Heptachlor	mg/kg	2.2	NLL	0.0017	< 0.02	< 0.02
Heptachlor epoxide	mg/kg	1.1	NLL	0.0017	< 0.02	< 0.02
Toxaphene	mg/kg	2.3	2.6	0.17	< 0.17	< 0.17
Methoxychlor	mg/kg	2100	130	0.8	< 0.05	< 0.05

Table 1
Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:					SB17-11	SB17-14
Sample Identification:		Part 201	Part 201	GM	83816-6598	83816-6599
Date Sampled:		Residential	20 Times	Inert	8/12/98	8/12/98
Sampled By:		Direct	Ground	Guildline	ETCO	ETCO
Analyzed By:		Contact	Water	Criteria	CT&E	CT&E
Comments:		Criteria	Criteria		Composite	Composite
VOMS Semi-Volatile Orgains	***Units***					
Chloronaphthalene	mg/kg	27000	36	NA	< 0.33	< 0.33
Bis(2-chloroethyl)ether	mg/kg	2.3	0.33(M)	0.33	< 0.33	< 0.33
Hexachlorobenzene	mg/kg	6.2	1.8	0.05	< 0.33	< 0.33
Chlorophenol	mg/kg	680	0.9	0.2	< 0.33	< 0.33
Hexachlorocyclopentadiene	mg/kg	81(C)	36	0.05	< 0.33	< 0.33
Bis(2-chloroisopropyl)ether	mg/kg	NA	NA	NA	< 0.33	< 0.33
n-Nitrosodi-n-propylamine	mg/kg	0.37	0.33(M)	0.33	< 0.33	< 0.33
Hexachloroethane	mg/kg	180	17	0.05	< 0.33	< 0.33
Nitrobenzene	mg/kg	51	0.33(M)	0.33	< 0.33	< 0.33
2-Methylphenol	mg/kg	5500	74	0.76	< 0.33	< 0.33
Isophorone	mg/kg	2400(C)	18	0.33	< 0.33	< 0.33
Bis(2-chloroethoxy)methane	mg/kg	NA	NA	NA	< 0.33	< 0.33
4-Methylphenol	mg/kg	NA	NA	NA	< 0.66	< 0.66
Dimethyl phthalate	mg/kg	790(C)	790(C)	NA	< 0.33	< 0.33
2-Nitrophenol	mg/kg	1200	0.4	NA	< 0.33	< 0.33
Diethyl phthalate	mg/kg	740(C)	110	NA	< 0.33	< 0.33
2,4-Dimethylphenol	mg/kg	21000	7.4	0.62	< 0.33	< 0.33
n-Nitrosodiphenylamine	mg/kg	520	3.4	0.33	< 0.33	< 0.33
2,4-Dichlorophenol	mg/kg	4200	2.6	0.4	< 0.33	< 0.33
Di-n-butyl phthalate	mg/kg	NA	760(C)	NA	< 0.33	< 0.33
4-Chloroaniline	mg/kg	NA	NA	NA	< 1.3	< 1.3
Butyl benzyl phthalate	mg/kg	310000(C)	310(C)	20	< 0.33	< 0.33
4-Chloro-m-cresol	mg/kg	2200	5.6	NA	< 0.33	< 0.33
Bis(2-ethyl hexyl)phthalate	mg/kg	700	NLL	0.33	< 0.33	< 0.33
Di-n-octyl phthalate	mg/kg	7600	100000	NA	< 0.33	< 0.33
2-Methylnaphthalene	mg/kg	15000	5.2	0.2	< 0.33	< 0.33
Phenol	mg/kg	12000(C)	88	22	< 0.33	< 0.33
2,4,6-Trichlorophenol	mg/kg	900	11	NA	< 0.33	< 0.33
2,4,5-Trichlorophenol	mg/kg	42000	160	14	< 0.33	< 0.33
Acenaphthene	mg/kg	76000	300	0.33	< 0.33	< 0.33
Acenaphthylene	mg/kg	1500	2.9	0.33	< 0.33	< 0.33
3-Nitroaniline	mg/kg	1200	0.4	NA	< 1.3	< 1.3
Fluorene	mg/kg	51000	390	6	< 0.33	< 0.33
Phenanthrene	mg/kg	1500	12	0.33	< 0.33	0.59
2,6-Dinitrotoluene	mg/kg	NA	NA	NA	< 0.33	< 0.33
Anthracene	mg/kg	420000	41	40	< 0.33	< 0.33
2-Nitroaniline	mg/kg	NA	NA	NA	< 1.3	< 1.3
Fluoranthene	mg/kg	51000	720	6	< 0.33	0.93
1,2,3,4-Tetrachlorobenzene	mg/kg	NA	NA	NA	N< 0.33	N< 0.33
4,6-Dinitrophenol	mg/kg	NA	NA	NA	< 1.3	< 1.3
Pyrene	mg/kg	32000	470	2000	< 0.33	0.84
4-Nitrophenol	mg/kg	NA	NA	NA	< 1.3	< 1.3
Benzo(a)anthracene	mg/kg	14(Q)	NLL(Q)	0.33	< 0.33	0.41
Chrysene	mg/kg	1400(Q)	NLL(Q)	0.33	< 0.33	0.47
Carbazole	mg/kg	130	8.6	NA	< 0.33	< 0.33
Benzo(b)fluoranthene	mg/kg	14(Q)	NLL(Q)	0.33	< 0.33	0.47
2,4-Dinitrotoluene	mg/kg	15	15	0.33	< 0.33	< 0.33
Benzo(k)fluoranthene	mg/kg	140(Q)	NLL(Q)	0.33	< 0.33	0.42
Benzo(a)pyrene	mg/kg	1.4(Q)	NLL(Q)	0.33	< 0.33	0.47
Indeno(1,2,3-cd)pyrene	mg/kg	14(Q)	NLL(Q)	0.33	< 0.33	< 0.33
4-Chlorodiphenyl ether	mg/kg	NA	NA	NA	< 0.33	< 0.33
Dibenz(a,h)anthracene	mg/kg	1.4(Q)	NLL(Q)	0.33	< 0.33	< 0.33
4-Nitroaniline	mg/kg	NA	NA	NA	< 1.3	< 1.3
Benzo(ghi)perylene	mg/kg	1500	NLL	0.33	< 0.33	< 0.33
4,6-Dinitro-o-cresol	mg/kg	150	1.7(M)	1.7	< 1.3	< 1.3
1,2,4,5-Tetrachlorobenzene	mg/kg	140000	1500	0.008	N< 0.33	N< 0.33
4-Bromodiphenyl ether	mg/kg	NA	NA	NA	< 0.33	< 0.33
1,3,5-Trichlorobenzene	mg/kg	NA	NA	NA	N< 0.33	N< 0.33

Table 1
Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

..te Identification:					SB17-11	SB17-14
Sample Identification:		Part 201	Part 201	GM	83816-6598	83816-6599
...te Sampled:		Residential	20 Times	Inert	8/12/98	8/12/98
...mpled By:		Direct	Ground	Guildline	ETCO	ETCO
...alyzed By:		Contact	Water	Criteria	CT&E	CT&E
Comments:		Criteria	Criteria		Composite	Composite
...C/MS Semi-Volatile Orgains, Con't.	*Units*					
...B (BP-6)	mg/kg	1.1	NLL	0.00008	N< 0.33	N< 0.33
...exabromobenzene	mg/kg	1200	0.4	0.2	N< 0.33	N< 0.33
Aniline	mg/kg	1700	3	1.7	< 1.3	< 1.3
...irex	mg/kg	NA	NA	NA	N< 0.33	N< 0.33
...benzofuran	mg/kg	ID	ID	NA	< 0.33	< 0.33
...enzyl alcohol	mg/kg	5800(C)	200	200	< 1.3	< 1.3
Pentachlorobenzene	mg/kg	190(C)	29	0.12	N< 0.33	N< 0.33
...entachlorophenol	mg/kg	8.1	3.2	0.0017	< 0.33	< 0.33
...ntachloronitrobenzene	mg/kg	3200	37	NA	N< 0.33	N< 0.33
...nzoic acid	mg/kg	1000000(D)	640	600	< 3.3	< 3.3
3,3'-Dichlorobenzidine	mg/kg	5.7	2(M)	2	< 1.3	< 1.3

Table 2
Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:					SB17-01	SB17-02	SB17-03	SB17-07	SB17-06	SB17-08	SB17-04
Sample Identification:		Part 201	Part 201	GM	83670-5907	83670-5914	83670-5920	83670-5927	83685-5970	83685-5964	83716-6301
te Sampled:		Residential	Statewide	Inert	8/3/98	8/3/98	8/4/98	8/4/98	8/5/98	8/5/98	8/6/98
mpled By:		Direct	Default	Guildline	ETCO	ETCO	ETCO	ETCO	ETCO	ETCO	ETCO
Analyzed By:		Contact	Background	Criteria	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E
Comments:		Criteria	Levels		Composite	Composite	Composite	Composite	Composite	Composite	Composite
tal Metals	*Units*										
uminum, total	mg/kg	42000	6900	1	2100	1600	1200	2200	1200	1500	820
Antimony, total	mg/kg	150	NA	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
senic, total	mg/kg	6.6(U)	5.8	0.1	1.3	1	D 1.6	1.7	0.9	0.8	D 0.9
rium, total	mg/kg	30000	75	40	13	10	9.2	10	7	8	5
oron, total	mg/kg	2500	NA	12	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cadmium, total	mg/kg	210	1.2	0.08	< 0.2	< 0.2	< 0.2	< 0.3	< 0.5	< 0.5	< 0.5
lcium, total	mg/kg	NA	NA	NA	22000	21000	58000	68000	51000	26000	19000
romium, total	mg/kg	NA	18(H)	NA	4.2	3	3.8	5	2.6	4	< 2.5
romium VI	mg/kg	2000(H)	18(H)	0.034	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cobalt, total	mg/kg	2100	6.8	NA	1.7	1.8	1.6	2.2	1.3	1.4	1.1
pper, total	mg/kg	16000	32	0.36	6	6	6	14	6	5	3
n, total	mg/kg	ID	12000	6	3600	3700	3900	5200	2800	3300	2300
ead, total	mg/kg	400	21	1	5.2	5	4.8	4	2	3	2
Manganese, total	mg/kg	20000	440	2	130	130	170	180	110	89	78
ercury, total	mg/kg	130	0.13	0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
ckel, total	mg/kg	32000	20	1.1	4.1	3	3.6	5	3	3	3
Selenium, total	mg/kg	2100	0.41	0.14	1.1	< 0.5	< 0.5	1.1	0.5	< 0.5	0.6
Silver, total	mg/kg	200	1	0.002	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
dium, total	mg/kg	1000000(D)	NA	3000	66	70	88	150	150	120	80
allium, total	mg/kg	28	NA	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium, total	mg/kg	3700	NA	NA	5	4	4	8	4	5	3
Zinc, total	mg/kg	140000	47	1.6	17	14	29	17	13	12	8

Table 2
Analytical Data for Soil Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:					SB17-05	SB17-09	SB17-12	SB17-10A	SB17-13	SB17-11	SB17-14
Sample Identification:		Part 201	Part 201	GM	83716-6294	83767-6458	83767-6456	83767-6452	83767-6455	83816-6598	83816-6599
Date Sampled:		Residential	Statewide	Inert	8/6/98	8/7/98	8/7/98	8/10/98	8/10/98	8/12/98	8/12/98
Sampled By:		Direct	Default	Guildline	ETCO	ETCO	ETCO	ETCO	ETCO	ETCO	ETCO
Analyzed By:		Contact	Background	Criteria	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E	CT&E
Comments:		Criteria	Levels		Composite	Composite	Composite	Composite	Composite	Composite	Composite
tal Metals	***Units***										
Aluminum, total	mg/kg	42000	6900	1	2000	1500	1600	1600	2200	1000	2300
Antimony, total	mg/kg	150	NA	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Arsenic, total	mg/kg	6.6(U)	5.8	0.1	D 1.3	1	2	0.8	1.8	0.8	1.1
Barium, total	mg/kg	30000	75	40	16	7.8	8.7	9.8	12	6	13
Boron, total	mg/kg	2500	NA	12	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cadmium, total	mg/kg	210	1.2	0.08	< 0.5	< 0.2	< 0.1	< 0.1	< 0.1	M< 0.2	< 0.2
Calcium, total	mg/kg	NA	NA	NA	54000	29000	27000	24000	29000	26000	21000
Chromium, total	mg/kg	NA	18(H)	NA	4.7	4.4	5.2	4	13	2.8	7
Chromium VI	mg/kg	2000(H)	18(H)	0.034	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cobalt, total	mg/kg	2100	6.8	NA	2.4	1.8	2.7	1.6	2.3	1.3	2.3
Copper, total	mg/kg	16000	32	0.36	6	6.7	6.6	4.4	9.9	4	19
Iron, total	mg/kg	ID	12000	6	5000	3600	3900	2900	5100	2900	5200
Lead, total	mg/kg	400	21	1	4	4.4	7.5	4.3	7.8	3	10
Manganese, total	mg/kg	20000	440	2	150	110	11	110	160	100	150
Mercury, total	mg/kg	130	0.13	0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Nickel, total	mg/kg	32000	20	1.1	5	4.6	4.2	3.2	5.6	2	5
Selenium, total	mg/kg	2100	0.41	0.14	< 0.5	0.9	0.8	0.5	0.9	< 0.5	< 0.5
Silver, total	mg/kg	200	1	0.002	< 0.5	0.26	0.25	< 0.5	0.35	< 0.5	0.6
Sodium, total	mg/kg	1000000(D)	NA	3000	170	73	91	76	87	290	190
Thallium, total	mg/kg	28	NA	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium, total	mg/kg	3700	NA	NA	7	5	5	2	7	4	7
Zinc, total	mg/kg	140000	47	1.6	20	15	16	14	18	7	17

Table 3
Analytical Data for Groundwater Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:			TW17-05	SB17-10A	TB
Sample Identification:		Part 201	83716-6291	83767-6453	83716-6295
Date Sampled:		Residential	8/6/98	8/10/98	7/24/98
Sampled By:		Drinking	ETCO	ETCO	ETCO
Analyzed By:		Water	CT&E	CT&E	CT&E
Depth:		Criteria	23 - 25	22 - 24	-
Volatile Organic	***Units***				
Dichlorodifluoromethane	ug/L	1700	< 1	< 1	< 1
Chloromethane	ug/L	66	< 1	< 1	< 1
Vinyl chloride	ug/L	2(A)	< 1	< 1	< 1
Bromomethane	ug/L	10	< 1	< 1	< 1
Chloroethane	ug/L	220	< 1	< 1	< 1
Benzyl chloride	ug/L	5	< 5	< 5	< 5
Trichlorofluoromethane	ug/L	2600	< 1	< 1	< 1
1,1-Dichloroethylene	ug/L	7(A)	< 1	< 1	< 1
Methylene chloride	ug/L	5(A)	< 1	< 5	< 1
2-Butanone	ug/L	13000	< 50	< 50	< 50
trans-1,2-Dichloroethylene	ug/L	NA	< 1	< 1	< 1
Butylbenzene, tertiary	ug/L	80	< 1	< 1	< 1
Methyl-t-butyl ether	ug/L	240(Z)	< 1	< 1	< 1
1,1-Dichloroethane	ug/L	880	< 1	< 1	< 1
2,2-Dichloropropane	ug/L	NA	< 1	< 1	< 1
cis-1,2-Dichloroethylene	ug/L	70(A)	2	< 1	< 1
Chloroform	ug/L	100(A,W)	< 1	< 1	< 1
Bromochloromethane	ug/L	NA	< 1	< 1	< 1
1,1,1-Trichloroethane	ug/L	200(A)	< 1	< 1	< 1
1,1-Dichloropropene	ug/L	NA	< 1	< 1	< 1
Carbon tetrachloride	ug/L	5(A)	< 1	< 1	< 1
Methyl isobutyl ketone	ug/L	1800	< 50	< 50	< 50
1,2-Dichloroethane	ug/L	5(A)	< 1	< 1	< 1
Ethyl ether	ug/L	3700	< 1	< 10	< 10
Benzene	ug/L	5(A)	< 1	< 1	< 5
Trichloroethylene	ug/L	5(A)	13	< 1	< 1
Dibromomethane	ug/L	80	< 1	< 1	< 1
1,2-Dichloropropane	ug/L	5(A)	< 1	< 1	< 1
Dibromochloromethane	ug/L	100(A,W)	< 1	< 1	< 1
Tetrachloroethylene	ug/L	5(A)	< 1	< 1	< 1
Toluene	ug/L	790(E)	< 1	2	< 1
1,1,2-Trichloroethane	ug/L	5(A)	< 1	< 1	< 1
1,3-Dichloropropane	ug/L	4.7(J)	< 1	< 1	< 1
Dichlorobromomethane	ug/L	100(A,W)	< 1	< 1	< 1
1,2-Dibromoethane	ug/L	0.05(A)	< 1	< 1	< 1
Chlorobenzene	ug/L	100(A)	< 1	< 1	< 1
1,1,1,2-Tetrachloroethane	ug/L	33	< 1	< 1	< 1
Ethylbenzene	ug/L	74(E)	< 1	< 1	< 1
1,3-Dichloropropene	ug/L	4.7(J)	< 1	< 1	< 1
m,p-Xylene	ug/L	280(E)	< 2	< 2	< 2
Acetone	ug/L	730	< 100	< 100	< 100
o-Xylene	ug/L	280(E)	< 1	< 1	< 1
Carbon disulfide	ug/L	800(R)	< 50	< 50	< 50
Styrene	ug/L	100(A)	< 1	< 1	< 1
2-Hexanone	ug/L	1000	< 50	< 50	< 50
Isopropyl benzene	ug/L	800	< 1	< 1	< 1
Bromoform	ug/L	100(A,W)	< 1	< 1	< 1
1,1,2,2-Tetrachloroethane	ug/L	4.3	< 1	< 1	< 1
1,2,3-Trichloropropane	ug/L	42	< 1	< 1	< 1
Bromobenzene	ug/L	18	< 1	< 1	< 1
Propylbenzene, normal	ug/L	80	< 1	< 1	< 1
2-Chlorotoluene	ug/L	150	< 1	< 1	< 1
4-Chlorotoluene	ug/L	NA	< 1	< 1	< 1
1,2,4-Trimethylbenzene	ug/L	1000(Z)	< 1	< 1	< 1
1,3,5-Trimethylbenzene	ug/L	1000(Z)	< 1	< 1	< 1

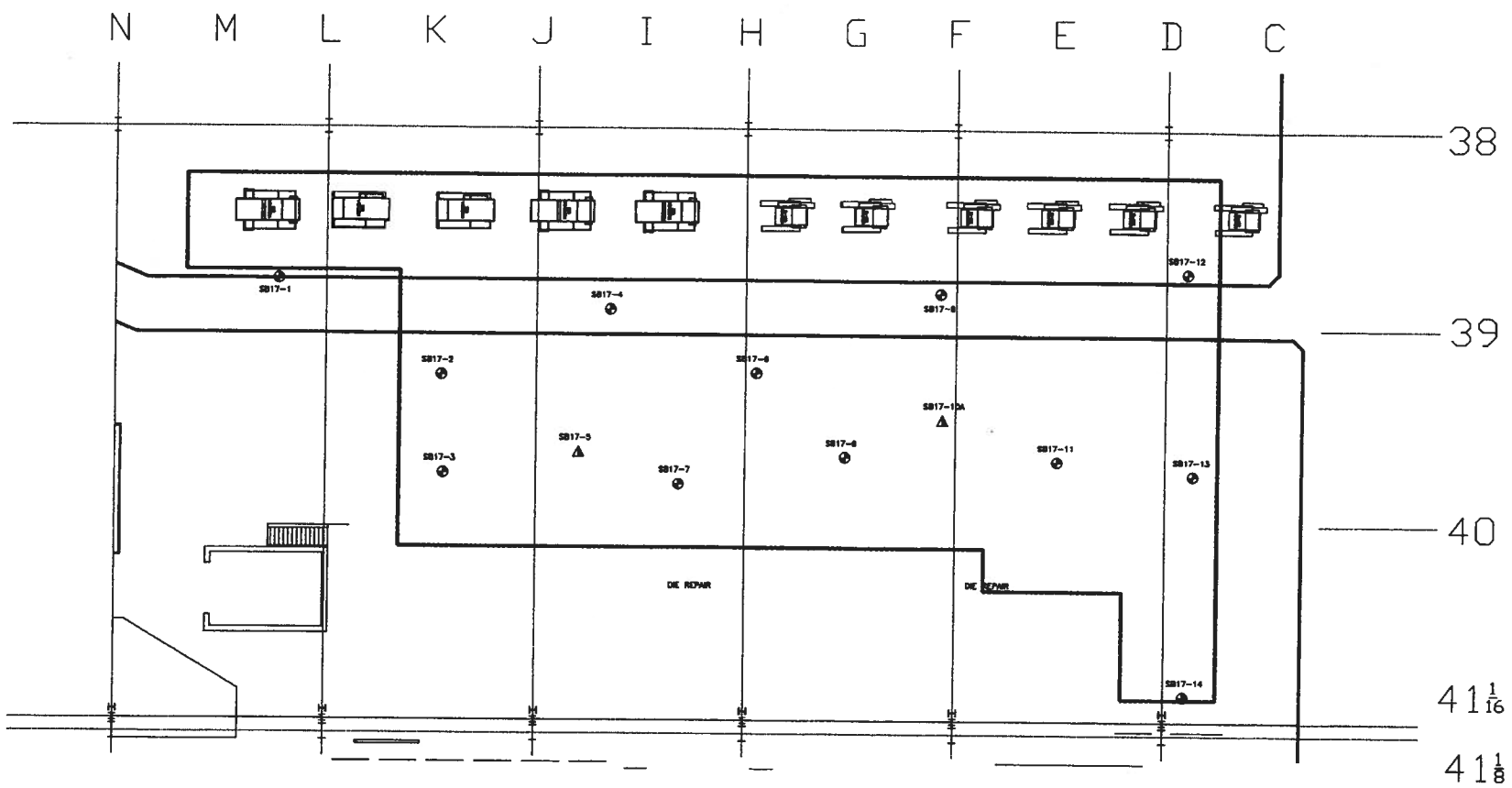
Table 3
Analytical Data for Groundwater Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:			TW17-05	SB17-10A	TB
Sample Identification:		Part 201	83716-6291	83767-6453	83716-6295
Date Sampled:		Residential	8/6/98	8/10/98	7/24/98
Sampled By:		Drinking	ETCO	ETCO	ETCO
Analyzed By:		Water	CT&E	CT&E	CT&E
Depth:		Criteria	23 - 25	22 - 24	-
Volatile Organic. Continued	***Units***				
Butylbenzene, secondary	ug/L	80	< 1	< 1	< 1
p-Isopropyl toluene	ug/L	NA	< 1	< 1	< 1
1,3-Dichlorobenzene	ug/L	600	< 1	< 1	< 1
1,4-Dichlorobenzene	ug/L	75(A)	< 1	< 1	< 1
Butylbenzene, normal	ug/L	80	< 1	< 1	< 1
1,2-Dichlorobenzene	ug/L	600(A)	< 1	< 1	< 1
1,2-Dibromo-3-chloropropane	ug/L	NA	< 1	< 1	< 1
1,2,4-Trichlorobenzene	ug/L	70(A)	< 1	< 1	< 1
Hexachloro-1,3-butadiene	ug/L	11	< 1	< 1	< 1
Naphthalene	ug/L	260	< 1	< 1	< 1
1,2,3-Trichlorobenzene	ug/L	NA	< 1	< 1	< 1
Trichlorotrifluoroethane	ug/L	170000(S)	< 1	< 1	< 1
Acrylonitrile	ug/L	1.6	< 1	< 1	< 1
Tetrahydrofuran	ug/L	240	< 1	< 1	< 1
Hexane	ug/L	3000	< 100	< 100	< 100
Methanol	ug/L	3700	< 10000	< 10000	< 10000
Ethyl glycol	ug/L	15000	< 10000	< 10000	< 10000
Isopropanol	ug/L	470	< 10000	< 10000	< 10000
Isobutyl alcohol	ug/L	2300	< 10000	< 10000	< 10000
1,2-Propanediol	ug/L	150000	< 10000	< 10000	< 10000

Table 4
Analytical Data for Waste Charaterization Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:			SB17-01	SB17-03	SB17-12	SB17-14
Sample Identification:			83670-5908	83670-5921	83767-6457	83767-6600
Date Sampled:		Regulatory	8/3/98	8/4/98	8/7/98	8/12/98
Sampled By:		Limit	ETCO	ETCO	ETCO	ETCO
Analyzed By:			CT&E	CT&E	CT&E	CT&E
Comments:			Composite	Composite	Composite	Composite
TLCP Metals	***Units***					
Arsenic, TCLP	mg/L	5	< 0.01	< 0.02	< 0.01	< 0.01
Barium, TCLP	mg/L	100	0.47	0.35	0.33	0.4
Cadmium, TCLP	mg/L	1	0.006	0.008	0.006	0.006
Chromium, TCLP	mg/L	5	0.031	0.068	< 0.05	< 0.05
Copper, TCLP	mg/L	100	< 0.005	0.011	< 0.02	< 0.02
Lead, TCLP	mg/L	5	< 0.005	< 0.005	< 0.005	< 0.005
Mercury, TCLP	mg/L	0.2	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Selenium, TCLP	mg/L	1	< 0.02	< 0.02	< 0.02	< 0.02
Silver, TCLP	mg/L	5	0.002	0.003	< 0.002	0.002
Zinc, TCLP	mg/L	500	0.06	0.07	0.1	0.11
TLCP Volatiles	***Units***					
Vinyl chloride, TCLP	mg/L	0.2	< 0.01	< 0.01	< 0.01	< 0.01
1,1-Dichloroethylene, TCLP	mg/L	0.7	< 0.01	< 0.01	< 0.01	< 0.01
2-Butanone, TCLP	mg/L	200	< 0.1	< 0.01	< 0.01	< 0.01
Chloroform, TCLP	mg/L	6	< 0.01	< 0.01	< 0.01	< 0.01
Carbon tetrachloride, TCLP	mg/L	0.5	< 0.01	< 0.01	< 0.01	< 0.01
1,2-Dichloroethane, TCLP	mg/L	0.5	< 0.01	< 0.01	< 0.01	< 0.01
Benzene, TCLP	mg/L	0.5	< 0.01	< 0.01	< 0.01	< 0.01
Trichloroethylene, TCLP	mg/L	0.5	< 0.01	< 0.01	< 0.01	< 0.01
Tetrachloroethylene, TCLP	mg/L	0.7	< 0.01	< 0.01	< 0.01	< 0.01
Chlorobenzene, TCLP	mg/L	100	< 0.01	< 0.01	< 0.01	< 0.01
1,4-Dichlorobenzene, TCLP	mg/L	7.5	< 0.01	< 0.01	< 0.01	< 0.01
TLCP Semi Volatiles	***Units***					
3/4-Methylphenol, TCLP	mg/L	200	< 0.02	< 0.02	< 0.02	< 0.02
2-Methylphenol, TCLP	mg/L	200	< 0.01	< 0.01	< 0.01	< 0.01
Cresols, TCLP	mg/L	200	< 0.03	< 0.03	< 0.03	< 0.03
Hexachlorobenzene, TCLP	mg/L	0.13	< 0.01	< 0.01	< 0.01	< 0.01
Hexachloroethane, TCLP	mg/L	3	< 0.01	< 0.01	< 0.01	< 0.01
Nitrobenzene, TCLP	mg/L	2	< 0.01	< 0.01	< 0.01	< 0.01
Pyridine, TCLP	mg/L	5	< 0.02	< 0.02	< 0.01	< 0.01
2,4,6-Trichlorophenol, TCLP	mg/L	2	< 0.01	< 0.01	< 0.01	< 0.01
2,4,5-Trichlorophenol, TCLP	mg/L	400	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dinitrotoluene, TCLP	mg/L	0.13	< 0.01	< 0.01	< 0.01	< 0.01
Hexachloro-1,3-butadiene, TCLP	mg/L	0.5	< 0.01	< 0.01	< 0.01	< 0.01
Pentachlorophenol, TCLP	mg/L	100	< 0.01	< 0.01	< 0.01	< 0.01
Hazardous Waste Characterization	***Units***					
Corrosivity	mg/kg	NA	NC	NC	NC	NC
Ignitability	Deg. F.	NA	NI	NI	NI	NI
Cyanide, reactive	mg/kg	250	< 250	< 250	< 250	< 250
Sulfide, reactive	mg/kg	500	< 500	< 500	< 500	< 500
Physical Property Analysis	***Units***					
pH	S.U.	NA	8.4	9.2	10	9.1

FIGURE



LEGEND

- ⊕ – GEOPROBE SOIL BORING
- ▲ – GEOPROBE SOIL BORING & GROUNDWATER SAMPLE
- ——— – APPROXIMATE AREA OF SOIL REMOVAL

EARTH TECH

GM G.R. METALS
GRAND RAPIDS, MICHIGAN
SOIL BORING MAP FOR 17DAY SOIL REMOVAL
AUGUST 1998

T.G. | APPV. TG
A.A.R. | APPV. TG
1:10
1:10
27854.01

F1

EARTH TECH

Well / Boring Log

SB-17-1

Page 1 of 2

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 20.7 bgs

Date	Time	Depth to Water (bgs/TOC)

TOC Elev: _____ Grd Elev: _____
Horiz. Coord:

Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/3/98 Finished 8/3/98
Time: Started 2:20 pm Finished 4:20 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Geoprobe (Hammer Bit)	0.2-1.0'	2 1/4"
Geoprobe	1-25'	2"

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	0	0.0 Wood Blocks 0.2 Concrete	Wood Blocks CONCRETE		0			0
	1	1.0 Sand, medium to coarse, some fine gravel, trace medium gravel, trace very fine sand, brown, dry			1			
	2				2			
	3				3			0
	4		SW		4			
	5				5			
	6				6			
	7	7.0 Gravel, fine to medium, some sand, medium to coarse, little fine sand, brown, dry, trace cinders			7			0
	8				8			
	9				9			
	10		GW		10			
	11				11			0
	12				12			
Natural Soil Backfill →	13	12.8 Sand, fine to coarse, some fine gravel, little medium gravel, brown, dry			13			
	14		SW		14			
	15	14.7 Sand, medium to coarse, black staining, trace cinders/slag, dry	SW		15			0
	16	15.3 Sand, medium to coarse, little fine gravel, trace fine sand, brown, dry			16			
	17		SW		17			
	18	17.7 Gravel, fine to medium, some medium to fine sand, brown, dry			18			
	19		GW		19			
	20	19.0 Sand, fine to medium, some coarse sand, little fine gravel, brown dry, trace silt			20			0

Soils composited from each of the 5' soil sample intervals for additional characterizations. @ 4:20 -*(TCLP sample on composite)

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/18/98

EARTH TECH

Well / Boring Log

SB-17-1

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	20		SW		20			
	21	20.7 Sand, Brown, fine to very fine, some silt, little fine to medium gravel, wet	SM		21			
	22	21.5 Sand, medium to coarse, some fine gravel, little coarse gravel, trace sand, brown, wet	SW		22			0
	23				23			
	24				24			
25.0	25	E.O.B. @ 25'			25			
	26				26			
	27				27			
	28				28			
	29				29			
	30				30			
	31				31			
	32				32			
	33				33			
	34				34			
	35				35			
	36				36			
	37				37			
	38				38			
	39				39			
	40				40			
	41				41			
	42				42			
	43				43			
	44				44			
	45				45			

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/18/98

EARTH TECH

Well / Boring Log

SB-17-2

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 22.2 bgs

Date	Time	Depth to Water (bgs/TOC)

TOC Elev: _____ Grd Elev: _____
Horiz. Coord:
Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/3/98 Finished 8/3/98
Time: Started 4:45 pm Finished 9:00 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Geoprobe (Hammer Bit)	0.2-1.0'	2 1/4"
Geoprobe	1-25'	2"

Well Construction
Seal / Backfill

Natural Soil Backfill

Depth (ft)	Lithological Description	USCS	Graphic Log	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
0	~~0.0 Wood Block Floor~~	Wood Blocks				
0.2	Concrete	CONCRETE				0
1.2	Sand fine to coarse, some fine gravel, brown, dry	SW				0
5.2	Gravel, fine to medium, some medium to coarse sand, little fine sand, dry	GW				0
8.5	Sand, fine to coarse, some fine gravel, trace medium gravel, brown, dry	SW				0
13.7	Gravel, fine, some fine to coarse sand, trace medium gravel, brown, dry	SW				0
17.9	Sand, fine to coarse, some fine gravel, little medium gravel, brown, dry, trace very fine sand	SW				0
20						

Soils composited from each of the 5' soil sample intervals for additional characterizations. @ 8:40 -*(TCLP sample on composite (17-2))

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

Well / Boring Log

SB-17-2

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	20	20.0 Sand, fine to coarse, some fine to medium gravel, brown, moist, little coarse gravel	SW		20			
	21				21			
	22	22.2 Sand, fine to coarse, little fine to medium gravel, wet, brown	SW		22			
	23	23.0 Gravel, fine to medium, some fine to coarse sand, brown, wet	GW-SW		23			0
	24				24			
25.0	25	E.O.B. @ 25'			25			
	26				26			
	27				27			
	28				28			
	29				29			
	30				30			
	31				31			
	32				32			
	33				33			
	34				34			
	35				35			
	36				36			
	37				37			
	38				38			
	39				39			
	40				40			
	41				41			
	42				42			
	43				43			
	44				44			
	45				45			

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

Well / Boring Log

SB-17-3

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 21.2 bgs

Date	Time	Depth to Water (bgs/TOC)

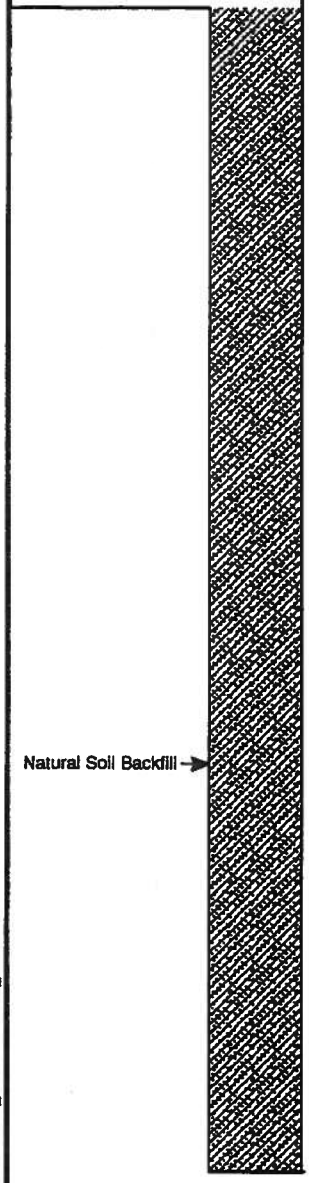
TOC Elev: _____ Grd Elev: _____
Horiz. Coord:

Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/4/98 Finished 8/4/98
Time: Started 8:30 am Finished 11:20 am
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Geoprobe (Hammer Bit)	0.2-1.0'	2 1/4"
Geoprobe	1-25'	2"



Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
0	0.0 Wood Block Floor	Wood Blocks		0			0
0.2	Concrete	CONCRETE					
1.1	Sand, fine to coarse, little fine gravel, brown, dry	SW					0
4.5	Sand, fine to medium, little fine gravel, brown, dry, trace, black staining, no odor	SW					0
11.5	Gravel fine to medium, some medium coarse sand, brown to light brown, dry	GP-SP					0
16.0	Sand, fine to coarse, little fine gravel, brown, dry	SW					0
19.4	Gravel, fine to medium, some medium to coarse sand, trace			20			

Soils composited from each of the 5' soil sample intervals for additional characterizations. @ 11:15 -*(TCLP sample on composite)

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

Well / Boring Log

SB-17-3

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	20	fine sand, brown, dry, slight odor	GW		20			
	21	~~21.0~~ Clay lens, soft, sandy, moist	CL		21			
		21.2 Gravel, fine to medium, some fine to coarse sand, brown, wet						
	22				22			
	23		GW		23			0
	24				24			
25.0	25	E.O.B. @ 25'			25			
	26				26			
	27				27			
	28				28			
	29				29			
	30				30			
	31				31			
	32				32			
	33				33			
	34				34			
	35				35			
	36				36			
	37				37			
	38				38			
	39				39			
	40				40			
	41				41			
	42				42			
	43				43			
	44				44			
	45				45			

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

Well / Boring Log

SB-17-4

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 21.0 bgs

Date	Time	Depth to Water (bgs/TOC)

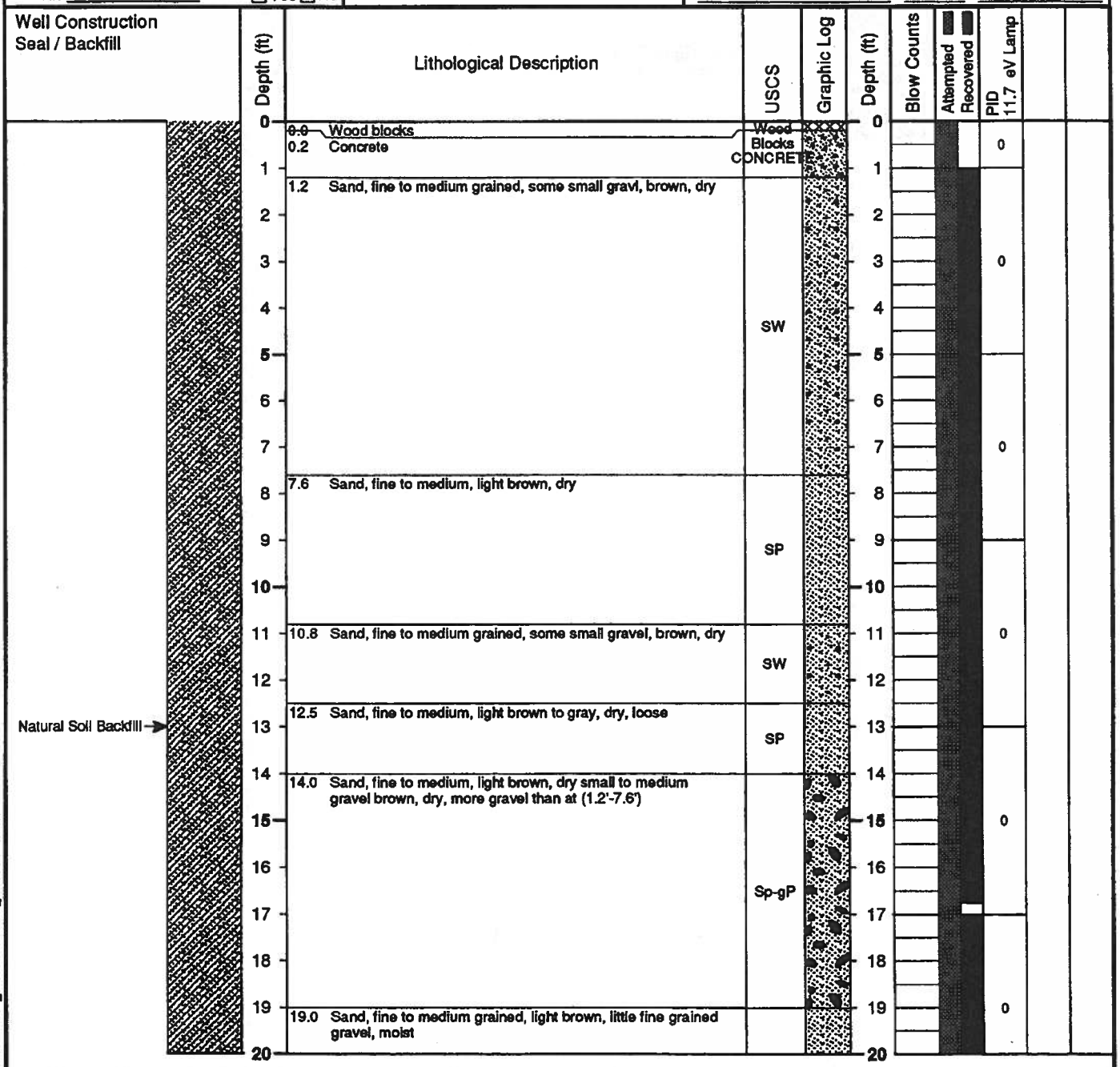
TOC Elev: _____ Grd Elev: _____
Horiz. Coord:

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/6/98 Finished 8/6/98
Time: Started 2:10 pm Finished 3:30 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Jonah Fogel

Drilling Method(s)	Depth	Borehole Dia.
Concrete Coring Machine	25'	3"
Geoprobe	1-25'	2"



Soils composited from each of the 5' soil sample intervals for additional characterizations. @ 11:15 -*(TCLP sample on composite)

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/16/98

EARTH TECH

Well / Boring Log

SB-17-4

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	20				20			
	21		SP		21			
	22				22			0
	23	23.0 Sand and Gravel, sand was fine to medium, brown and Gravel wasa fine to medium, little coarse gravel, wet			23			
	24		Sp-GP		24			
25.0	25	E.O.B. @ 25'			25			
	26				26			
	27				27			
	28				28			
	29				29			
	30				30			
	31				31			
	32				32			
	33				33			
	34				34			
	35				35			
	36				36			
	37				37			
	38				38			
	39				39			
	40				40			
	41				41			
	42				42			
	43				43			
	44				44			
	45				45			

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/18/08

EARTH TECH

Well / Boring Log

SB-17-5

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 22.0 bgs

Date	Time	Depth to Water (bgs/TOC)

TOC Elev: _____ Grd Elev: _____
Horiz. Coord:

Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/6/98 Finished 8/6/98
Time: Started 8:30 am Finished 2:00 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Jonah Fogel

Drilling Method(s)	Depth	Borehole Dia.
Concrete Coring Machine	25'	3"
Geoprobe	1-25'	2"

Well Construction Seal / Backfill

Natural Soil Backfill

Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
0	0.0 Wood Blocks 0.2 Concrete	Wood Blocks CONCRETE		0			
1	1.2 Sand, fine to medium, brown, some gravel, dry	SW		1			0
2				2			
3				3			
4				4			
5				5			0
6				6			
7				7			
8				8			
9				9			0
10				10			
11				11			
12	11.8 Sand, fine, light brown, dry	SP		12			
13	12.1 Sand, fine to medium, light brown, fine to medium gravel, well graded, dry	GW-SW		13			0
14				14			
15				15			
16				16			
17	17.0 Sand, light brown, poorly graded, dry, fine to medium grained	SP		17			0
18	18.0 Sand, fine to medium grained, fine to medium gravel, dry, brown, some coarse gravel	GW		18			
19				19			
20				20			

Soils composited from each of the 7.5' soil sample intervals for additional characterizations. @ 11:15 -*(TCLP sample on composite) Water sample collected at 23'-25' @11:10 AM

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

Well / Boring Log

SB-17-5

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	20	19.8 Sand, light brown, poorly graded, dry, fine to medium grained	SP		20			
	21	20.0 Sand, fine to medium grained, little fine to medium gravel, moist, brown -- Clay stringer at 25.1'			21			
	22				22			0
	23		SP		23			
	24				24			
	25	E.O.B. @ 25'			25			
	26				26			0
	27	26.9 Sand, fine to medium, angular, dark gray to black staining, sharp contact at 27.5'	SP		27			
	28	~~27.5~~ Sand, fine to very fine, light brown 27.7 Sand, fine to very fine, orange brown 27.9 Sand, fine to very fine, light brown, no odor, wet	SP		28			
	29		SP		29			
	30				30			0
	31	31.0 Sand, very fine grained, Clay, some plasticity, light brown, firm			31			
	32				32			
	33		SC		33			0
	34				34			
35.0	35				35			
	36				36			
	37				37			
	38				38			
	39				39			
	40				40			
	41				41			
	42				42			
	43				43			
	44				44			
	45				45			

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

Well / Boring Log

SB-17-6

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 20.0 bgs

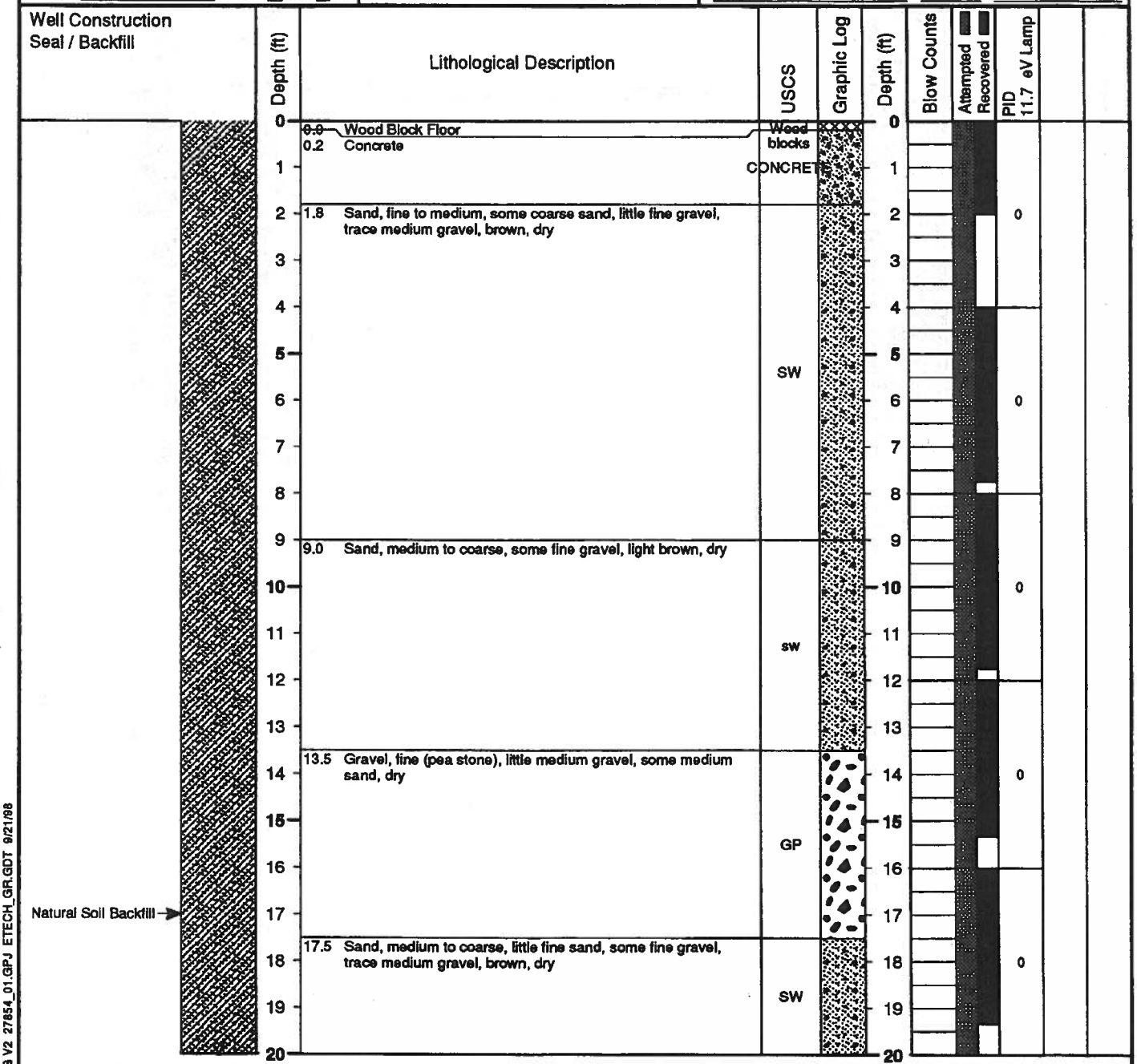
Date	Time	Depth to Water (bgs/TOC)

TOC Elev: _____ Grd Elev: _____
Horiz. Coord:
Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/5/98 Finished 8/5/98
Time: Started 1:00 pm Finished 6:55 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Concrete Coring Machine	0.2'-1.8'	3"
Geoprobe	1.8'-35'	2"



Soils composited from each of the 7.5' soil sample intervals for additional characterizations. *(TCLP sample on composite)

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

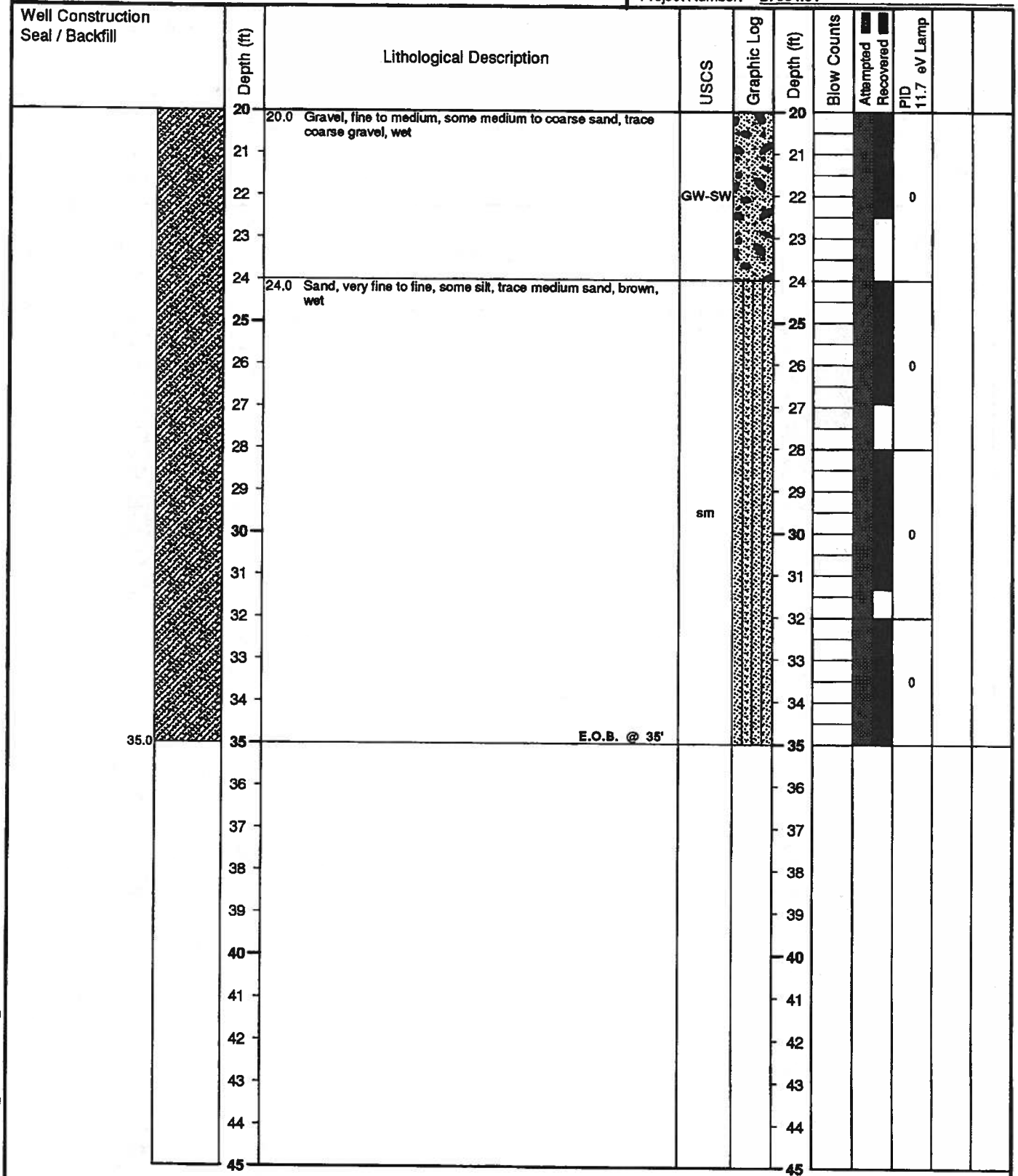
Well / Boring Log

SB-17-6

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01



WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

Well / Boring Log

SB-17-7

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 20.8 bgs

Date	Time	Depth to Water (bgs/TOC)

TOC Elev: _____ Grd Elev: _____
Horiz. Coord:
Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/4/98 Finished 8/4/98
Time: Started 12:20 pm Finished 3:30 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Geoprobe (Hammer Bit)	0.2-1.2'	2.25"
Geoprobe	1.2-25'	2"

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	0	0.0 Wood Blocks 0.2 Concrete	Wood Blocks CONCRETE		0			0
	1	1.2 Sand, fine to medium, some fine gravel, little coarse sand, trace medium gravel, brown dry, no odor			1			
	2				2			
	3				3			0-1
	4		SW		4			
	5				5			
	6				6			
	7				7			0-2
	8	7.5 Sand, fine to medium, some fine to medium gravel, little coarse sand, brown, trace black stains, dry no odor			8			
	9				9			
	10		SW		10			
	11				11			0
	12				12			
Natural Soil Backfill →	13	13.0 Gravel, fine to medium, some medium to coarse sand, brown, dry			13			
	14		GP-SP		14			
	15				15			0
	16	15.5 Sand, medium to fine, some coarse sand, little fine gravel, light brown, dry	SW		16			
	17	17.0 Gravel, fine to medium, little medium to coarse sand, trace coarse gravel, brown, dry	GW		17			
	18	18.2 Sand, fine to coarse, trace fine to medium gravel, light brown, dry			18			
	19		SW		19			0
	20				20			

Soils composited from each of the 5' soil sample intervals for additional characterizations. @3:20 *(TCLP sample on composite)

WELL_LOG V2. 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

Well / Boring Log

SB-17-7

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	20				20			
	21	20.8 Sand, medium to coarse, some fine sand, little fine gravel, brown, wet			21			
	22				22			
	23		SW		23			0
	24				24			
25.0	25	24.7 Sand very fine to fine, little silt, brown, wet E.O.B. @ 25'	SM		25			
	26				26			
	27				27			
	28				28			
	29				29			
	30				30			
	31				31			
	32				32			
	33				33			
	34				34			
	35				35			
	36				36			
	37				37			
	38				38			
	39				39			
	40				40			
	41				41			
	42				42			
	43				43			
	44				44			
	45				45			

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

Well / Boring Log

SB-17-8

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 20.7 bgs

Date	Time	Depth to Water (bgs/TOC)

TOC Elev: _____ Grd Elev: _____
Horiz. Coord:

Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/4/98 Finished 8/5/98
Time: Started 4:10 pm Finished 11:45 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Concrete Coring Machine	0.2-1.5'	3"
Geoprobe	1.5-25'	2"

Well Construction
Seal / Backfill

Natural Soil Backfill

Depth (ft)	Lithological Description	USCS	Graphic Log
0.0	~~Wood Blocks~~	Wood Blocks	
0.2	Concrete	CONCRETE	
1.5	Sand, fine to medium, some coarse sand, little fine gravel, trace medium gravel, brown, dry	SW	
5.5	Sand, fine to medium, some fine to medium gravel, little coarse sand, brown, dry, trace black stains, no odor	SW	
16.0	Sand, fine to medium, trace coarse sand, little fine gravel, trace medium gravel, light brown, dry	SW	
18.0	Sand, fine to medium, some fine gravel, brown, dry	Sw	

Depth (ft) | Blow Counts | Attempted / Recovered | PID 11.7 eV Lamp

PID 11.7 eV Lamp: 0 (1-5) | 0 (5-10) | 0 (10-15) | 0 (15-20)

Soils composited from each of the 5' soil sample intervals for additional characterizations. @11:30 *(TCLP sample on composite)

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

Well / Boring Log

SB-17-8

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	20	20.0 Sand, very fine to fine, some silt, brown, trace medium sand, dry	SM		20			
	21	20.7 Sand, very fine to fine, some silt, brown, wet			21			
	22		SM		22			
	23	23.0 Silt, brown, some very fine to fine sand, wet			23			0
	24		ML		24			
25.0	25	E.O.B. @ 25'			25			
	26				26			
	27				27			
	28				28			
	29				29			
	30				30			
	31				31			
	32				32			
	33				33			
	34				34			
	35				35			
	36				36			
	37				37			
	38				38			
	39				39			
	40				40			
	41				41			
	42				42			
	43				43			
	44				44			
	45				45			

EARTH TECH

Well / Boring Log

SB-17-9

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 20.0 bgs

Date	Time	Depth to Water (bgs/TOC)

TOC Elev: _____ Grd Elev: _____
Horiz. Coord:

Protective Casing Material:
Diameter: _____ Cap Type:
T.O.C. Height Above Ground:
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/7/98 Finished 8/7/98
Time: Started 1:25 pm Finished 4:00 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Concrete Coring Machine	0.2-1.2'	3"
Geoprobe	1.2-35'	2"

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	0	0.0 Wood Blocks	Wood Blocks		0			
	1	0.2 Concrete	CONCRETE		1			
	2	1.2 Sand, medium to fine, some coarse sand, little fine gravel, trace medium gravel, brown, dry	SW		2			0
	3				3			
	4				4			
	5				5			
	6				6			0
	7				7			
	8				8			
	9				9			
	10	9.5 Sand, fine to medium, some fine gravel, trace medium gravel, brown to light brown, dry			10			0
	11				11			
	12		Sp-Gp		12			
	13				13			
	14				14			0
	15	15.0 Gravel, fine to medium, some medium to coarse sand, brown, dry			15			
	16				16			
	17		GW		17			
Natural Soil Backfill →	18				18			0
	19	18.2 Sand, medium to coarse, some fine to medium gravel, little fine sand, brown, dry	SW		19			
	20				20			

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/18/98

EARTH TECH

Well / Boring Log

SB-17-9

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	20	20.0 Sand, medium to coarse, some fine gravel, trace medium gravel, brown, wet	SW		20			0
	21				21			
	22				22			
	23	22.5 Sand, very fine to fine, some silt, brown, wet	SM		23			0
	24				24			
	25				25			
	26				26			0
	27				27			
	28				28			
	29				29			0
	30				30			
	31				31			
	32				32			0
	33				33			
	34				34			
35.0	35	E.O.B. @ 35'			35			
	36				36			
	37				37			
	38				38			
	39				39			
	40				40			
	41				41			
	42				42			
	43				43			
	44				44			
	45				45			

EARTH TECH

Well / Boring Log

SB-17-10

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered While Drilling at:

Date	Time	Depth to Water (bgs/TOC)

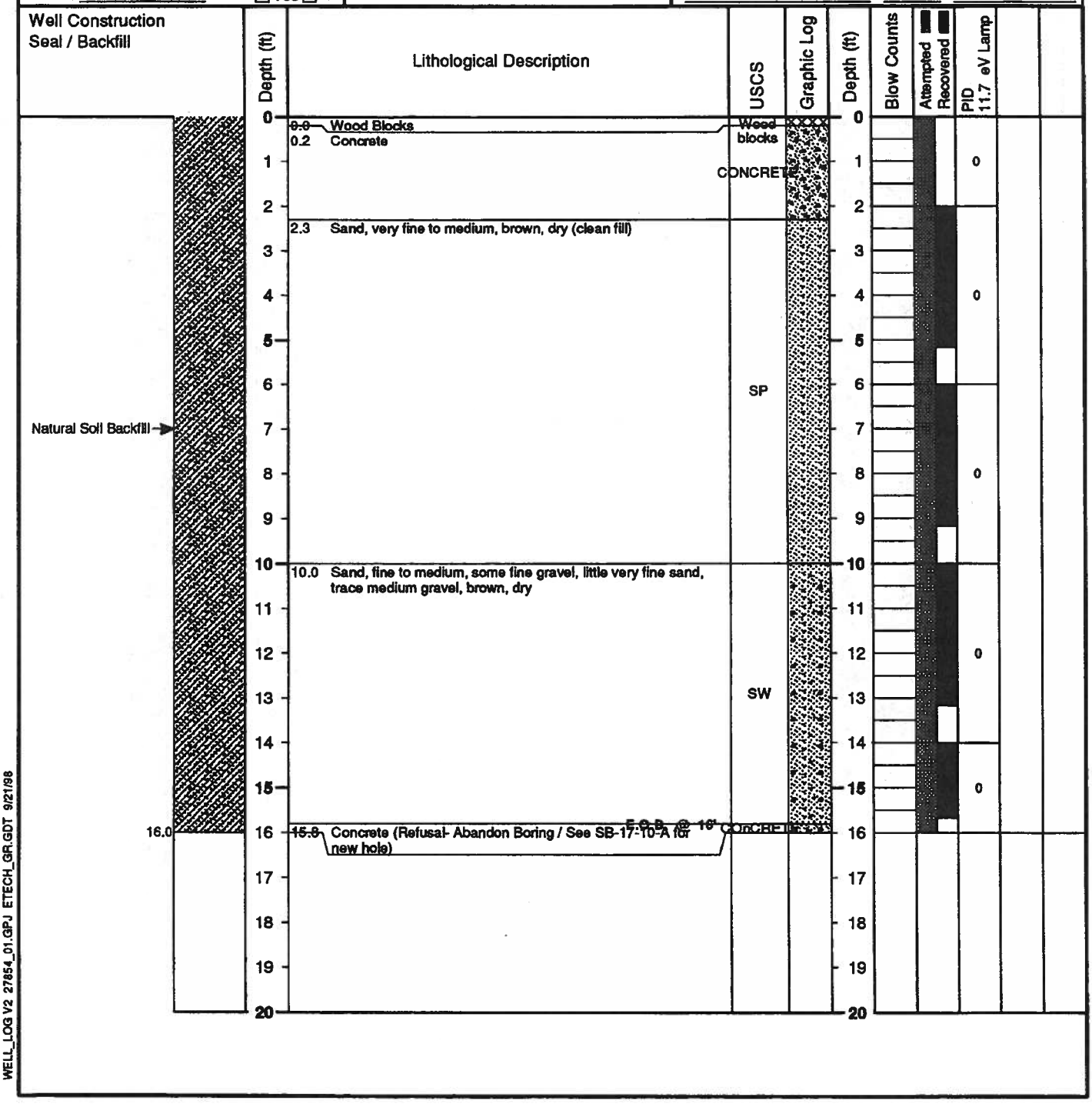
TOC Elev: _____ Grd Elev: _____
Horiz. Coord:

Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/6/98 Finished 8/6/98
Time: Started 4:35 pm Finished 5:25 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Concrete Coring Machine	16'	3"
Geoprobe	2.3-16'	2"



WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

Well / Boring Log

SB-17-10-A

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 21.2 bgs

Date	Time	Depth to Water (bgs/TOC)

TOC Elev: _____ Grd Elev: _____
Horiz. Coord:
Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/10/98 Finished 8/10/98
Time: Started 9:55 am Finished 4:30 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Concrete Coring Machine	0.2-1.9'	3"
Geoprobe	1.9-30'	2"

Well Construction
Seal / Backfill

Natural Soil Backfill

Depth (ft)	Lithological Description	USCS	Graphic Log
0	0.0 Wood Blocks	Wood Blocks	
0.2	Concrete	ConCRETE	
1.9	Sand, fine to medium, light brown, dry	SP	
2.5	Sand, medium to fine, some fine gravel, little coarse sand, brown, trace black stains, no odor, dry	Sw	
6.5	Sand, fine to medium, some fine to medium gravel, little coarse sand, brown, dry	SW	
15.8	Gravel, fine to medium, some medium to coarse sand, brown, dry, trace coarse gravel	GW	
17.5	Sand, medium to fine, some fine gravel, brown, dry	SP	

Depth (ft) | Blow Counts | Attempted / Recovered | PID 11.7 eV Lamp

PID 11.7 eV Lamp: 0 (2-3 ft); 0 (4-5 ft); 0 (6-7 ft); 0 (8-9 ft); 0 (12-13 ft); 0 (16-17 ft)

Soils composited from each of the 7.5' soil sample intervals for additional characterizations. *(TCLP sample on composite)

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/18/98

EARTH TECH

Well / Boring Log

SB-17-10-A

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	20	20.0 Sand, medium to coarse, some fine gravel, little fine sand, brown, dry	sw		20			0
	21				21			
	22	21.2 Sand, coarse, some medium sand, little fine to medium gravel, brown, wet	SW		22			
	23	22.4 Sand, very fine to fine, some silt, brown, wet			23			
	24				24			0
	25				25			
	26		sm		26			
	27				27			
	28				28			0
	29				29			
30.0	30	E.O.B. @ 30'			30			
	31				31			
	32				32			
	33				33			
	34				34			
	35				35			
	36				36			
	37				37			
	38				38			
	39				39			
	40				40			
	41				41			
	42				42			
	43				43			
	44				44			
	45				45			

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/18/98

EARTH TECH

Well / Boring Log

SB-17-11

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 21.3 bgs

Date	Time	Depth to Water (bgs/TOC)

TOC Elev: _____ Grd Elev: _____
Horiz. Coord:

Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/12/98 Finished 8/12/98
Time: Started 8:30 am Finished 12:15 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Open Hole (Pit)	0-11.2'	NA
Concrete Coring Machine	11.2'- 12.53"	
Geoprobe	12.5'-30'	2"

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	0	0.0 Open Hole (Conveyor Pit)			0			0
	1				1			
	2				2			
	3				3			
	4				4			0
	5				5			
	6				6			
	7				7			
	8				8			
	9				9			
	10				10			0
	11				11			
	12	11.2 Concrete	CONCRETE		12			
	13	12.5 Sand, medium to fine, some fine gravel, little coarse sand	SW		13			
	14				14			0
Natural Soil Backfill →	15	14.2 Gravel, fine to medium, some medium to coarse sand	GW		15			
	16	15.6 Sand, medium to fine, some coarse sand, little fine gravel, light brown, dry			16			
	17		SW		17			
	18				18			0
	19	18.5 Gravel, fine to coarse, some medium to coarse sand, dry			19			
	20				20			

Soils composited from each of the 7.5' soil sample intervals for additional characterizations. @12:10*(TCLP sample on composite)

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

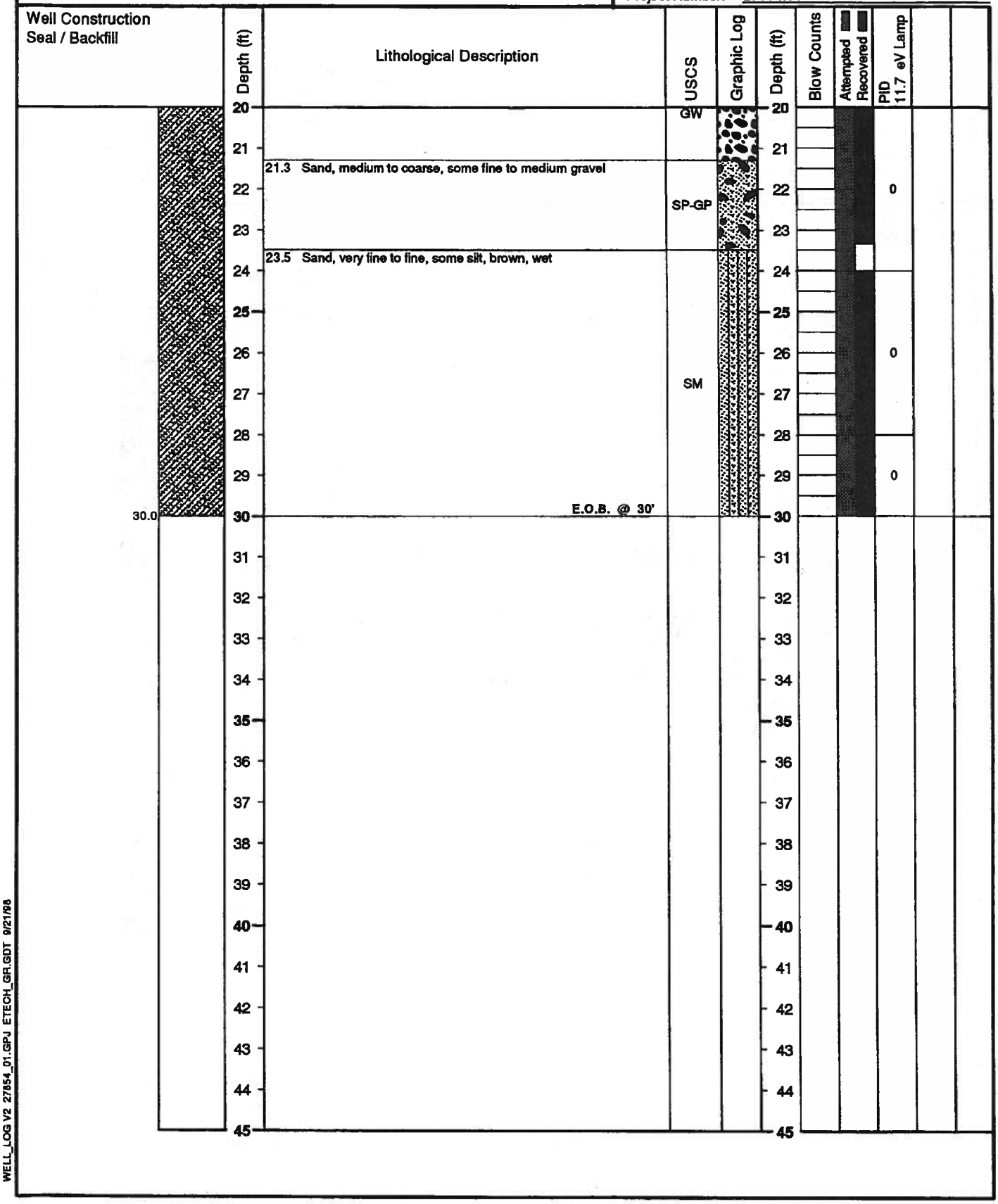
Well / Boring Log

SB-17-11

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01



WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/21/98

EARTH TECH

Well / Boring Log

SB-17-12

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 20.5 bgs

Date	Time	Depth to Water (bgs/TOC)

TOC Elev: _____ Grd Elev: _____
Horiz. Coord:

Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/7/98 Finished 8/7/98
Time: Started 8:50 am Finished 11:45 am
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Concrete Coring Machine	0-1.5'	3"
Geoprobe	1.5-25'	2"

Well Construction
Seal / Backfill

Natural Soil Backfill

Depth (ft)	Lithological Description	USCS	Graphic Log	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
0	0.0 Wood Blocks	Wood Blocks				0
0.2	Concrete	CONCRETE				
1.5	Sand, medium to fine, some fine gravel, trace coarse sand, brown, dry, trace concrete pieces	SW				0
6.0	Gravel, fine to medium, some fine to coarse sand, brown, dry	GW				0
7.5	Sand, fine to medium, little fine gravel, trace medium gravel, brown, dry	SW				
9.0	Gravel, fine to medium, some fine to coarse sand, brown, dry	GW				
11.0	VOID	VOID				0
13.0	Sand, fine to medium, little fine gravel, brown, dry	SW				0
16.3	Sand, fine to medium, light brown, dry	SP				
17.0	Gravel, fine to medium, some fine to medium sand, trace coarse gravel, brown, dry	GW				0
20						

Soils composited from each of the 5' soil sample intervals for additional characterizations. @11:40*(TCLP sample on composite)

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/18/98

EARTH TECH

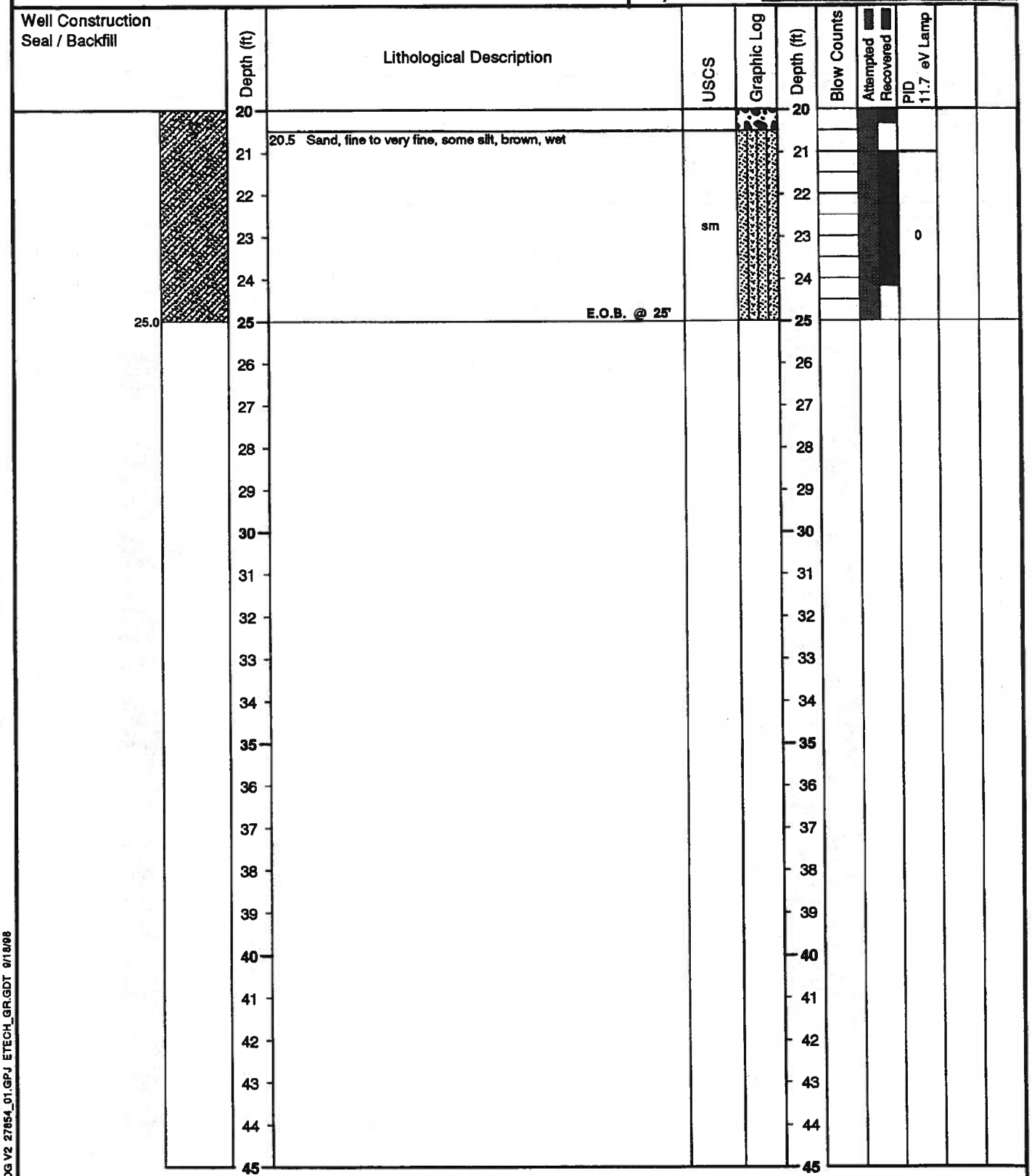
Well / Boring Log

SB-17-12

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01



WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/18/98

EARTH TECH

Well / Boring Log

SB-17-13

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered While Drilling at: Dry

Date	Time	Depth to Water (bgs/TOC)

TOC Elev: _____ Grd Elev: _____
Horiz. Coord:
Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/10/98 Finished 8/10/98
Time: Started 5:05 pm Finished 6:40 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Concrete Coring Machine	0-1.2'	3"
Geoprobe	1.2-20.5"	2"

Well Construction Seal / Backfill: Natural Soil Backfill

Depth (ft)	Lithological Description	USCS	Graphic Log	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
0	0.0 Wood Blocks 0.2 Concrete	Wood blocks ConCRET				0
1.2	Sand, fine to medium, some fine to medium gravel, brown, dry	SW				0
5.6	Sand, medium to fine, some fine gravel, little medium gravel, trace coarse sand, trace black staining, no odor	SW				0
12.2	Sand, fine to medium, some fine gravel, trace medium gravel, brown, dry	Sw				0
18.1	Sand, fine to coarse, some fine to medium gravel, brown, dry	SW				0
19.1	Gravel, fine to medium, some medium to coarse sand, trace coarse gravel, brown dry.	GP-GW				
20						

Soils composited from each of the 5' soil sample intervals for additional characterizations. @6:30*(TCLP sample on composite) —Mircore refusal at 20.5'

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/18/98

EARTH TECH

Well / Boring Log

SB-17-13

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
20.5	20	"Coring halted due to refusal by gravel" E.O.B. @ 20.5'			20			
	21				21			
	22				22			
	23				23			
	24				24			
	25				25			
	26				26			
	27				27			
	28				28			
	29				29			
	30				30			
	31				31			
	32				32			
	33				33			
	34				34			
	35				35			
	36				36			
	37				37			
	38				38			
	39				39			
	40				40			
	41				41			
	42				42			
	43				43			
	44				44			
	45				45			

EARTH TECH

Well / Boring Log

SB-17-14

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:

Groundwater Encountered
While Drilling at: 21.2 bgs

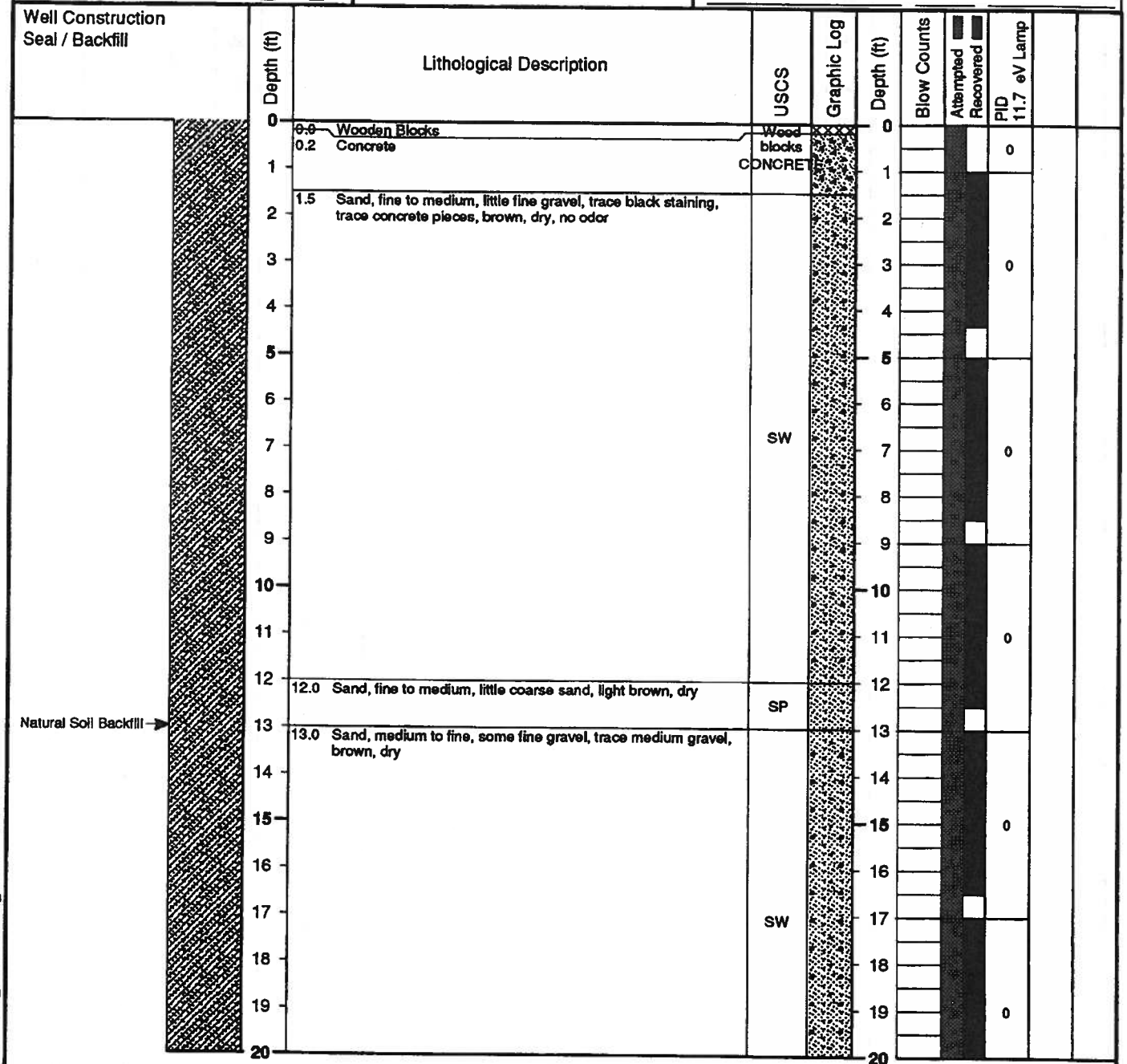
Date	Time	Depth to Water (bgs/TOC)

TOC Elev: _____ Grd Elev: _____
Horiz. Coord:
Protective Casing Material:
Diameter: _____ Cap Type:
T.O.C. Height Above Ground:
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 8/12/98 Finished 8/12/98
Time: Started 2:00 pm Finished 4:00 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Pkwy
Grand Rapis, MI 49588
Equipment: Geoprobe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Concrete Coring Machine	0-1.5'	3"
Geoprobe	1.5-25"	2"



Soils composited from each of the 5' soil sample intervals for additional characterizations. @3:45*(TCLP sample on composite) *Missing 1 750mL Jar for TCLP*

WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 9/18/98

EARTH TECH

Well / Boring Log

SB-17-14

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27654.01

Well Construction Seal / Backfill	Depth (ft)	Lithological Description	USCS	Graphic Log	Depth (ft)	Blow Counts	Attempted / Recovered	PID 11.7 eV Lamp
	20				20			
	21	21.2 Sand, very fine to fine, some silt, brown to light brown, wet			21			
	22				22			
	23		sm		23			0
	24				24			
25.0	25	E.O.B. @ 25'			25			
	26				26			
	27				27			
	28				28			
	29				29			
	30				30			
	31				31			
	32				32			
	33				33			
	34				34			
	35				35			
	36				36			
	37				37			
	38				38			
	39				39			
	40				40			
	41				41			
	42				42			
	43				43			
	44				44			
	45				45			

WELL_LOG V2 27654_01.GPJ ETECH_GR.GDT 9/18/06

ATTACHMENT 2

Memo

Date: September 29, 1998

To: Ted Lietzke cc:

From: Mike Schmoldt, CHMM

Subject: **Waste Characterization of Foundation Soil Excavation**

Purpose

This memo was prepared to assist General Motors 36th Grand Rapids Metal Division (GM) in documenting the determination that certain excavated soils are non-hazardous waste suitable for off-site disposal in an municipal non-hazardous solid waste landfill.

Background

GM plans to excavate a quantity of soil to be used for the foundation for new equipment. The area examined consists of the area within 17-Bay between columns C-38 and M41 slated for excavation. The soil was probably impacted prior to the effective date of RCRA (1980) and is currently not a solid waste, but is known to be contaminated environmental media, and may be subject to RCRA if it is removed. Prior to excavation, Earth Tech has collected soil 14 boring samples from grid areas representative of the area and depth to be excavated. Each core was composited vertically using 5 samples from the length of the core into one composite for each boring composite sample analyzed.

Some prior soil excavated at a within the plant have been disposed of as listed (F001) hazardous waste, based on the known source of trichloroethylene from a degreasing operation. Figure 8 (attached) from a 1987 investigation of soil vapor TCE concentrations show the isobar contours of the TCE at the 3 to 6 foot depth. Figure 8 has been modified to show the location of the former degreaser and proposed excavation. Records and information obtained from interview with knowledgeable GM staff (Tobe Allen and other GM staff who identified the known source of degreaser) did not indicated knowledge of a connection between the known listed source, or any

DP/eid m:\GM\19428.03\cor\talmemo

known release of trichloroethylene from a degreasing or solvent usage in the area being prepared for excavation.

Waste Characterization

Characteristic Waste Code

All soil boring samples were observed to be contain less than the detection limit values of 0.01 mg/L and are therefore also below the TCLP minimum concentration of 0.5 mg/L (or 500 ug/L) which would be necessary to classify the soil as hazardous waste code D040. A grid sampling method was used to obtain a representative sample of the soil to be excavated

Therefore the excavated soil is not a ***characteristic*** hazardous waste when removed for disposal.

Listed Waste Code

The trichloroethylene contained in the soils are not known to be connected with prior known activities such as degreasing or solvent use, which would cause the soil to be a 'F' listed waste. Even if soils could be shown to be associated with listed activities, the listed waste classification would not apply for the following reasons:

- EPA policy[1] is to accept authorized state's risk based standards, where authorized states make risk-based determinations about the levels of environmental contamination with listed waste which are no longer considered to contain that hazardous waste. The listed constituent is below the approved State risk based standard: Michigan's Part 201 NREPA of 1994 as amended (Generic Cleanup Criteria and Screening Levels -April 1998a):

Criteria for Trichloroethylene

TCLP analytical result mg/L	TCLP ug/KG (assumes density=2.5)	Direct Contact Industrial Criteria ug/kg	Industrial and Commercial Drinking Water Protection Criteria ug/kg
<0.01	<4.0	500	100

1 U.S. EPA Office of Solid Waste. June 19, 1989 Memorandum by Jonathan Z. Cannon. FAXBACK document number 11434.

Here - 1 12
OSW-206

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 9 1990

OFFICE OF
SOLID WASTE AND EMERGENCY RESPO

MEMORANDUM

SUBJECT: Replacement of Contaminated Soil and Debris Treated under a Treatability Variance

FROM: Sylvia K. Lowrance, Director
Office of Solid Waste

TO: David Ullrich, Acting Director
Waste Management Division, Region V

This memorandum is in response to your correspondence of April 25, 1990, in which you requested guidance in relation to six specific questions dealing generally with how the RCRA land disposal restrictions may affect certain remedial situations. We apologize for the delay in responding to your request; however, it was necessary for us to insure consensus at Headquarters in order to address the questions you have posed. We offer the following response to those six questions:

1. Q: Can soil and debris which has been treated in a tank within the area of contamination (AOC) in accordance with a treatability variance be replaced within the area of contamination without meeting any additional 40 CFR Part 264 requirements?

A: If contaminated soil and debris is treated to meet standards specified in a treatability variance that has been approved by the Agency, the treated soil/debris may then be placed in any treatment, storage or disposal unit that is in compliance with RCRA Subtitle C. This could include an "area of contamination" (i.e., a RCRA landfill) that has been designated by the Regional Administrator for the purpose of remediating the facility or site. Thus, as a regulatory matter, there would be no real distinction between soil/debris that is treated to the standard(s) set in the treatability variance and then placed in another unit, as opposed to "pure" hazardous wastes that are treated to the applicable Part 268 standards, and placed in another unit, except as discussed in the response to Question #5 (concerning contaminated media which no longer contains any waste).

By stating in your question that the treated wastes are to be redeposited into the AOC, we assume there is an

- Soil being removed from the site for land disposal elsewhere, (contaminated media) determined not to contain any hazardous waste is not subject to RCRA subtitle C requirements, including the land disposal restrictions (LDRs)[2 and 3].

Therefore the excavated soil is not a ***listed*** hazardous waste when removed for disposal.

CONCLUSIONS

The soil boring investigation is expected to be sufficient for the waster characterization of the soil excavation to be performed. The following conclusions are valid unless additional new information conflicting with the above observations and discussion becomes available.

1. The soil is contaminated environmental media which is exempt from RCRA until removed for disposal.

2. The excavated soil is a non-hazardous solid waste under RCRA.

3. The trichloroethylene present is below each applicable Michigan Act 201 criteria

4. If disposed of off-site, the soil meets requirements for a municipal permitted solid waste landfill.

5. The soil may be used as clean fill for on-site or off-site purposes.

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2 U.S. Epa Office of Solid Waste. September 15, 1995. Memorandum by Peter C. Wright. FAXBACK document number 11948

3 U.S. EPA Office of Solid Waste. October 9, 1990. Memorandum by Sylvia K. Lawrence.

implied question as to what design and operating standards would then be applicable to the AOC itself. This is discussed in our response to question #6, below.

2. Q: Has the policy set forth on Page 5.12 of the document Implementing the Land Disposal Restrictions, October 1989, been revised?

A: This policy has not been revised. The policy states that once an owner/operator receives a treatability variance, completes treatment, and has a treatment residual to be land disposed, the residue can be directed to any permitted or interim status unit.

3. Q: For the purpose of land disposal, is the residue of soil treated under a treatability variance to be distinguished from the residue of waste treated according to treatment standards?

A: No. See response to Question 1, above.

4. Q: For the purpose of land disposal, is the residue of soil treated under a treatability variance in a tank within the area of contamination to be distinguished from the residue of soil treated under a treatability variance in a tank outside of the area of contamination?

A: No. The location of the tank in relation to the "area of contamination" would not create a distinction as to how or where the treatment residuals could be land disposed. This assumes, of course, that the wastes have been treated to the standards specified in the treatability variance. A tank cannot be considered a part of the AOC (landfill), regardless of where it is physically located; thus, its location would have no bearing on the standards that would apply to management of the contaminated soils (or other hazardous wastes, for that matter) after they have been treated in the tank.

5. Q: Is a treatability variance for soil and debris to be considered in effect a delisting? Do the principles of the "contained in" policy for the treatment of contaminated ground water have any applicability to the treatment of contaminated soil and debris?

A: A treatability variance for soil/debris does not have the effect of a delisting approved for the waste. The treated residuals typically will still contain hazardous wastes, and thus must be managed as such. In contrast, when wastes are delisted they are generally no longer subject to Subtitle C regulation.

The "contained in" policy applies to ground water

and other contaminated media such as soil which are contaminated with listed hazardous wastes. Thus, if ground water or soil are treated such that concentrations of the listed wastes are at or below health based levels, the ground water or soil would no longer "contain" the hazardous wastes, and would therefore be no longer subject to Subtitle C regulation.

6. Q: If an AOC can be considered a RCRA unit for the purpose of closure, would an AOC ever be considered equivalent to a RCRA compliant unit for the purpose of disposal? (See page 6 of OSWER Directive 9234.2-04FS RCRA ARARs: Focus on Closure Requirements.)

A: As outlined in the cited ARARs manual, the AOC is a concept which can be applied in the context of remediation under CERCLA response actions or RCRA corrective actions. It is in many ways analogous to situations where two or more regulated surface impoundments would be treated as one unit in the context of closure of the impoundments.

When applied in the context of RCRA corrective actions or CERCLA remedial actions, the AOC concept would allow the Regional Administrator to designate a broadly contaminated contiguous area to be a RCRA "unit" (i.e., a landfill) for the purpose of implementing the remedy. In an existing landfill, the movement or consolidation of hazardous wastes within the designated area would not by itself trigger Subtitle C requirements (including the land disposal restrictions and the RCRA minimum technology requirements) since that movement or consolidation does not constitute "disposal" for Subtitle C purposes. If, however, wastes are excavated from the designated area, treated in another unit, and subsequently redeposited into the same area or unit, disposal has occurred, and the landfill would have to comply with applicable Part 264 or 265 requirements, including the LDRs, MTRs, closure standards (264.310), and the ground water monitoring requirements of Subpart F, Part 264 or 265.

The proposed Subpart S corrective action rule explains the AOC (described therein as the "corrective action management unit") concept in more detail. However, if you have more specific questions or issues regarding AOCs, we will be glad to work with you or your staff to resolve them.

If there are any questions on the above responses to your questions, please contact Dave Fagan (FTS 382-4497) or Judy

Goldberg (FTS 382-4534).

Enclosure
cc: Regional RCRA Branch Chiefs
PSPD Branch Chiefs

11948

9441.1995(32)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Washington, D.C. 20460

September 15, 1995

Mr. Peter C. Wright
Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63167

Dear Mr. Wright:

I am writing in response to your letter of January 3, 1995, in which you requested clarification of the RCRA "contained-in" policy. In your letter you asked several specific questions regarding this policy and we offer our responses below. It should be understood that these responses reflect the Agency's current interpretation of the contained-in concept; in the Hazardous Waste Identification Rule for Contaminated Media (HWIR-media), currently under development, we will be looking closely at the contained-in policy and other issues associated with contaminated media and will be addressing those issues through the rulemaking process.

Question 1. Can a State determine whether or not soils which contained a listed hazardous waste, but were then treated to below health based concentrations, no longer contain the hazardous waste?

The contained-in policy is intended to clarify the application of RCRA hazardous waste regulations to environmental media. As stated in previous guidance on this policy, contaminated media are not considered solid wastes in the sense of being abandoned, recycled, or inherently waste-like as those terms are defined in RCRA regulations. However, environmental media that contain listed hazardous wastes must be managed as hazardous wastes because--and only as long as--they contain listed waste(s) (see footnote 1). EPA Regions and authorized states may apply the contained-in policy to determine site-, media- and contaminant-specific levels, such that if the concentration of the hazardous constituents in the environmental media fall below these levels, the environmental media may be determined to no longer contain hazardous waste. Such "contained-in determinations" may be made

before or after treatment of the contaminated environmental media and may include consideration of site-specific exposure pathways (e.g., potential for human exposure, soil permeability, depth to groundwater).

Question 2. Are soils that have been treated and then determined not to contain hazardous wastes still subject to the Land Disposal Restrictions (LDRs) Universal Treatment Standards?

then determined to no longer contain hazardous waste, the LDR treatment standards still must be complied with prior to land disposal. This means that the media would have to be treated to meet UTS or a treatability variance would have to be obtained (see footnote 2). Individuals who believe that the UTS are not appropriate for media containing solid waste are encouraged to work with their State regulatory agency and the appropriate EPA Regional Office to obtain a site-specific treatability variance under 40 CFR •268.44(h). EPA's policy is that site-specific treatability variances are presumed to be appropriate for contaminated media. See 55 FR 8760 (March 8, 1990). For more information on site- specific treatability variances granted in the context of environmental cleanup, please refer to the Superfund LDR Guides Numbered 6A and 6B, entitled, Obtaining a Soil and Debris Treatability Variance for Remedial Actions and Obtaining a Solid and Debris Treatability Variance for Removal Actions, respectively. For your convenience, copies of these guidance documents are enclosed.

Of course, if no land disposal will occur, the LDR treatment standards do not apply. Additionally, contaminated environmental media determined not to contain any waste (i.e., it's just media), would not be subject to any RCRA Subtitle C requirement, including the LDRs.

Question 3. If groundwater that originally exhibited a hazardous characteristic is subsequently treated to below a State-determined contained-in level, would the ground water still be subject to the UTS requirements prior to land disposal?

Yes. Once the LDR treatment standards attach to characteristic wastes, even if the characteristic is climinated, the media remain subject to any applicable LDR treatment standards

that have not been met through removal of the characteristic. As indicated in the Third decision, Chemical Waste Management v. U.S. EPA, 976 F.2d 2 (D.C. Dir. 1992), cert. denied, 1135 S.Ct 1961 (1993), elimination of the characteristic does not necessarily satisfy LDR requirements. If groundwater that exhibits a characteristic is treated prior to land disposal, it must be treated in accordance with applicable LDR treatment standards or pursuant to a treatability variance to meet LDR requirements. As discussed in our response to question 2, individuals who believe that the UTS are not appropriate to their contaminated media are encouraged to apply for a site-specific treatability variance.

Of course, if no land disposal will occur, the LDR treatment standards do not apply. Additionally, ground water managed in accordance with one of the existing statutory or regulatory exclusions may not be subject to the LDR treatment standards even when land disposal will occur. For example, under RCRA •3020(b), contaminated groundwater may be treated in accordance with a cleanup action and then reinjected into the aquifer from which it was withdrawn without meeting LDR treatment standards, provided the treatment substantially reduces the hazardous constituents prior to reinjection and the cleanup action will, upon completion, be sufficient to protect human health and the environment.

Question 4. May a State that is authorized only for the base RCRA program make contained-in determinations, or does the State need to be authorized for the LDRs as well?

In order to make contained-in determinations, a State must only be authorized for the part of the base program under which the waste of concern is identified as hazardous. For example, when determining whether or not a medium contains a particular characteristic waste, the State must be authorized for that characteristic. In the same manner, if the State wishes to determine whether or not a medium contains a particular listed waste, that State must be authorized for that particular waste listing. In regard to the two sites described in your letter, both Massachusetts and Texas are authorized for the base program under which the wastes you mentioned are identified as hazardous, and may, at their discretion, make the contained-in determinations you described.

Question 5. Do contained-in determinations needed to be made under a RCRA permit, or can another mechanism be used?

Authorized states and EPA regions may use any format or mechanism to document contained-in determinations. These mechanisms could include official agency correspondence, orders, and RCRA permits.

We hope this will be of assistance to you in applying the contained-in policy. If you have any further questions, please contact Elizabeth McManus, of my staff, at (703) 308-8657. In addition, please note that authorized states have their own regulations and policies which may be more stringent than federal regulations and policies. In authorized states, questions about application of the contained-in policy, including the interpretations put forth in this letter, should be referred to the appropriate state agency. In Texas, please contact Paul Lewis of the Texas Natural Resources Conservation Commission at (512) 239-2340; in Massachusetts, please contact John Carrigan of the Massachusetts Department of Environmental Protection at (617) 292-5584.

Sincerely,

Michael Shapiro
Director, Office of Solid Waste

Enclosure

cc: Matt Hale, OSW, PSPD
David Bussard, OSW, CAD
Jim Berlow, OSW, WMD
Larry Starfield, OGC
Dawn Messier, OGC
Barbara Pace, OGC
Bruce Diamond, OECA, OSRE
US EPA Regional RCRA Branch Chiefs, Regions I - X
John Carrigan, State of Massachusetts
Susan Ferguson, State of Texas

Footnotes

1. June 19, 1989 letter from Jonathan Cannon, Acting Assistant Administrator of EPA's Office of Solid Waste and Emergency Response to Thomas Jorling, Commissioner of the New York Department of Environmental Conservation.

2. Nothing in this letter is intended to affect the status of existing regulatory or statutory exclusions to the definition of solid or hazardous waste. Such provisions can prevent the duty to comply with LDRs from attaching in the first instance. See, e.g., RCRA •1004(27) (exempting industrial point source discharges subject to Clean Water Act permits from the definition of solid waste). In addition, the Agency does not intend in this letter to expand the scope of activities that constitute land disposal and thus trigger LDR treatment requirements. For example, the Agency's positions that in situ treatment and movement of contaminated media within an area of contamination do not constitute land disposal remain unaffected. Similarly, this letter is not intended to affect any statutory or regulatory exclusions to the requirement to comply with LDRs (see .e.g, RCRA •3020(b)).

Attachment

Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63167
Phone: (314) 694-1000

Peter C. Wright
Environmental Attorney
(314) 694-8509

January 3, 1995

Mr. Michael Shapiro
United States Environmental Protection Agency
Office of Solid Waste and Emergency Response
401 M Street, S.W.
Washington, D.C. 20460

Re: Clarification of the Contained in Rule

Dear Mr. Shapiro:

This letter addresses an urgent issue that arises with the

December 19 effective date of the Phase II Land Disposal Restriction (LDR) rule. Your immediate attention and response is requested in order to avoid delay of planned remedial work that has been developed in concert with state authorities.

Monsanto Company has two plant sites that are planning to engage in remediation activities in the near term, which require confirmation of Monsanto's understanding of the operation of the contained in rule. More specifically, as will be described in detail below, these two sites have planned to implement remedial measures that will remove hazardous waste constituents from affected environmental media so that it is Monsanto's understanding (and that of the two RCRA authorized states) that the treated media will no longer "contain" a hazardous waste. The treated environmental media will likely contain traces of hazardous constituents after treatment, at concentrations below health based concentration limits established by the two states. We understand that once the media no longer contains the listed waste (as determined by the State agency) it no longer must be managed as a hazardous waste, i.e. subtitle C no longer applies and the media may be placed on the land without regard to the Land Disposal Restrictions Universal Treatment Standards (UTS). Do you concur? We also understand that a State authorized for the base program is empowered to make the contained-in determination without regard to the State's authorization status for the LDR program. Do you concur?

Overview of the Sites and Remediation Projects

The first plant site is located in Everett, Massachusetts, just north of the City of Boston. This long time chemical manufacturing facility was closed in November, 1992. Currently, the Everett site has been proceeding under the authority of the Massachusetts Contingency Plan (MCP) with proposed remediation scheduled for completion in 1997. In order for the Everett site to proceed on its cleanup schedule, the Agency's interpretation of the contained in rule is important, particularly as the site is currently under a Purchase and Sale Agreement for development as a shopping center with construction scheduled to begin in 1997. This development is critical to the local community because the shopping center will be a major element of Everett's tax base and a significant source of employment in the city.

Due to historic manufacturing operations, areas of the plant site

have been contaminated with bis 2-ethyl hexyl phthalate (BEHP), naphthalene and phthalic anhydride still bottoms, materials which carry the RCRA hazardous waste codes U028, U165 and K024, respectively. Concentrations as high as 10,000 mg/kg of BEHP, 30,000 mg/kg of naphthalene, and 60,000 mg/kg of phthalic acid have been detected in soil samples collected at the site. The remediation plan that has been under development would involve the separation of some discreet waste materials, treatment of some soil in place, and excavation and treatment of some soil from hotspot areas with subsequent reuse of the treated soil on-site as backfill. These treatment methods would significantly reduce the concentration of hazardous constituents remaining in the soils. The Everett Plant has held discussions with the Massachusetts Department of Environmental Protection (DEP's) Bureau of Waste Prevention regarding the impact of RCRA regulations on the planned remediation strategy and has assumed that once the soil was remediated to meet health-based concentrations levels established by Massachusetts (a RCRA authorized state), that the soil no longer would contain hazardous waste and could be beneficially reused as backfill on-site with no further RCRA restrictions. The planned remediation strategy would satisfy the Massachusetts Bureau of Waste Site Cleanup Program requirements to achieve a Permanent Solution, addressing potential risks to human health and the environment and eliminate the potential for constituent migration. Attached is a copy of a DEP policy memorandum dated March 4, 1994 and a letter issued on the same date describing DEP's understanding of how it will apply the contained in rule to a particular remediation project.

The other Monsanto site is the Chocolate Bayou plant, located near Alvin, Texas. This is a large diversified chemical manufacturing site that has a RCRA permit, which includes a corrective action component that is administered by the Texas Natural Resource Conservation Commission (TNRCC). Texas is authorized for RCRA corrective action. The particular remediation project at issue, a program to pump, treat and reinject groundwater that has been contaminated by benzene, phenol and acetone, is not being conducted under RCRA permit, but rather these actions are being undertaken proactively by Monsanto in consultation with the TNRCC. The plant applied for and has received a groundwater class V reinjection permit from TNRCC for this remedial project.

The groundwater at the point it is brought out of the ground is characteristically hazardous for benzene. The groundwater

exhibited measured levels of benzene, phenol and acetone as high as 62 mg/l, 6 mg/l and 6 mg/l, respectively without any treatment. The air stripping treatment system to be installed has been designed to treat the groundwater so that the concentrations of benzene, phenol and acteone are no higher than 0.001 mg/l, 6 mg/l, and 2 mg/l respectively. This treatment of groundwater to these levels would mean that all three contaminants would be below the Texas Risk Reduction Rule Standard 2 Residential levels of 0.005 mg/l benezene, 21.9 mg/l phenol and 2.65 mg/l acetone. The phenol and the acetone are biodegradable organic chemicals and it is believed that the reinjection process will add oxygen to the affected groundwater, assisting in the biodegradation of the organic materials that are not removed by the treatment.

Neither site has considered applying for a Corrective Action Management Unit (CAMU). First, it was believed to be unnecessary to employ a CAMU because of the plan to treat contaminated media to meet health based levels. Second, the time, expense and effort on behalf of Monsanto and the state agencies to put in place the necessary RCRA permits and modifications makes the CAMU option not practical for a timely commencement of remediation activities.

History of the Contained in Rule

Monsanto's understanding has been that treating affected environmental media to meet health based concentration levels that have been applied on a site specific basis by the respective authorized states would free the treated media from further RCRA regulation, including the application of any land disposal restrictions. Monsanto's understanding is based on EPA discussions of the contained in rule. Monsanto's understanding of EPA's position on the "contained in rule" is that it was an interpretative rule long before it was "codified" in rulemakings in the 1990s. EPA has stated that this view of the contained in rule was supported by the 1989 Chemical Waste Management decision. Chemical Waste Management v. EPA, 869 F.2d 1526, 1538 ftnt. 15 (D.C. Cir. 1989).

The contained in rule was first explained in a memorandum from Marcia Williams to Patrick Tobin dated November 13, 1986. That memorandum stated that "if groundwater is treated such that it no longer contains a hazardous waste, the groundwater would no longer be subject to regulation under Subtitle C of RCRA."

Subsequent memoranda and letters (see footnote 1) expanded on the application of the contained in rule. These writings refined the concept that if contaminated environmental media was treated so that the levels of hazardous constituents that remained after treatment were below certain levels, which often have been set at health based levels, that EPA would consider that the affected media no longer "contained" a hazardous waste and so no longer was subject to regulation under RCRA Subtitle C. Monsanto is not certain that the contained in rule applies to a situation like what exists at the Chocolate Bayou plant where there are no listed, but only characteristic wastes involved. Yet Monsanto can see no reason why an exit level appropriate for media contaminated with listed waste would not also apply to media contaminated with a characteristic waste.

EPA also made it clear that an authorized RCRA state could determine what the contained in levels could be. EPA guidance to the states in making the contained in determinations has stressed the need to make the contained in determination on a site-specific basis, in accordance with the general State or Federal guidelines, or by means of a site specific risk assessment. It would appear that the Massachusetts regulations, 310 CMR 40.00 (the Massachusetts Contingency Plan) and the associated policy on the contained in rule and the TNRCC's Risk Reduction Rules provide precisely the kind of the decision making framework EPA requires that an authorized RCRA state use for making the contained in rule decision. It is only a requirement for a state to be authorized for the basic RCRA program to be able to make contained in determination, and it is not necessary for the state to be authorized for all or parts of the land disposal program.

The rulemakings "codifying" the contained in rule began with the reference in the Third Third rulemaking in which EPA "clarified" the treatment standards that would apply to soils that had been contaminated with listed waste. 53 Fed. Reg. 31138, 31142 (August 17, 1988). The contained in rule has been addressed in at least five other Federal Register notices (see footnote 2). The most involved discussion and greatest reliance on the contained in rule is found in the Contaminated Debris rulemaking. In the proposed rulemaking, EPA stated that debris which had been contaminated with hazardous waste would "no longer be a prohibited waste or a hazardous waste if it achieves levels which debris no longer 'contains' hazardous waste." 57 Fed. Reg. at 982. EPA further explained that the levels would be that at which the potential

threat to human health and the environment had been minimized. Id. at 985. In the final rulemaking, EPA explained that treated contaminated debris would be considered to no longer "contain" a hazardous waste, if the debris were treated so as to achieve health based concentrations based on considerations of site hydrology and exposure pathways. EPA summarized the regulatory effect of providing treatment to these levels by stating that "[d]ebris found not to contain hazardous waste (and not exhibiting a hazardous waste characteristic) would not be subject to further Subtitle C regulation, and so could be land disposed without further treatment." 57 Fed. Reg. at 37226 (emphasis added).

The contained in rule has also been discussed in context of the rulemaking proposing land disposal restriction standards for soil and in the final UTS rulemaking. EPA stated "the primary function of a contained in determination has been to determine specific constituent concentrations at which the media at a specific site no longer 'contained' hazardous waste and thus would no longer be subject to the management standards for hazardous waste." 58 Fed. Reg. at 48127. EPA's discussion of the contained in rule and its relationship to the concept of minimized threat levels in these rulemakings is unclear to us. Yet is appears to us that a contained in determination based on a site specific determination satisfies any requirement to achieve minimized threat levels. If this is not EPA's position, then EPA has made a major change in policy for which no notice has been given, for which no rationale has been provided and which may mean that the work on the HWIR will be a complete waste of time. More to the point, if this interpretation about the affect of the contained in rule has changed it may bring to a halt the two remedial projects referenced above and undoubtedly countless other projects.

In order to avoid delay and unnecessary additional expense in connection with approving bids from remediation contractors, we request a prompt response. Monsanto would also like an opportunity to meet with the Agency at the Agency's convenience during January to address the matters raised in this letter.

We look forward to the Agency's urgent consideration and response on this important matter.

Very truly yours,

Peter C. Wright

cc: Barbara Pace, Esquire, EPA Office of General Counsel
Steven Silverman, Esquire, EPA
Richard Kinch, EPA

Mr. Thomas Powers, Acting Commissioner
Mr. John Carrigan
Mr. Brian Moran
Commonwealth of Massachusetts
Department of Environmental Protection
One Winter Street
Boston, Massachusetts 02108

Mr. Richard Chaplin
Commonwealth of Massachusetts
Department of Environmental Protection
10 Commerce Way
Woburn, Massachusetts 01801

Mr. Douglas Crist
Mr. Tom Jecha
Ms. Wendy Ruzacky
Texas Natural Resource
P.O. Box 13087
Austin, Texas 78711-3087

Lowell Martin, Esquire, RCRA Corrective Action Project

Footnotes

1. See e.g., Sylvia K. Lowrance to Jeff Zeikinson, January 24, 1989; Jonathan Cannon to Thomas Jorling, June 19, 1989 (authorized states can make determination on what the appropriate health based levels are at which media no longer "contains" a hazardous waste); Sylvia K. Lowrance to John Ely, March 20, 1991 (recommended that the state use a risk assessment approach to making contained in determinations) [The Massachusetts letter cites additional letters].

2. See e.g., 56 Fed. Reg. 24456 (May 11, 1991); 57 Fed. Reg. 958, 961 (January 9, 1992); 57 Fed Reg. 37194 (August 18, 1992); 58 Fed. Reg. 48092, 48096 (September 14, 1993) and 59 Fed. Reg. 47982, 47986 (September 19, 1994).

11434

JUN 19 1989

Mr. Thomas C. Jorling
Commissioner
Department of Environmental Conservation
State of New York
Albany, New York 12233-1010

Dear Mr. Jorling:

I am writing in response to your letter of May 5, 1989, in which you ask numerous questions concerning the regulatory status, under the Resource Conservation and Recovery Act (RCRA), of environmental media (ground water, soil, and sediment) contaminated with RCRA-listed hazardous waste.

As you point out in your letter, it is correct that the Agency's "contained-in" interpretation is that contaminated environmental media must be managed as if they were hazardous wastes until they no longer contain the listed waste, or are delisted. This leads to the critical question of when an environmental medium contaminated by listed hazardous waste ceases to be a listed hazardous waste. In your letter, you discuss three possible answers (based on previous EPA positions and documents) which you believe address this question, and request the Agency to clarify its interpretation. Each of these is discussed below.

The first possible answer you cite would be that the contaminated media would be a hazardous waste unless and until it is delisted, based on the "mixture" and "derived-from" rules. As you correctly state in your letter, a waste that meets a listing description due to the application of either of these rules remains a listed hazardous waste until it is delisted. However, these two rules do not pertain to contaminated environmental media. Under our regulations, contaminated media are not considered solid wastes in the sense of being abandoned, recycled, or inherently waste-like as those terms are defined in the regulations. Therefore, contaminated environmental media cannot be considered a hazardous waste via the "mixture" rule (i.e., to have a hazardous waste mixture, a hazardous waste must be mixed with a solid waste per 40 CFR 261.3(a)(2)(iv)). Similarly, the "derived-from" rule does not apply to contaminated media. Our basis for stating that contaminated environmental media must be managed as hazardous wastes is that they "contain"

SYMBOL
SURNAME
DATE
EPA Form 1

FaxBack# 11434

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listed hazardous waste. These environmental media must be managed as hazardous waste because, and only as long as, they "contain" a listed hazardous waste, (i.e., until decontaminated).

The second possibility you mention is that environmental media contaminated with a RCRA listed waste no longer have to be managed as a hazardous waste if the hazardous constituents are completely removed by treatment. This is consistent with the Agency's "contained-in" interpretation and represents the Agency's current policy.

The third possibility you discuss comes from Sylvia Lowrance's January 24, 1989, memorandum that you cited in your letter. This memorandum indicates that OSW has not issued any definitive guidance as to when, or at what levels, environmental media contaminated with listed hazardous waste are no longer considered to contain that hazardous waste. It also states that until such definitive guidance is issued, the Regions may determine these levels on a case-specific basis. Where this determination involves an authorized State, such as New York, our policy is that the State may also make such a determination.

Related to such a determination, you ask whether a risk assessment approach that addressed the public health and environmental impacts of hazardous constituents remaining in treatment residuals would be acceptable. This approach would be acceptable for contaminated media, but would not be acceptable for "derived-from" wastes under our current rules. Additionally, consistent with the statute, you could substitute more stringent standards or criteria for contaminated environmental media than those recommended by the Federal EPA if you determined it to be appropriate.

The Agency is currently involved in a rulemaking effort directed at setting de minimis levels for hazardous constituents below which eligible listed wastes, treatment residuals from those wastes, and environmental media contaminated with those listed wastes would no longer have to be managed as hazardous wastes. The approach being contemplated in the De Minimis program would be similar to that used in the proposed RCRA Clean Closure Guidance in terms of the exposure scenario (direct ingestion), the management scenario (not in a waste management unit), and the levels (primarily health-based).

Your final question related to whether the "remove and decontaminate" procedure set forth in the March 19, 1987 Federal Register preamble to the conforming regulations on closing surface impoundments applies when making complete removal determinations for soil. These procedures do apply when one

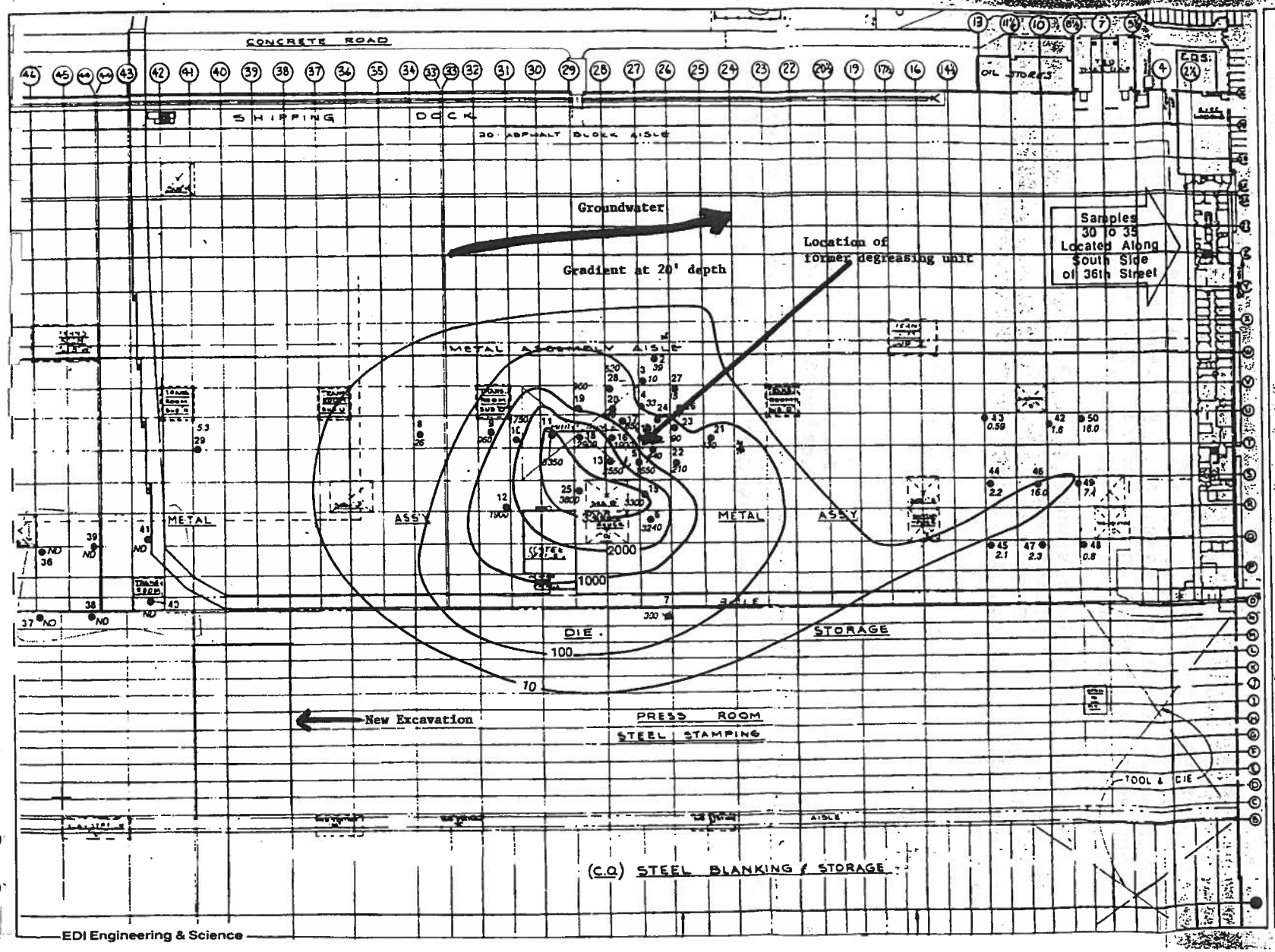
chooses to clean close a hazardous waste surface impoundment by removing the waste. The preamble language states that the Agency interprets the term "remove" and "decontaminate" to mean removal of all wastes, liners, and/or leachate (including ground water) that pose a substantial present or potential threat to human health or the environment (52 FR 8706). Further discussion of these requirements is provided in a clarification notice published on March 28, 1988, (53 FR 1144) and in OSWER Policy Directive # 9476.00-18 on demonstrating equivalence of Part 265 clean closure with Part 264 requirements (copy enclosed).

I hope that this response will be helpful to you in establishing and implementing New York's hazardous waste policies on related issues. Should you have additional questions, please contact Bob Dellinger, Chief of the Waste Characterization Branch at (202) 475-8551.

Sincerely yours,

Jonathan Z. Cannon
Acting Assistant Administrator

OS-305/DELLINGER/D.BARTOSH - 382-4646/SLD/6-2-89/CONTROL NO: AX891796/DUE DATE: 6-5-89/CONTROL #26(WORDPERFECT)/NAME: JORLING



Legend

- Sample Locations
- Column Designation
- TCE Concentration Levels
- 14 TCE Concentration mg/m^3

N

0 100 200

Approximate Scale in Feet

March 1987

Figure 8

Soil Vapor
TCE Concentrations in mg/m3
at 3–6' depth
General Motors Corp./CPC Group
Grand Rapids, Michigan

total water management

remediation

engineering

EARTH TECH

A Tyco INTERNATIONAL LTD. COMPANY

Printed on recycled paper.

5555 Glenwood Hills Parkway, SE, Post Office Box 874, Grand Rapids, Michigan 49588-0874

March 3, 1999

Mr. Tobe Allen
General Motors Corporation
Grand Rapids Metal Fabrication Plant
300 36th Street SW
Grand Rapids, MI 49509

RE: **Results of Soil and Groundwater Sampling Performed in 20 Bay**
General Motors Grand Rapids Metal Fabrication Plant

Dear Mr. Allen:

Telephone
616.942.9600
Facsimile
616.942.6499

At the request of General Motors (GM), Earth Tech, Inc. (Earth Tech) installed three soil borings in 20 Bay of the GM Grand Rapids Metal Fabrication Plant, collected soil and groundwater samples, and reviewed analytical data. The objectives of this work are to determine if soil excavated from 20 Bay is suitable for disposal in a Type II municipal solid waste landfill and to determine the appropriate handling of the de-watering system output during excavation.

This report summarizes the drilling and sample collection activities, presents the analytical results in comparison to relevant criteria, presents a map of the soil boring locations, and provides conclusions regarding the disposition of the excavated soil and water.

SOIL BORING ACTIVITES

On February 2 and 3, 1999, Earth Tech installed three soil borings in 20 Bay (SB-1/TW-1, SB-2, and SB-3/TW-2). The borings were completed by removing approximately 4 inches of wood flooring on the main floor level, coring through the approximately 3.5 feet of concrete of the basement floor, then using Geoprobe® Macrocore and Closed Piston samplers. Approximately 17.5 feet of open space was present between the wood flooring and the concrete. The Geoprobe® equipment was encased in 2.5" black steel pipe positioned between the wood block of the main floor and the basement floor to provide stabilization to the equipment. Each boring was completed to a depth of 36.5 feet below the wood flooring. The location of each boring within the bay is presented in Figure 1. The boring logs are presented in Attachment 1.

Mck\eid tjc m:\gm-grmfp\27854\cor\20BAYSGW

SAMPLE COLLECTION ACTIVITIES

Soil was collected from four, 3- to 4-foot intervals in each boring. The intervals extended from approximately 21.3 feet to 36.5 feet below the wood flooring. Soil collected from each interval was combined to create a composite sample for the boring. The soil composite samples were submitted to CT&E Environmental Services, Inc. (CT&E) for analysis of waste characterization parameters: TCLP metals, TCLP volatiles, TCLP semivolatiles, ignitability, corrosivity, and reactivity. The samples were also analyzed for PCB compounds.

Groundwater samples were collected from SB-1/TW-1 and SB-3/TW-2 using a 6-inch stainless steel implant screen placed inside a mill slot screen. Groundwater was encountered at approximately 21.5 feet below the wood flooring in both SB-1/TW-1 and SB-3/TW-2. The screen was set from 23.5 feet to 24 feet in both borings.

A peristaltic pump was used to purge approximately 2.0 gallons of water from SB-1/TW-1 and approximately 1.5 gallons from SB-3/TW-2. The groundwater samples were collected using polyethylene tubing and a peristaltic pump. The groundwater samples and one trip blank were submitted to CT&E for analysis of volatile organic compounds (VOCs).

ANALYTICAL RESULTS

The analytical results are presented in comparison to relevant criteria in the attached tables. The tables are formatted so that all detectable concentrations are in bold print. Detectable concentrations that exceed specific criteria are highlighted by shading.

The soil sample analytical results for the waste characterization parameters and PCB compounds are presented in Table 1. None of the samples were found to be corrosive, ignitable, or reactive for cyanide or sulfide. Additionally, none of the TCLP metals, TCLP volatiles, or TCLP semivolatiles exceeded the regulatory limits. None of the composite samples contained detectable concentrations of PCB compounds.

Table 2 presents the analytical results from the groundwater samples collected from borings SB-1/TW-1, SB-3/TW-2, and the trip blank. The analytical results are compared to the Part 201 Generic Residential Drinking Water Criteria.

The groundwater results presented in Table 2 show that trichloroethylene (TCE) was detected in the sample from SB-1/TW-1 at a concentration of 3 ug/L. The detected concentration is

less than the Part 201 Residential Drinking Water Criterion of 5 ug/L. No other VOCs were detected in SB-1/TW-1 or SB-3/TW-2.

CONCLUSIONS

Based on the analytical results the three soil samples collected from 20 Bay are not characterized as hazardous. Consequently, the soil excavated from 20 Bay is suitable for disposal in a Type II municipal solid waste landfill

Based on the analytical results for the groundwater samples collected from SB-1/TW-1 and SB-3/TW-2, the output from the de-watering system is likely to have a concentration of TCE that is below the guideline concentration established previously by the City of Wyoming for discharge to their treatment facility.

If you have any questions regarding the results of the 20 Bay soil and groundwater study, please contact us at (616) 942-9600.

Very truly yours,

Earth Tech, Inc.

Todd J. Colon
Project Environmental Scientist

Theodore A. Lietzke
Project Manager

Enclosures

DATA TABLES

Data Qualifiers for Bay 20 Analytical
Grand Rapids Metal Plant
General Motors Corporation

CODE	DEFINITION
Note:	Bolded values indicate an exceedence of the detection limit.
Note:	Shaded values indicate an exceeedance of Part 201 - 20 Times Groundwater Criteria for Table 1; Part 201 - Statewide Default Background Levels for Table 2, and Part 201 Residential Drinking Water Criteria for Table 3. Part 201 Criteria from the MDEQ-ERD Operational Memorandum #8, Revision 4, as revised June 1998.
(A)	Criterion is the State of Michigan Drinking Water Standard established pursuant to Section 5 of the Safe Drinking Water
(E)	Criterion is the aesthetic drinking water value.
(J)	Chemical may be present in several isomers forms.
(R)	Chemical may exhibit the characteristic of reactivity.
(W)	Concentrations of trihalomethanes in groundwater must be added together to determine compliance with the State of Michigan Drinking Water Standard of 100 ug/L.
D	Compound identified in an analysis at a secondary dilution factor.
NA	Not available.
NC	Non Corrosive
NI	Non Ignitable

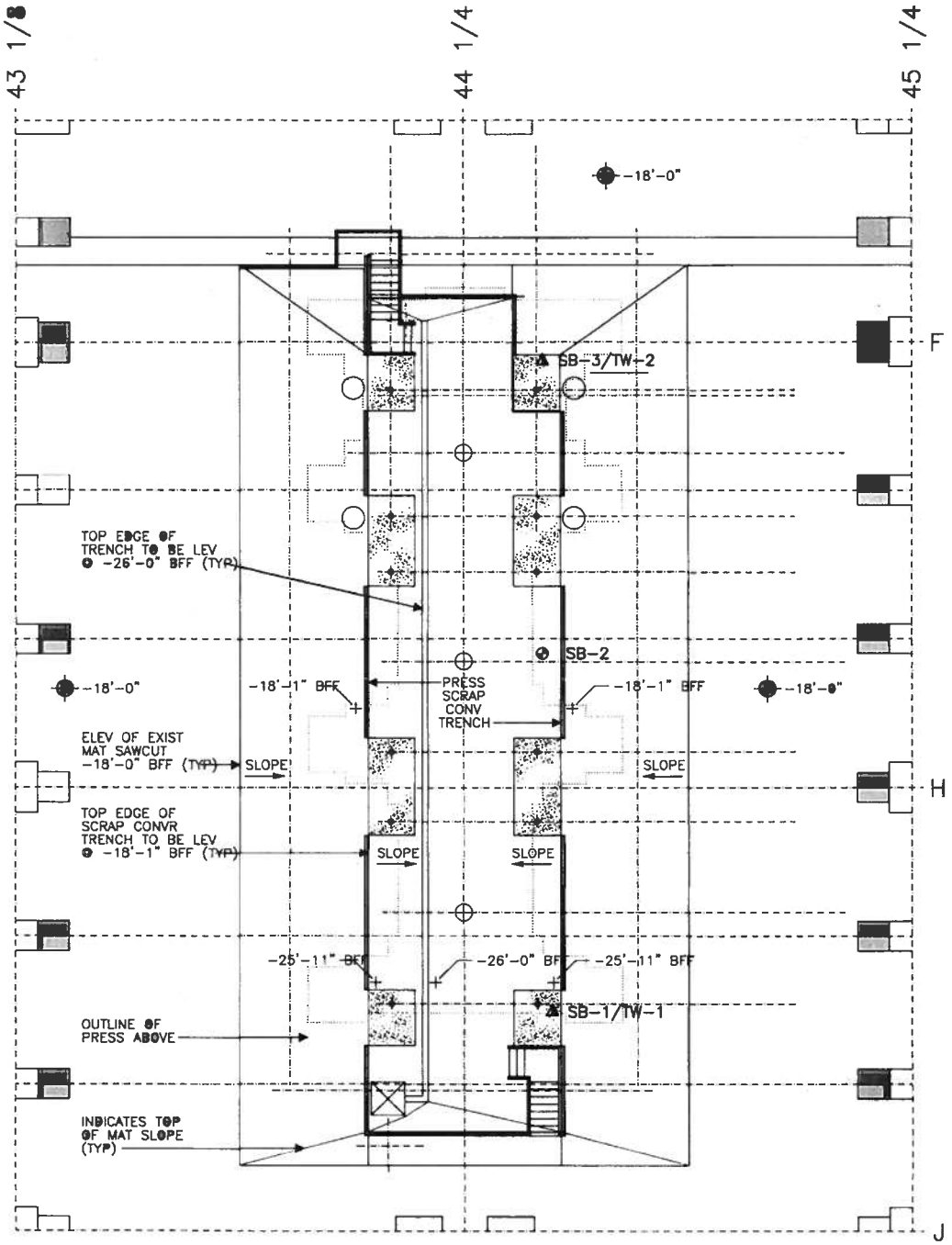
Table 1
Analytical Data for Waste Charaterization Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:			SB20-01	SB20-02	SB20-03
Sample Identification:			90449-4287	90449-4289	90449-4290
Date Sampled:		Regulatory	2/2/99	2/2/99	2/3/99
Sampled By:		Limit	ETCO	ETCO	ETCO
Analyzed By:			CT&E	CT&E	CT&E
Comments:			Composite	Composite	Composite
TLCP Metals	***Units***				
Arsenic, TCLP	mg/L	5	< 0.01	< 0.01	< 0.01
Barium, TCLP	mg/L	100	**0.24**	**0.19**	**0.38**
Cadmium, TCLP	mg/L	1	**0.004**	**0.002**	<0.002
Chromium, TCLP	mg/L	5	< 0.05	**0.1**	**0.05**
Copper, TCLP	mg/L	100	**0.03**	< 0.02	**0.02**
Lead, TCLP	mg/L	5	< 0.008	< 0.005	< 0.007
Mercury, TCLP	mg/L	0.2	< 0.0002	< 0.0002	< 0.0002
Selenium, TCLP	mg/L	1	< 0.02	< 0.02	< 0.02
Silver, TCLP	mg/L	5	< 0.002	< 0.002	< 0.002
Zinc, TCLP	mg/L	500	**0.16**	**0.11**	**0.18**
TLCP Volatiles	***Units***				
Vinyl chloride, TCLP	mg/L	0.2	D< 0.01	D< 0.01	D< 0.01
1,1-Dichloroethylene, TCLP	mg/L	0.7	D< 0.01	D< 0.01	D< 0.01
2-Butanone, TCLP	mg/L	200	D< 0.01	D< 0.1	D< 0.01
Chloroform, TCLP	mg/L	6	D< 0.01	D< 0.01	D< 0.01
Carbon tetrachloride, TCLP	mg/L	0.5	D< 0.01	D< 0.01	D< 0.01
1,2-Dichloroethane, TCLP	mg/L	0.5	D< 0.01	D< 0.01	D< 0.01
Benzene, TCLP	mg/L	0.5	D< 0.01	D< 0.01	D< 0.01
Trichloroethylene, TCLP	mg/L	0.5	D< 0.01	D< 0.01	D< 0.01
Tetrachloroethylene, TCLP	mg/L	0.7	D< 0.01	D< 0.01	D< 0.01
Chlorobenzene, TCLP	mg/L	100	D< 0.01	D< 0.01	D< 0.01
1,4-Dichlorobenzene, TCLP	mg/L	7.5	D< 0.01	D< 0.01	D< 0.01
TLCP Semi Volatiles	***Units***				
3/4-Methylphenol, TCLP	mg/L	200	< 0.02	< 0.02	< 0.02
2-Methylphenol, TCLP	mg/L	200	< 0.01	< 0.01	< 0.01
Cresols, TCLP	mg/L	200	< 0.03	< 0.03	< 0.03
Hexachlorobenzene, TCLP	mg/L	0.13	< 0.01	< 0.01	< 0.01
Hexachloroethane, TCLP	mg/L	3	< 0.01	< 0.01	< 0.01
Nitrobenzene, TCLP	mg/L	2	< 0.01	< 0.01	< 0.01
Pyridine, TCLP	mg/L	5	< 0.02	< 0.02	< 0.02
2,4,6-Trichlorophenol, TCLP	mg/L	2	< 0.01	< 0.01	< 0.01
2,4,5-Trichlorophenol, TCLP	mg/L	400	< 0.01	< 0.01	< 0.01
2,4-Dinitrotoluene, TCLP	mg/L	0.13	< 0.01	< 0.01	< 0.01
Hexachloro-1,3-butadiene, TCLP	mg/L	0.5	< 0.01	< 0.01	< 0.01
Pentachlorophenol, TCLP	mg/L	100	< 0.04	< 0.04	< 0.04
Hazardous Waste Characterization	***Units***				
Corrosivity	mg/kg	NA	NC	NC	NC
Ignitability	Deg. F.	NA	NI	NI	NI
Cyanide, reactive	mg/kg	250	< 25	< 25	< 25
Sulfide, reactive	mg/kg	500	< 50	< 50	< 50
Polychlorinated Biphenyls (PCBs)	***Units***				
Aroclor-1016	ug/kg	NA	<330	<330	<330
Aroclor-1221	ug/kg	NA	<330	<330	<330
Aroclor-1232	ug/kg	NA	<330	<330	<330
Aroclor-1242	ug/kg	NA	<330	<330	<330
Aroclor-1248	ug/kg	NA	<330	<330	<330
Aroclor-1254	ug/kg	NA	<330	<330	<330
Aroclor-1260	ug/kg	NA	<330	<330	<330
Aroclor-1262	ug/kg	NA	<330	<330	<330
Aroclor-1268	ug/kg	NA	<330	<330	<330
Physical Property Analysis	***Units***				
pH	S.U.	NA	**7.4**	**7.4**	**7.4**
%Solid	%	NA	**78.7**	**81.8**	**81.3**

Table 2
Analytical Data for Groundwater Samples
Grand Rapids Metal Plant
General Motors Corporation
(Units as Given)

Site Identification:			TW20-01	TW20-02	TB
Sample Identification:		Part 201	90449-4288	90449-4289	90449-4292
Date Sampled:		Residential	2/2/99	2/3/99	1/26/99
Sampled By:		Drinking	ETCO	ETCO	ETCO
Analyzed By:		Water	CT&E	CT&E	CT&E
Depth:		Criteria	23.5-24	23.5-24	-
Volatile Organic	***Units***				
Chloromethane	ug/L	66	< 1	< 1	< 1
Vinyl chloride	ug/L	2(A)	< 1	< 1	< 1
Bromomethane	ug/L	10	< 1	< 1	< 1
Chloroethane	ug/L	220	< 1	< 1	< 1
1,1-Dichloroethylene	ug/L	7(A)	< 1	< 1	< 1
Methylene chloride	ug/L	5(A)	< 5	< 5	< 5
1,1-Dichloroethane	ug/L	880	< 1	< 1	< 1
Chloroform	ug/L	100(A,W)	< 1	< 1	< 1
1,1,1-Trichloroethane	ug/L	200(A)	< 1	< 1	< 1
Carbon tetrachloride	ug/L	5(A)	< 1	< 1	< 1
Carbon Disulfide	ug/L	800(R)	< 1	< 1	< 1
1,2-Dichloroethane	ug/L	5(A)	< 5	< 5	< 5
1,2-Dichloroethylene	ug/L	NA	< 2	< 2	< 2
Benzene	ug/L	5(A)	< 1	< 1	< 1
Acetone	ug/L	730	< 5	< 5	< 5
Trichloroethylene	ug/L	5(A)	3	< 1	< 1
1,2-Dichloropropane	ug/L	5(A)	< 1	< 1	< 1
Dichlorobromomethane	ug/L	100(A,W)	< 1	< 1	< 1
Tetrachloroethylene	ug/L	5(A)	< 1	< 1	< 1
cis-1,3-Dichloropropene	ug/L	4.7(J)	< 1	< 1	< 1
Toluene	ug/L	790(E)	< 1	< 1	< 1
tran-1,3-Dichloropropene	ug/L	4.7(J)	< 1	< 1	< 1
1,1,2-Trichloroethane	ug/L	5(A)	< 1	< 1	< 1
Chlorodibromomethane	ug/L	100(A)	< 1	< 1	< 1
Chlorobenzene	ug/L	100(A)	< 1	< 1	< 1
Ethylbenzene	ug/L	74(E)	< 1	< 1	< 1
m,p-Xylene	ug/L	280(E)	< 2	< 2	< 2
o-Xylene	ug/L	280(E)	< 1	< 1	< 1
Styrene	ug/L	100(A)	< 1	< 1	< 1
Bromoform	ug/L	100(A,W)	< 1	< 1	< 1
1,1,2,2-Tetrachloroethane	ug/L	4.3	< 1	< 1	< 1
2-Butanone	ug/L	13000	< 5	< 5	< 5
Methyl isobutyl ketone	ug/L	1800	< 5	< 5	< 5
2-Hexanone	ug/L	1000	< 5	< 5	< 5

FIGURE



LEGEND

⊕ – GEOPROBE SOIL BORING

▲ – GEOPROBE SOIL BORING & GROUNDWATER SAMPLE

0 5 10 20

SCALE IN FEET

27854F-1
JAS038199

EARTH TECH

ATTACHMENT 1

EARTH TECH

Well / Boring Log — 20-BAY-SB-1 / TW-1

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:
20' East of column J
20' West of column H
33.2' North of 45 1/4 columns

composite soils from 21.5' to 36.5' at 11:00 am

Groundwater Encountered
While Drilling at: 21.5 bgs ▽

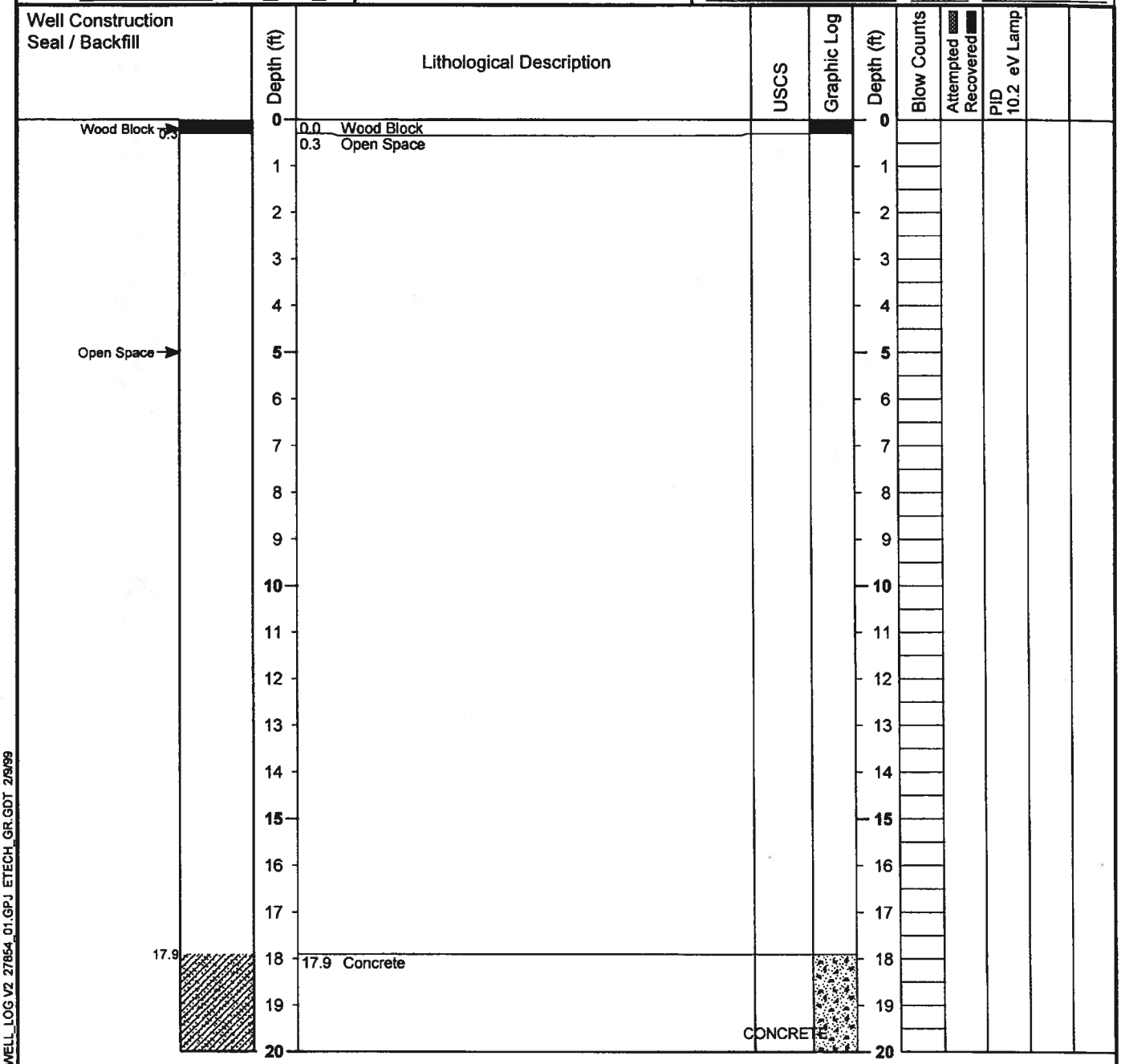
Date	Time	Depth to Water (bgs/TOC)
2/2/99	11:00 am	▽ 21.50 bgs
		▽
		▽

TOC Elev: _____ Grd Elev: _____
Horiz. Coord:
Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: 2/2/99 Time: 11:45 am
Volume: 2 gal. Method: peristaltic pump
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 2/2/99 Finished 2/2/99
Time: Started 9:00 am Finished 12:30 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Parkway
Grand Rapids, MI 49588
Equipment: GeoProbe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Hilti Concrete Core	18'-21.3'	3"
Geoprobe- MacroCore	21.3'-25.3'	2"
Geoprobe- Closed Piston	25.3'-36.5'	2"



WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 2/9/99

EARTH TECH

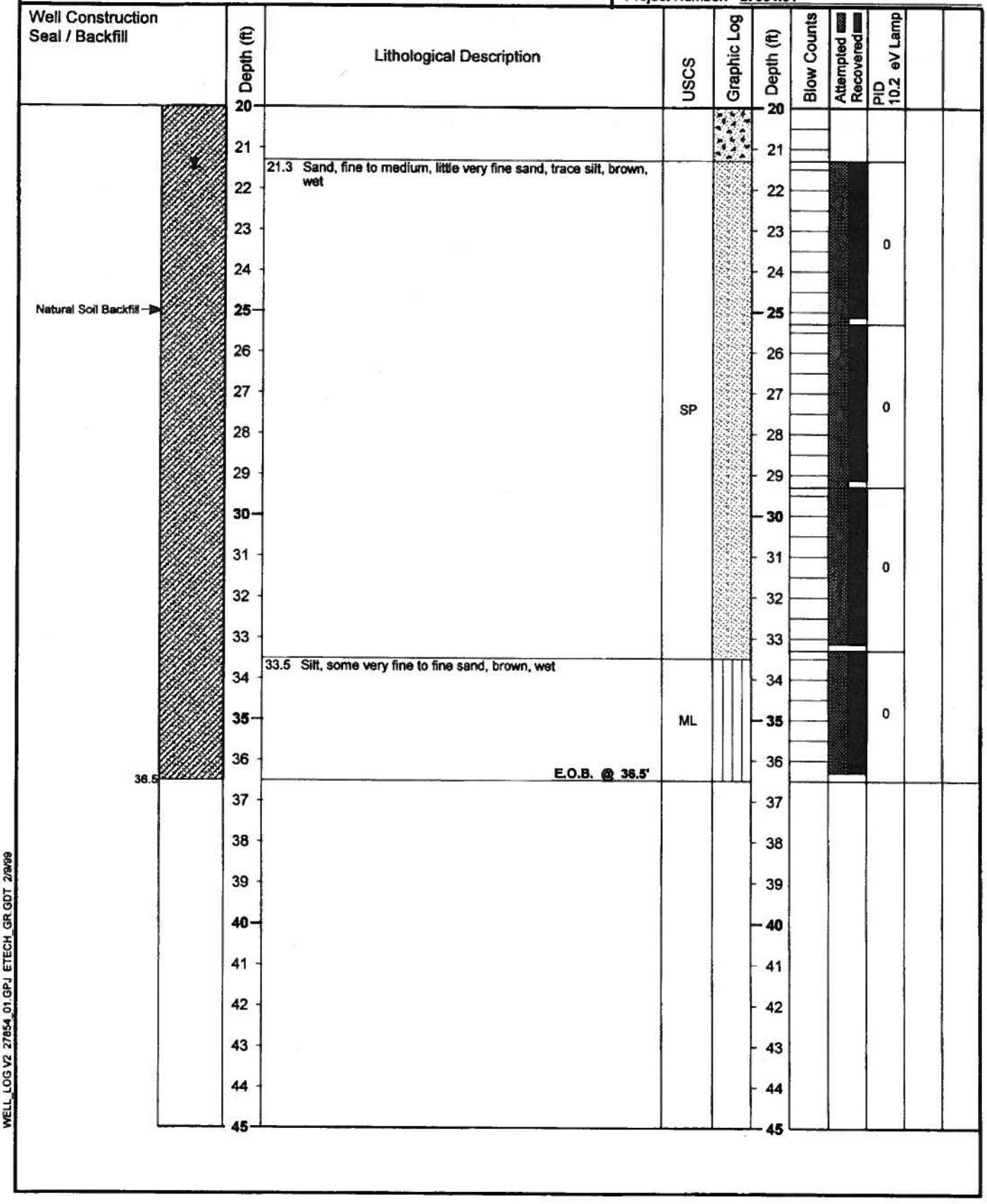
Well / Boring Log

20-BAY-SB-1 / TW-1

Location and Comments: * Temp well set at 24' for Water Sample

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01



WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 2/9/99

EARTH TECH

Well / Boring Log

20-BAY-SB-2

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:
32' East of SB-1
33' North of 45 1/4 line

composite soils from 21.5' to 36.5' at 3:25 pm

Groundwater Encountered
While Drilling at: 21.5 bgs

Date	Time	Depth to Water (bgs/TOC)

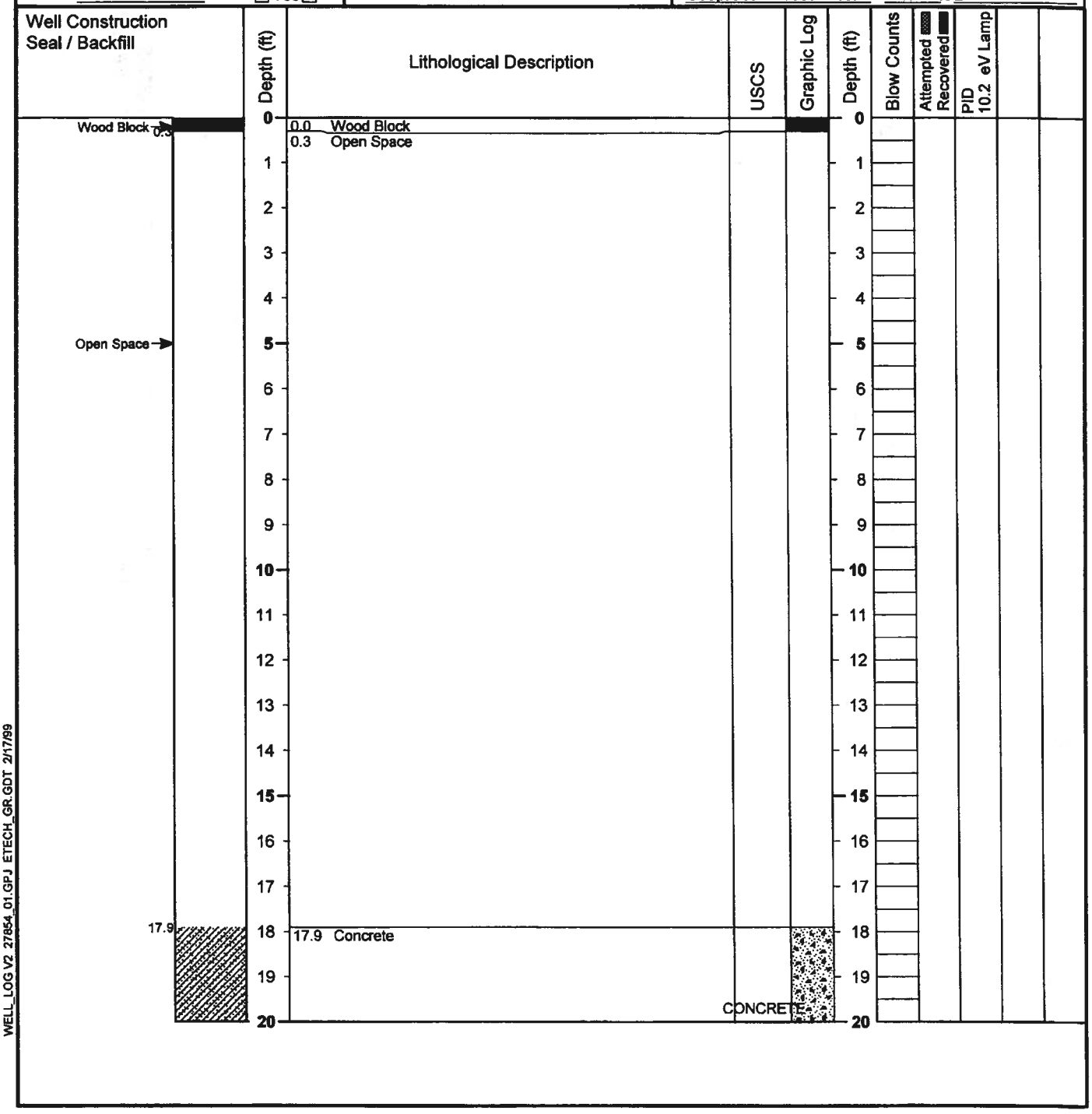
TOC Elev: _____ Grd Elev: _____
Horiz. Coord:

Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted: ☐ Yes ☐ No

Well Development
Date: _____ Time: _____
Volume: _____ Method: _____
Comments:

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 2/2/99 Finished 2/2/99
Time: Started 1:30 pm Finished 4:00 pm
Contractor: Earth Tech
Address: 5555 Glenwood Hills Parkway
Grand Rapids, MI 49588
Equipment: GeoProbe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Hilti Concrete Core	18'-21.5'	3"
Geoprobe- MacroCore	21.5'-25.5'	2"
Geoprobe- Closed Piston	25.5'-36.5'	2"



WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 2/17/99

EARTH TECH

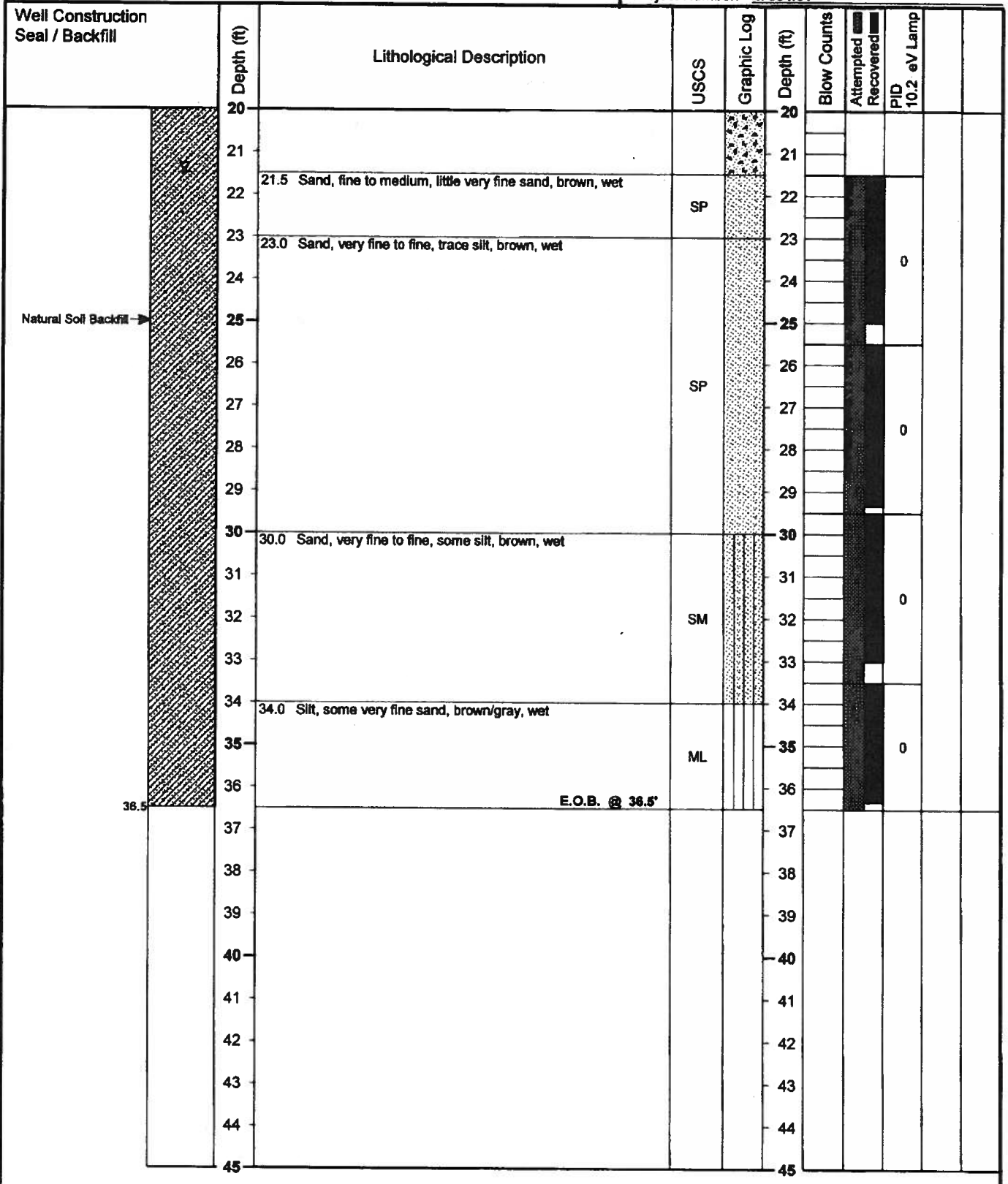
Well / Boring Log

20-BAY-SB-2

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01



WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 2/17/99

EARTH TECH

Well / Boring Log — 20-BAY-SB-3 /TW-2

State	County	Township/City	T	R	Sec.	Fraction
MI	Kent	City of Wyoming	6N	12W	24	NW1/4, NE1/4

Location and Comments:
26.5' East of SB-2
33' North of 45 1/4 line

composite soils from 21.5' to 36.5' at 10:25 am

Groundwater Encountered
While Drilling at: 21.5 bgs ▽

Date	Time	Depth to Water (bgs/TOC)
		▽
		▽
		▽

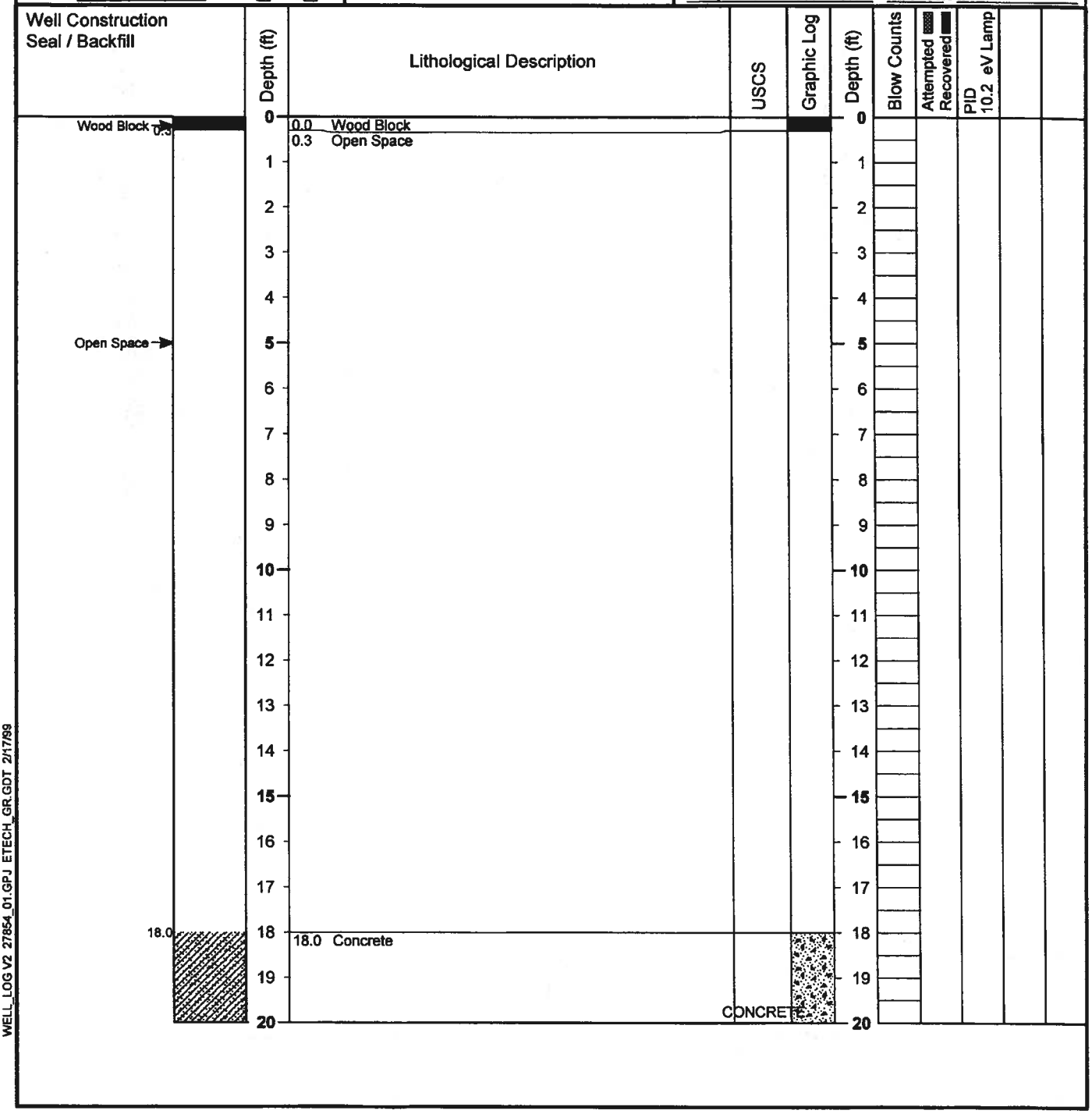
TOC Elev: _____ Grd Elev: _____
Horiz. Coord:

Protective Casing Material: _____
Diameter: _____ Cap Type: _____
T.O.C. Height Above Ground: _____
Lock #: _____ Bolted ☐ Yes ☐ No

Well Development
Date: 2/3/99 Time: 11:00 am
Volume: 2 gal. Method: peristaltic pump
Comments: **Temp well 2 sampled at 11:00 am**

Client: GM Grand Rapids Metal Fab.
Project Number: 27854.01
Date: Started 2/3/99 Finished 2/3/99
Time: Started 8:25 am Finished 11:00 am
Contractor: Earth Tech
Address: 5555 Glenwood Hills Parkway
Grand Rapids, MI 49588
Equipment: GeoProbe
Crew Chief: Brent Bell
Logged By: Don Johnson

Drilling Method(s)	Depth	Borehole Dia.
Hilti Concrete Core	18'-21.5'	3"
Geoprobe- MacroCore	21.5'-25.5'	2"
Geoprobe- Closed Piston	25.5'-36.5'	2"



WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 2/17/99

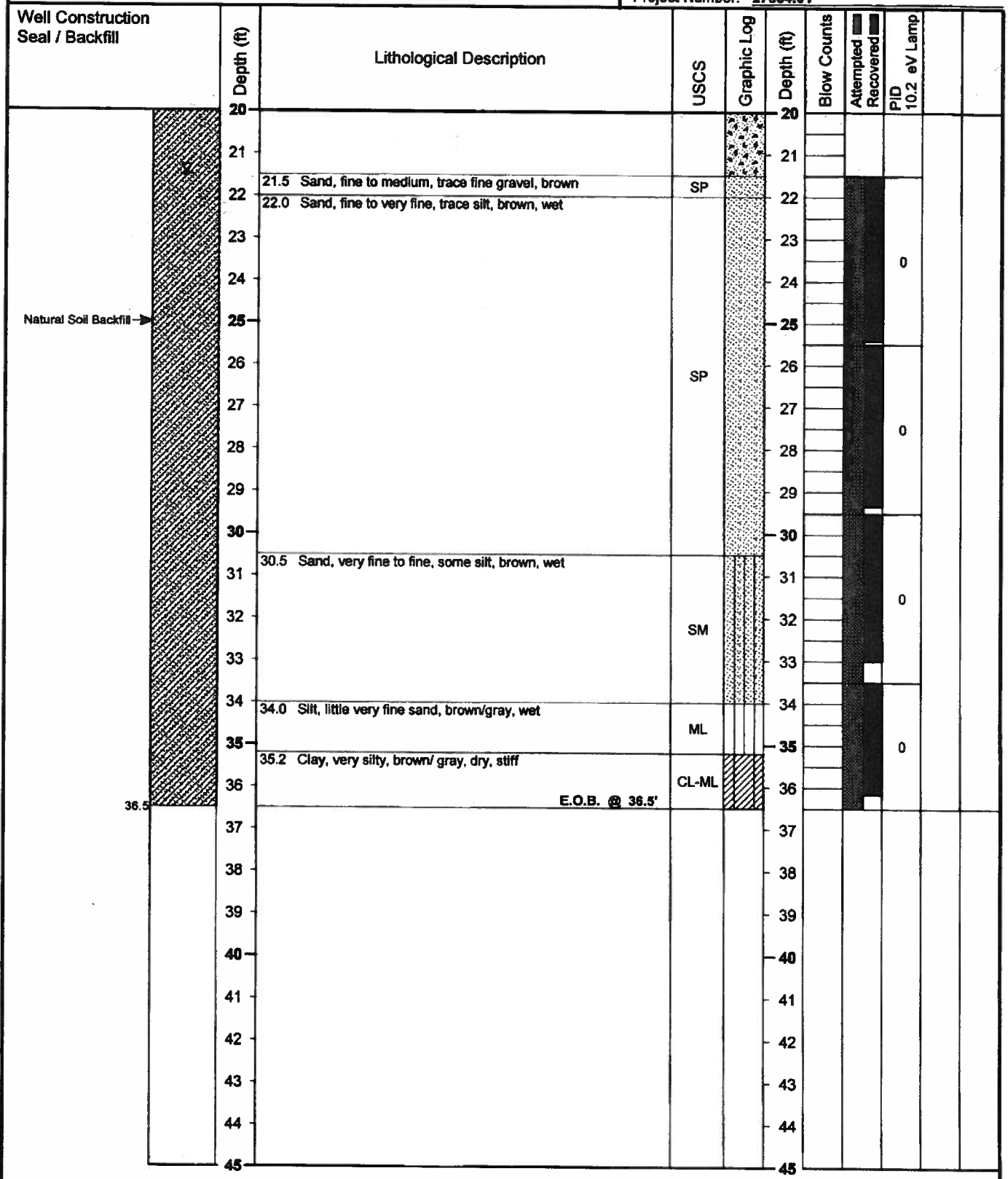
EARTH TECH

Well / Boring Log — 20-BAY-SB-3 /TW-2

Location and Comments:

Client: GM Grand Rapids Metal Fab.

Project Number: 27854.01



WELL_LOG V2 27854_01.GPJ ETECH_GR.GDT 2/17/99

WW Engineering & Science
A Summit Company

June 17, 1993

Mr. Dennis Stickney
General Motors Corporation
Grand Rapids Metal Fabrication Plant
300 36th Street SW
Grand Rapids, MI 49509

RE: ADDENDUM TO THE MAY 1993 GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED PRESS PIT, 13-BAY AREA; SOIL CHARACTERIZATION RESULTS

Dear Dennis:

The laboratory analyses of the composite soil sample are complete. The purpose of the soil analyses were to characterize the soils to be excavated during construction in the 13-Bay area in order to obtain prior approval for disposal, if necessary. The sample was composited from drill cuttings obtained from borings SB-1 and SB-2 at depths of 0 to 20 feet below first floor. Figure 2 from the original report is enclosed, which illustrates the study area and boring locations. A summary of the laboratory analytical results is listed in Table 1. The laboratory analytical data sheets are enclosed in Attachment A.

Based on the results of the laboratory analyses, the soils at borings SB-1 and SB-2 from 0 to 20 feet are nonhazardous and can be disposed of at a Type II landfill. However, headspace tests performed on soil samples using a photoionization detector (PID) indicated considerable variation in the PID response throughout the study area. Previous environmental studies and excavation work performed at the site (Column A15 - A30) indicate that mineral spirits and/or cuttings oils are probably present in the soils. These materials can cause PID readings comparable to those seen here. Therefore, the soils should be monitored with a PID during excavation. If zones are encountered that appear visibly impacted, or produce a high PID response, it may be necessary to further characterize the soils prior to disposal. However, at this point and time, it appears that the samples collected for TCLP analyses are representatiave of the bulk soils.

The laboratory results indicated the presence of trichloroethylene (TCE) in the soil sample at 0.12 mg/kg. However, the toxicity characteristic leaching procedure (TCLP) results do not indicate detectable concentrations of TCE in the TCLP leachate (Table 1).

Three constituents were detected in the TCLP leachate. They include barium at 0.73 mg/L, copper at 0.034 mg/L, and zinc at 0.22 mg/L. All three constituents were at levels below the TCLP regulatory limits. The regulatory limits are 100 mg/L for barium and copper, and 500 mg/L for zinc.

At the time of drilling, the soil samples collected from the borings were subjected to a headspace analysis in the field using a PID. The PID was used to screen the samples for the presence of VOC's. A portion of each soil sample was placed in a clean glass jar, capped, and shaken to maximize the release of VOC's potentially present. The headspace in the jar was then analyzed with the PID.

Headspace analyses of the split-spoon soil samples indicated PID responses consistently exceeding 100 ppm. Table 2 presents the results of headspace tests.

The PID response from soil samples collected from boring SB-1 between 0 to 21.5 feet were moderately high, ranging from 180 ppm to 600 ppm. The highest PID response obtained from boring SB-1 was 2000 ppm at the 30 to 31.5-foot sample depth. The PID readings below 31.5 feet to the bottom of the boring (71.5 feet) ranged from 310 ppm to 810 ppm.

The PID response from soil samples collected from boring SB-2 between 0 to 21.5 feet ranged from 4 ppm to 820 ppm. There was a relatively high reading from the sample collected just beneath the concrete floor (720 ppm). The highest PID response from boring SB-2 was 820 ppm at the 20 to 21.5-foot sample depth. The PID readings below 21.5 feet decreased with depth.

The PID response from the soil samples collected from boring SB-3 were fairly uniform from just beneath the floor to a depth of 36.5 feet; the values ranged from 103 ppm to 310 ppm. Below 36.5 feet the values decreased with depth to 9.6 ppm at the bottom of the boring (51.5 feet).

In borings SB-4 and SB-5 the highest PID responses were obtained from soil samples collected just beneath the concrete floor (beneath the press pit). The PID response decreased with depth to the bottom of the boring at SB-4. In general, the PID response also decrease with depth in boring SB-5 down to 58 feet. Below 58 feet the response increased with depth to the bottom of the boring (70 feet).

If you have any question regarding the above information, or would like to discuss it in more detail, please call us at your convenience.

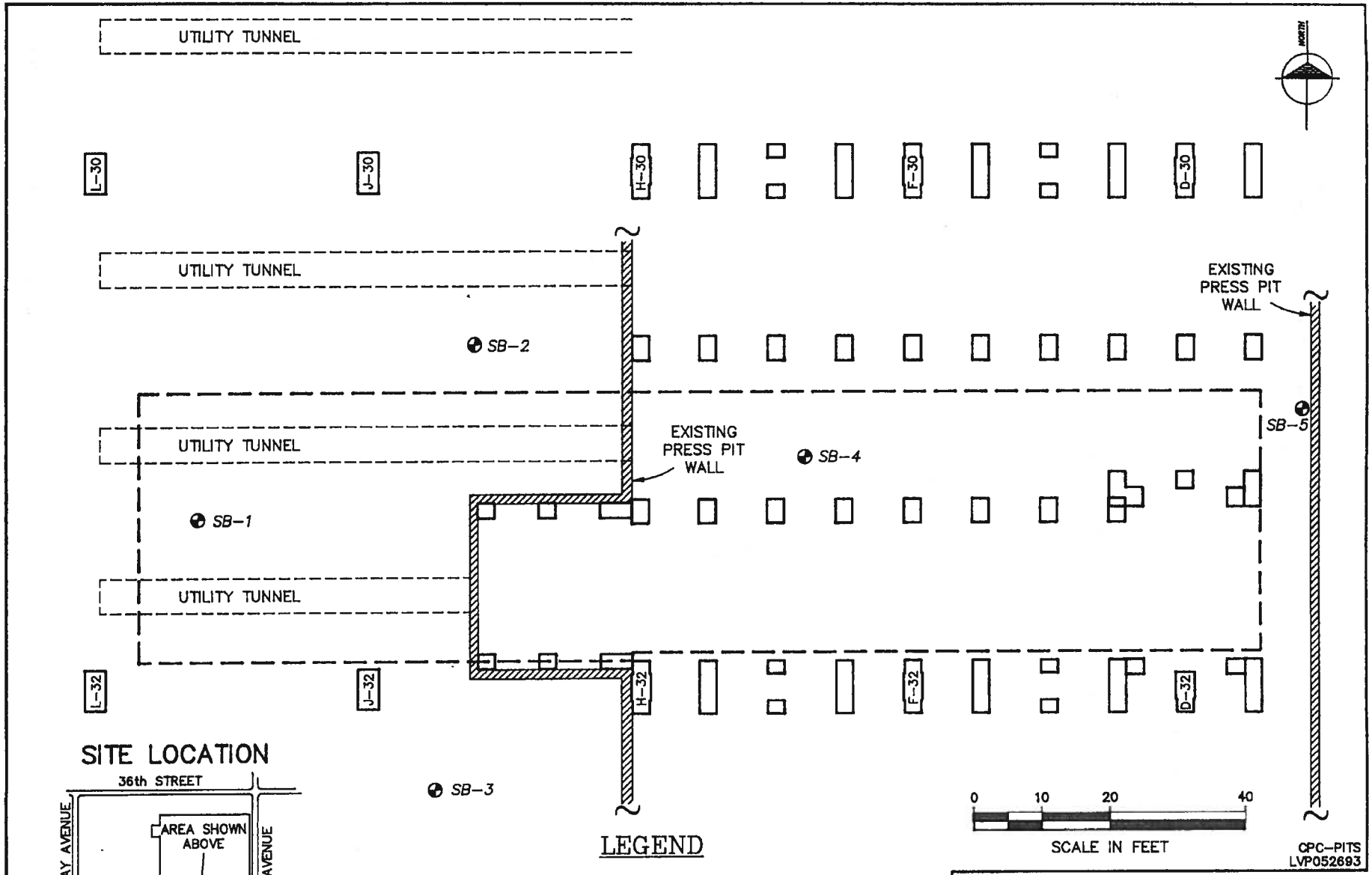
Sincerely

WW ENGINEERING & SCIENCE
Environmental Services

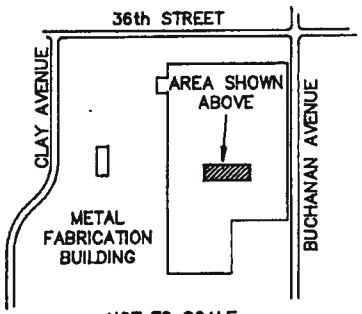
Theodore A. Lietzke
Project Manager

Jeff S. Cargill
Project Geologist

Attachments



SITE LOCATION



NOT TO SCALE

LEGEND

- ◕ — SOIL BORING LOCATION
- — — — — OUTLINE OF PROPOSED PRESS PIT
- F-32 — DENOTES COLUMN NUMBER

NOTE: THE BASE INFORMATION ILLUSTRATED IN THIS FIGURE WAS TAKEN FROM SHEET NUMBER SBR-1, PROJECT NUMBER 92277, PROVIDED BY GM.

FIGURE 2

SOIL BORING LOCATION MAP

CPC GRAND RAPIDS METALS PLANT
GENERAL MOTORS CORPORATION
GRAND RAPIDS, MICHIGAN

MAY, 1993 22601

WW Engineering & Science

STATEMENT OF DATA QUALIFICATIONS

CLIENT: CPC Grand Rapids Metals Plant

SUBMITTAL: 31577-1

_____ All analyses have been validated and comply with our Quality Control Program. No qualifications required.
__X__ The following analyses have been qualified for the reasons cited.

Sample No.(s): 53138 Parameter: Paint filter test Reason: 10
Explanation: Sample contains no free liquid.

Sample No.(s): 53138 Parameter: All except TCLP Reason: 10
Explanation: Sample results are calculated on a dry weight basis.

KEY

1. Sample integrity suspect upon receipt (explain).
2. Analysis performed beyond EPA established maximum allowable holding time.
3. Detection limit elevated due to matrix interferences.
4. Laboratory control sample value outside established acceptable limits.
5. Matrix spike sample value outside established acceptable limits.
6. Duplicate analysis value outside established acceptable limits.
7. Surrogate/internal standard recoveries outside established acceptable limits.
8. Data point suspect due to potential laboratory contamination (explain).
9. Coelutes with the compound cited. Result may represent a combination of both compounds.
10. Other (explain).

Note: This document is included as part of the Analytical Report for the above referenced submittal and should be retained as a permanent record thereof.

5555 Glenwood Hills Parkway SE, PO Box 874, Grand Rapids, MI 49588-0874, 616/942-9600 Fax 942-6499

WW ENGINEERING & SCIENCE
TCLP REGULATORY LIMITS

	Regulatory Limit		*EPA HW Number (1)*	*CAS Number (2)*
Volatiles				
Benzene	0.5	mg/l	D018	71-43-2
Carbon Tetrachloride	0.5	mg/l	D019	56-23-5
Chlorobenzene	100.0	mg/l	D021	108-90-7
Chloroform	6.0	mg/l	D022	67-66-3
1,2-Dichloroethane	0.5	mg/l	D028	107-06-2
1,1-Dichloroethylene	0.7	mg/l	D029	75-35-4
Methyl Ethyl Ketone	200.0	mg/l	D035	78-93-35
Tetrachloroethylene	0.7	mg/l	D039	127-18-4
Trichloroethylene	0.5	mg/l	D040	79-01-6
Vinyl Chloride	0.2	mg/l	D043	75-01-4
Semivolatiles				
1,4-Dichlorobenzene	7.5	mg/l	D027	106-47-7
2,4-Dinitrotoluene	0.13	mg/l	D030	121-14-2
Hexachlorobenzene	0.13	mg/l	D032	118-74-1
Hexachlorobutadiene	0.5	mg/l	D033	87-68-3
Hexachloroethane	3.0	mg/l	D034	67-72-1
Nitrobenzene	2.0	mg/l	D036	98-95-3
Pyridine	5.0	mg/l	D038	110-86-1
Pentachlorophenol	100.0	mg/l	D037	87-86-5
2,4,6-Trichlorophenol	2.0	mg/l	D042	88-06-2
2,4,5-Trichlrophenol	400	mg/l	D041	95-95-4
2-Methyl Phenol (o-Cresol)	200.0	mg/l	D023	95-48-7 (3)
3-Methyl Phenol (m-Cresol)	200.0	mg/l	D024	108-39-4 (3)
4-Methyl Phenol (p-Cresol)	200.0	mg/l	D025	106-44-5 (3)
Pesticides/Herbicides				
Lindane	0.4	mg/l	D013	58-89-9
Endrin	0.02	mg/l	D012	72-20-8
Methoxychlor	10.0	mg/l	D014	72-43-5
Chlordane	0.03	mg/l	D020	57-74-9
Heptachlor	0.008	mg/l	D031	76-44-8
Heptachlor Epoxide	0.008	mg/l	D031	102-45-73
Toxaphene	0.5	mg/l	D015	8001-35-2
2,4-D	10.0	mg/l	D016	94-75-7
Silvex (2,4,5-TP)	1.0	mg/l	D017	93-72-1
Metals				
Arsenic	5.0	mg/l	D004	7440-38-2
Barium	100	mg/l	D005	7440-39-3
Cadmium	1.0	mg/l	D006	7440-43-9
Chromium	5.0	mg/l	D007	7440-47-3
Copper	100	mg/l (4)	D001	7440-50-8
Lead	5.0	mg/l	D008	7439-92-1
Mercury	0.2	mg/l	D009	7439-97-6
Selenium	1.0	mg/l	D010	7782-49-2
Silver	5.0	mg/l	D011	7440-22-4
Zinc	500	mg/l (4)	D003	7440-66-6

1. Hazardous waste number.
2. Chemical abstracts service number.
3. If o-, m-, and p-Cresol concentrations cannot be differentiated, the total Cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/l.
4. MDNR regulatory limit.

TABLE 1

SUMMARY OF DETECTED CONSTITUENTS IN THE COMPOSITE SOIL SAMPLE

CPC Grand Rapids Metals Plant
General Motors Corporation
Grand Rapids, Michigan

CONSTITUENT	TCLP REGULATORY LIMIT	DETECTED CONCENTRATION
Trichloroethylene	NA	0.12 mg/kg
Barium, TCLP	100 mg/l	0.73 mg/l
Copper, TCLP	100 mg/l	0.034 mg/l
Zinc, TCLP	500 mg/l	0.22 mg/l

NA = not applicable
TCLP = toxicity characteristic leaching procedure

TABLE 2

RESULTS OF HEADSPACE TESTS USING A PHOTOIONIZATION DETECTOR

CPC Grand Rapids Metals Plant
General Motors Corporation
Grand Rapids, Michigan

SAMPLE DEPTH (ft)	BORING SB-1	SB-2	SB-3
3.5-5	600	720	132
6.5-8	250	4	ND
10-11.5	180	76	220
15-16.5	200	340	310
20-21.5	310	820	300
25-26.5	400	750	280
30-31.5	2000	250	103
35-36.5	810	14	240
40-41.5	720	2	95
45-46.5	550	2.1	60
50-51.5	480	5.2	9.6
55-56.5	310		
60-61.5	400		
65-66.5	680		
70-71.5	410		

SAMPLE DEPTH (ft)	BORING SB-4	SB-5
18-19.5	280	980
20.5-22	ND	300
23-24.5	65	28
28-29.5	10	5
33-34.5	49	0
38-39.5	8	5.8
43-44.5	0.4	0
48-49.5	NA	0.3
48.5-50	2.4	NA
53-54.5		ND
58-59.5		42
63-64.5		480
68.5-70		320

The depth indicated was measured from the first floor elevation.
ND = no data
NA = not applicable

ATTACHMENT A

Laboratory Analytical Data Sheets

ANALYTICAL REPORT

CPC-Grand Rapids Metals Plant
Proj: Soil Analysis

Subm: May 12, 1993 Sample

Submittal Number: 31577- 1
Location:
CCS Number 22601.00
CCS Manager: Ted Lietzke

	SB-1+SB-2 0-20'	Detection Limit	Units
WWES Sample No:	53138		
Trichloroethylene	0.12	0.010	mg/kg
cis-1,2-Dichloroethene	<0.010	0.010	mg/kg
trans-1,2-Dichloroethene	<0.010	0.010	mg/kg
Vinyl Chloride	<0.010	0.010	mg/kg
Petroleum Hydrocarbons	<50	50	mg/kg
Flash point, cl-cup	>200	200	deg-F
Paint Filter Liquids Test	<1	1	mls
Percent Solids	97	0.01	%
Arsenic, TCLP	<0.20	0.20	mg/l
Barium, TCLP	0.73	0.02	mg/l
Cadmium, TCLP	<0.01	0.01	mg/l
Chromium, TCLP	<0.08	0.08	mg/l
Copper, TCLP	0.034	0.02	mg/l
Lead, TCLP	<0.10	0.10	mg/l
Mercury, TCLP	<0.0004	0.0004	mg/l
Selenium, TCLP	<0.20	0.20	mg/l
Silver, TCLP	<0.01	0.01	mg/l
Zinc, TCLP	0.22	0.02	mg/l
TCLP Volatile Organics Scan	Enclosed		
Sampled by:	Cargill		
Date Sampled:	05/12/93		
Time Sampled:	15:52		
Date Received:	05/13/93		
Time Received:	08:30		

TCLP VOLATILE ORGANICS SCAN

CPC-Grand Rapids Metals Plant
Proj: Soil Analysis

Subm: May 12, 1993 Sample
Sample: SB-1+SB-2
0-20'

Submittal Number 31577- 1
Date Sampled: 05/12/93 Time: 15:52
Date Received: 05/13/93 Time: 08:30
Analysis Date: 05/21/93
Sample No: 53138

Parameter	Result mg/l	Parameter	Result mg/l
Benzene	<0.001	1,1-Dichloroethylene	<0.001
Carbon Tetrachloride	<0.001	Methyl Ethyl Ketone	<0.05
Chlorobenzene	<0.001	Tetrachloroethylene	<0.001
Chloroform	<0.001	Trichloroethylene	<0.001
1,2-Dichloroethane	<0.001	Vinyl Chloride	<0.001

METHODS PAGE

Parameter: Arsenic, TCLP
Method: Atomic Emission-ICP
Application: TCLP — Reference Citation: USEPA-6010
Analyst: David W. Johnson — Date Analyzed: 05/24/93

53138 SB-1+SB-2 0-20'

Parameter: Barium, TCLP
Method: Atomic Emission-ICP
Application: TCLP — Reference Citation: USEPA-6010
Analyst: David W. Johnson — Date Analyzed: 05/24/93

53138 SB-1+SB-2 0-20'

Parameter: Cadmium, TCLP
Method: Atomic Absorption-Flame, Cadmium
Application: TCLP — Reference Citation: USEPA-7130
Analyst: Marge A. Scott — Date Analyzed: 05/25/93

53138 SB-1+SB-2 0-20'

Parameter: Chromium, TCLP
Method: Atomic Emission-ICP
Application: TCLP — Reference Citation: USEPA-6010
Analyst: David W. Johnson — Date Analyzed: 05/24/93

53138 SB-1+SB-2 0-20'

Parameter: cis-1,2-Dichloroethene
Method: Halogenated and Aromatic Volatiles by GC
Application: SOIL — Reference Citation: USEPA-8021
Analyst: Christopher J. Penkala — Date Analyzed: 05/25/93

53138 SB-1+SB-2 0-20'

Parameter: Copper, TCLP
Method: Atomic Emission-ICP
Application: TCLP — Reference Citation: USEPA-6010
Analyst: David W. Johnson — Date Analyzed: 05/24/93

53138 SB-1+SB-2 0-20'

METHODS PAGE

Parameter: Flash point, cl-cup
Method: Pensky-Martens Closed-Cup Method
Application: SOIL — Reference Citation: USEPA-1010
Analyst: James M. Koedam — Date Analyzed: 06/10/93

53138 SB-1+SB-2 0-20'

Parameter: Inorganic Pretreatment
Method: Spectrophotometric, Infrared
Application: SOIL — Reference Citation: USEPA-418.1
Analyst: James M. Koedam — Date Analyzed: 05/18/93

53138 SB-1+SB-2 0-20'

Parameter: Lead, TCLP
Method: Atomic Absorption-Flame, Lead
Application: TCLP — Reference Citation: USEPA-7420
Analyst: David W. Johnson — Date Analyzed: 05/24/93

53138 SB-1+SB-2 0-20'

Parameter: Mercury, TCLP
Method: Manual Cold Vapor, Mercury
Application: TCLP — Reference Citation: USEPA-7470
Analyst: Stacy L. VanDyken — Date Analyzed: 05/24/93

53138 SB-1+SB-2 0-20'

Parameter: Digestion Mtd. 245.1/7471 Mercury-Cold Vapor Method
Method: Digestion for Mercury Manual Cold-Vapor
Application: TCLP — Reference Citation: USEPA-7470
Analyst: J.T. Whitmore — Date Analyzed: 05/20/93

53138 SB-1+SB-2 0-20'

Parameter: Digestion Method-3010 Flame-AA/ICP (TCLP)
Method: Acid Digestion for Flame AA-ICP
Application: TCLP — Reference Citation: USEPA-3010
Analyst: Don J. Ghysels — Date Analyzed: 05/20/93

53138 SB-1+SB-2 0-20'

METHODS PAGE

Parameter: Paint Filter Liquids Test
Method: Paint Filter Liquids Test
Application: SOIL — Reference Citation: USEPA-9095
Analyst: Heather L. Duncanson — Date Analyzed: 05/13/93

53138 SB-1+SB-2 0-20'

Parameter: Percent Solids
Method: Residue-Gravimetric, Dried @ 103-105*C
Application: SOIL — Reference Citation: USEPA-160.3
Analyst: Heather L. Duncanson — Date Analyzed: 05/14/93

53138 SB-1+SB-2 0-20'

Parameter: Petroleum Hydrocarbons
Method: Spectrophotometric, Infrared
Application: SOIL — Reference Citation: USEPA-418.1
Analyst: James M. Koedam — Date Analyzed: 05/19/93

53138 SB-1+SB-2 0-20'

Parameter: Selenium, TCLP
Method: Atomic Emission-ICP
Application: TCLP — Reference Citation: USEPA-6010
Analyst: David W. Johnson — Date Analyzed: 05/24/93

53138 SB-1+SB-2 0-20'

Parameter: Silver, TCLP
Method: Atomic Absorption-Flame, Silver
Application: TCLP — Reference Citation: USEPA-7760
Analyst: Colette A. Clark — Date Analyzed: 05/21/93

53138 SB-1+SB-2 0-20'

Parameter: TCLP Extraction-Metals
Method: Leaching Procedure (TCLP-METALS)
Application: TCLP — Reference Citation: USEPA-1311
Analyst: Don J. Ghysels — Date Analyzed: 05/19/93

53138 SB-1+SB-2 0-20'

METHODS PAGE

Parameter: TCLP ZHE Extraction
Method: Zero Headspace Extraction-TCLP
Application: TCLP — Reference Citation: USEPA-1311
Analyst: Mariano A. Vanegas — Date Analyzed: 05/20/93

53138 SB-1+SB-2 0-20'

Parameter: TCLP Volatile Organics Scan
Method: Volatiles Purge & Trap-GC/MS
Application: TCLP — Reference Citation: USEPA-8240
Analyst: Janet M. Kudirka — Date Analyzed: 05/21/93

53138 SB-1+SB-2 0-20'

Parameter: trans-1,2-Dichloroethene
Method: Halogenated and Aromatic Volatiles by GC
Application: SOIL — Reference Citation: USEPA-8021
Analyst: Christopher J. Penkala — Date Analyzed: 05/25/93

53138 SB-1+SB-2 0-20'

Parameter: Trichloroethylene
Method: Halogenated and Aromatic Volatiles by GC
Application: SOIL — Reference Citation: USEPA-8021
Analyst: Christopher J. Penkala — Date Analyzed: 05/25/93

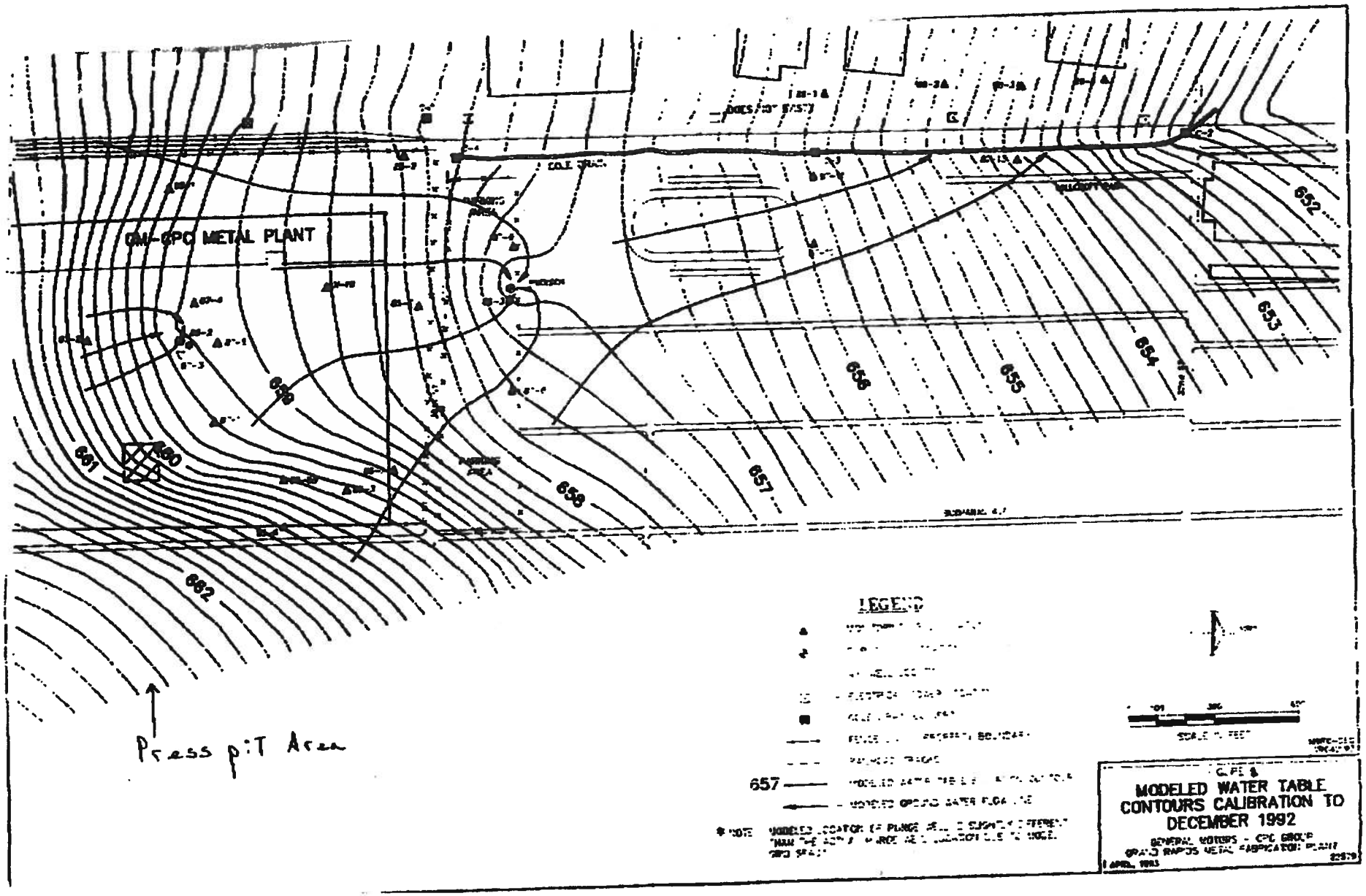
53138 SB-1+SB-2 0-20'

Parameter: Vinyl Chloride
Method: Halogenated and Aromatic Volatiles by GC
Application: SOIL — Reference Citation: USEPA-8021
Analyst: Christopher J. Penkala — Date Analyzed: 05/25/93

53138 SB-1+SB-2 0-20'

Parameter: Zinc, TCLP
Method: Atomic Emission-ICP
Application: TCLP — Reference Citation: USEPA-6010
Analyst: David W. Johnson — Date Analyzed: 05/24/93

53138 SB-1+SB-2 0-20'


GM-CPC METAL PLANT
652
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Press pit Area
LEGEND
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MODELED CONTOUR OF EQUAL GROUND WATER ELEVATION
MODELED GROUND WATER FLOW LINE
MODELED WATER TABLE CONTOURS CALIBRATION TO DECEMBER 1992
GENERAL MOTORS - CPC GROUP
GRAND RAPIDS METAL FABRICATION PLANT

DRAFT #

memorandum report

Distribution limited to:

D. M. Biekhold
L. F. Charla
D. J. Eden
E. R. Harris
L. E. Reuss
J. Spendel
D. K. Van Zile

Reported By R. A. Roda

Approved By J. P. Barzotti

Department GM Plant Environment

Report No. 501 *Date*

Project No. 20024 *Copy No.*

Environmental Activities Staff

General Motors Corporation
General Motors Technical Center
Warren, Michigan 48090

INDUSTRIAL ENVIRONMENTAL

PERFORMNACE REVIEW

C-P-C GROUP

METAL FABRICATION PLANT

GRAND RAPIDS, MICHIGAN

NOVEMBER 22, 1985

SECURITY

☒ **GM Restricted**

☐ **GM Confidential**
Not To Be Copied

This report is prepared for the information of management and engineering groups of General Motors. Since it covers policies and programs of the Environmental Activities Staff, the information should not be disclosed without authorization of Staff management.

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EAS-041

REVIEW SUMMARY

PURPOSE

The Plant Environment Department of Environmental Activities Staff conducted a third on-site Industrial Environmental Performance Review at the C-P-C Metal Fbrication plant in Grand Rapids, Michigan to reevaluate the facility's status with regard to environmental regulations and recommended procedures for Plant Engineering. The response to the deficiencies identified as a result of the previous Performance Review conducted in April, 1981 was evaluated. Additionally, the handling of air quality, water quality, waste and hazardous materials, areas of safety and health normally considered Plant Engineering responsibilities and energy conservation was reviewed in light of revised codes, changing plant conditions, and refined audit techniques.

PROCEDURE

Plant records were reviewed and operating conditions were observed on a sampling basis. Deficiencies are separated into areas not meeting code and potential problem areas. The out-of-code items are those that do not conform with existing emission or effluent limitations; ambient air, stream quality, or safety and health standards; or permit requirements. Potential problems reflect situations where information is insufficient to determine if an item is in or out of code, instances that will not meet known future codes, conditions that do not conform with General Motors Standards or recommendations, or present practices which may result in temporary code violations.

CONCLUSIONS

Most of the deficiencies identified in April, 1981 have been satisfactorily corrected through plant action or code revisions. A deficiency that is essentially the same as reported in the previous review is identified as a "repeat problem".

There were no significant problems identified on this review. However, a higher priority for correction should be considered for the many items concerning the Noise Control Program.

In general, plant personnel are aware of existing environmental regulations, are responsive to correcting deficiencies, and have good programs for maintaining compliance with the environmental regulations and recommended standards.

PROBLEM SUMMARIES

The following summarizes all the problems that were discussed with plant personnel and require corrective action or investigation:

AIR QUALITY

Areas Not Meeting Code

No problems observed.

Potential Problem Areas

No problems observed.

WATER QUALITY

Areas Not Meeting Code

No problems observed.

Potential Problem Areas

Order Of Determination - Discharges to the city sanitary sewer have not met the zinc limitation of 6.0 mg/l specified in the plant's Order Of Determination issued by the City Of Wyoming in two of four wastewater samples tested since October, 1984 . Test results indicate excursions of 6.3 mg/l and 10:8 mg/l.

Anticipated Sewer Code Limitations - Analyses performed since May, 1984 show discharges to the sanitary sewer exceed the anticipated sewer ordinance (effective December 3, 1985) for the following contaminants:

CONTAMINANT	OUTFALL	LIMIT (mg/l)	SAMPLE EXCEEDENCES	*DISCHARGE CONCENTRATIONS
Beryllium	022	.005	1 of 3	N.D. - .01
Beryllium	021	.005	1 of 3	N.D. - .02
Beryllium	025	.005	1 of 2	N.D. - .02
Ammonia	025	40	1 of 2	13-99
Ammonia	022	40	1 of 3	13-99

*All concentrations in mg/l

Organic Contaminants - Analyses from 1984 and 1985 showed the following organic contaminants in exceedence of the GM Plant Environment recommended standard of 10 parts per billion (ppb) to a storm sewer.

OUTFALL	CONTAMINANT	*DISCHARGE CONCENTRATION	SAMPLE EXCEEDENCES
010	1,1,1 trichloroethane	N.D.- 57	2 of 3
010,011	bis (2-ethylhexyl) phthalate	N.D.- 40	2 of 6

* All concentrations in ppb.
Further investigation should be conducted to determine and eliminate the Source(s) of these contaminants.

HAZARDOUS & WASTE MATERIALS

Areas Not Meeting Code

Polychlorinated Biphenyl (PCB) Requirements - The following areas are not in compliance with Toxic Substance Control Act (TSCA) regulations regarding PCB's as a result of one drum with a small quantity of waste PCB contaminated debris:

- The container is not dated to indicate when it was placed into storage (40 CFR 761.65(c)(8)).
- The container has not been inspected at least once every thirty days (40 CFR 761.65(c)(5)).
- The container has not been disposed within one year from the date it was first placed into storage (40 CFR 761.65(a)).
- The PCB debris has not been included in the PCB annual report (40 CFR 761.180).

In addition, PCB fluid from a previous PCB transformer leak which has been trapped by absorbant in the K-substation has not been disposed in accordance with TSCA regulations (40 CFR 761.60(d)). Spills of PCBs at a concentration of 50 ppm or greater constitute the disposal of PCBs.

Potential Problem Areas

Waste Analyses - Zinc rich primer overspray has not been tested to determine if it exhibits any of the characteristics of hazardous waste such as ignitability or E.P. toxicity. In addition, several other waste streams have not been re-tested after changes in processes to determine if these waste streams exhibit any of the characteristics of hazardous waste: (1) wastewater treatment sludge, (2) steam clean sump pit sludge, (3) maintenance sump pit sludge, and (4) oil separator sludge.

Further, analyses for these waste streams have not included zinc, copper and cyanide in the E.P. toxicity determination.

Small Quantity Generator Status - Currently, the plant is managed as a small quantity generator facility. However, if waste streams listed in the above "Waste Analyses" comment are hazardous, then the small quantity generator designation is not valid. Without the small quantity generator status, the plant would be deficient in the following areas: labeling and dating requirements; inspection requirements; personnel training, contingency plan; and storage area containment and protection.

PCB Capacitor Labeling - Large, low voltage PCB capacitors are not labeled in-service as recommended by GM Plant Environment in Bulletin SWM 80-2.

Hazardous Materials Control Program - Although a formal Hazardous Materials Control Program has been implemented, the program is deficient in the following areas:

- Two of fifteen (13%) materials randomly selected and observed in use have not been evaluated for their hazard potential as evidenced by the lack of safety data sheets for these materials.

- Education and training has not been provided for all employes handling hazardous materials.

- Annual audit reviews by the Hazardous Materials Control Committee have not been conducted.

SAFETY AND HEALTH

Areas Not Meeting Code

Audiometry Program - The Audiometry Program is deficient in the following areas:

- Noise Exposure Assessment - Employes' most recent noise exposure assessments have not been included in their annual audiometric test records.

- Follow Up Exam - Annual follow-up examinations are not performed on many employes (including department supervisors) exposed to 85dBA (TWA) or greater. Although appointments are set up for employes, they are not all responding (repeat problem).

- Threshold Shift - Written notification has not been given to employes when their audiometric examinations revealed a standard threshold shift in their hearing.

- Audiometer Calibration - Biological calibrations are not being performed on the audiometer before use each day as required by federal regulations. Consequently, deviations of 10 decibels or more could result in invalid audiograms.

- Audiometric Test Room - The background sound pressure level has not been determined to assure that the audiometric test booth is within permissible sound level limits for testing employes hearing.

Hearing Protection - Some employes (29 of 125) or 23% were not wearing hearing protection in designated high noise level areas (repeat problem).

The noncompliance employes include: Production employes (10 of 85) or 12%, non-production employes (14 of 29) or 48% and department supervisors (5 of 11) or 45%.

Area Resurvey - Sound level measurements are not taken whenever a change in the equipment, or controls increases noise exposure to the extent that additional employes may be exposed at or above 85 dBA (TWA).

Hoist Inspections - The overhead crane hoist inspections are not performed quarterly as required by state regulations. Semi-annual inspections are performed, however, signed records, as required by federal regulations are not retained.

Inspection Records - Inspections of alloy steel chain slings, mechanical power presses and over head cranes are not retained as required by federal regulations. It was noted that only inspection completion dates are electronically stored which is not adequate documentation. GM legal staff recommends all inspection records, as required by federal regulations, be retained for examination.

Cross-Connections - The potential for contaminating the potable water system through the existence of cross-connections was noted in the following areas:

- EDM (Electrical Discharge Machining) equipment in the Tool Room at the filtration system,
- Water servicing furnaces in heat treat area, and
- Water lines submerged in reservoirs at Tool Room grinder.

Potential Problem Areas

Cross-Connection Control Program - A formalized cross-connection program, to prevent the contamination of the potable water system, has not been developed and implemented as outlined in GM Plant Engineering Programs Bulletin 1B-84-109. A formalized program should include:

- Annual survey of the potable water system throughout the plant to ensure that no cross-connections exist.
- Annual testing of all reduced pressure backflow preventer valve.
- Annual pipefitter/maintenance training.

Noise Specifications - Certified sound level data for machinery and equipment are not received for review and evaluation by the noise engineer. In addition, GM Sound Level Specifications For Machinery and Equipment is not included as part of the purchase

requirement for portable power tools such as impact wrenches, die grinders, and disc sanders.

Employe Training Program - Although employes working in areas at or above 85 dBA (TWA) have been included in a formal training program, there are no records to verify employe participation.

Noise Control Coordinator - Noise related problems noted in this report indicate more emphasis is required to ensure an effective noise control program. Consideration should be given to form a noise control committee and assign a noise control coordinator to review progress and assign priorities as recommended by GM Central Noise Committee.

ENERGY CONSERVATION

No problems observed.

BACKGROUND DATA

R. A. Roda

The C-P-C Group Grand Rapids Metal Fabrication plant is located in the City of Wyoming, Michigan, which is a suburb of Grand Rapids in Kent County. This facility's major products include automobile door assemblies, roofs, deck lids, and floor pans for all GM car lines. The major production processes consist of sheet metal stamping and fabrication including welding and zinc spraying.

The facility has approximately 188 600 square meters (2,030,000 square feet) of floor space on 35.6 hectares (88 acres) and employs 450 salaried and 3000 hourly people. As shown on the plot plan at the end of this section, this facility has several commercial establishments and a few residences to the north and east, a residential and light commercial area to the south, and some commercial businesses within an open area west of the plant. Construction of the plant started in 1935 with production beginning in 1936. The facility was the first Fisher Body metal fabrication plant designed specifically for that purpose. During World War II and the Korean War, aircraft and tank parts were produced, along with anti-aircraft weaponry. In the fall of 1984 the Grand Rapids Fabrication plant becme part of the C-P-C Group as a result of the Corporate reorganization. Years of major construction included: 1937, 1939, 1950, 1964, 1977 and 1979. Currently an expansion of the Pressroom and a plant modernization program is in progress which is scheduled for completion for the 1990 Model Program.

Electricity is purchased from Consumers Power Company and natural gas is purchased from Michigan Consolidated Gas Company. Steam is produced on- site with three gas/oil-fired package boilers.

All water is purchased from the City of Wyoming. Storm water from several outside storage areas is directed to a retention basin prior to discharge to the Cole drain, which flows into the Grand River. The roof drains as well as the balance of the yard drains are directed to a city storm sewer without passing through the retention basin. Process wastewater is batch treated at the waste treatment facility prior to discharge to the City of Wyoming sanitiary sewer system. Non-contact cooling water is recirculated.

Existing air quality control equipment includes dry filters on zinc prime and deadner spray booths, a water-wall maintenance paint spray booth, a baghouse for the die pattern area exhaust, close capture smoke control equipment which filters the exhaust from the various welding areas before discharging back into the plant.

There is no on-site disposal of waste materials. All waste materials are hauled from the facility by private contractors or

company trucks to either a municipal landfill or other private disposal sites. Waste oil is reprocessed into #3 or #4 fuel oil and burned in the Powerhouse boilers.

The remainder of this report presents the plant's environmental status at the time of the review.

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AIR QUALITY

R. A. Roda

A review was performed at the facility to determine the type of emission sources and whether these sources meet applicable emission limitations and/or permit requirements. In addition, air quality procedures, programs and control equipment were reviewed. The status with regard to standards and recommendations is summarized below followed by general observations.

ITEMS REVIEWED	*STANDARDS	**EVALUATION
Process Source Emissions		
Particulate	S	OK
Hydrocarbons (VOC)	S	OK
Combustion Source Emissions		
Particulate	S	OK
Sulfur Dioxide/Fuels	S	OK
Oxides of Nitrogen	S	NC
Opacity	S	OK
Permits	S	OK
Emission Inventory		
Sources	S/GM	OK
Hydrocarbons (VOC)	S	OK
Episode Plan	S/GM	OK
Violation Notices/Complaints	S	OK
Odors	S	OK
Noise	S	OK
Fugitive Emissions	S	OK
Ambient Air Standards	F/S	OK
Material Accumulations (Roof)	GM	OK
Control Equipment Maintenance	S/GM	OK

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**Evaluation

OK - No problems observed
Problem - Detailed in Review Summary
N/A - Not applicable
N/C - Not checked

GENERAL OBSERVATIONS

Burning of Reprocessed Oil - It appears the reprocessed oils both from the Waste Treatment facility and outside vendors being burned in the boilers are in compliance with existing air permit conditions. The latest laboratory analysis (9/30/85) of reprocessed oil indicates compliance with the proposed maximum allowable federal contaminant levels for all parameters checked except lead. Lead is 16 mg/l which is in excess of the proposed federal standard of 10 mg/l. Further testing should be performed to establish normal values of this contaminant and include additional checks for flash point and chromium as outlined in Plant Environment Bulletin AQC 85-1.

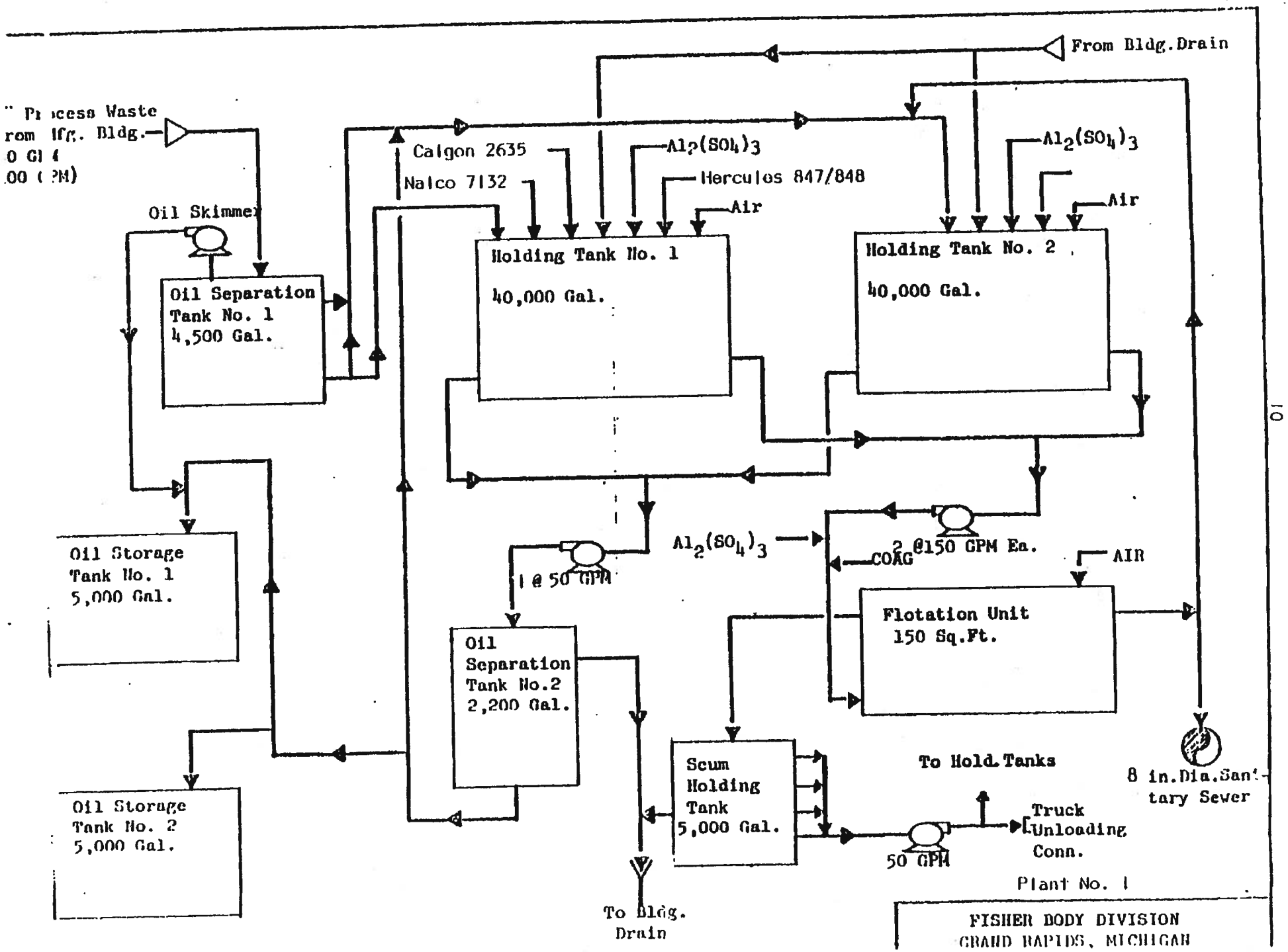
Neighborhood Complaints - A complaint was received in September 1985 from one of the neighbors living on the north side of the plant. It addressed the general nuisance of the major construction taking place including excessive noise and occasional odors. Plant personnel have planted trees which were scheduled as part of the modernization program along the property line to improve the esthetics and reduce the noise as requested in the complaint. No complaints have been received since.

WATER QUALITY

T.L. Kline

A review was performed at the facility to determine the sources of wastewater and whether these discharges meet applicable code limitations and/or permit requirements. In addition, water quality procedures, programs and treatment equipment were reviewed. The status with regard to standards and recommendations is summarized below followed by general observations.

ITEMS REVIEWED	*STANDARDS	**EVALUATION
General Regulation/Code Compliance		
Effluent Limitations/Visual Appearance	C/S	Problem
Pretreatment Standards	F	OK
Reports and Recordkeeping	C/S	OK
Other Requirements	C/S	OK
Permit Compliance		
NPDES	S/F	OK
Sanitary or Combined Sewers	C	OK
Polychlorinated Biphenyls (PCB)		
Effluent Testing	GM	OK
Discharge Concentrations	GM	OK
Violation Notices/Complaints	C/S/F	OK
Wastewater Effluent		
Monitoring and Testing Completed	GM	OK
Anticipated Code/Permit Compliance	C/S/F	Problem
Typical Code Compliance	GM	OK
Organic Contaminants	GM	Problem
Waste Treatment Process and Equipment		
Treatment Effectiveness	N/A	OK
By-passing Regulated	N/A	OK
Equipment Operational	N/A	OK
Operators Certified	S	OK
Plant Operations		
Process Discharges Controlled	GM	OK
Material Accumulations (roof & ground)	N/A	OK
Automatic Refueling Latches Removed	GM	OK
Water Balance Flow Diagram	GM	OK
Quality Control/Quality Assurance Program	GM	OK


From Bldg. Drain
Process Waste
rom Bldg. Bldg.
0 Gl
00 GPM)
Calgon 2635
Nalco 7132
$Al_2(SO_4)_3$
Hercules 847/848
Air
$Al_2(SO_4)_3$
Air
Oil Skimmer
Oil Separation
Tank No. 1
4,500 Gal.
Holding Tank No. 1
40,000 Gal.
Holding Tank No. 2
40,000 Gal.
Oil Storage
Tank No. 1
5,000 Gal.
1 @ 50 GPM
$Al_2(SO_4)_3$
COAG
2 @150 GPM Ea.
AIR
Flotation Unit
150 Sq.Ft.
Oil
Separation
Tank No.2
2,200 Gal.
Scum
Holding
Tank
5,000 Gal.
To Hold. Tanks
8 in.Dia.San
tary Sewer
Oil Storage
Tank No. 2
5,000 Gal.
Truck
Unloading
Conn.
50 GPM
To Bldg.
Drain
Plant No. 1
FISHER BODY DIVISION
GRAND RAPIDS, MICHIGAN

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GENERAL OBSERVATION

New City Ordinance - The City of Wyoming has approved a city sewer ordinance scheduled to go into effect on December 3, 1985. The new ordinance will impose a surcharge on BOD, suspended solids, oil and grease, and phosphorus. In addition, arsenic, beryllium, mercury, silver, total phenol, COD, ammonia, and chlorine demand which were previously unregulated, will be regulated under this new ordinance.

HAZARDOUS AND WASTE MATERIALS

D.M. Travers

A review was performed at the facility to determine the types of wastes generated and whether disposal practices meet applicable code limitations and/or permit requirements. In addition, hazadous and waste material handling procedures, programs, and equipment were reviewed. The status with regard to standards and recommendations is summarized below followed by general observations.

ITEMS REVIEWED	*STANDARDS	**EVALUATION
Waste Management Facilities and Transporters		
Evaluations on File	GM	OK
Licenses on File	GM	OK
Asbestos Disposal/Notification	F	OK
RCRA Hazardous Waste Requirements		
Permits	F	OK
Waste Analysis	F/S	Problem
Small Quantity Generator Status	F/S	Problem
Accumulation Requirements	F/S	N/A
Labeling	F/S	N/A
Dating	F/S	N/A
Manifest System	F/S	OK
Personnel Training	F/S	N/A
Contingency Plan	F/S	N/A
Container Management	F/S	N/A
Tank Requirements	F/S	N/A
Inspections	F/S	N/A
Operating Record	F/S	N/A
Closure Plan	F/S	N/A
Storage Area	F/S	N/A
Groundwater Monitoring	F/S	N/A
PCB Materials		
Capacitors Labeled	F/GM	Problem
Storage Area	F	OK
Items in Storage (Labeling, Dating)	F	Problem
Inspections	F	Problem
Disposal	F	Problem
Annual Reports	F	Problem
Hydraulic System/Reclaimed Oil Checks	GM	OK
Hazardous Material Control Program		
Evaluated/Approved for Use	GM	Problem
Training	GM	Problem
Annual Self-Audit	GM	Problem
Spill Prevention Program		
Contingency Plans (Developed,	F/S/GM	OK

Certified, and Implemented)		
Containment Facilities	GM	OK
Underground Tank Leakage Detection	GM	OK
Spill Reporting and Follow-up	F/S/GM	OK

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GENERAL OBSERVATIONS

Waste Materials Handling - Waste materials at the plant are handled in the following manner:

- Plant personnel are aware of only one routinely generated hazardous waste at the plant, methylene chloride. The Plastics Department generates less than 20 kilograms per month, and none has been disposed to date.

- Waste paint from miscellaneous projects was disposed as hazardous waste in January and April, 1985. In both cases, approximately 725 kilograms were diposed. The waste paint was transported by Valley City Refuse Disposal to Michigan Disposal, Inc. This waste was mainfested and sent to a licensed TSD facility as required for Small Quantity Generators.

- Zinc rich primer overspray is returned to the manufacturer, W.C. Richards Co., for reclamation. Approximately 20,000 kilograms per month are generated. This waste paint is transported by Valley City Refuse Disposal.

Currently, this paint is excluded from regulation under Michigan Act 64 Hazardous Waste Regulations because it is sold for a net positive gain. In December, 1985, however, ammendments to Act 64 become effective which remove the aforementioned exclusion. At that time the waste may be regulated by Act 64, and currently the waste may be regulated by the Resource Conservation and Recovery Act Regulations (RCRA) (as indicated in the "Waste Analyses" comment).

- Waste oils, both plant-generated and outside purchases, are stored in a tank in the Wastewater Treatment Plant and processed to use as supplemental fuel in the Powerhouse boilers during the winter. During the summer, waste oil is transported by Valley City Refuse Disposal to Astro Oil Company and Century Oil Company.

- Oily wastewater treatment sludges are transported by Valley City Refuse Disposal to Michigan Disposal, Astro Oil Co. and Titan Oil Co..

- PCB capacitors and transformers were transported by Ensco,Inc. to American Industrial Waste in Tennessee.

- Reusable barrels are transported and recycled by George Belfer Drum and Barrel Co. Other barrels are flattened and ultimately sold to a scrap dealer.

- The plant's compacted solid waste is hauled by Kent to the Recycling Center where wood, paper, cardboard and some plastics are removed and recycled. Loads are segrgated so that inert, recyclable and landfill trash are hauled individually. Inert material (sand, broken concrete) is used as fill, recyclables (wood, cardboard) are recycled and other material (cafeteria garbage, oil contaminated soil) is landfilled at Ottawa County Landfill, Byron Landfill or Fenske Sanitary Landfill.

Valley City Refuse Disposal Evaluation - Valley City Refuse Disposal, Inc., which provides hazardous waste transportation and roll off container service for commercial and industrial refuse disposal, was evaluated during the week of the review. The major area of concern regards the lack of containment for vehicles which could develop leaks. One roll off which contained metal hydroxide sludge was observed outside, surrounded by pools of green liquid on the ground which had leaked from the container. Valley City personnel indicated that this situation was irregular, and the usual procedure is to store overnight loads inside the garage to keep them secure and protected from the weather. All necessary licenses and permits are on file. A RCRA inspection performed by the Michigan Department of Natural Resources on January 24, 1985 found the facility to be in compliance with RCRA hazardous waste regulations. A Department of Transportation (DOT) inspection on July 12, 1985 found no substantial violations of the Federal Motor Safety and/or Hazardous Materials Regulations.

Pollution Incident - On July 26, 1985, plant personnel phoned in a pollution incident report to the National Response Center regarding oil which was discovered during excavation for a new equipment installation. Preliminary investigation indicated the material as mineral seal oil, which is a petroleum distillate used in equipment throughout this area of the plant. Testing has been performed on recovered samples of the liquid to confirm its nature. The material had apparently leaked through cracks in the concrete floor, over a period of several years, into sand/gravel soils up to 18 feet below the ground surface. EDI Engineering and Science has been contracted to perform a hydrological study and to drill and survey monitoring wells.

Underground Storage Tanks - Two new underground storage tanks for gasoline and diesel fuel have been installed as replacements for the two previously removed to accommodate the new building addition. These are double-walled steel tanks with cathodic protection. Monitoring wells with hydrocarbon sensors have also been installed.

Contaminated Soil Disposal - Oil contaminated soil from excavation inside the main plant was originally used as fill at VanKampen Bros. - Grandville Site. After the contamination was determined, approximately 1500 cubic yards of soil were excavated from the VanKampen site and removed to Byron Landfill and Ottawa County Farms Landfill, both sanitary Type II landfills. This action was taken as part of a work plan approved by the Michigan Department of Natural Resources.

Hazardous Material Control Program - The Hazardous Material Control Committee is co-chaired by the Chief of Plant Security and the Master Mechanic. Safe Use Instruction sheets are prepared in conjunction with all Material Safety Data Sheets. Committee personnel are in the process of updating both sheets in order to comply with OSHA Hazard Communication Regulations which take effect on May 26, 1986.

SAFETY AND HEALTH

L. L. Zajko and G. Famolare

A review was performed at the facility to evaluate the noise control program and certain maintenance safety inspection records to determine whether these meet applicable federal, state, and/or GM requirements. In addition, other aspects of safety and health procedures, controls and programs were reviewed. The status with regard to standards and recommendations is summarized below, followed by general observations.

ITEMS REVIEWED	*STANDARDS	**EVALUATION
HEARING CONSERVATION & NOISE CONTROL PROGRAM		
Noise Control Coordinator	GM	Problem
Sound Survey	S/F/GM	
1. Performed Per GM Procedure		OK
2. Adequate Data & Records Maintained		OK
3. Layouts With Area Noise Levels Depicted		OK
4. Areas Resurveyed Where Changes Effect Noise		Problem
5. Instrument Accuracy Certified Annually		OK
6. Employes notified of survey results		OK
Audiometry	S/F/GM	
1. Audiometric Exam (Baseline)		OK
2. Hearing Protectors Properly Fitted/Issued		OK
3. Audiometric Exam Annual Follow-Up		Repeat Problem
4. Performed by Qualified Personnel		OK
5. Audiometer Calibration (Accoustical/Biological)		Problem
6. Records (Include Employe Noise Assessment)		Problem
7. Written Notice of STS to Employe		Problem
8. Audiometric Test Room SPL W/in Limits		Problem
Administrative Controls	S/F/GM	
1. Reason for nonuse Documented		OK
2. Records of Implementation		N/A
Engineering Controls	S/F/GM	
1. Utilization		OK
2. Documentation		OK
3. Controls Maintained		OK
Noise Specifications	GM	
1. With Request for Quote (Portable Power Tools)		Problem
2. Machine Noise Data on File		Problem
3. "Out-of-Spec" (Acceptance by Written Waiver)		OK
Hearing Protection	S/F/GM	
1. Training Program		Problem
2. Areas Posted For Hearing Protection		OK
3. Full Time Requirement (Entire Shift)		OK

4. Employe Compliance	Repeat Problem
5. Employes W/STS Included in Program	N/C

ITEMS REVIEWED	*STANDARDS	**EVALUATION
MAINTENANCE -INSPECTION/RECORDS		
Overhead & Gantry Cranes	S/F/GM	
1. Written Operator Instructions for Daily Visual/Functional Checks		OK
2. Crane Inspection (W/Signed Records)		Problem
3. Records of Crane Repair (To Justify Only Once-A-Year Inspections)		OK
4. Hoist Inspection (W/Signed Records)		Problem
5. Records of Repair (To justify Less Than Monthly Inspections)		OK
Alloy Steel Chain Slings	S/F	
1. Annual Inspection		Problem
2. Proof Test Certificates on File		OK
Mechanical Power Presses	S/F/GM	
1. Safety Inspection		OK
2. GM - "No Hands in Dies"		OK
Mechanical Forging Machines	S/F/GM	N/A
1. Safety Inspection		
2. GM - "No Hands in Dies"		
Cross-Connection Controls	S/F/GM	
1. Adequate Control Devices to Prevent Potable Water Contamination		Problem
2. Formalized Program		Problem
3. Annual Survey of the Potable Water Lines		Problem
4. Annual Test of all Reduced Pressure Backflow Preventer Valves		Problem

*Standards

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F - Federal
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**Evaluation

OK - No problems observed
Problem - Detailed in Review Summary
N/A - Not applicable
N/C - Not checked due to time constraints and /or unavailable data.

GENERAL OBSERVATIONS

Annual Sound Survey - The GM Uniform Plant Sound Survey was performed by Acoustical Systems, an outside engineering firm. Noise exposure readings were taken with a Metrosonic Model #306 Metrologger integrating noise meter capable of measuring sound pressure levels and eight hour time weighted averages (TWA) for

employe noise exposure. The sound measurement data and records appeared to be complete and the results were documented. A new survey will be performed in January 1986, per the updated GM Uniform Plant Sound Survey Procedure.

Backflow Device Testing - The main city water line reduced pressure backflow preventer valve is being tested annually by plant personnel according to city regulations.

ENERGY CONSERVATION

L. L. Zajko and G. Famolare

A review was performed at the facility to determine the status of the energy conservation program and whether energy usage reductions meet Corporate goals. In addition, energy conservation procedures and projects were reviewed. The status with regard to GM recommendations is summarized below followed by general observations.

ITEMS REVIEWED	*EVALUATION
Adjusted Energy Savings (Corporate Goal = Decrease 4%)	
Last Year - Increased/Decreased %	Not Available
1985 Year-to-Date - Decreased %	Not Available
Base Year 1972-to-Date - Decreased %	Not Available
Actual Energy Savings - 1983 to 1990 (Corporate Goal is 1% Reduction Annually)	
Base Year 1983 to-Date - Decreased %	Not Available
Conservation Program	
Management Involvement	OK
Conservation Committee	OK
Energy Coordinator	OK
Training Program	OK
Energy Responsibility Accounting Program	OK
Records	OK
Administrative Controls	OK
Shutdown Procedures	OK
Engineering Changes	
Projects to Achieve Goals	OK
Heat Conservation/Recovery	OK
Inefficient Lighting Converted	OK
Powerhouse Reductions	
* Steam	OK
* Air	OK
* Summer Operations	OK
Maintenance of Steam and Air Equipment	OK
Energy Monitoring and Control System	OK

*Evaluation

OK - No problems observed
Problem - Detailed in Review Summary
N/A - Not applicable
N/C - Not checked

GENERAL OBSERVATIONS

Energy Conservation Program - The energy coservation program has an active committee co-chaired by the Plant Engineer and the Powerhouse Chief. The Powerhouse chief is currently functioning as the energy coordinator and spends approximately 20 percent of his time on energy related activities. Committee meetings are held semi-annually with the plant management and weekly with the plant maintenance committee. The committee has done an excellent job which resulted in a 47.7% adjusted savings from Base Year 1972 to 1983. Curent data was not available from the plant.

Some of the projects completed during the 1985 calendar year include:

- Improvement of electrical power factor to greater than 90%, which resulted in a savings of over $45,000.

- Shut down of units servicing heating and ventilating systems, and operating Powerhouse emergency diesel during peak electrical demand periods.

- Conversion to high efficiency lighting.

- Installation of air bags on presses to eliminate air leaks.

In addition, future energy projects include the implementation of a Quality In-Plant Environment Program. This program will mainly consist of modernization of the plant envelope which will increase ventilation air and reduce heat loss.

Program Review - A review of the energy conservation program was conducted using checklists similar to those used by Energy Management during "Assistance Visits". Copies of the completed checklists have been forwarded to GM Energy Management for their review and files.

NATURAL RESOURCES COMMISSION
THOMAS J. ANDERSON
MARLENE J. FLUHARTY
GORDON E. GUYER
KERRY KAMMER
O. STEWART MYERS
DAVID D. OLSON
RAYMOND POUPORE

STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

RONALD O. SKOOG, Director

Gordon E. Guyer, Director
State Office Building
350 Ottawa, N.W.
Grand Rapids, MI 49503

October 14, 1987

Mr. Merl Petzold/James Brandt
General Motors Corporation-CPC Group
Metal Fabrication Plant
300 36th Street, S.W.
Grand Rapids, MI 49508-2107

SUBJECT: Phase IIIB Hydrogeologic Investigation Report

Gentlemen:

Staff of the Environmental Response Division have completed their review of the Phase IIIB Hydrogeologic Investigation Report.

The report was well organized and written. We concur with the findings and have no additional comments or recommendations to add at this time.

In the interest of expediting the next study phase, I have verbally approved the initiation of the soil gas study and the installation of 5 wells. This will confirm our telephone conversations on September 2, 1987 and October 1, 1987 in which the approvals to proceed were given.

It appears that this most recent phase should complete the hydrogeologic investigation. If that is the case, the report should include recommendations for a remedial program for the downgradient area. I would like your best estimate for a report completion date.

Do not hesitate to call if you have any questions or comments regarding our review.

Sincerely,

Bonnie L. White
Environmental Quality Analyst
Environmental Response Division
616-456-5071

BLW/lks

NATURAL RESOURCES COMMISSION
THOMAS J. ANDERSON
MARLENE J. FLUHARTY
GORDON E. GUYER
KERRY KAMMER
O. STEWART MYERS
DAVID D. OLSON
RAYMOND POUPORE

STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

Gordon E. Guyer, Director
State Office Building
350 Ottawa, N.W.
Grand Rapids, MI 49503

June 15, 1987

Mr. Merl Petzold
General Motors Corporation - CPC Group
Metal Fabrication Plant
300 - 36th Street, S.W.
Wyoming, MI 49508-2107

SUBJECT: Meeting on Recent Hydrogeologic Investigation Report and Proposed Remedial Actions at the Plant

Dear Mr. Petzold:

This will summarize our June 11, 1987 meeting to discuss the Phase IIIA Hydrogeologic Report and GMC - CPC's proposals to remediate the trichloroethylene contamination in the soils and groundwater underlying the plant. Other participants in the meeting included Jim Brandt and Jurgen Spendel, CPC - Grand Rapids; Mitch Zayb, GMC - Plant Environment; Ed Piasecki, CPC - Headquarters; Ted Lietzke, EDI; and Jenny Hoffmann, MDNR - Grand Rapids.

Phase IIIB Investigation -

Ted Lietzke briefly outlined the findings of the Phase IIIB investigation. Two new wells (87-8, 87-9), have defined the lateral extent of the TCE plume along the north property line. The wells were vertically profiled. Samples collected in the up and downstream reaches of Cole Drain had similar TCE concentrations. The detailed report of findings, conclusions and recommendations for future investigations will be forthcoming in late June or early July.

Vapor Recovery Pilot Study

My verbal approval to proceed with the pilot study was confirmed at the meeting. For the initial studies, only a vacuum will be applied to the center well. The vacuum will be drawn for three days, with a three day recovery period between tests. If appropriate, a combined vacuum/pressure system will be tested later. The pilot study will

help determine the number of vapor recovery wells needed. The recovery efficiencies of continuous vs. intermittent vacuum application will also be studied. Three-quarter inch (3/4") permanent soil vapor probes will be installed down to 15 feet to monitor the performance of the recovery system. Rotometers will be installed to monitor air inflow into the perimeter vapor wells.

Groundwater Purge System

GM-CPC is considering the use of one or more purge wells to recover the dissolved TCE around and downgradient from the source area at Column T27. Pump tests on Well 87-5 will begin as soon as arrangements for disposal of the purge water can be made. GM-CPC will meet with the City of Wyoming in the near future to discuss the limitations for a temporary sanitary sewer discharge. GM-CPC will also begin to explore possible temporary treatment systems in case pretreatment of the pump test discharge is required. If no pretreatment is required, the test could be initiated within a month, or concurrently with the vapor recovery pilot study. More time would be required if pretreatment is necessary. Well 87-5 will require further development before use.

Mineral Spirits/Mineral Seal Loss

MDNR requested clarification on earlier studies of the mineral spirits/seal contamination downgradient from Column AZZ. We also requested that the existing monitoring wells around AZZ be checked for the presence of free floating product to determine if any accumulations have occurred over time.

Phase IIIA Report

We requested clarification on the time frames for sample results used for preparation of the TCE isoconcentration maps. The maps are based on a composite of analytical results from various onsite studies.

General

We requested that we be notified shortly before the groundwater pump test begins, so that we can meet to discuss the details of the test program. We would like to observe the vapor recovery tests when they begin. We will also need to have copies of the plans and specifications of the vapor recovery and purge wells systems when the final designs are completed.

A substantial amount of progress towards understanding and controlling the TCE contamination at the plant has been made to date. I look

forward, as I'm sure you do, to continuing progress in a timely fashion. Do not hesitate to call me if you have any questions or comments as the project progresses.

Sincerely,

Gerard Hoekstra for

Bonnie L. White
Environmental Quality Analyst
Environmental Response Division
616-456-5071

BLW/dkw

CC: T. Lietzke, EDI

NATURAL RESOURCES COMMISSION
THOMAS J. ANDERSON
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STEPHEN F. MONSMA
O. STEWART MYERS
RAYMOND POUPORE
HARRY H. WHITELEY

STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

Gordon E. Guyer, Director
State Office Building
350 Ottawa N. W.
Grand Rapids, Michigan 49503

October 2, 1986

Mr. Merl Petzold
General Motors Corporation
CPC-Metal Fabrication Plant
300 - 36th Street S. W.
Grand Rapids, MI 49508-2107

SUBJECT: Phase II Hydrogeologic Study Results and Proposal for Further Investigation and Remediation

Dear Mr. Petzold:

This will confirm our September 12, 1986 meeting to discuss the results of the Phase II hydrogeologic study and GMC's proposal for future investigation and remediation.

Phase II verified the presence of trichloroethylene (TCE) in the groundwater adjacent to and downgradient from the former location of a degreaser unit. Elevated TCE levels were documented as far downgradient as the plant's north boundary line.

GMC proposed a concurrent program of remedial action and further investigation. The program included:

1. The installation of air purge and vacuum recovery wells in and around the TCE source area.

2. Use of these wells in a pilot study to strip TCE from in situ soils and groundwater.

3. Definition of the contaminant plume using soil gas and monitoring wells along the north property boundary.

4. TCE sample collection in the hypothesized discharge area in Cole Drain.

Full scale in situ stripping will be implemented if the pilot studies show the technique to be effective. A detailed work plan

for the program and an implementation schedule will be prepared and provided to the Department of Natural Resources for review before well construction begins. The plan should reach this office by October 17, 1986.

As discussed, GMC will be required to document the extent of off-site TCE contamination in the soils and groundwater. The studies must be of sufficient scope to allow for the design of a remedial program in the downgradient area. The work plan for the off-site work will be prepared and submitted for staff review after completion of the on-site studies as proposed at the meeting.

Feel free to call me if there are questions or comments on this correspondence or on the work plan.

Sincerely,

Bonnie L White

Bonnie L. White
Environmental Quality Analyst
Groundwater Quality Division
616-456-5071

BLW/mam

CC: Ted Lietzke, EDI
J. Hoffmann, Groundwater Quality Division

J. Mundel ✓
A. Agnew
T. Strauss

Chevrolet·Pontiac·Canada Group

OCTOBER 14, 1986

Ms. Bonnie L. White
Environmental Quality Analyist
Groundwater Quality Div. Mich DNR
State Office Building
350 Ottawa Ave N.W.
Grand Rapids, MI 49503

Re: Workplan for Phase III - Hydrogeologic Investigation and Remediation

Enclosed is the work plan which covers the items discussed at our September 12, 1986 meeting. You will note the plan also includes the investigation of two potential additional degreaser locations that would be dated in the late 1940's and early 1950's. At this point, the plant only has the recollection of some employees. An attempt is being made to locate plant layout drawings from this time period to determine precise locations.

Please feel free to call me at 247-5470 if you have any questions about the plan. Construction of the proposed wells will comence as soon as your review is completed.

Merl Petzold
Ch Engr Energy & Envir

Juergen Spendel
Supt Maint/Plt Engr

cc: A. Aguwa - GMEAS
T. Strauss - CPC HDQTS

NATURAL RESOURCES COMMISSION
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STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

Gordon E. Guyer, Director
State Office Building
350 Ottawa N. W.
Grand Rapids, Michigan 49503

October 2, 1986

Mr. Merl Petzold
General Motors Corporation
CPC-Metal Fabrication Plant
300 - 36th Street S. W.
Grand Rapids, MI 49508-2107

SUBJECT: Phase II Hydrogeologic Study Results and Proposal for Further Investigation and Remediation

Dear Mr. Petzold:

This will confirm our September 12, 1986 meeting to discuss the results of the Phase II hydrogeologic study and GMC's proposal for future investigation and remediation.

Phase II verified the presence of trichloroethylene (TCE) in the groundwater adjacent to and downgradient from the former location of a degreaser unit. Elevated TCE levels were documented as far downgradient as the plant's north boundary line.

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1. The installation of air purge and vacuum recovery wells in and around the TCE source area.

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Full scale in situ stripping will be implemented if the pilot studies show the technique to be effective. A detailed work plan

for the program and an implementation schedule will be prepared and provided to the Department of Natural Resources for review before well construction begins. The plan should reach this office by October 17, 1986.

As discussed, GMC will be required to document the extent of off-site TCE contamination in the soils and groundwater. The studies must be of sufficient scope to allow for the design of a remedial program in the downgradient area. The work plan for the off-site work will be prepared and submitted for staff review after completion of the on-site studies as proposed at the meeting.

Feel free to call me if there are questions or comments on this correspondence or on the work plan.

Sincerely,

Bonnie L. White

Bonnie L. White
Environmental Quality Analyst
Groundwater Quality Division
616-456-5071

BLW/mam

CC: Ted Lietzke, EDI
J. Hoffmann, Groundwater Quality Division

D. Mandel

A. Agnew

T. Kramer

Chevrolet-Pontiac-Canada Group
Grand Rapids Metal Fabrication Plant
General Motors Corporation
300 36th St., S.W.
Grand Rapids, Michigan 49508-2107

OCTOBER 14, 1986

Ms. Bonnie L. White
Environmental Quality Analyist
Groundwater Quality Div. Mich DNR
State Office Building
350 Ottawa Ave N.W.
Grand Rapids, MI 49503

Re: Workplan for Phase III - Hydrogeologic Investigation and Remediation

Enclosed is the work plan which covers the items discussed at our September 12, 1986 meeting.

Please feel free to call me at 247-5470 if you have any questions about the plan. Construction of the proposed wells will commence as soon as your review is completed.

Merl Petzold
Ch Engr Energy & Envir

Juergen Spendel
Supt Maint/Plt Engr

cc: A. Aguwa - GMEAS
T. Strauss - CPC HDQTS

NATURAL RESOURCES COMMISSION
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STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

Gordon E. Guyer, Director
State Office Building
350 Ottawa N. W.
Grand Rapids, Michigan 49503

November 14, 1986

Mr. Merl Petzold
General Motors Corporation - CPC Group
Grand Rapids Metal Fabrication Plant
300 - 36th Street S. W.
Grand Rapids, MI 49508-2107

SUBJECT: Review of Phase III Work Plan for GM - Metal Fabrication

Dear Mr. Petzold:

The Phase III work plan has been received and reviewed by Groundwater Quality Division staff. The following are questions and comments arising from the review:

1. II.E. - Which well numbers are being referred to as background wells?

2. II.F. - Omit the Cole Drain sample to be taken north of 28th Street. The sampling point is within the discharge area of an organic contaminant plume originating from Chem Central. TCE is one of the constitutents of that plume.

3. V.H. - The Phase III report should include recommendations for addressing off-site contaminant migration beyond the north parking lot (GMC's) boundary.

4. The work plan does not include a schedule for implementation of the Phase III tasks.

The work plan is tentatively approved pending the receipt of a schedule for implementation and completion of Phase III. The schedule should be submitted as soon as possible.

In our October 17, 1986 conversation you indicated that degreasing operations took place in several, previously unidentified, locations in the plant. These locations came to light after the Phase III work plan was completed. It is my understanding that

GMC will investigate the soils underlying these locations via soil borings during Phase III. This work may proceed without a work plan provided it is done using the procedures outlined in the Phase II work plan. Results of this soil investigation may be incorporated into the Phase III report.

Feel free to contact me if you have any questions regarding this correspondence.

Sincerely,

Bonnie L. White

Bonnie L. White
Environmental Quality Analyst
Groundwater Quality Division
616 - 456-5071

BLW/mam

CC: Tim Strauss, General Motors Corporation
Juergen Spenden, General Motors Corporation
Ted Lietzke, EDI
J. Hoffmann, Groundwater Quality Division

ENVIRONMENTAL SCIENTISTS/ENGINEERS/GEOLOGISTS/CHEMISTS•611 CASCADE W. PKWY., S.E., P.O. BOX 6510, GRAND RAPIDS, MI 49506•PH: (616) 942-0970/942-9600

Environmental Data Inc.

a subsidiary of WILLIAMS & WORKS

January 12, 1982

Mr. Merl Petzold
GMC Fisher Body Plant #1
300 36th Street SW
Grand Rapids, MI 49508

Dear Merl:

Enclosed are the laboratory results for the recent sample collected from the monitoring well adjacent to Press HS-5. The results show grease & oil at 0.4 mg/l and TOC at 8 mg/l. This compares with 20 mg/l grease & oil and 8 mg/l TOC in the previous sample. Although the TOC remains the same, the 20 mg/l of grease & oil is not repeated; therefore, we recommend that the priority pollutant scan not be done. This recent sample reaffirms the conclusion made in our December, 1981 report that no substantial impact on groundwater quality has occurred.

We still recommend that the monitor well be left in place with the screen set 2 feet below the water table. To do this, you have to pull the well back 18 feet from its present depth. Perhaps this could be done with your overhead crane or a hi-lo. With the screen set just below the water table, a sample should be collected a year from now to determine if the contaminants in the overlying soil are producing products of anaerobic fermentation which impact shallow groundwater quality.

We enjoyed working with you, and look forward to a continuing association with your organization. If you have any questions, please feel free to call us.

Sincerely yours,

Dennis

Dennis J. Gebben
Manager of Geologic Services

DJG/mck

Enclosure(s)

Environmental Data Inc.
ENVIRONMENTAL SCIENTISTS/ENGINEERS/GEOLOGISTS/CHEMISTS
911 CASCADE WEST PARKWAY, S.E., P.O. BOX 6910, GRAND RAPIDS, MICHIGAN 49506

WATER · WASTEWATER · BIOLOGICAL STUDIES
ORGANICS · TOXIC SUBSTANCE ANALYSIS
TREATABILITY STUDIES · ENVIR. EVALUATIONS

ANALYTICAL SERVICES

PROJECT: GMC Fisher Body Plant #1
JOB #: 20127
SAMPLING LOCATION:
SAMPLED BY: GS
SAMPLE DESCRIPTION: TW #1 HS5

DATE SAMPLED: 12/15/81 TIME: 10:00 AM
DATE RECEIVED: 23/15/81 TIME: 5:00 PM
DATE COMPLETED: 12/23/81
SCHEDULED COMPLETION: 12/23/81
ANALYST: MS
QUALITY CONTROL REVIEW BY: DMF

COMMENTS:

						DATE OF ANALYSIS	DL
EDI SAMPLE NO.	22492						
Grease & Oil	0.4 mg/1					12/22/81	0.1 mg/1
TOC	8 mg/1					12/21/81	5 mg/1

Analysis by Standard Methods, 14th Edition, and/or Methods for Chemical Analysis of Water and Wastes. EPA. 1979.

ENVIRONMENTAL SCIENTISTS/ENGINEERS/GEOLOGISTS/CHEMISTS•611 CASCADE W. PKWY., S.E., P.O. BOX 6510, GRAND RAPIDS, MI 49506•PH: (616) 942-0970/942-9600

Environmental Data Inc.

a subsidiary of WILLIAMS & WORKS

December 23, 1982

Mr. Merl Petzold
GMC Fisher Body Plant #1
300 36th Street, S.E.
Wyoming, Michigan 49508

Dear Merl:

Attached are the results of the analysis of the water sample collected from the monitor well next to the HS-5 press on November 9, 1982. This sample was analyzed for the base-neutral and acid fractions of the USEPA Priority Pollutants and nothing was detected.

Based on these results we see no need to continue sampling this well, and recommend that you remove it unless, for reasons unrelated to the oil leak incident, you see a future need to investigate groundwater conditions beneath the plant site.

Sincerely yours,

ENVIRONMENTAL DATA, INC.

Dennis

Dennis J. Gebben, Vice President
Manager of Geological Services

Attachments

/sv

Environmental Data Inc.
ENVIRONMENTAL SCIENTISTS/ENGINEERS/GEOLOGISTS/CHEMISTS
611 CASCADE WEST PARKWAY, S.E. P.O. BOX 6510, GRAND RAPIDS, MICHIGAN 49506

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 2
BASE-NEUTRAL FRACTION

PROJECT: GMC FISHER BODY PLT #1 DATE SAMPLED: 11/9/82 TIME: 10:30am

PROJECT No.: 20051 DATE RECEIVED: 11/9/82 TIME: 2:00am

SAMPLING LOCATION: _____ DATE COMPLETED: _____

COMMENTS: NO PEAKS DETECTED.

SAMPLE:

SAMPLE No. 27076

COMPOUND	RESULTS (mg/l)	DETECTION LIMIT
Hexachloroethane	*	0.010
Hexachlorobutadiene	*	0.010
1,2,4-Trichlorobenzene	*	0.010
Naphthalene	*	0.010
Hexachlorocyclopentadiene	*	0.010
Nitrobenzene	*	0.010
2-Chloronaphthalene	*	0.010
Acenaphthene	*	0.010
Isophorone	*	0.010
Fluorene	*	0.010
2,4-Dinitrotoluene	*	0.010
1,2-Diphenylhydrazine	*	0.010
2,6-Dinitrotoluene	*	0.010
N-Nitrosodiphenylamine	*	0.010
Hexachlorobenzene	*	0.010
4-Bromophenyl phenyl ether	*	0.010
4-Chlorophenyl phenyl ether	*	0.010
Anthracene	*	0.010
Phenanthrene	*	0.010
Dimethyl phthalate	*	0.010
Bis-(2-chloroethyl) ether	*	0.010
Di-n-butyl phthalate	*	0.010
Diethyl phthalate	*	0.010
Butyl benzyl phthalate	*	0.010

COMPOUND	RESULTS (mg/l)	DETECTION LIMIT
Benzidine	*	0.010
Pyrene	*	0.010
Fluoranthene	*	0.010
Chrysene	*	0.010
Bis-(2-ethyl hexyl) phthalate	*	0.010
Benzo (a) anthracene	*	0.010
Benzo (k) fluoranthene	*	0.010
Benzo (a) pyrene	*	0.010
Indeno (1,2,3-cd) pyrene	*	0.010
Dibenzo (a,h) anthracene	*	0.010
Benzo (g,h,i) perylene	*	0.010
3,3'-Dichlorobenzidine	*	0.010
Tetrachlorodibenzo-p-dioxin	*	0.010
N-Nitroso-n-propylamine	*	0.010
Acenaphthylene	*	0.010
Bis(2-chloroisopropyl) ether	*	0.010
Bis (2-chloroexthoxy) methane	*	0.010
1,2-dichlorobenzene	*	0.010
1,3-dichlorobenzene	*	0.010
1,4-dichlorobenzene	*	0.010
N-Nitrosodimethylamine	*	0.010
Bis-(chloromethyl) ether	*	0.010
Di-n-octylphthalate	*	0.010

* COMPOUND NOT PRESENT AT DETECTION LIMIT

Environmental Data Inc.
ENVIRONMENTAL SCIENTISTS/ENGINEERS/GEOLOGISTS/CHEMISTS
611 CASCADE WEST PARKWAY S.E. P.O. BOX 6510, GRAND RAPIDS, MICHIGAN 49506

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 3
ACID FRACTION

PROJECT: GMC Fisher Body Plant #1 DATE SAMPLED: 11/9/82 TIME: 10:30am

PROJECT No.: 20051 DATE RECEIVED: 11/9/82 TIME: 2:00pm

SAMPLING LOCATION: _____ DATE COMPLETED: _____

COMMENTS: NO PEAKS DETECTED.

SAMPLE:

SAMPLE No.
27076

COMPOUND	RESULTS (mg/l)	DETECTION LIMIT
2-Chlorophenol	*	0.010
Phenol	*	0.010
2,4-Dichlorophenol	*	0.010
2-Nitrophenol	*	0.010
4-Chloro-3-methylphenol	*	0.010
2,4,6-Trichlorophenol	*	0.010
2,4-Dimethylphenol	*	0.010
2-Methyl-4,6-Dinitrophenol	*	0.010
4-Nitrophenol	*	0.010
Pentachlorophenol	*	0.010
2,4-Dinitrophenol	*	0.010

*COMPOUND NOT PRESENT AT DETECTION LIMIT

Inter-Organization

Environmental Activities Staff
General Motors Corporation
General Motors Technical Center
Warren, Michigan 48090

Date: August 25, 1981

Subject: Groundwater Monitoring

From: W. P. Ward Bill Ward

To: Merl Petzold - Fisher Body, Grand Rapids Metal Fab.

I have reviewed the data you provided me on 8/5/81, and have arrived at the following conclusions. As a cautionary note, soil borings give very useful information on soil characteristics, but are not designed or intended to give highly accurate data on water levels. However, general trends can usually be observed from boring information, and all my remarks are related to these trends.

I - Soil Characteristics

In general, the soils beneath your plant are medium to fine grained sands, occasionally mixed with some fine gravel. At a depth of about 40 feet (elevation of 50 to 55 feet relative to the Plant floor datum of 101 feet) is found a silty blue clay containing some sand and pebbles. Some of the deeper borings penetrate this clayey layer and indicate the presence of a water-saturated fine sand overlying another blue clay layer. This lower clay layer either lies directly on the bedrock or overlies a relatively thin sand layer which, in turn, overlies bedrock. The upper blue clay layer is assumed to be continuous beneath the plant since it is seen in borings along the west and southeast sides of the plant. However, there is a suggestion it may dip to the northwest.

The depth to bedrock varies from less than 60 to well over 100 feet (elevations +47 to -5 feet, plant datum) across the plant. There is the suggestion of a bedrock valley, or some other type of low spot, running from southeast to northwest across the plant. If a valley does in fact exist, it may affect groundwater flow patterns to some extent.

The coarse nature of soils above the clay layers indicates a high ~~hydraulic conductivity. From the uniformity of these soils I would~~ believe that the groundwater flow patterns are fairly consistent across the site.

II - Groundwater Flow

~~Based on the soil boring data, groundwater appears to be flowing basically toward the west. (See attached figures).~~

The slight mound near the retention basin may not be related to leakage from it, since boring 77-29 (due south of the basin) shows a

water table elevation 1 to 3 feet lower than 77-28 (southeast of the basin). If the mound at boring 77-28 was its result of basin leakage, water in both 77-28 and 77-29 should be about the same level. However, we cannot positively conclude that the basin does not leak.

Along the west side of the plant, the groundwater gradient had a distinct northward component in 1977. Although flow is basically toward the west, the 1954 borings showed a southwestward flow vector along the west side of the plant. I should note that this type of apparent flow reversed is not uncommon.

I would suspect that present flow may be radial toward the plant because of the dewatering that has occurred over the years. This means the soil beneath the plant may have water table somewhat lower than the surrounding soil, which is being maintained by pump removal of groundwater. Practically, this means anything floating on the surface (or within a few inches) beneath the plant will move preferentially toward the dewatering drains. However, the water table elevations along the north side of the plant may be close to or slightly below the elevation of the dewatering drains. Thus, groundwater could flow from under the plant toward the north, but very slowly because the hydrostatic gradient would be low.

It appears the average rate of groundwater flow at the plant is on the order of 2 to 4 feet per day, higher near the mound areas and presumably lower on the north side of the plant. Considering a general flow direction of west and north and a rate of 2 to 4 feet per day, a water particle starting at the southeast corner of the plant could take 1 to 2 1/2 years to reach the outer plant wall, at the northwest corner. This is an estimate based on the soil boring data and could be in error by as much as an order of magnitude. More precise measurements will give more accurate flow values.

III - Conclusions and Recommendations

At this time, I do not believe the soluble oil coolant has migrated any considerable distance from the leak site. However, I believe this needs to be proven. Since the primary leak source has been stopped, the forces driving the coolant toward the water table are minimal (gravity, extraneous inflow from leaky sewers, etc.). However, it is not possible to tell whether or not any coolant did reach the water table before the leak was corrected. We can assume the dewatering activities have had an effect on coolant movement, but we do not know what effect.

~~I believe your plant should undertake steps to determine:~~

1. Whether or not coolant has reached the water table.

2. The net effect of its dewatering activity.

3. Current groundwater flow regimes, since the 1977 data do not fully include current dewatering activities.

Therefore, I would recommend installing a series of observation wells around the plant site. These wells would be used to monitor water level and quality in the upper saturated zone (i.e., upper aquifer).

The upper aquifer is that zone above the blue silty clay identified in the soil borings at a depth of about 50 feet. I would suggest using fully penetrating wells (i.e., wells screened over their entire length) until enough data are developed to indicate the desirability of a different type well. Considering financial constraints, you may wish to install wells in phases. If so, I would suggest starting along the north and west sides of the plant, since groundwater flow appears to be in those directions. It would be advantageous to install a few observation wells inside the plant, beneath the floor. I would also suggest installing piezometer clusters in the southeast corner of the plant to more clearly define the groundwater mound (or hole) in that corner.

To save drilling costs, these are some recently developed techniques which can allow obtaining depth-dependent data from a single well.

If you wish to proceed with a monitoring program, I would suggest selecting a good geotechnical consultant. Then, I think we should meet to discuss the program in detail. Please call me when you are ready to proceed.

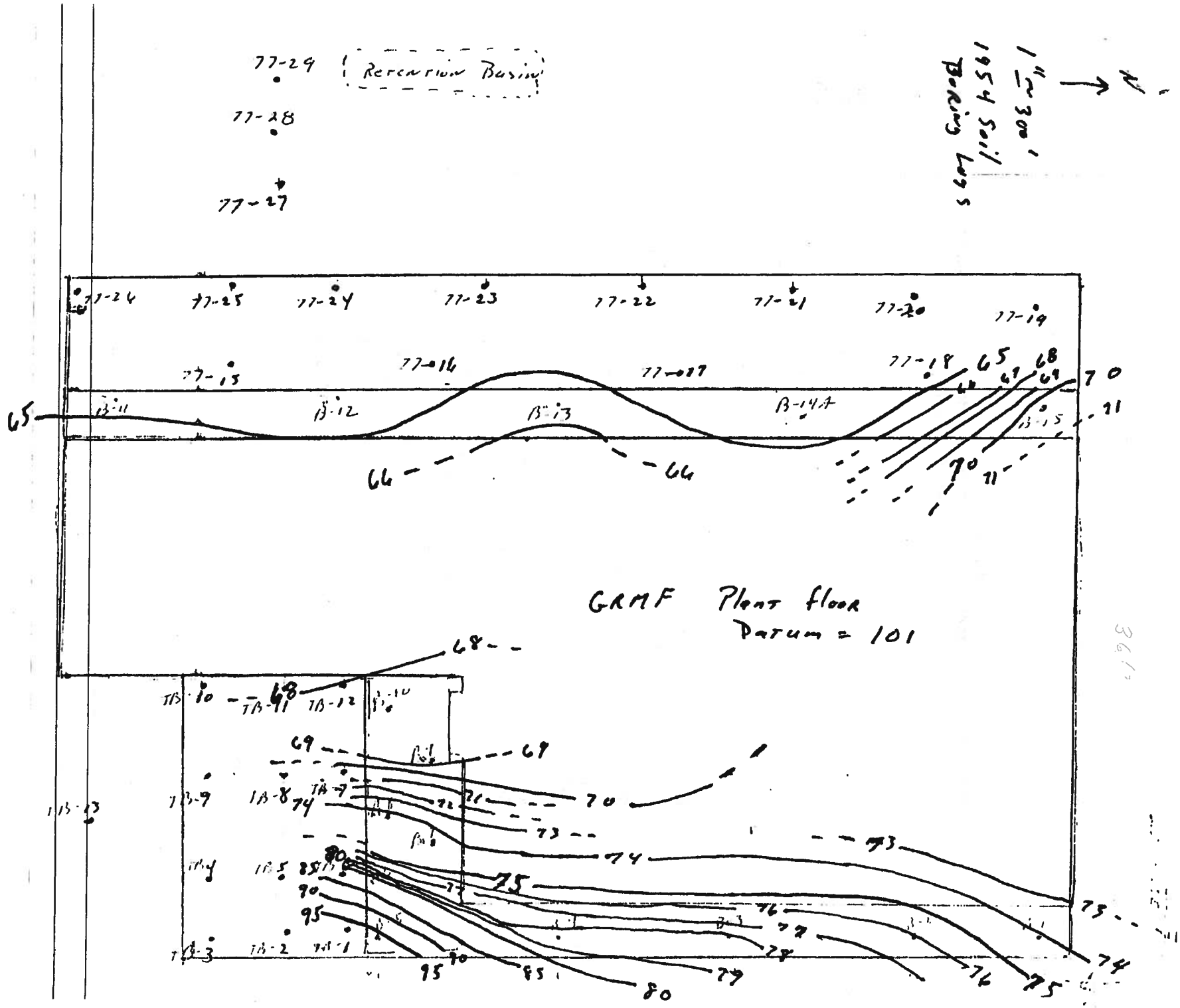
9WPW/824

cc: J. P. Chu
E. D. Second - Fisher Body, Works Engineering

Boring# (1954 Series)	Surface* Elev.	Depth to Water	Water Level	Boring# (1977 Series)	Surface Elev.	Depth to Water	Water Level
				TB-1***	97.8	20	77.8
				TB-2	99.9	21	78.9
				TB-3	98.5	18	80.5
				TB-4	97.5	17.5	80.0
				TB-5	97.3	14	83.3
				TB-6	97.5	19.5	78.0
				TB-7	100.9	21	79.9
				TB-8	100.9	22	78.9
				TB-10	100.8	21.5	79.3
				TB-11	100.9	21	79.9
				TB-12	100.8	20	80.8
B-1**	100.4	26.42	74.	TB-13	97.4	19	78.4
B-2	100.3	21.25	76.	TB-14	97.3	14	83.3
B-3	99.03	20.67	78.36	77-15	96.9	17.0	79.9
B-4	99.5	21.42	78.1	77-16	96.4	17.0	79.4
B-5	98.06	2.5	95.5	77-17	96.5	17.0	79.5
B-6	96.66	17.0	79.7	77-18	96.0	20.0	76.0
B-7	97.36	23.0	74.4	77-19	95.5	19	76.5
B-8	98.16	24.17	73.99	77-20	95.4	19	76.4
B-9	100.57	32.0	68.6	77-21	95.2	19	76.2
B-10	100.17	32.0	68.2	77-22	94.9	18	76.9
B-11	97.34	32.5	64.8	77-23	95.2	17	78.2
B-12	96.24	32.0	64.2	77-24	94.9	NO	RECORD
B-13	96.6	30.5	66.1	77-25	95.4	18	77.4
B-14A	97.34	33.0	64.3	77-26	94.9	18	76.9
B-15	96.96	26.25	70.71	77-27	95.1	19	76.1
				77-28	94.1	13.5	80.6
				77-29	90.1	11.5	78.6

* - Elevations given Relative to Plant floor datum of 101
** - 1954 Series
*** - 1977 Series

9WPW/824
8/26/81


77-29
Retention Basin
77-28
77-27
1" = 30'
1954 Soil
Boring Logs
N
77-26
77-25
77-24
77-23
77-22
77-21
77-20
77-19
77-15
77-16
77-17
77-18
65
68
70
71
B-11
B-12
B-13
B-14A
B-15
66
66
70
71
GRMF Plant floor
Datum = 101
68
TB-10
TB-11
TB-12
69
69
TB-14
TB-13
TB-9
TB-8
TB-7
74
72
71
70
73
74
73
80
85
TB-5
75
90
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TB-4
TB-3
TB-2
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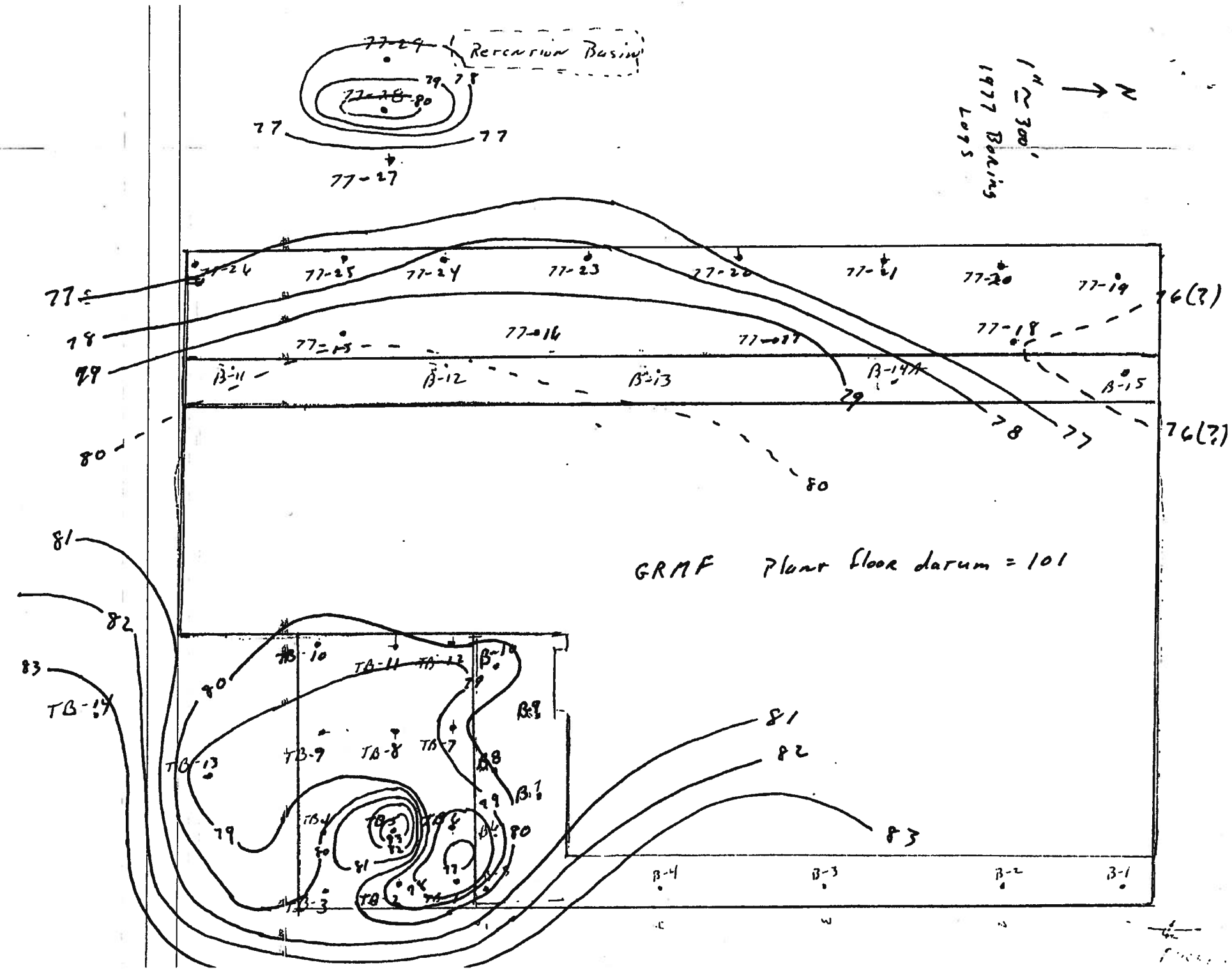
85
80
77
76
75
74


Retention Basin
77-27
77-24
77-25
77-24
77-23
77-22
77-21
77-20
77-19
77-18
77-17
77-16
77-15
B-11
B-12
B-13
B-14A
B-15
77
78
79
80
76(?)
81
82
83
GRMF Plant floor datum = 101
TB-10
TB-11
TB-12
TB-13
TB-14
TB-9
TB-8
TB-7
TB-6
TB-5
TB-4
TB-3
TB-2
TB-1
B-1
B-2
B-3
B-4
1977 Boring Logs
1" ≈ 300'
N

environmental activities report

Environmental Activities Staff

General Motors Corporation
General Motors Technical Center
Warren, Michigan 48090

INDUSTRIAL ENVIRONMENTAL PERFORMANCE REVIEW REPORT

GM CONFIDENTIAL

Not To Be Copied

This report is prepared for the information of management and engineering groups of General Motors. Since it covers policies and programs of the Environmental Activities Staff, the information should not be disclosed without authorization of Staff management.

Distribution of this report is restricted to those listed herein. The report may be circulated to persons in the recipient's organization who have a "need to know" the information reported herein.

memorandum report

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Reported By R. E. Gunderson SPK for REG

Approved By J. P. Barzotti JPB

Department GM Plant Environment

Report No. 311 *Date* 9-1-81

Project No. 20024 *Copy No.* 2

Environmental Activities Staff

General Motors Corporation
General Motors Technical Center
Warren, Michigan 48090

INDUSTRIAL ENVIRONMENTAL

PERFORMANCE REVIEW

FISHER BODY DIVISION

GRAND RAPIDS

METAL FABRICATION PLANT

GRAND RAPIDS, MICHIGAN

APRIL 10, 1981

SECURITY

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REVIEW SUMMARY

PURPOSE

The Plant Environment Department of Environmental Activities Staff conducted a second on-site Industrial Environmental Performance Review at the Fisher Body Grand Rapids Metal Fabrication Plant to re-evaluate the plant's status with regard to environmental regulations and recommended procedures for Plant Engineering. The response to the deficiencies identified as a result of the previous Performance Review conducted in March, 1978 was evaluated. Additionally, the handling of air quality, water quality, waste materials, hazardous materials, areas of OSHA normally considered Plant Engineering responsibilities and energy conservation was reviewed in light of revised codes, changing plant conditions, and refined audit techniques.

PROCEDURE

Plant records were reviewed and operating conditions were observed on a sampling basis. Deficiencies are separated into areas not meeting codes and potential problem areas. The out-of-code items are those that do not conform with existing emission or effluent limitations; ambient air, stream quality or OSHA standards; or permit requirements. Potential problems reflect situations where information is insufficient to determine if an item is in or out of code, instances that will not meet known future codes, conditions that do not conform with General Motors Standards or recommendations, or present practices which may result in temporary code violations.

CONCLUSIONS

1. Most of the deficiencies identified in March, 1978 have been satisfactorily corrected through plant action or code revisions. A deficiency that is essentially the same as reported in the previous review is identified as a "repeat problem".

2. The problem area that should be considered higher priority for correction involves the high percentage of employes without hearing protection in designated areas.

PROBLEM SUMMARIES

The following summarizes all the problems that were discussed with plant personnel and require corrective action or investigation:

AIR QUALITY

Area Not Meeting Code

No problems observed.

Potential Problem Area

No problems observed.

WATER QUALITY

Areas Not Meeting Code

Permit Limitations - Recent discharges to the city sewer (November, January, and February) have not met permit and code limitations for oil and grease. Split samples with the city verify some of these findings, although the city's analyses normally indicate higher concentrations than those of the independent laboratory. The city has not issued any complaints or violation notices as a result of these excursions. Most of the values range from 60 to 120 mg/l compared to the city permit and code limit of 50 mg/l.

Potential Problem Area

Testing - Testing of all outlets as recommended by GM Plant Environment Bulletin WPC 81-1 (previously WPC 77-3) has not been performed (repeat problem). Although some testing has been performed, all outlets and parameters have not been included as recommended.

WASTE MATERIALS

Areas Not Meeting Code

No problems observed.

Potential Problem Area

PCB Testing - Hydraulic systems fluids have not been analyzed to determine the presence of PCB as recommended by GM Plant Environment. Trace quantities of PCB have been identified in the sewer discharges. Systems containing concentrations greater than 50 mg/l must be drained and refilled and the system must be analyzed again within six months. This procedure must continue yearly until a level less than 50 mg/l is attained.

Containment - Although the PCB transformers located on the roof of the Powerhouse are within a diked area, there are two open storm sewer roof conductors adjacent to this equipment. These open drains were within the containment area (repeat problem). In addition, a minute leak was noted on one transformer vane weld joint.

OSHA AND HAZARDOUS MATERIALS

Areas Not Meeting Code

Hearing Protection - Many employes (40 of 109 or 37%) including seven supervisors were observed without hearing protection in designated areas (repeat problem). The location and percentage of non-compliance were the press area - 27%, and the metal assembly area - 48%. The seven supervisors observed without hearing protection comprised 58% of the supervisors surveyed. Ear protectors are available in all areas.

Crane and Hoist Inspections - Inspections have not been initiated for new installations of crane and hoist units in the Jig and Fixture, and Maintenance Departments.

Alloy Steel Chain Sling Certificates - Some proof test certificates for alloy steel chain slings were not located during the review. The certificates that were not found may have been misfiled by the Maintenance Department.

Potential Problem Area

Audiometry - Audiometric examinations are not performed yearly for all employes working in high noise level areas. A sampling of 20 employes revealed only seven were tested within the year. Most of these employes were tested in 1978. Medical Department personnel indicated that plant supervisors are notified each year to send their employes for audiometric exams.

ENERGY CONSERVATION

Area Not Meeting Code

No problems observed.

Potential Problem Area

No problems observed.

BACKGROUND DATA

L. D. Cottrell

The Fisher Body Grand Rapids Metal Fabrication plant is located in the City of Wyoming, Michigan, which is a surburb of Grand Rapids in Kent County. This facility's major products include automobile door assemblies, roofs, deck lids, and floor pans for all GM car lines. The major production processes consist of sheet metal stamping and fabrication including welding and zinc spraying.

The facility has approximately 188 600 square meters (2,030,000 square feet) of floor space on 35.6 hectares (88 acres) and employs 450 salaried and 2800 hourly people. As shown on the plot plan at the end of this section, this facility has several commercial establishments and a few residences to the north and east, a residential and light commercial area to the south, and some commercial businesses within an open area west of the plant. Construction of the plant started in 1935 with production beginning in 1936. The facility was the first Fisher Body metal fabrication plant designed specifically for that purpose. During World War II and the Korean War, aircraft and tank parts were produced, along with anti-aircraft weaponry. Years of major construction included: 1937, 1939, 1950, 1964, and 1977. The most recent expansion provided approximately 30 percent additional floor space and was completed in the spring of 1979. Some of this additional space provided room so several departments could move to the plant floor and an office remodelling project is nearing completion.

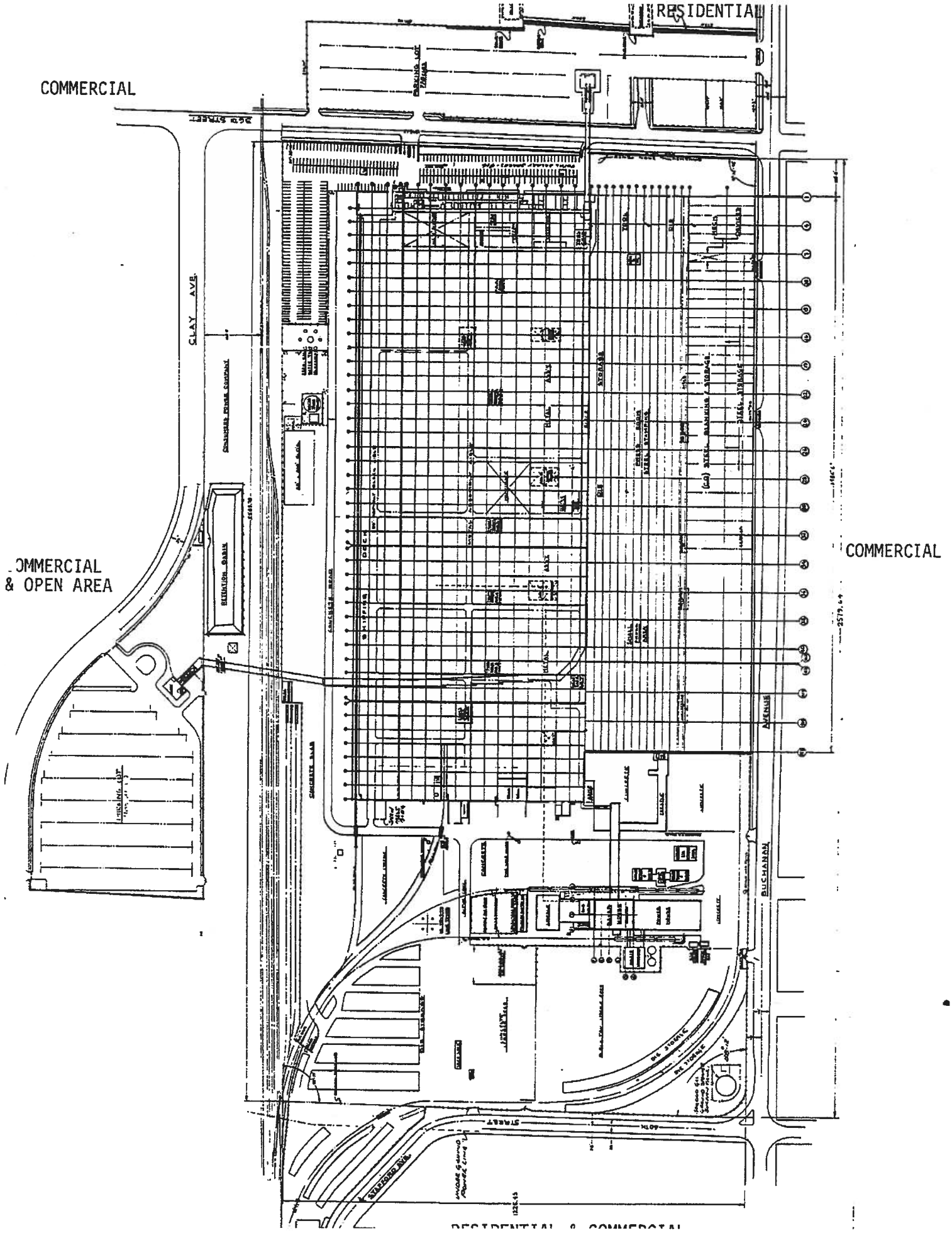
Electricity is purchased from Consumers Power Company and natural gas is purchased from Michigan Consolidated Gas Company. Steam is produced on-site with three gas/oil-fired package boilers.

All water is purchased from the City of Wyoming. Storm water from several outside storage areas is directed to a retention basin prior to discharge to the Cole drain, which flows into the Grand River. The roof drains as well as the balance of the yard drains are directed to a city storm sewer without passing through the retention basin. Process wastewater is batch treated at the waste treatment facility prior to discharge to the City of Wyoming sanitiary sewer system. Non-contact cooling water is recirculated.

Existing air quality control equipment includes dry filters on zinc prime and deadner spray booths, a water-wall maintenance paint spray booth and a baghouse for the die pattern area exhaust.

There is no on-site disposal of waste materials. All waste materials are hauled from the facility by private contractors to either a municipal landfill or other private disposal sites. Waste oil is burned in the Powerhouse boilers.

The remainder of this report presents the plant's environmental status at the time of the review.


RESIDENTIA
COMMERCIAL
26th STREET
CLAY AVE.
COMMERCIAL
& OPEN AREA
COMMERCIAL
BUCHANAN
AVENUE
STREET
STATESIDE AVE.

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AIR QUALITY

L. D. Cottrell

A review was performed at the facility to determine the type of emission sources and whether these sources meet applicable emission limitations and/or permit requirements. In addition, air quality procedures, programs, and control equipment were reviewed. The status with regard to standards and recommendations is summarized below, followed by general observations.

ITEMS REVIEWED	STANDARDS*	EVALUATION**
Process Source Emissions		
- Particulate	S	OK
- Hydrocarbons (VOC)	S	OK
Combustion Source Emissions		
- Particulate	S	OK
- Sulfur Dioxide/Fuels	S	OK
- Oxides of Nitrogen	S	N/A
Opacity	S	OK
Permits	S	OK
Emissions Inventory		
- Sources	S/GM	OK
- Hydrocarbons	S	OK
Episode Plan	S/GM	OK
Violation Notices/Complaints	S	OK
Odors	S	OK
Noise	S	OK
Fugitive Emissions	S	OK
Ambient Air Standards	F/S	OK
Material Accumulations (Roof)	GM	OK

*Standards

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S - State
F - Federal
N/A - No applicable standards
GM - GM standards, procedures, or recommendations

**Evaluation

N/A - Not applicable
N/C - Not checked
OK - No problems observed
Problem - Detailed in Review Summary

GENERAL OBSERVATIONS

Burning of Waste Oils - Waste oil reclaimed at the plant's waste treatment facility as well as reclaimed oil purchased from outside vendors is burned in the Powerhouse boilers. The data submitted with the installation and operating permit applications for the boilers indicated waste oil would be used as an auxiliary fuel. The waste oil provision was also pointed out on prints submitted with the installation permit request. A member of the DNR was questioned about the burning of waste oils in the

boilers. He stated that all conditions of the permit must be met. He also advised against using oil containing quantities of PCB above detection limits (20 ppm).

All oil purchased from outside suppliers must be accompanied with an analysis detailing PCB, sulphur content, percent water and other parameters specified by the Powerhouse Chief. The specification for acceptable oil is basically equivalent to No. 4 fuel oil. One boiler is equipped to burn up to No. 5 fuel oil. The remaining two boilers are equipped to burn No. 2 fuel oil.

New Door Line Installation Permits - The installation of a door fabrication line for the new mid-size "A" body series is presently under construction. Permits for the zinc primer paint spray booths were issued January 30, 1981. A permit for a spray deadner booth required for this line has not been obtained. The installation of this booth will trigger the 100 ton rule and therefore the request for an installation permit will be deferred until 39.9 tons of additional offsets are provided. A "Letter of Site Approval" for the booth has been issued by the DNR with "conditional approval" to start construction. The booth cannot be activated for tryout until the installation permit is obtained. The source of offsets necessary to obtain the required permit is still in question.

WATER QUALITY

R. E. Gunderson

A review was performed at the facility to determine the sources of wastewater and whether these discharges meet applicable code limitations and/or permit requirements. In addition, water quality procedures, programs, and treatment equipment were reviewed. The status with regard to standards and recommendations is summarized below, followed by general observations.

ITEMS REVIEWED	STANDARDS*	EVALUATION**
General Regulation/Code Compliance		
- Effluent Limitations/Visual Appearance	C/S	(See Permit Compliance)
- Reports and Recordkeeping	C/S	OK
- Other Requirements	C/S	OK
Permit Compliance		
- NPDES	S/F	N/A
- Sanitary or Combined Sewers	C	Problem
Polychlorinated Biphenyls (PCB)		
- Effluent Testing	C/GM	OK
- Concentrations	C/GM	OK
Spill Prevention Program		
- Contingency Plans (Developed, Certified, and Implemented)	S/F/GM	OK
- Containment Facilities	GM	OK
- Underground Tank Leakage Detection	GM	
- Spill Reporting and Follow-up	S/F/GM	N/A
Violation Notices/Complaints	C/S/F	N/A
Wastewater Effluent		
- Monitoring and Testing Completed	GM	Repeat Problem
- Anticipated Code/Permit Compliance	GM	OK
- Typical Sewer Code Compliance	N/A	OK
Waste Treatment Processes and Equipment		
- Treatment Effectiveness	N/A	(See Permit Compliance)
- By-passing Regulated	N/A	OK
- Equipment Operational	N/A	OK
- Operators Certified	C/S	OK
Plant Operations		
- Process Discharges Evaluated/Controlled	GM	OK
- Material Accumulations (Roof and Ground)	N/A	OK
- Automatic Refueling Latches Removed	GM	OK

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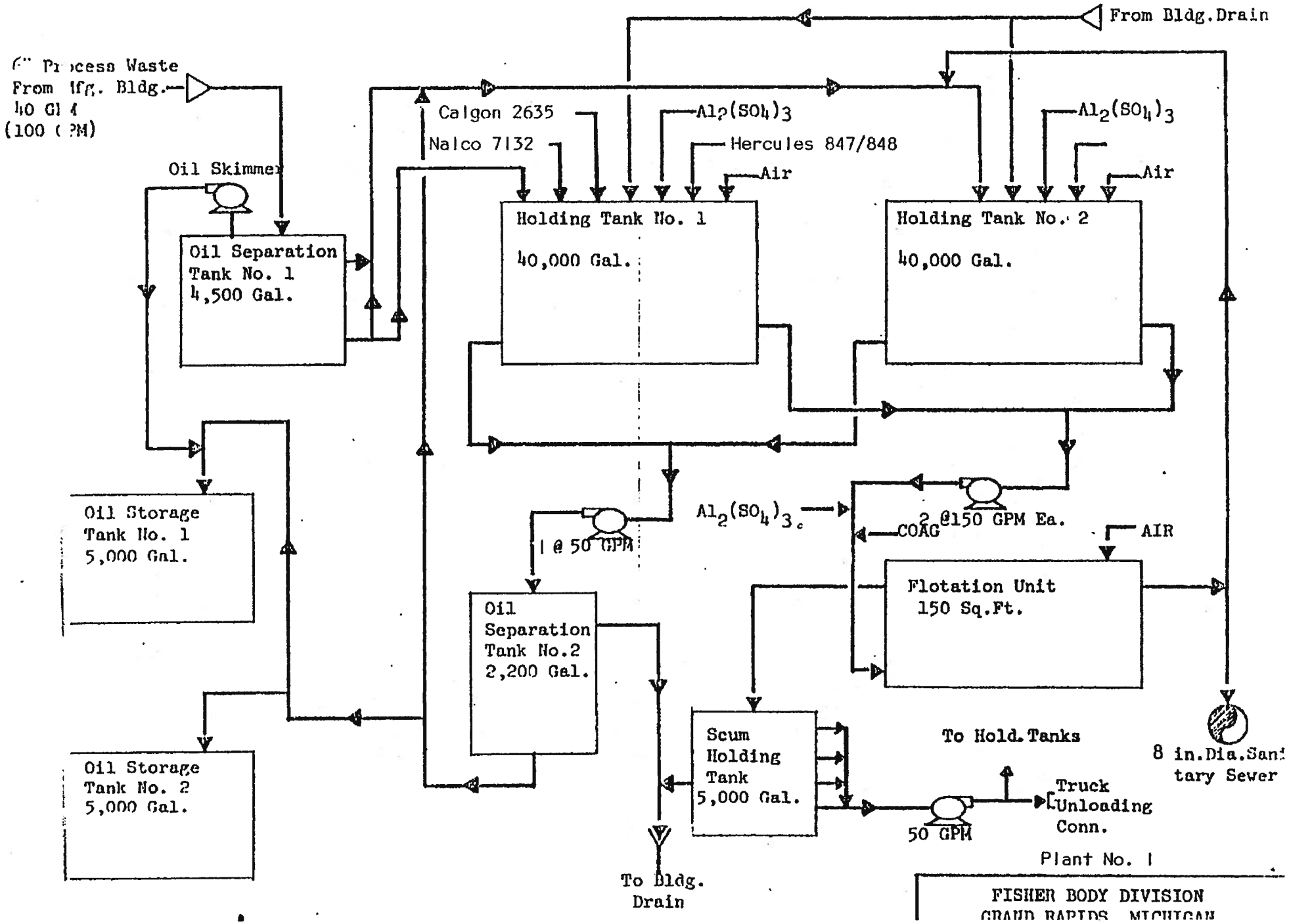
GENERAL OBSERVATIONS

Spill Materials - The plant has a trailer equipped with spill control supplies. The trailer contains most of the items needed in case of a spill, i.e. shovels, bales of straw, booms, absorbent pads, etc. The trailer is located adjacent to the Waste Treatment Plant.

Testing - The City of Wyoming obtains samples approximately every three months from the Waste Treatment Plant (WTP) discharge and the sanitary sewer which also carries the WTP discharge. The 24-hour composite samples are split and the plant engages Environmental Data, Inc. to perform the analysis. The city sends a copy of their analysis to the plant indicating any surchargeable concentrations and any out-of-code values. When the plant's discharges are out-of-code they are usually slightly over the limit and no complaints or violation notices have been received.

City Discharge Permit - Last year the City of Wyoming revised the plant's Order of Determination by changing the limitations for phosphorous and making it a surchargable contaminant. The limit for oil and grease remained at the 50 mg/l. Personnel from the Plant and Plant Environment had requested it be changed to 100 mg/l. The order is in effect until reissued.


6" Process Waste
From Mfg. Bldg.
40 GPM
(100 GPM)
From Bldg. Drain
Calgon 2635
Nalco 7132
$Al_2(SO_4)_3$
Hercules 847/848
Air
$Al_2(SO_4)_3$
Air
Oil Skimmer
Oil Separation Tank No. 1
4,500 Gal.
Holding Tank No. 1
40,000 Gal.
Holding Tank No. 2
40,000 Gal.
Oil Storage Tank No. 1
5,000 Gal.
1 @ 50 GPM
$Al_2(SO_4)_3$
2 @150 GPM Ea.
COAG
AIR
Flotation Unit
150 Sq.Ft.
Oil Separation Tank No.2
2,200 Gal.
Scum Holding Tank
5,000 Gal.
To Hold. Tanks
8 in.Dia.Sanitary Sewer
Oil Storage Tank No. 2
5,000 Gal.
50 GPM
Truck Unloading Conn.
To Bldg. Drain
Plant No. 1
FISHER BODY DIVISION
GRAND RAPIDS MICHIGAN

WASTE MATERIALS

S. P. Krupa

A review was performed at the facility to determine the types of wastes generated and whether disposal practices meet applicable code limitations and/or permit requirements. In addition, waste material handling procedures, programs, and equipment were reviewed. The status with regard to standards and recommendations is summarized below, followed by general observations.

ITEMS REVIEWED	STANDARDS*	EVALUATION**
Plant Disposal Practices		
- Liquids	S	OK
- Solid Waste	C/S	OK
Solid Waste Haulers Licensed	C/S	OK
- Licenses on File	GM	OK
- Operation	S/GM	OK
Liquid Waste Haulers Licensed	C/S	OK
- Licenses on File	GM	OK
- Operation	S/GM	OK
Disposal Site Licensed	C/S	OK
- Licenses on File	GM	OK
- Operation	S/GM	OK
Disposal Operations Evaluation	GM	OK
PCB Materials		
- Labeling	F	OK
- Testing	S/F	Problem
- Storage Requirements	GM	OK
- Disposal	F	OK
- Containment	F	Problem
RCRA Hazardous Waste Requirements		
- Manifest/Recordkeeping/Reporting	F	OK
- Contingency Plan/Emergency Procedures	F	OK
- Testing/Testing Plan	F	OK
- Training	F	OK
- Storage Requirements/Inspection	F	OK
- Security	F	OK
- Arrangements w/Local Authorities	F	OK
- Labeling	F	OK
- Container Residue	F	OK

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GENERAL OBSERVATIONS

RCRA Hazardous Waste Requirements - In November of 1980, plant personnel filed for interim status as a hazardous waste management treatment and storage facility. This action was required because their paint residues and sludges from industrial painting were listed as hazardous wastes (F017). However, on January 16, 1981, the U.S. E.P.A. promulgated amendments to the hazardous waste management and consolidated permit regulations which removed this waste from the listing. Testing of these residues and sludges, as well as other sludges generated by the plant, revealed that they were either not hazardous or generated in quantities of less than 1000 kilograms per calendar month, thereby qualifying this facility as a small quantity generator. In addition, the zinc rich primer residue is classified by the plant (and manufacturer) as secondary zinc rich primer which is reclaimed by the manufacturer, thus meeting the intent of 40 CFR 261.6 - the "special requirements for hazardous waste which is used, re-used, recycled or reclaimed". This reclaim/recovery policy extends to all wastes possible and is influencing the purchase of new materials (since the buyer now investigates the potential for reclaim of the material waste at the time of purchase of the raw material).

Plant Disposal Practices - Most trash including rubbish, vending wastes, garbage, paper, cardboard, wood, rubber, plastic, collector residue, and floor sweepings are compacted into closed roll-on containers and hauled by Waste Management of Michigan, Inc. to the Plainfield (Kent County) Landfill. The remaining trash including broken wood pallets, construction debris and non-hazardous adhesive wastes are self-hauled to the Fenske Landfill. Oily wastewater treatment sludges are hauled by A-1 Disposal, Inc. of Plainwell, Michigan to Liquid Disposal, Inc. of Utica, Michigan for incineration. Waste oils, both plant-generated and outside purchases, are stored in a tank in the Wastewater Treatment Plant and used as a supplementary fuel in the Powerhouse boilers. Purchased waste oil is analyzed for PCB and sulfur content prior to receipt, and excellent records of this operation are maintained.

PCB Transformers - Nitrogen-filled replacement transformers are on site for the PCB units now in use. The plant indicated quotes would be requested for the removal of the present transformers and installation of the new units. The contract will then be awarded and project completed.

OSHA AND HAZARDOUS MATERIALS

R. E. Gunderson

A review was performed at the facility to evaluate the noise and hazardous materials control programs, along with certain maintenance safety inspection records, and to determine whether these meet applicable OSHA and/or GM requirements. The status with regard to standards and recommendations is summarized below, followed by general observations.

ITEMS REVIEWED	STANDARDS*	EVALUATION**
Noise Program		
- Hearing Protection	OSHA	Repeat Problem
- Engineering Controls	OSHA	OK
- Administrative Controls	OSHA	OK
- Sound Survey	GM	OK
- Sound Level Specification	GM	OK
- Audiometry	GM	Problem
- Instrument Calibration	GM	OK
Maintenance - Records		
- Overhead and Gantry Cranes	OSHA	Problem
- Mechanical Power Presses	OSHA	OK
- Mechanical Forging Machines	OSHA	N/A
- Alloy Steel Chain Slings	OSHA	Problem
- Hydraulic Elevators	GM	OK
- Cross-Connections Control	OSHA/GM	OK
Hazardous Materials		
- Approved for Use	GM	OK
- Employe Protection	OSHA	OK
- Acid-Cyanide Intermix Control	OSHA	N/A

*Standards

OSHA - Federal regulations
GM - GM standards, procedures or recommendations

**Evaluation

N/A - Not applicable
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GENERAL OBSERVATIONS

Noise Program - The noise program is handled by the Master Mechanics Department. The survey is usually performed by a GMI student, after adequate training. The Phase I portion of the survey is performed in areas of known high noise levels and in other areas where noise level changes may have occurred. The noise levels of areas that do not change annually such as shipping and receiving, stock areas, and a few other selected areas are not surveyed. Administrative problems have resulted in full-time hearing protection requirements and the discontinuance of the fractional system. Floor plans of the plant have been colored to indicate

the areas where the high, indeterminant, and satisfactory noise levels occur.

Noise Engineering Controls - A $100,000 noise abatement appropriation request had been submitted to Detroit General Offices and denied because of the present economic climate. However, some of the projects requested have been completed and charged to departmental expense.

Maintenance Records - Inspections related to OSHA requirements are included in the Plant's preventive maintenance (PM) program. A job assignment card generated by this program is given to the assigned trade. The employe performs the assignment, signs the card and returns it to the supervisor. The card is recorded in the computer and a print-out is available for the record. The preventive maintenance (PM) program is set up for cranes and hoists, mechanical presses and alloy steel chain slings.

Hazardous Materials - The Hazardous Materials Control Program is patterned after the GM Corporate guidelines. The Committee is chaired by the Master Mechanic and includes representatives from all of the major departments. Meetings are held as required to evaluate new materials. Hazardous materials information is distributed to each using department. The supervisor not only accepts the material but the responsibility of training his employes in proper handling, use and disposal. Random follow-ups to determine if specific instructions are being followed are made by Master Mechanics' personnel and annually the total Hazardous Materials Control Program is reviewed by the Plant Auditor. During the review, a sample list of fifteen various materials which included chemical cleaners, oils, paints, organic solvents, adhesives and resins was compiled and reviewed with a member of the Committee. All but one material had received proper review and evaluation for hazard potential prior to use. The one material was "Oakite Radiate", a pellet type de-icing compound, which will replace previously used snow removal materials. A review of the Material Safety Data Sheets revealed they were non-hazardous and plant personnel believe that this new material probably will have a composition similar to those previously used.

ENERGY CONSERVATION

L. D. Cottrell

A review was performed at the facility to determine the amount of energy consumed and whether reductions meet applicable Corporate requirements. In addition, energy conservation procedures, programs, and projects were reviewed. The status with regard to standards and recommendations is summarized below, and is followed by general observations.

ITEMS REVIEWED	EVALUATION*
Adjusted Energy Savings (Corporate Goal = Decrease 4%)	
- Last Year - Decreased- 6.6%	
- Year-to-Date - Decreased- 3.9%	
Conservation Program	
- Management Involvement	OK
- Conservation Committee	OK
- Energy Coordinator	OK
- Training Program	OK
- Energy Responsibility Accounting Program	N/A
- Records	OK
- Administrative Controls	OK
- Shutdown Procedures	OK
Engineering Changes	
- Projects to Achieve Goals	OK
- Heat Conservation/Recovery	OK
- Inefficient Lighting Converted	OK
- Powerhouse Reductions	
o Steam	OK
o Air	OK
o Summer Operations	OK
- Maintenance of Steam and Air Equipment	OK
- Energy Monitoring and Control System	OK

*Evaluation

N/A - Not applicable
N/C - Not checked
OK - No problems observed
Problem - Detailed in Review Summary

GENERAL OBSERVATIONS

Program - The energy conservation program has a functioning committee which is co-chaired by the Plant Engineer and the Powerhouse Chief. The Powerhouse Chief is also currently functioning as the energy coordinator and spends approximately 25 percent of his time on energy management. Committee meetings are held twice yearly.

Some of the projects completed during the 1980 calendar year which resulted in energy savings include:

A. Draining of the elevated water tank during winter months to eliminate heating requirements to prevent freezing. Fire protection is still provided by two ground level storage tanks.

B. Installation of solar heat for the south fire tank to prevent freezing.

C. Installation of insulated metal siding in place of glass sash.

D. Press-by-press shutoff of air supply when not in use.

E. Use of a portable air compressor for equipment maintenance to eliminate need to operate main air compressors.

In addition, a central control and monitoring system has been installed and plant personnel are presently tying in equipment which is to be monitored or controlled. Presently, only 20 of approximately 229 presses have been wired into the system. Also, roof fans, air conditioners and make-up air units will be controlled by the computer system. When complete, this system should provide additional energy savings.

The conservation program has been able to meet Corporate goals to date. If the program continues to receive support of management and all employes, additional significant savings should be realized.

LIST OF REVIEW PARTICIPANTS

The three person review team spent three days in the plant. Twelve people from the division were involved at various times.

FISHER BODY DIVISION
GRAND RAPIDS METAL FABRICATION

C. Ball
J. A. Brandt
T. J. Desser
L. J. Elzinga
T. Fish, Jr.
O. W. Heyboer
W. M. Jann
H. W. Kruse
D. R. Meyer
M. A. Petzold
J. E. Wyatt
E. T. Van Wieren

GM INDUSTRIAL ENVIRONMENTAL
PERFORMANCE REVIEW GROUP

L. D. Cottrell
R. E. Gunderson
S. P. Krupa

4REG/504
8/28/81

Date July 28, 1978

Environmental Activities Staff

To Mr. Bill Goosmann

From Mr. Bob Roda

☐ For Your Info ☐ Please Handle ☐ Please Comment ☐ In Reply

Attached is a draft copy of the report covering our Environmental Review at your plant. The report has not been reviewed by the remainder of the GM Plant Environment Group or GM Legal Staff personnel. However, should they suggest any significant changes, I will discuss them with you prior to final distribution of the report.

I assume you will review our report with your people, Mr. Petzold, and possibly Mr. Brown. Your comments would be appreciated. Final distribution, as indicated on the cover sheet, will be made as soon as agreement on the report contents is reached. Mr. Pender will receive only the summary portion (three pages) and these would be the only items to be answered. An answer would be requested within 60 days of the final distribution.

Thanks again for your cooperation. I shall call in the near future to get your comments on the report and review comments made by the various staff personnel.

Bob
(8-535-8616)

cg

Attachment

DRAFT #_____

memorandum report

Distribution limited to:

P. D. Pender
J. J. Edwards
B. O. Cambell
H. J. Brown
W. R. Johnson
D. K. Van Zile
J. J. Hollis

Reported By R. A. Roda

Approved By J. P. Barzotti

Department GM Plant Environment

Report No. 143 *Date*

Project No. 20024 *Copy No.*

Environmental Activities Staff

General Motors Corporation
General Motors Technical Center
Warren, Michigan 48090

FISHER BODY

GRAND RAPIDS NO. 1

APRIL 14, 1978

SECURITY

☐ GM Restricted

☒ GM Confidential
Not To Be Copied

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EAS-041

REVIEW SUMMARY

PURPOSE

The Plant Environment Department of Environmental Activities Staff conducted an on-site Industrial Environmental Performance Review at the Fisher Body Division Plant #1 in Grand Rapids, Michigan, to determine the plant's status with regard to Environmental Regulations and recommended procedures for Plant Engineering. The handling of water quality, air quality, waste materials, toxic materials and hazardous materials was reviewed. In the area of OSHA, only noise and those functions normally considered Plant Engineering responsibilities were covered. In addition, the plant's Energy Conservation Program was investigated.

CONCLUSIONS

At this time, there are no areas of major environmental concern at this facility. Fisher Body personnel maintain an awareness of changing environmental regulations and appear to take action as required to meet new conditions. One factor in evidence of this statement is the excellent hazardous materials program at this facility.

The following items, which require some action or investigation, were reviewed with plant personnel.

AIR QUALITY

Calculated hydrocarbons emissions from the deadener spray and zinc spray booths for outer door panels exceed limitations specified in operating permit conditions.

Expected hydrocarbon emissions from zinc spray operation for E and K roof panels exceed limitations specified in installation permit conditions.

An installation and operating permit has not been obtained for the tar house.

Sulfur content of #2 fuel oil has not been checked to verify compliance with the state code.

WATER QUALITY

Testing of all parameters as recommended per bulletin WPC 77-3 has not been performed.

Transformers located on the roof of the power house with PCB laden oil are located by a roof drain. Also minute leaks of the transformers were noted.

The fire water diesel oil tank is located near an open storm drain, this does not conform to recommended GM containment standards.

WASTE MATERIALS

Copies of waste haulers and disposal sites licenses were not on file.

OSHA

Some employes, including supervisory personnel, were observed without hearing protection in designated areas during the hours when hearing protection is required.

Operator exposure facotrs have not been calculated for all indeterminate operator positions as required by the GM Uniform Sound Survey Procedure.

A schedule for implementation of known noise reduction measures, based on sound survey results has not been developed.

Sound data and certification sheets received from vendors on equipment being purchased are not reviewed by the plant.

The GM Sound Level Specification for machinery and equipment is not referenced on portable power tool orders.

BACKGROUND DATA

L. E. Breeding

The Fisher Body Grand Rapids #1 plant is located in the City of Wyoming, Michigan, which is a suburb of Grand Rapids in Kent County. The major products of this facility include automobile door assemblies, roofs, deck lids, and floor pans for all GM car lines. The major production processes consist of sheet metal stamping and fabrication including welding and zinc spraying.

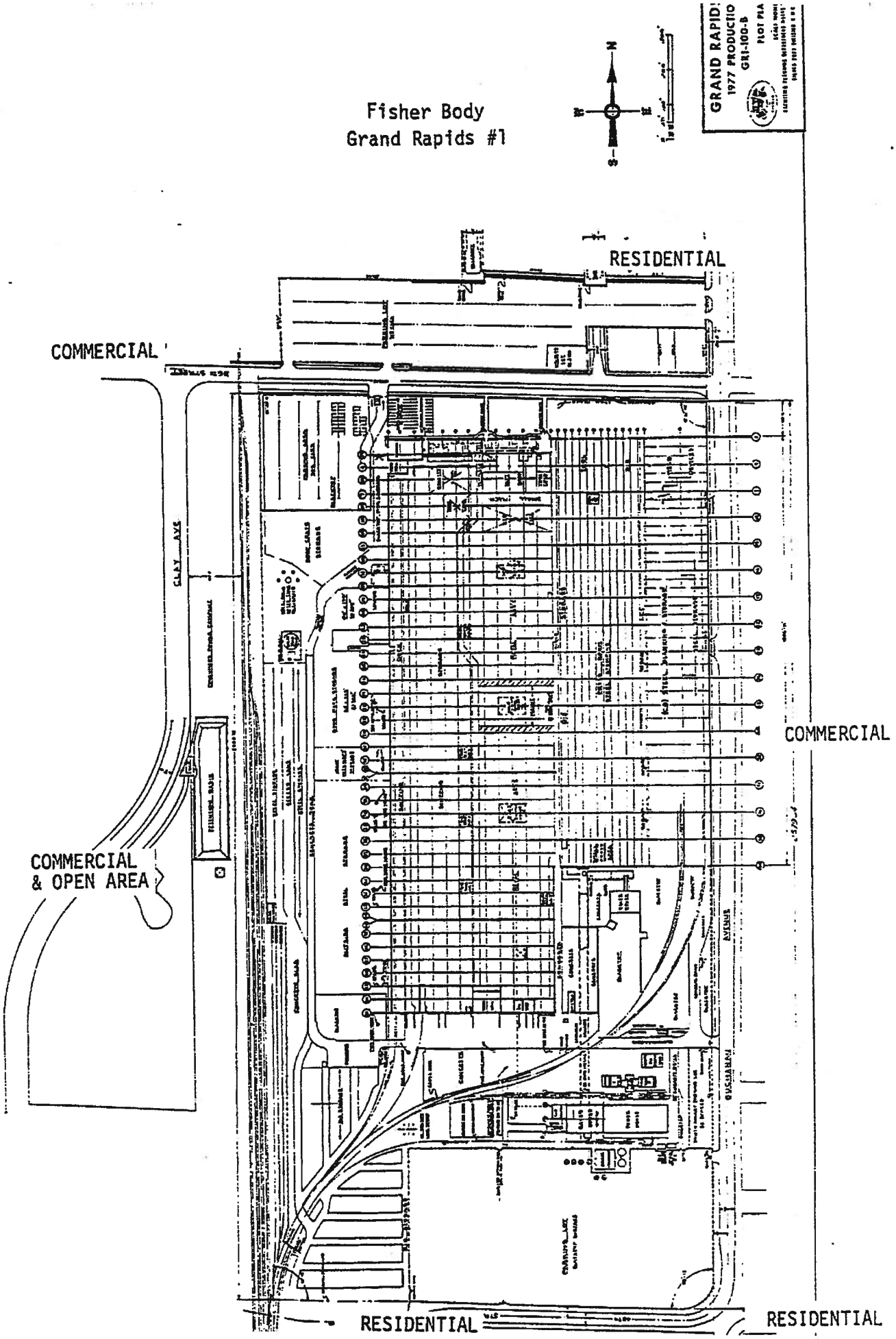
The facility has approximately 117,000 square meters (1,300,000 square feet) of floor space on 35.6 hectares (88 acres) and employs 460 salaried and 2400 hourly people. As shown on the plot plan, page 5A, this facility has several commercial establishments with a few residences to the north and east, a residential and light commercial area to the south, and some commercial establishments within an open area west of the plant. Construction of the plant started in 1935 with production beginning in 1936. The facility was the first Fisher Body metal fabrication plant designed specifically for that purpose. During World War II and the Korean War, aircraft and tank ports were produced, along with anti-aircraft weaponry. Years of major construction included: 1937, 1939, 1950, 1954 and 1964. Currently, a 32,850 square feet) building expansion is underway.

Electricity is purchased from Consumers Power Company and natural gas is purchased from Michigan Consolidated Gas Company. Steam is produced on-site with four gas/oil fired package from the City of Wyoming. Storm water is retained in a retention basin prior to discharge to the Cole drain, which flows into the Grand River.

Process wastewater is batch treated at the waste treatment facility prior to discharge to the City of Wyoming sanitary sewer system. Non-contact cooling water is recirculated.

Deficiencies identified during the performance review were separated into "areas not meeting codes" and "potential problem areas." The out-of-code items are those that do not conform with existing emission or effluent limitations; ambient air, stream quality or OSHA standards; or permit requirements; irrespective of whether or not the plant is operating in accorance with an approved variance or compliance schedule. Potential problems reflect situations where information is insufficient to determine if an item is in or out of code, instances that will not meet known future codes, conditions that do not conform with General Motors standards of recommendations, or present practices which may result in temporary code violations.

Fisher Body
Grand Rapids #1



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AIR QUALITY

L. E. Breeding

Existing control equipment includes dry filters on zinc prime and deadener spray booths, a cyclone collector for sawdust from the wood crating area, and a water wall maintenance paint spray booth.

AREAS NOT MEETING CODES

Hydrocarbon Emissions

Calculated hydrocarbon emissions from the deadender spray and zinc spray booths for outer door panels exceed the emission limitations specified as special conditions in the operating permits. Data submitted with the two permit applications included the estimated hydrocarbon emissions from these operations in units of tons per year. Upon issuance of the permits, regulatory officials assumed the operations to be continuous on a 24-hour basis and specified emission limitations in units of pounds per year based on the estimated annual emission data submitted by plant personnel. Since these operaitons are not continuous, the hydrocarbon emissions on an hourly basis exceed the limitation specified on the operating permits. This miscalculation was not realized until the installation permits had been converted to operating permits--a process which normally results in no change from the specifications of the installation permit. Plant personnal submitted a letter of explanation and request for correction to the state agency in March, 1978, and are awaiting action by the agency.

Permits

An installation and operating permit has not been obtained for the tar house located south of the manufacturing building. State law requires that no stationary source which may be a source of air contaminants be constructed or altered before issuance of a construction permit, nor be

operated without a permit to operate. This is an oversight of a minor source since it is a small unit used only periodically to heat tar for block floor repairs. Plant personnel have identified this source on the source inventory list as requiring the necessary permit. It appears all other sources requiring air pollution construction and operating permits for this facility have been obtained.

POTENTIAL PROBLEM AREAS

Hydrocarbon Emissions

The expected hydrocarbon emissions as calculated from mass balance usage from the zinc spray operation for E and K roof panels exceed the emission limitation specified as a special condition in the installation permit. This problem is identical to the emission problem from the deadener spray and zinc spray booths for outer door panels described earlier except this operation is still in the installation process. The letter submitted to the state agency requesting recalculation of the emission limitations for the previously mentioned operating permits also included the same request for this operation.

[redacted] Sulfur Content

The sulfur content of #2 fuel oil has not been analyzed to verify compliance with the state code limitation of 1.5 percent sulfur by weight. The #2 fuel oil is used as an alternate fuel for powerhouse boilers, however, verification of fuel sulfur content is still needed to assure compliance with the state code.

GENERAL OBSERVATIONS

Powerhouse

The powerhouse has three gas/oil fired boilers with a total rated steam capacity of 743,250 kilograms/hour (165,000 pounds/hour). During the review, one boiler was on-line operating at approximately 3600 kilograms/hour (8000 pounds/hour steam). The approximate steam utilization is 75 percent for building heat and 25 percent for process. Natural gas is the primary fuel, with #2 fuel oil as an alternate. Presently, preparations are being made to burn waste oil in the boilers, and operating permits for the boilers have already been revised to burn #6 fuel oil, although the boilers are not as yet capable of using the heavier oil.

Episode Plan

An episode plan outlining what will be done in case of an air pollution alert, or emergency has been prepared by plant personnel. The state has not requested that the plan be submitted.

Emissions Survey

The annual Michigan Air Polltuion Report was observed to be complete as submitted to the state. For their own use, plant personnel have compiled an inventory of all plant processes including permit requirements and status plus availabe emission calculations for each process.

Roof and Area Tours

The roof was clean with respect to evidence of uncontrolled emissions. All source emissions were within opacity limits. Maintenance of control and exhaust equipment appeared adequate. There were no objectionable noises, odors or visible emissions that could be attributed to plant operations.

WATER QUALITY

R. E. Gunderson

Sanitary and treated process wastewater are discharged into the sanitary sewer system of the City of Wyoming.

Storm runoff exits the property via two outfalls. Outfall 001 discharges directed to Cole Drain. This outfall carries most of the roof and yard runoff which passes through a retention basin. At the point of discharge a CPI separator collects floating oil which is pumped to a storage tank adjacent to the basin. The other outfall exits the property at the northwest corner into the city storm sewer. These storm waters enter Plaster Creek via Cole Drain.

Approximately 14.2 megaliters (0.5 million cubic feet) of water per month are purchased from the city. Approximately 55% is used for sanitation, 5% for boiler feed, 5% is consumed through the welder water system, 25% is needed for the compressors and the remaining 10% is process waters and miscellaneous.

Process wastewater is pumped to the waste treatment plant for treatment. Treatment consists of free oil skimming, chemical addition of alum and polymers for oil break, and air floatation. The batch treatment operations is performed approximately 9-10 times per month. A process flow diagram is attached at the end of this section indicating the sequence of treatment.

POTENTIAL PROBLEM AREAS

Testing

Testing of all outfalls and parameters as recommended by bulletin WPC 77-3 has not been performed. The last complete analysis was performed in

August of 1972. Samples were taken of; (A) the storm sewer which is now 001 at the retention basin, (B) sanitary sewer at the main plant, (C) sanitary sewer at the boiler/power house, and (D) the effluent of waste treatment plant. C and D are now combined. This reveals that the northwest storm effluent was not tested. Also many tests, required by WPC 77-3, were not ~~started~~ TESTED.

The routine monthly tests run of the waste treatment and retention basin effluents by Fisher Body General Offices do test for almost all of the required parameters. BOD, COD, potassium and silver are not included however.

The sanitary effluent which is primarily considered strictly sanitation does include the cooling tower blowdown water and the wash rack of the company car garage. Only 13 parameters were checked in 1972 and none since.

Transformers

Transformers, located on the roof of the power house, containing PCB laden fluid, are located on a diked pad. However there are two storn sewer roof conductors located within the diked area and adjacent to the transformers. Also minute leaks were noted on several of these transformers. Containment has not been provided with these open drains.

Containment

The fire water diesel oil tank is located near an open storm drain. This does not conform to recommended GM containment standards.

Temporary Storage

Due to the building expansion program, storage space capacity is limited. Presently several skids of oil are stored on portable dollies at the rear of the boiler house. These dollies are located near an open manhole.

Although they are portable and temporary, storage locations should be selected where containment is provided, such as east of the waste treatment plant in the diked area.

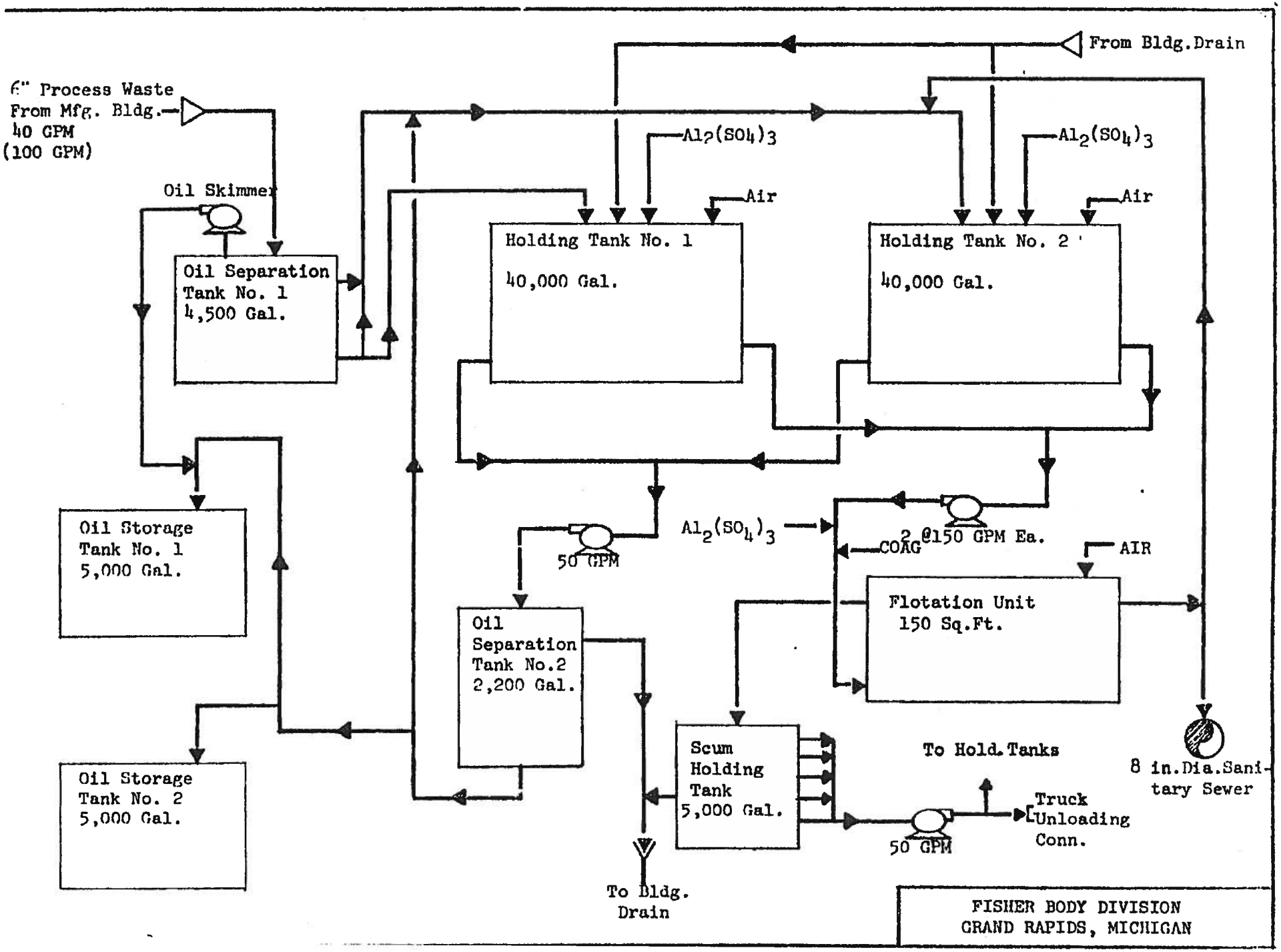
GENERAL OBSERVATIONS

Inside Transformers

PCB laden transformers were noted in the plant within curbed areas. These transformers were adjacent to drains which were plugged after being told of the condition during the review.

Alarms

The holding tanks have a warning alarm but they are not kept in calibration due to cost. Personnel are assigned to check to prevent overfilling. With the excess capacity, this does not appear to be a problem.


From Bldg.Drain
6" Process Waste
From Mfg. Bldg.
40 GPM
(100 GPM)
Oil Skimmer
Oil Separation
Tank No. 1
4,500 Gal.
Al2(SO4)3
Air
Holding Tank No. 1
40,000 Gal.
Al2(SO4)3
Air
Holding Tank No. 2
40,000 Gal.
Oil Storage
Tank No. 1
5,000 Gal.
50 GPM
Al2(SO4)3
COAG
2 @150 GPM Ea.
AIR
Flotation Unit
150 Sq.Ft.
Oil
Separation
Tank No.2
2,200 Gal.
Scum
Holding
Tank
5,000 Gal.
To Hold.Tanks
8 in.Dia.Sani-
tary Sewer
Oil Storage
Tank No. 2
5,000 Gal.
Truck
Unloading
Conn.
50 GPM
To Bldg.
Drain
FISHER BODY DIVISION
GRAND RAPIDS, MICHIGAN

WASTE MATERIALS

L. E. Breeding

Most trash including rubbish, vending wastes, garbage, paper, cardboard, wood, rubber, plastics, collector residue, and floor sweepings are compacted into closed roll-on containers and hauled by Industrial Disposal Incorporated to the Kent County Refuse Disposal System landfill. Remaining trash including scrap drums, broken wood pallets, and construction debris are self-hauled to the Fenske Landfill.

Waste oils are hauled in tank trucks by Metalworking Lubricants Incorporated or licensed subcontractors to General Oil Company in Detroit for reclamation.

Oily sludge and water sludges are hauled by Bigelow-McFadden to General Oil Company, where extracted oil is reclaimed and the remaining solids are landfilled.

Some non-returnable drums, used batteries, and non-ferrous scrap is sold on a bid basis. Scrap steel is baled in a separate building. Large bales are sold on a bid basis, with the remaining baled scrap divided between Central Foundry Division in Saginaw and the highest bidder. Rail cars are utilized to ship baled material. Loose steel bushelings are transported by truck to Central Foundry in Saginaw. Contracts for salvage materials are handled by the Division's Central Salvage.

POTENTIAL PROBLEM AREAS

Licenses

Copies of all applicable collection, disposal, and landfill permits were not on file. General Motors Legal Staff personnel have recommended that copies of all collection, disposal and landfill permits be obtained and

maintained on file to assure that they are current and to determine if there are limitations specific to a given waste hauler or landfill. Current licenses were not on file for Industrial Disposal Incorporated nor the plant's own solid waste transporting unit. Only the hauling permit for General Oil Company was on file for the purpose of implied approval of their disposal site within Michigan. No other licenses for liquid waste haulers were on file. However, plant policy requires that only vehicles bearing current waste hauler decals are allowed to transport waste from the plant. The liquid waste hauler's license numbers are recorded on the liquid Waste Removal Record for each vehicle to assure compliance with the plant policy.

GENERAL OBSERVATIONS

Landfill Sites

Both the Kent County Refuse Disposal System and Fenske landfill sites were visited during the review. Both sites were observed to be satisfactory in regard to access, compaction, and intermediate and final cover. Liter was not fully controlled at either location, but isolation from residential areas minimized the effect. Plant Engineering personnel have initiated a program to annually review and evaluate local disposal sites.

Disposal Site Approval

Plant personnel expressed a strong desire for GM Plant Environment to lend additional assistance in evaluating final disposal sites and techniques. The major complaint is that even with review of hauler and disposal site licenses, the actual credibility of the disposal services is unknown. Periodic review of haulers and disposal sites by plant personnel is difficult, especially when waste materials are transported a long distance. Plant personnel believe that GM Plant Environment should further evaluate available disposal services and make safe recommendations to the various plants.

OSHA AND HAZARDOUS MATERIALS

R. A. Roda

The noise and hazarous materials program were reviewed for compliance with OSHA and GM Standards. Overhead and gantry cranes, alloy steel chain slings, mechanical power presses, and powered industrial trucks were reviewed for OSHA inspection and record keeping requirements. Hydraulic elevators were reviewed to assure that they had double bottom bulkheads. Process water connections were investigated to determine if a cross-connection existed which could potentially contaminate drinking water.

AREAS NOT MEETING CODES

Hearing Protection

Approximately 45% of a sampling of employes, including supervisory personnel, were observed without hearing protection in designated areas during the hours when hearing protection is required. When employes are subjected to sound exceeding those levels listed in OSHA, it is a Federal regulation that engineering controls, administrative controls or hearing protection be utilized to reduce sound levels to within listed limits. GM's program to insure continuing compliance with the occupational noise exposure section of OSHA similarly stresses the use of hearing protection which is to be used until engineering or administrative controls can reduce noise levels below permissible limits. Hearing protection usage is just an interim measure and at this time cannot be considered the solution to a noise problem.

POTENTIAL PROBLEM AREAS

Sound Survey

The annual noise survey is taken using Phase II of the GM Uniform Plant Sound Survey Procedure only. Phase III of the sound survey procedure has not been completed for the indeterminate areas indicated on Phase II. As a result, some employes working in posted areas may be exposed above limits even if they were to wear hearing protection for the designated time since noise exposures are actually unknown. The Fisher Body fractional noise level hearing conservation system is based on operator exposure levels.

Noise Program

A schedule for implementation of known noise reduction measures, based on sound survey results where noise levels are above allowable limits has not been developed as recommended by GM Plant Engineering Program and Services. This plan should include cost consideration, and predicted noise reduction to be obtained with projected completion dates. The plant has identified its major sources of noise but does not have such a plan for solving its noise problems.

The Safety Department designates where hearing protection is to be used and production supervision enforces hearing protection usage. Posting of areas requiring hearing protection is done on a fractional basis at the entrance and exit of an asile and an specific pieces of equipment. An extensive study was undertaken for using administrative controls but was found to be not feasible because of work schedules, job classifications and seniority problems.

Noise Standards

The GM Sound Level Specification for Machinery and Equipment is included in purchase orders for potential noise generating equipment except portable power tool orders. The intent of the specification is also to include such hand tools which generate noise. Also some certification and data sheets received on equipment are not reviewed by a person trained in noise reduction. Such an evaluation should be made to deterime their effect on the plant environment. If noise abatement is required, it can sometimes be engineered into the equipment before it's installed and creates additional noise problems for the facility.

GENERAL OBSERVATIONS

Maintenance Records

Inspections of overhead gantry cranes, mechanical power presses, alloy steel chain slings, and powered industrial trucks are well documented and meet OSHA requirements.

Hazardous Materials Program

The Hazardous Materials Committee is chaired by the master mechanic, with representatives from plant protection, purchasing, powerhouses, material control, safety, accounting, traffic and the doctor. A review of noise materials in use including solvents, oils, paints, adhesives, and drawing compounds indicated that all had been reviewed for their hazard potential. The program appears effective and up-to-date.

Hydraulic Elevators

Records indicate the two hydraulic elevators at this facility incorporated provisions to protect against bottom bulkhead failure.

Cross Connections

No connections were found that would allow the contamination of drinking water supplies with process water.

ENERGY CONSERVATION

R. E. Gunderson

The energy conservation program is a functioning committee with the Plant Engineer as the chairman and the Power House Chief as the coordinator. Committee meetings are held quarterly with the last being 4/12/78. Progress meetings with the chairman and coordinator are held each week. The time allotted to energy ranges from 4-5 hours per day distributed among various functions.

An energy consumption survey was completed in March of 1978.

Implemented improvement encompass almost every idea category outlined in Energy Management bulletins. Building light and heat have been reduced with further reductions during nonproductive hours. Buildings have been closed-up with window sash repaired as required. Process temperatures have been reduced. Check for and repair of steam and air leaks is a routine procedure. Ventilation has been minimized.

Other energy conservation oriented improvements which have been implemented or are in progress include:

- Deactivated make-up heaters in the powerhouse and main plant.

- Shutdown steam mains when not required for heating. Set up all process steam on one main.

- Use reciprocating compressor for productive loads and centrifugal compressor for base load.

- Raise maximum temperature of welder water (closed system) cooling requirements from 80°F to 95°F.

- Combine welder tower and compressor towers to provide maximum cooling effect and minimize fan usage.

- Reduce pH of water to 7.0-7.4 to minimize scale build up in heat exchanges.

GENERAL OBSERVATIONS

The applications of capacitators has maintained a power correction factor at 97-98%.

The emergency plans made for voltage loss (blackout) include battery powered emergency lights, diesel generators and diesel pumps for fire lines.

A central control and monitoring system has been evaluated and an appropriation has been INITIATED.

LIST OF REVIEW PARTICIPANTS

A total of five days was spent in the plant by the four man review team. One other man from GM Plant Environment attended the summary meeting, and 19 men from the plants were involved at various times.

Fisher Body
Grand Rapids No. 1

E. A. Ball
P. A. Bouman
R. E. Bowen
R. L. Carlson
R. J. DeHaan
J. J. Desser
J. L. Elzinga
W. F. Goosmann
W. Jan
L. L. Lambregtse
D. R. Meyer
W. Neis
M. A. Petzold
D. E. Prose
J. Spendel
E. T. Van Wieren
D. C. Veltman
J. E. Wyatt
W. Wysocki

GM Industrial Environmental
Performance Review Group

L. E. Breeding
R. E. Gunderson
J. R. Keller
R. A. Roda

memorandum report

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J. J. Hollis

Reported By R. A. Roda

Approved By J. P. Barzotti

Department GM Plant Environment

Report No. 143 *Date*

Project No. 20024 *Copy No.*

Environmental Activities Staff

General Motors Corporation
General Motors Technical Center
Warren, Michigan 48090

FISHER BODY

GRAND RAPIDS NO. 1

APRIL 14, 1978

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Fisher Body
DIVISION OF GENERAL MOTORS CORPORATION

INTER-ORGANIZATION

Grand Rapids Metal Fab.
PLANT

SUBJECT Flood Lube Leak at HS-5 Press

DATE August 7, 1981

FROM M. Petzold

TO Mr. H. W. Kruse

During July it was observed that flood-lube was weeping down the press pit wall. (See attachment for complete historical record). It became obvious that this leak was occurring continuously whenever HS-5 was operating. Therefore, HS-5 press was removed to correct this problem and to investigate to determine if this leak may have contaminated the ground-water.

Mr. Bill Ward from GM Environment Act. Staff came into this plant on 8/5/81 to investigate. The HS-5 press area was observed, data from previous soil borings was taken, and the ingredients of Franklin Tuf-Draw Compound checked over for toxicity and degradability. Concern was expressed over the triethanolamine at 2% concentration and chlorinated paraffin at 20%. However, both are bio-degradable in the presence of air. Also, Mr. Ward commented that the foundation drain sumps at Z-1 press pit and south scrap conveyor pit may be intercepting oil which leaked into the sand. Also, it was noted that there are no known domestic water supplies which use this aquifer.

Mr. Ward stated that the data taken must be compiled to determine the potential extent of this problem. He will call next week with recommendations.

Mert Petzold

M. Petzold
Chief Engineer
Energy & Environment

MP/rma
Attach.

cc: Messrs. O.Heyboer, J. Brandt, E. T. Van Wieren
Joe Chu (GM EAS), B. Ward (GM EAS)

HISTORICAL RECORD

HS-5 - FLOOD LUBE OPERATION

1. Installed in 1973 or 1974 - (approximate date per D. Veltman)

2. Record of Franklin Oil Purchases

6/78 thru 2/79	- 33 bl./9 Mos.	=	3.67 bl./Mo.
3/79	- 14 bl./Mo.		
4/79 thru 11/79	- 10 bl./8 Mo.	=	1.25 bl./Mo.
12/79 thru 5/80	- 21 bl./6 Mo.	=	3.5 bl./Mo.
6/80 thru 5/81	- 45 bl./12 Mos.	=	3.75 bl./Mo.

3. Leak check on sump pan - tested in July, 1981 - no change in level over 37-hour period. Physical examination of pan also showed no cracks or leaks.

4. If the historical use is assumed to be 3.5 gal/month (no leaks), perhaps ten bl. was lost in March of 1979, or about 500 gal. concentrate or 5500 gal. of 1:10 dilute fluid.

5. A new pan was installed in April or May of 1979 per Don Veltman (M/Mech. Department).

6. In late 1979, oil started weeping down the wall which undoubtedly came from the March leak. It continued to weep for several months into the Press Pit in front of Z-1 Press.

7. In June, 1981, it was noticed that the pit wall was weeping again.

8. In July, 1981, it was observed that the pit wall was weeping whenever HS-5 press was operating and management decided that the leak was continuous. Remedial steps must be taken, and the extent of the loss to sand and possibly ground-water investigated.

9. In July, 1981, HS-5 Press was removed. The flood lube sump pan was intact. However, the angle iron containment outside the pan was leaking, allowing the lube to escape over the concrete floor, to cracks in the floor and into the sand. A section of floor was removed to examine the sand between HS-5 and Z-1 Press. The top layer of sand had a thick black coating. If a sample was taken 18" down, the sand was natural color, but had a distinct odor. Samples were taken 5 ft. down and the odor persisted.

10. On August 4, 1981, Joe Chu of GM Envir. Act. Staff was called and informed. He suggested that their staff geologist, Mr. Bill Ward, be sent to Grand Rapids Metal Fab. to investigate.

11. On August 5, 1981, Mr. Bill Ward came into the plant and observed the operation, recorded test boring data from the 1954 and 1977 expansion,

and made a presentation to the plant (O. Heyboer, J. Brandt, M. Petzold, and R. Carlson) about the hydrogeological implications of ground-water contamination.

12. Mr. Ward stated that he will examine the data collected and call M. Petzold during the week of 8/10/81 with recommendations. Mr. Ward left the plant at 5:30 P.M.

GENERAL MOTORS CORPORATION Mer/
MATERIAL SAFETY DATA SHEET Flood lobe material for HS4-5

SECTION I

PRODUCT NAME OR NUMBER: TUF-DRAW D-S COMPOUND 21305 (93C95042801)	
MANUFACTURER'S NAME: FRANKLIN OIL CORPORATION	EMERGENCY TELEPHONE NO.: 216/232-3000
ADDRESS (Number, Street, City, State and Zip Code): P.O. BOX 46030, FRANKLIN PARK, CLEVELAND, OHIO 44146	
HAZARDOUS MATERIALS DESCRIPTION AND PROPER SHIPPING NAME(49 CFR 172.101)	HAZARD CLASS (49 CFR 172.101)
CHEMICAL FAMILY: PETROLEUM HYDROCARBONS	FORMULA: SEE SECTION II

SECTION II — INGREDIENTS (list all ingredients)

	C.A.S. NO.	%
LIQUIDFIED PARAFFIN WAX	8012-95-1	60
OIL SOLUBLE PETROLEUM SULFONATE	61789-85-3	15
LARD OIL	8002-50-4	2
ETHOXYLATED ALCHOLS	26027-38-3	1
TRIETHANOLAMINE	102-71-6	2
CHLORINATED PARAFFIN	8029-39-8	20

☐ SECTION III — PHYSICAL DATA

BOILING POINT (°F) (°C)	N/A	SPECIFIC GRAVITY (H_2O=1)	1.00		
VAPOR PRESSURE (mm Hg)	N/A	PERCENT VOLATILE BY VOLUME (%)	N/A		
VAPOR DENSITY (AIR=1)	N/A	EVAPORATION RATE (=1)	N/A		
SOLUBILITY IN WATER	DISPERSABLE	pH= 10-1	8.8		
APPEARANCE AND ODOR	CLEAR AMBER OIL, BLAND ODOR			IS MATERIAL: (LIQUID) SOLID GAS PASTE POWDER	

☐ SECTION IV-FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (method used)	340° F. (COC)	FLAMMABLE LIMITS	LEL / UEL
EXTINGUISHING MEDIA	FOAM, CO_2, DRY CHEMICAL		
SPECIAL FIRE FIGHTING PROCEDURES	FIGHT AS A CLASS B FIRE		
UNUSUAL FIRE AND EXPLOSION HAZARDS			

☐ SECTION V-HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE	THRESHOLD LIMIT VALUE (OF MIXTURE)
EMERGENCY AND FIRST AID PROCEDURES: IF SWALLOWED, DO NOT INDUCE VOMITING, CALL A PHYSICIAN. EYE CONTACT, FLUSH WITH WATER, CALL A PHYSICIAN, WASH OFF SKIN WITH SOAP AND WATER.	

☐ SECTION VI-REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	
INCOMPATIBILITY (materials to avoid)	STRONG OXIDIZING AGENTS		
HAZARDOUS DECOMPOSITION PRODUCTS:	UPON COMBUSTION - CO, CO_2, Cl_2		
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

☐ SECTION VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
CLEAN UP WITH OIL ABSORBENT MATERIAL
WASTE DISPOSAL METHOD
DISPOSE OF IN AUTHORIZED LANDFILL

☐ SECTION VIII-SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)		
VENTILATION	LOCAL EXHAUST (Specify Rate)	SPECIAL
	MECHANICAL (General) (Specify Rate)	OTHER
PROTECTIVE GLOVES: NEOPRENE	EYE PROTECTION: SAFETY GLASSES OR GOGGLES	
OTHER PROTECTIVE EQUIPMENT		

☐ SECTION IX-SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: IF FROZEN, ALLOW TO COME TO ROOM TEMPERATURE
BEFORE USING.
OTHER PRECAUTIONS

Seller agrees not to assert any claim (other than a claim for a patent infringement) against General Motors Corporation for any use or disclosure of any technical data or information disclosed in connection with this questionnaire.

PLEASE COMPLETE QUESTIONNAIRE AND RETURN TO:	Name (print)	R. E. KLOTZ
	Signature	R. E. Klotz
	Title	TECHNICAL DIRECTOR
	Date	10/15/79

LOCATION CISCO CODE ☐☐☐☐

FOR GM USE ONLY

GM IDENTIFICATION CODES USED AT THIS LOCATION:

GM- ☐☐☐☐☐☐☐☐ 105 ☐☐☐☐☐☐☐☐ 998 ☐☐☐☐☐☐☐☐

☐☐☐☐☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐☐☐☐☐

IS THIS SUBSTANCE CRITICAL TO CURRENT PRODUCTION? ☐ YES ☐ NO

IS THIS SUBSTANCE CRITICAL TO FUTURE PRODUCTION? ☐ YES ☐ NO

CLASSIFICATION OF USE:

☐ SOLVENT	☐ FLUX	☐ ABSORBANT	☐ INSULATOR	☐ ☐☐☐☐☐☐☐☐☐☐☐☐
☐ COATING	☐ FUEL	☐ ABRASIVE	☐ LUBRICANT	☐ ☐☐☐☐☐☐☐☐☐☐☐☐
☐ DEODORANT	☐ INSECTICIDE	☐ ADHESIVE	☐ POLISH	☐ ☐☐☐☐☐☐☐☐☐☐☐☐
☐ DISINFECTANT	☐ COOLANT	☐ CLEANER	☐ FILLER	☐ ☐☐☐☐☐☐☐☐☐☐☐☐

CRITICAL MATERIALS REGISTER

SUPPLIER FRANKLIN OIL CORPORATION PRODUCT TUF-DRAW D-S COMPOUND 21305

CODE NO. (94C95042801) *UNIT WEIGHT OF PRODUCT _____ LB. PER _____

I Inorganic Materials

A The following inorganic materials and all their compounds are to be reported

	Parameter Number
antimony	Class 01-0
arsenic	Class-01-1
beryllium	Class 01-2
cadmium	Class-01-3
chromium	Class 01-5
cobalt	Class-01-6
copper	Class 01-7
— cyanides	Class-01-8
— hypochlorite	Class-01-4
— lead	Class-01-9
thium	Class-02-0
mercury	Class-02-1
nickel	Class-02-2
selenium	Class-02-3
silver	Class 02-4
thallium	Class-02 5
zinc	Class-02-7

B The following specific inorganic materials are to be reported (do not report compounds)

	Parameter Number
— chlorine	07782 50 5
— hydrogen sulfide	07783-06-4

II Organic Materials

	Parameter Number
acetone cyanohydrin	00075-86-5
*2 acetylaminofluorene	00053 96 3
acrolein	00107 02-8
*acrylamide	00079-06-1
*acrylic acid	00079 10-7
acrylonitrile	00107-13-1
aminoazobenzene	00060-09-3
4-aminobiphenyl	00092-67-1
amitrole	00061-82-5
aniline	00062 53-3
benzene	00071-43-2
benzidene	00092-87-5
benzo(a)pyrene	00050-32-8
brucine	00357-57-3
1 4 butane sultone	01633-83-6
carbon disulfide	00075-15-0
carbon tetrachloride	00056-23-5
*chloramines	Class-08-6
chlorinated dibenzofurans	Class-05-3
chlorinated dioxins	Class-05-4
1-chloro-2 3-epoxypropane	00106-89-8
2-chloroethanol	00107-07-3
*chloroform	00067-66-3
bis(2-chloroethyl)ether	00111-44-4
bis(2-chloromethyl)ether	00542-88-1
2 3 and 4-chlorophenol	Class-07-1
1-(4-chlorophenyl) -3 3-dimethyl triazene	07203-90-9
chloroprene	00126 99 8
di-n-butyl phthalate	00084-74-2
cresols	Class-08-5
dichlorobenzenes	Class-05-6
3 3 -dichlorobenzidine	00091-94-1
dichlorophenols	Class-07-3
dichloropropanes	Class-05-7
*1 2 3 4 diepoxybutane	00298-18-0
4-dimethylaminoazobenzene	00060-11-7
dimethylhydrazines	Class 06-2
3 3-dimethyl-1-phenyl triazene	07227 91-0
dimethyl sulfate	00077-78-1
2 3-epoxy-1-propanal	00765-34-4
ethylene dibromide	00106-93-4
ethyleneimine	00151-56-4
ethylene oxide	00075-21-8
formaldehyde	00050-00-0
hexachlorobenzene (HCB)	00118-74-1
hexachlorobutadiene (HCBD)	00087-68-3
hexachlorocyclohexane (lindane)	00608-73-1

Organic Materials (continued)

hexachlorocyclopentadiene	00077-47-4
hydrazine	00302 01-2
hydrazobenzene	00122 66 7
hydroquinone	00123 31 9
n-(2-hydroxyethyl)ethyleneimine	01072 52 2
lactonitrile	00078-97-7
methyl(chloromethyl)ether	00107 30 2
methylene(bis)-2-chloraniline	00101 14-4
*1 2(methylenedioxy)-4-propenyl benzene	00120-58 1
*methyl hydrazine	00060-34 4
naphthalene	00091 20-3
1-naphthylamine	00134 32 7
2-naphthylamine	00091 59 8
*4-nitrobiphenyl	00092-93 3
2 3 and 4 nitrophenol	Class 07 4
n-nitroso diethylamine	00055-18-5
n-nitroso dimethylamine	00062-75 9
n-nitroso-dimethylaniline	00138 89 6
pentachloroethane	00076 01-7
*pentachloronitrobenzene	00082 68-8
pentachlorophenol	00087-86-5
peroxyacetic acid	00079-21-0
phenol	00108 95-2
polybrominated biphenyls (PBB)	Class-07-8
polychlorinated biphenyls (PCB)	Class-07-9
1,3-propane sultone	01120-71-4
β-propiolactone	00057-57-8
propylene imine	00075-55 8
semicarbazide	00057 56-7
styrene	00100-42-5
tetrachloroethanes	Class 08-2
*tetrachloroethylene	00127-18-4
thiourea	00062 56-6
triaryl phosphate esters	Class-08-4
*trichloroethylene	00079-01-6
trichlorophenols	Class-07-6
tris(dibromopropyl)phosphate	00126-72-7
vinyl chloride	00075-01-4
xylenols	Class-07-7

Does this product contain any of the above materials? Yes___ No ✓

If yes, list them below.

	%/wt		%/wt

*Necessary if supplied on other than weight basis, e.g. #/gal.

We agree not to assert any claim (other than a claim for patent infringement) against General Motors Corporation with respect to any technical information which we have disclosed hereon.

For use in Michigan locations only.

Date: 10/11/79 Signature: Robert E Kelly Company: FRANKLIN OIL CORP. (OHI

Title: TECHNICAL DIRECTOR

INSTRUCTIONS: This form properly filled out shall accompany any samples requested or special order non-specified materials.

REPORT ON SOILS INVESTIGATION

FOR

FISHER BODY RETENTION BASIN

GRAND RAPIDS, MICHIGAN

GRAND RAPIDS TESTING SERVICE

SOIL AND FOUNDATION ENGINEERS

Grand Rapids, Michigan

GRAND RAPIDS TESTING SERVICE

3064 MADISON AVE., S. E. GRAND RAPIDS, MICHIGAN 49508
PHONE (616) 245-9117

Fisher Body Retention Basin
Project Number 14-1072

PURPOSE:

The purpose of this report is to present the results of a soils investigation performed for Fisher Body at the Retention Basin on Clay Street, Grand Rapids, Michigan.

PROCEDURE:

Soil borings were the primary method of investigation used for determining soil classification, soil bearing capacity, and ground water information.

The borings were advanced with continuous flight augers to sample depths where samples of the soils were obtained in a two-inch split spoon sampler driven by a 140 pound hammer falling 30 inches. The number of blows required to drive the sampler two six-inch increments is recorded on the boring logs and the summation of the two is the standard penetration resistance in blows per foot.

DESCRIPTION OF SUBSURFACE MATERIALS:

Boring Number 1 has a surface stratum of 6.4' of very loose to loose black fibrous organic material (peat) overlying medium to loose light brown medium sand to 14.3'. Loose to medium light brown coarse sand with pebbles goes to the end of the boring at 20.0'.

Boring Number 2 has 2.6' of loose black fibrous organic material (peat) at the surface, overlying loose light brown medium sand to 6.7'. Loose very light brown medium sand goes to 8.4', and overlies loose to medium light brown coarse sand to 20.0', the end of the boring.

Boring Number 3 has very loose to medium light brown coarse sand to 13.9', overlying medium light brown coarse sand with pebbles to 20.0', the end of the boring.

Boring Number 4 has a surface stratum of very loose to loose light brown coarse sand to 8.4', overlying light brown coarse sand with pebbles to 20.0', the end of the boring.

Water was encountered in Borings Number 1, 2, 3, and 4 at 14.3', 14.0', 1.0', and 0.5', respectively.

CONCLUSIONS AND RECOMMENDATIONS:

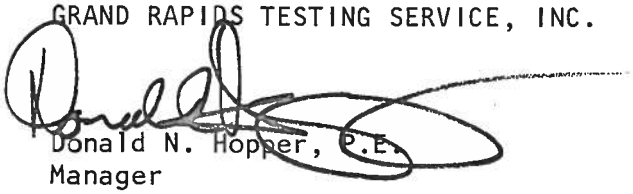
As can be seen by the boring logs, soils on the site are quite uniform in classification, being generally a fibrous organic peat overlying granular materials of various densities. It is our understanding that foundations for structures to be placed in or about the retention basin are to be set at elevation 58.0'. The boring logs indicate that generally, water on the site is at elevation 57.0'. The boring logs also indicate that at the locations of Borings 1 and 2, footings may be placed at that depth, provided they are designed with 2000 p.s.f. assigned the supporting soils. They also may be placed at elevation 60.0', designed with 3000 p.s.f. assigned the supporting soils, provided the soils are densified by vibration to 95% of maximum dry density as determined by the modified proctor method.

At the location of Borings 3 and 4, very little bearing capacity is available at elevation 58.0'. If foundations are to be placed at that elevation, they should be designed with 1500 p.s.f. assigned the supporting soils. An alternative to this, however, would be to excavate the soils to the water table, import clean bankrun gravel approved by a qualified testing laboratory and vibrate it into the very loose soils underlying the foundations. This material should be placed to approximately elevation 60.0', and here again, foundations may be placed with 3000 p.s.f. assigned the imported soils, again provided they are densified to the above-mentioned compaction percentages.

It should be noted that proper cover should be placed over the footings to protect them from frost penetration.

Respectfully submitted,

GRAND RAPIDS TESTING SERVICE, INC.



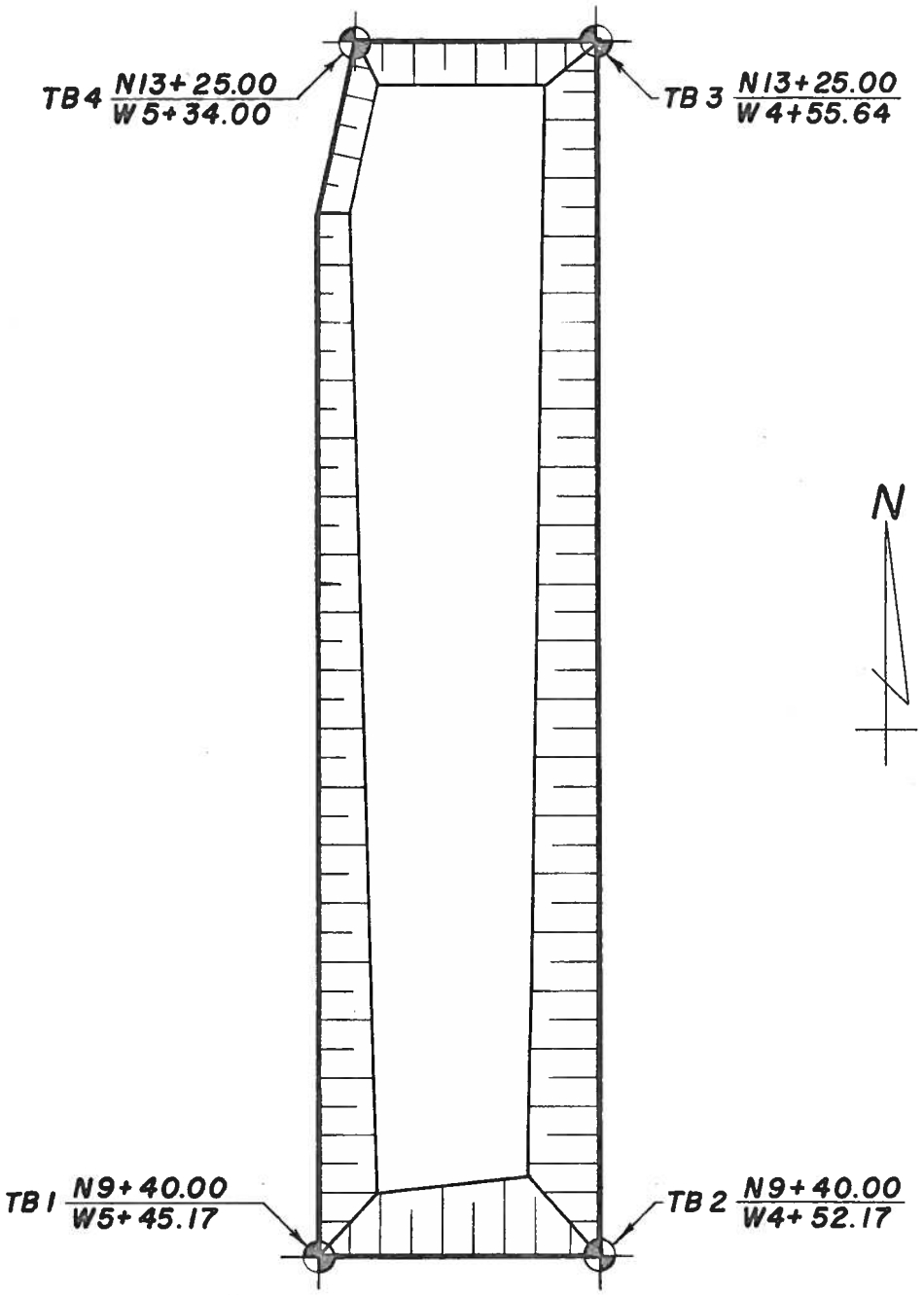
Donald N. Hopper, P.E.
Manager

DNH/hc

GRAND RAPIDS TESTING SERVICE

3064 MADISON AVE., S. E. GRAND RAPIDS, MICHIGAN 49508
PHONE (616) 245-9117

Fisher Body Retention Basin
Project Number 14-1072



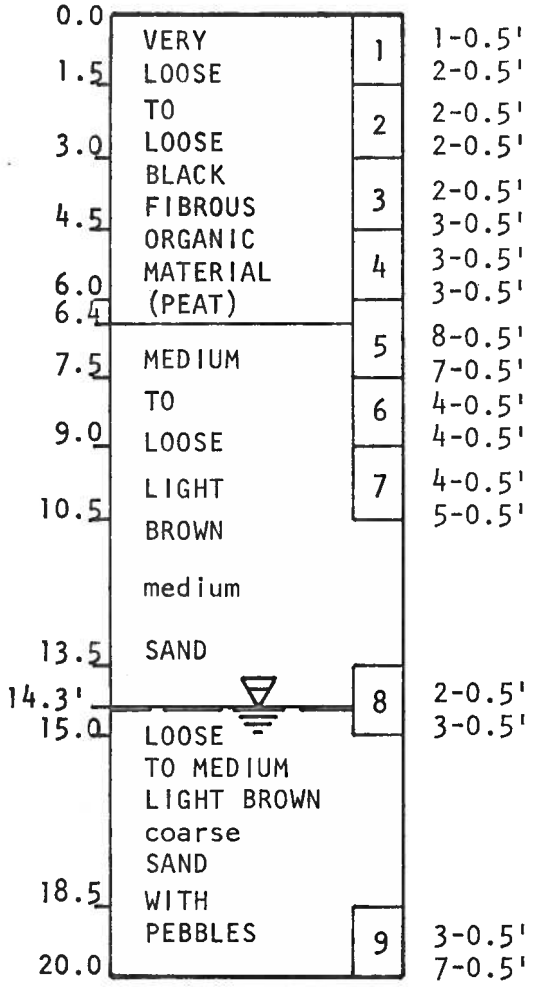
SOIL BORING LOCATION PLAN

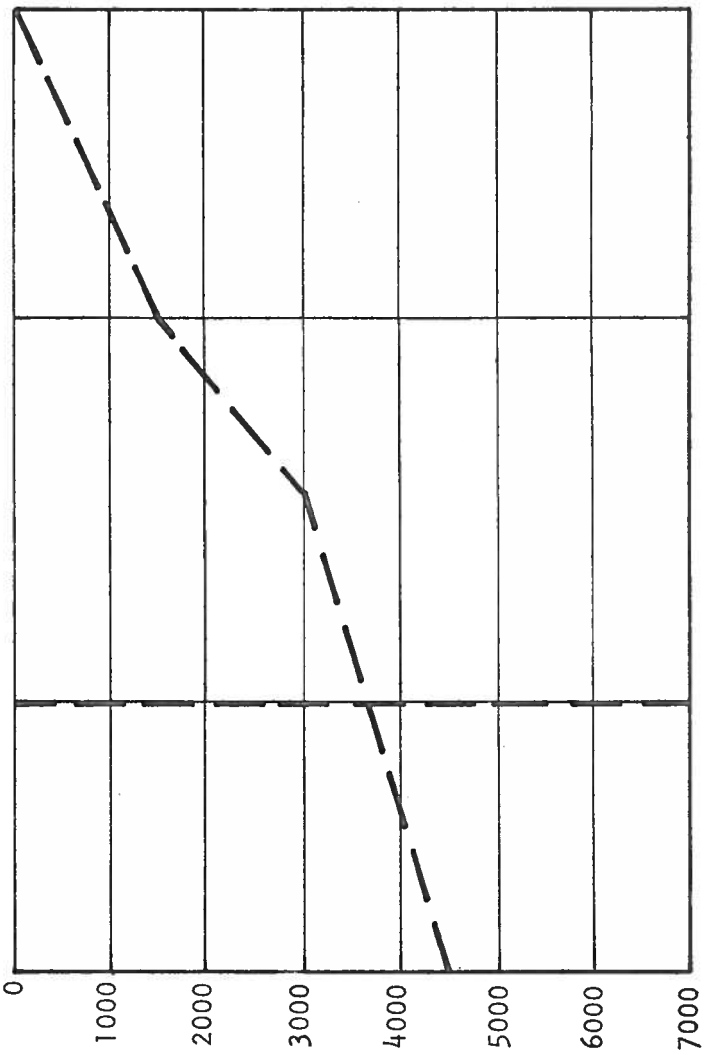
SCALE- 1"=60'

GRAND RAPIDS TESTING SERVICE

3064 MADISON AVE., S. E. GRAND RAPIDS, MICHIGAN 49508
PHONE (616) 245-9117

PROJECT Fisher Body Retention Basin (Clay Street)
CLIENT Fisher Body
BORING NO. 1 DATE STARTED 10-17-72 DATE COMPLETED 10-17-72
SURF. ELEV. 669.9 DATUM Chisel mark headwall TBM#1 = 664.95
DRILLER L. Taylor HELPER C. Janiszewski



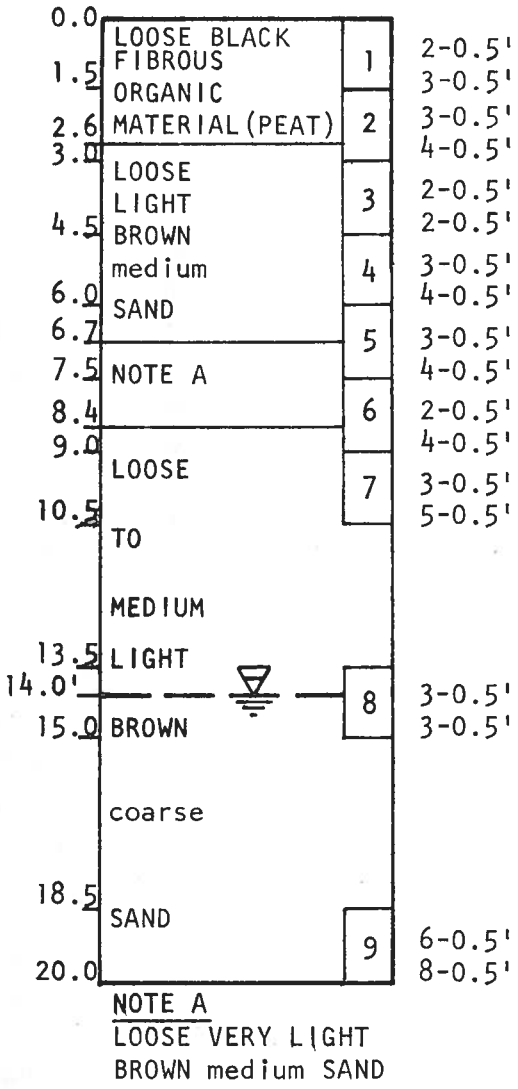


PROJECT NUMBER 14-1072

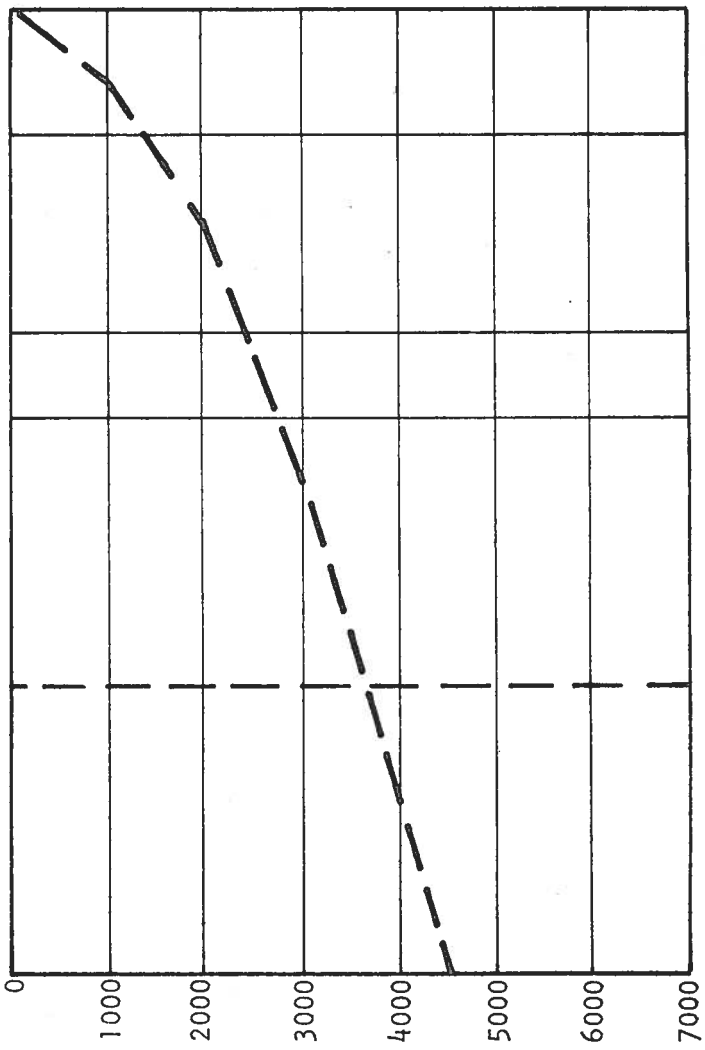
GRAND RAPIDS TESTING SERVICE

3064 MADISON AVE., S. E. GRAND RAPIDS, MICHIGAN 49508
PHONE (616) 245-9117

PROJECT Fisher Body Retention Basin (Clay Street)
CLIENT Fisher Body
BORING NO. 2 DATE STARTED 10-17-72 DATE COMPLETED 10-17-72
SURF. ELEV. 670.9 DATUM Chisel Mark headwall TBM#1 = 664.95
DRILLER L. Taylor HELPER C. Janiszewski



NOTE A
LOOSE VERY LIGHT BROWN medium SAND

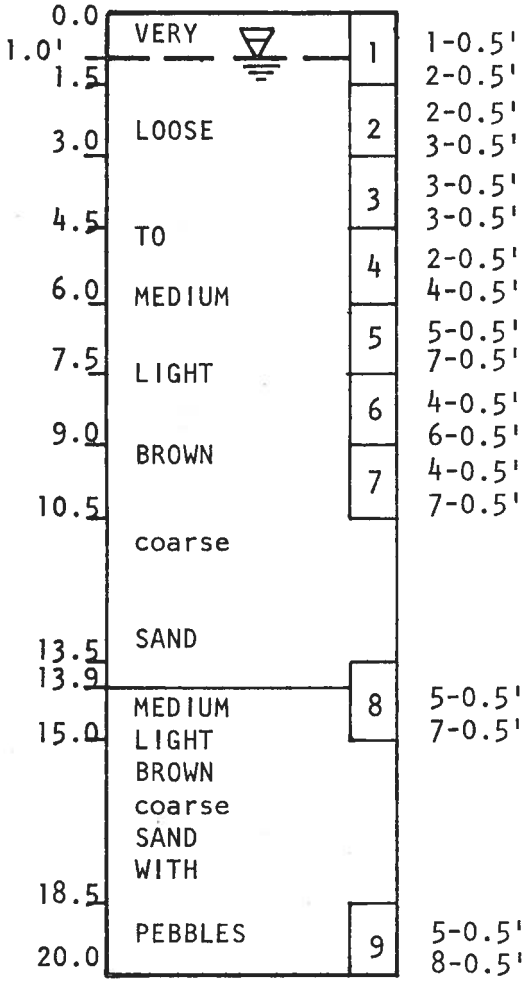


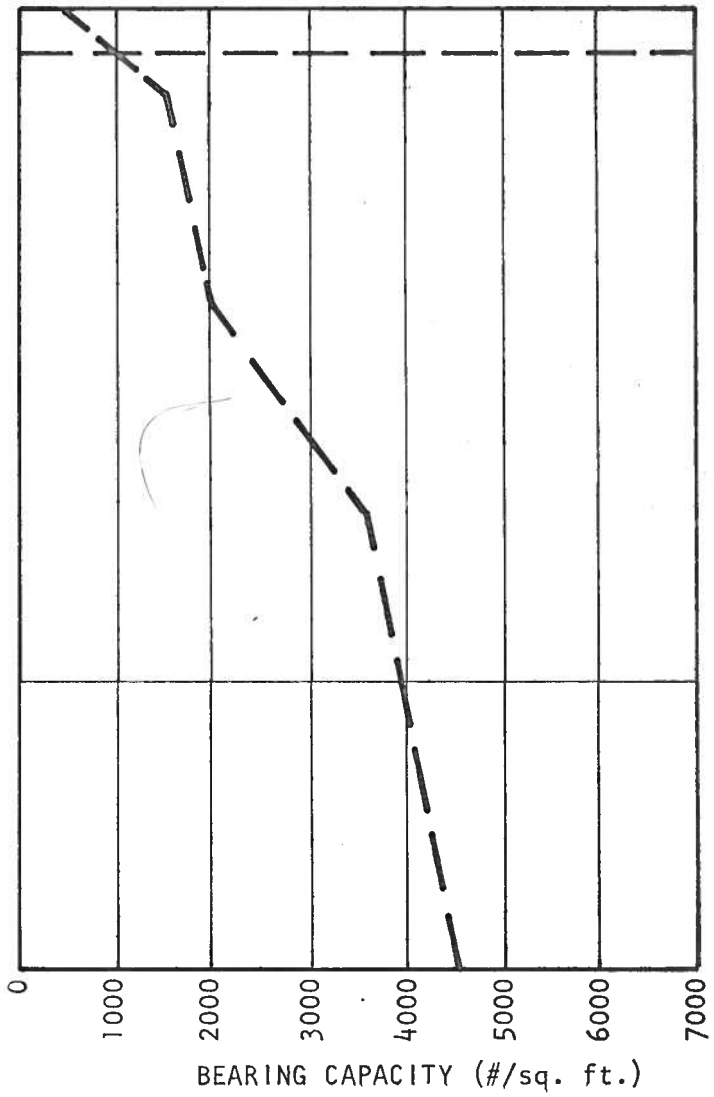
PROJECT NUMBER 14-1072

GRAND RAPIDS TESTING SERVICE

3064 MADISON AVE., S. E. GRAND RAPIDS, MICHIGAN 49508
PHONE (616) 245-9117

PROJECT Fisher Body Retention Basin (Clay Street)
CLIENT Fisher Body
BORING NO. 3 DATE STARTED 10-18-72 DATE COMPLETED 10-18-72
SURF. ELEV. 659.9 DATUM Chisel mark headwall TBM#1 = 664.95)
DRILLER L Taylor HELPER C. Janiszewski



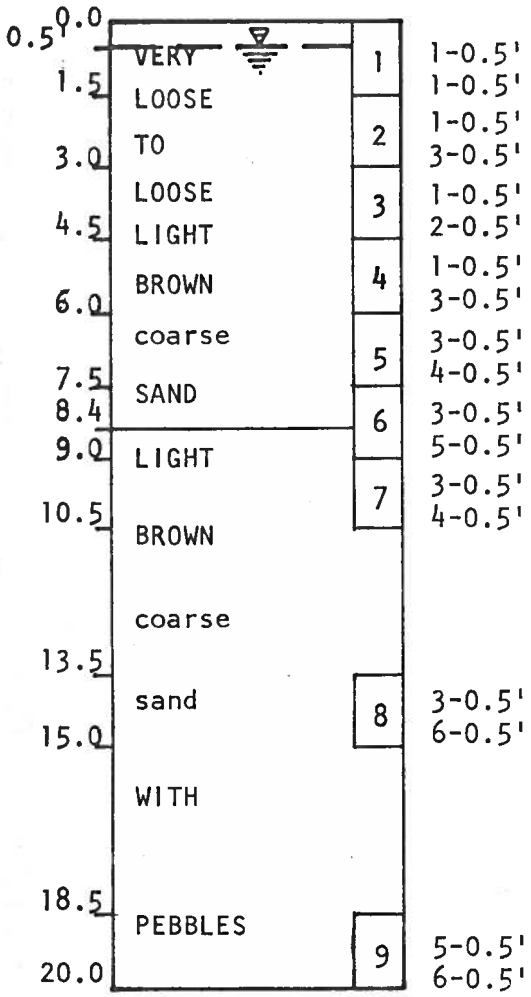


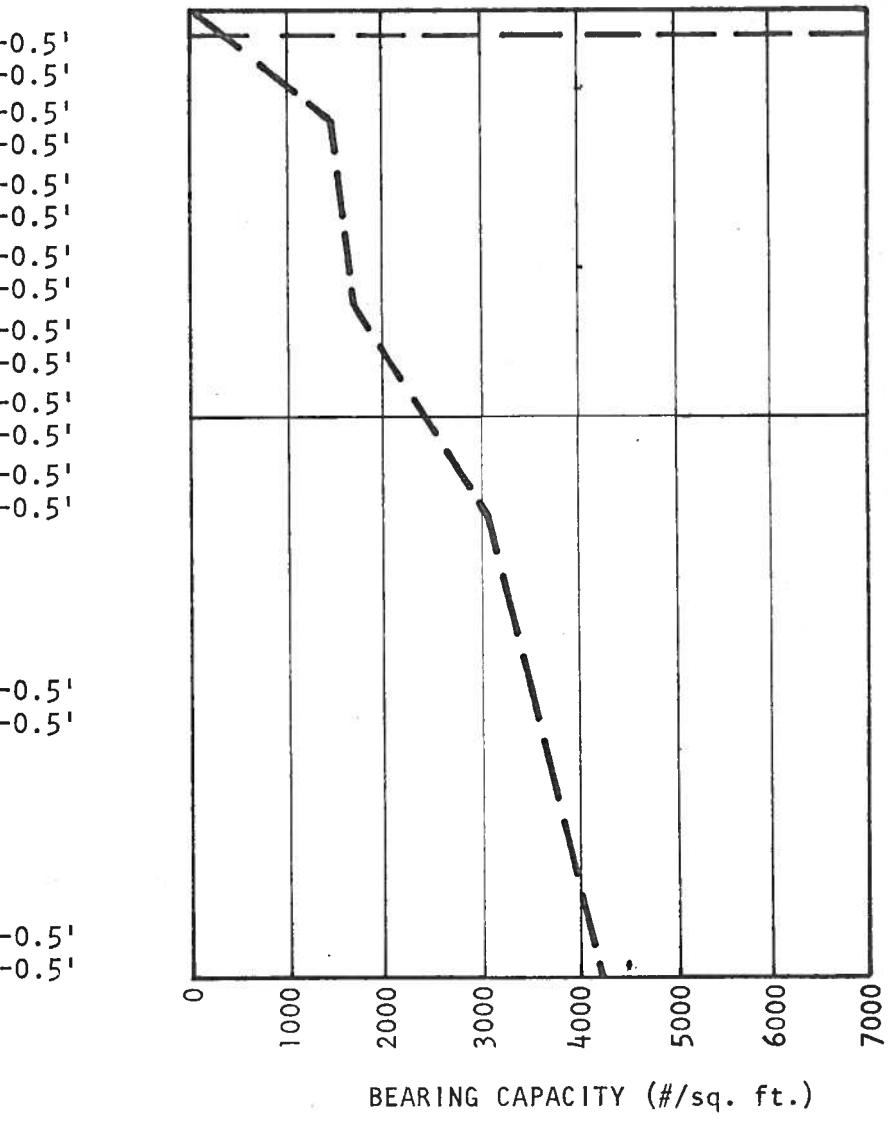
PROJECT NUMBER 14-1072

GRAND RAPIDS TESTING SERVICE

3064 MADISON AVE., S. E. GRAND RAPIDS, MICHIGAN 49508
PHONE (616) 245-9117

PROJECT Fisher Body Retention Basin (Clay Street)
CLIENT Fisher Body
BORING NO. 4 DATE STARTED 10-17-72 DATE COMPLETED 10-18-72
SURF. ELEV. 660.1 DATUM Chisel mark headwall TBM#1 = 664.95
DRILLER L. Taylor HELPER C. Janiszewski

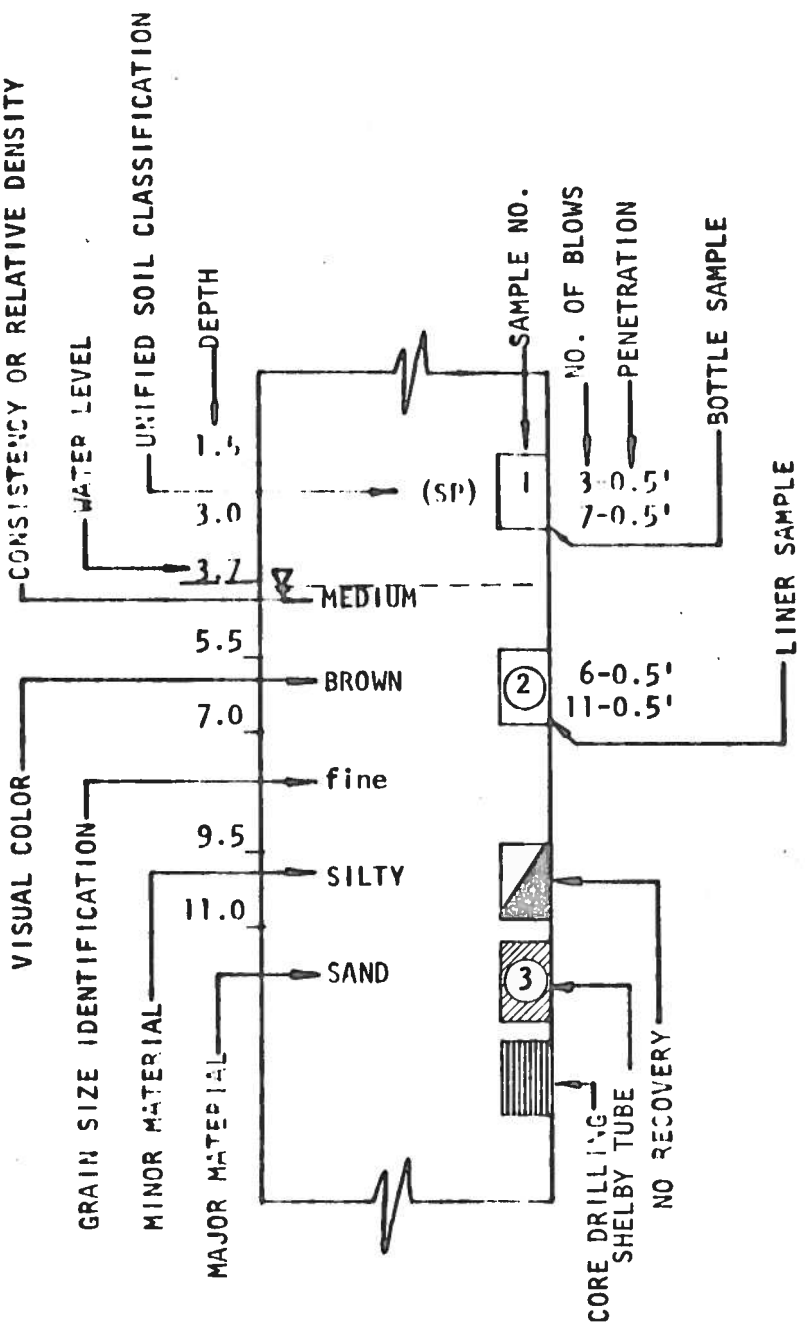




PROJECT NUMBER 14-1072

GRAND RAPIDS TESTING SERVICE

3064 MADISON AVE., S. E. GRAND RAPIDS, MICHIGAN 49508
PHONE (616) 245-9117



STANDARD PENETRATION IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2" O.D. SAMPLER 1 FOOT, BY A 140# HAMMER FALLING 30 INCHES.

BORING LOG LEGEND

GRAND RAPIDS TESTING SERVICE

3064 MADISON AVE., S. E. GRAND RAPIDS, MICHIGAN 49508
PHONE (616) 245-9117

RELATIVE DENSITY AND CONSISTENCY TABLE

Sand and Silt, Relative Density		Consistency of Clay	
No. of blows req'd to drive a sampler 1 ft. using a 140# hammer falling 30" 2" O.D. Samplers	RELATIVE DENSITY	No. of blows req'd to drive a sampler 1 ft. using a 140# hammer falling 30" 2" O.D. Samplers	CONSISTENCY
< 4	Very Loose	< 2	Very Soft
4-10	Loose	2- 4	Soft
10-30	Medium	4- 8	Medium
30-50	Dense	8-15	Stiff
> 50	Very Dense	15-30	Very Stiff
		> 30	Hard

GRAND RAPIDS TESTING SERVICE

3064 MADISON AVE., S. E. GRAND RAPIDS, MICHIGAN 49508
PHONE (616) 245-9117

October 25, 1972
Project Number 14-1072

Fisher Body Plant Number 1
300 - 36th. Street
Grand Rapids, Michigan 49508

Re: Fisher Body Retention Basin
Slope Stabilization

Attention: Mr. W.F. Goosmann

Gentlemen:

We have completed our testing on the materials sampled from the job site, and have performed moisture content and loss by ignition tests on those materials. The results of those tests are as follows:

Moisture Content = 83.3%

Loss by Ignition = 74.7% Loss

The results of these tests indicate that the present material in the basin slope is a highly organic peat and should not be relied upon to support any structure, whether it be a foundation or an embankment. We therefore recommend that the soils in the area of the proposed embankment be removed as indicated on our attached drawing, and replaced with an engineered controlled fill, compacted to 95% of maximum dry density as determined by the modified proctor method.

With this accomplished, we feel that the proposed retention basin may be completed successfully with little or no problems encountered in the future.

We are pleased to have been of service to you. If you have any questions, please contact us.

Very truly yours,

GRAND RAPIDS TESTING SERVICE, INC.

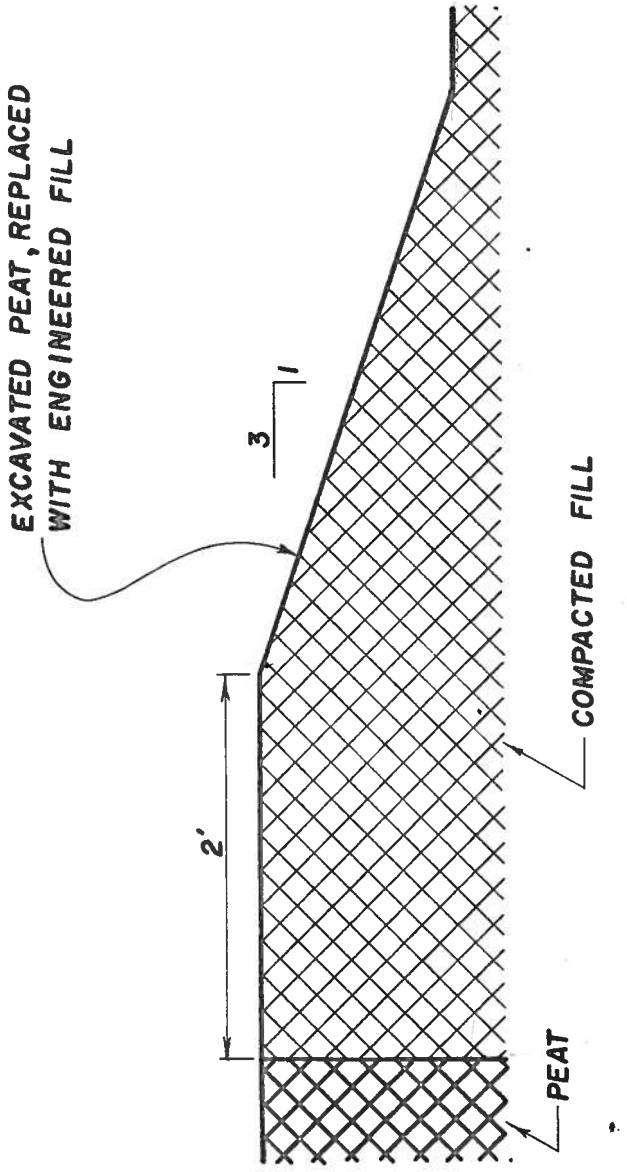
Donald N. Hopper, P.E.
Manager

DNH/hc
Enclosures

GRAND RAPIDS TESTING SERVICE

3064 MADISON AVE., S. E. GRAND RAPIDS, MICHIGAN 49508
PHONE (616) 245-9117

Fisher Body Retention Basin
Project Number 14-1072



PROPOSED BANK CROSS SECTION

SCALE - 1"=1'

Privileged and Confidential
Prepared at ENCORE Counsel's Request
Environmental Audit Report

THIS DOCUMENT IS TO BE MAINTAINED AT
REFERENCED SITE ADDRESS

DOCUMENTATION OF COMPLIANCE WITH SECTION 20107a OF PART 201 OF MICHIGAN ACT 451 PURSUANT TO ADMINISTRATIVE RULE 1003(4)(a)

GENERAL MOTORS CORPORATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Prepared by:
Conestoga-Rovers and Associates, Inc.

JULY 2002
REF. NO. 17360 (1)

Rule 1003(4) Compliance Documentation for Section 20107a, 1994 P.A. 451
General Motors Corporation
Grand Rapids Metal Plant
Wyoming, Michigan

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Rule 1003(4) Compliance Documentation for Section 20107a, 1994 P.A. 451
General Motors Corporation
Grand Rapids Metal Plant
Wyoming, Michigan

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Rule 1003(4) Compliance Documentation for Section 20107a, 1994 P.A. 451
General Motors Corporation
Grand Rapids Metal Plant
Wyoming, Michigan

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FIGURE 1.2 ZONING MAP

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(Following Text)

PLAN 1 SITE PLAN

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Rule 1003(4) Compliance Documentation for Section 20107a, 1994 P.A. 451
General Motors Corporation
Grand Rapids Metal Plant
Wyoming, Michigan

LIST OF APPENDICES

APPENDIX A LEGAL PROPERTY DESCRIPTIONS

APPENDIX B NOTICE OF MIGRATION OF CONTAMINATION

Rule 1003(4) Compliance Documentation for Section 20107a, 1994 P.A. 451
General Motors Corporation
Grand Rapids Metal Plant
Wyoming, Michigan

1.0 INTRODUCTION

Conestoga-Rovers & Associates, Inc. has prepared this documentation of compliance with Section 20107a of Part 201 of Michigan Act 451 pursuant to administrative Rule 1003(4)(a) for the General Motors Corporation (GM) Grand Rapids Metal Plant located at 300 36th Street in Wyoming, Kent County, Michigan (Site). The Site location is presented on Figure 1.1. A Site plan is presented on Plan 1. Legal property descriptions are presented in Appendix A.

This provides documentation of initial analysis necessary, and of hazard mitigation measures, that would not be evident as a result of inspection.

The Site is currently being evaluated with respect to environmental issues on a Site-wide basis. This documentation will be necessarily updated to address any changes to the Site environmental status.

1.1 BACKGROUND

The Grand Rapids Metal Plant is a metal fabrication and assembly plant for GM North American Operations (NAO) Group consisting of approximately 45 acres of production activities on approximately 88 acres of land. The Site manufactures quarter panels, floor pans, roof panels, deck lids, doors, and center pillars for assembly plant use. In addition, the Site constructs the dies, fixtures, mechanical devices, and manufacturing aids used internally to produce the aforementioned parts.

The Site is currently zoned General Industrial. Adjoining properties are currently zoned as a mixture of residential and industrial properties. Figure 1.2 presents a portion of the City of Wyoming Zoning Map.

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1.2 KNOWN CONTAMINATION

Known contamination identified at the Site was ascertained through reviewing numerous documentation regarding environmental Site investigations. A listing of all available environmental investigation documentation reviewed for the Site is presented in Table 1.1. Based on the review of available environmental investigation documentation previously conducted at the Site, the following areas of concern were identified at the Site:

i) an oil release from a press pit sump pan near Column B-35;
ii) chlorinated compounds from a former parts cleaner station near Column T-27;
iii) free product observed during excavation activities near Column A-15;
iv) chlorinated compounds identified in dewatering wells during building expansion activities near the southeast corner of the building; and
v) semi-volatile organic compounds (SVOCs) identified in historical groundwater samples above current Michigan Act 451, Part 201 Cleanup Criteria.

Contamination from a release of water-soluble oil from a press pit pan was identified in soil and groundwater at the Site in 1981. Based on analytical results from soil and groundwater samples collected in the vicinity of the release and a review of the material safety data sheet (MSDS) for the oil, no chemical of concern were detected in the soil or groundwater samples collected above the applicable regulatory limits at the time the samples were collected.

From 1953 to 1979, the Site conducted degreasing operations inside the facility utilizing chlorinated compounds. This area is the suspected source of chlorinated compound contamination to soil and groundwater beneath the facility. Numerous subsurface investigations were conducted at the Site between 1985 and 1989 to identify and delineate the chlorinated compound contamination and the geological/hydrogeological conditions at the Site and the area located hydraulically downgradient of the Site. Based on the results of the investigations, a remediation system, consisting of a combination soil vapor extraction (SVE) well with activated carbon filtration and a series of

groundwater extraction wells with activated carbon filtration was constructed in 1989 and is currently in place at the facility to remediate the chlorinated impacted soil and groundwater at the Site.

A Notice of Migration of Contamination Notice (Notice) was filed with the Michigan Department of Environmental Quality (MDEQ) by GM on June 9, 1999. The Notice identified that trichloroethene (TCE) and cis-1,2-dichloroethene (cis-1,2-DCE) were emanating from the Site and were migrating off-Site in groundwater at concentrations above the Michigan Act 451, Part 201 Residential Cleanup Criteria. A copy of the Notice is presented in Appendix B. This document addresses on-Site "due care" obligations under Michigan Act 451, Part 201. Off-Site issues are currently being addressed by GM and are routinely reported to MDEQ.

1.3 EVIDENCE PROPERTY IS A "FACILITY"

The Site is currently listed on the Michigan Act 451, Part 201 Contaminated Sites List. Volatile organic compound (VOC) and SVOC impacted soil and/or groundwater has been identified at the Site at levels above Michigan Act 451, Part 201 generic residential criteria. As such, the Site is a "facility" pursuant to Act 451, Part 201.

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2.0 DOCUMENTATION OF COMPLIANCE REQUIRED BY RULE 1003(4)(a)

i) Identification of exposure pathways that are complete, or are likely to become complete, in light of the intended land use of the property and the features of the property, including potential exposure barriers such as structures or pavement.

2.1 EXPOSURE PATHWAYS

A review of pertinent exposure pathways is presented in the following sections. These exposure pathways were selected based on a review of MDEQ exposure pathway guide sheets presented in the "DEQ Training Material for Part 201, Cleanup Criteria", (MDEQ) June 2000), with consideration given to Site-specific conditions.

2.1.1 SOURCE CONTROL AND EXISTING CONTAMINATION

Since the causes of contamination to the Site, whether by disposal, spillage, leakage, or other means, was a historical occurrence, the potential sources of contamination to these impacted areas are believed to no longer exist due to changes in industrial operations and ongoing, long-term remediation activities. Residual levels of known contamination are expected to continue to reduce over time, due to demonstrated natural attenuation and/or remediation activities.

Although, control of hazardous substance sources is likely to be complete, evaluation of this issue is a continuing effort of GM ISO 14000, and other initiatives.

2.1.2 SOIL CONTAMINATION RISK OF INJURY TO DRINKING WATER USES OF GROUNDWATER

Certain contaminants in soil have the potential to leach and impact groundwater which employees may utilize as a drinking water source. However, the Site is located in an

area serviced by a municipal water supply system. In addition, no production/domestic supply wells currently exist at the Site. Consequently, drinking water is provided entirely by an off-Site source.

Accordingly, there is no soil contamination risk of injury to drinking water uses of groundwater. This exposure pathway will not be considered further.

2.1.3 SOIL CONTAMINATION RISK FOR GROUNDWATER TO POSE HAZARD TO SURFACE WATER

Certain contaminants in soil have the potential to leach and impact groundwater, which may enter surface water. However, no surface water bodies exist on Site. The nearest surface water body to the Site is the plant stormwater retention pond located approximately 100 feet to the west of the Site. The nearest natural surface water body is Cole Drain located approximately 200 feet to the west of the Site. The stormwater retention pond discharges to Cole Drain. Based on historic groundwater measurements and geology/hydrogeology, groundwater has the potential to migrate to Cole Drain. However, no constituents have historically been identified in the soil collected at the downgradient Site boundary that exceeded Michigan Act 451, Part 201 generic groundwater surface water interface protection criteria (GSIPC).

Accordingly, there is no soil contamination risk for groundwater to pose a hazard to surface water. This exposure pathway will not be considered further.

2.1.4 SOIL CONTAMINATION RISK FOR GROUNDWATER TO POSE A DERMAL CONTACT HAZARD

Certain contaminants in soil have the potential to leach and impact groundwater, which may pose a risk to construction and/or utility workers performing subsurface activities.

However, no constituents have historically been identified in the soil that exceeded Michigan Act 451, Part 201 generic groundwater contact protection criteria (GCPC).

Accordingly, there is no soil contamination risk for groundwater to pose a dermal contact hazard. This exposure pathway will not be considered further.

2.1.5 SOIL CONTAMINATION RISKS FROM INDOOR AIR INHALATION EXPOSURES

Certain contaminants in soil have the potential to migrate to indoor air through volatilization and vapor intrusion through building floors. Buildings exist on Site and indoor air inhalation exposures from soil are likely. However, no constituents have historically been identified in the soil that exceeded Michigan Act 451, Part 201 generic industrial soil volatilization to indoor air inhalation criteria (ISVIIC).

Accordingly, there is no soil contamination risk from indoor air inhalation exposure. This exposure pathway will not be considered further.

2.1.6 SOIL CONTAMINATION RISKS FROM AMBIENT AIR INHALATION EXPOSURES

Certain contaminants in soil have the potential to migrate to ambient air through volatilization and/or particulate emissions (i.e., fugitive dust). The Site is currently an active metal manufacturing plant; however, the Site is entirely covered by asphalt/concrete or landscaped with sustaining vegetation. In addition, no constituents have historically been identified in the soil which exceeded Michigan Act 451, Part 201 generic industrial volatile source inhalation criteria (IVSIC) or industrial particulate soil inhalation criteria (IPSIC).

Accordingly, there is no soil contamination risk from ambient air inhalation exposure. This exposure pathway will not be considered further.

2.1.7 SOIL CONTAMINATION RISKS FROM DIRECT CONTACT EXPOSURES

Direct contact exposure to soil by construction and/or utility worker during subsurface activities is likely. However, no constituents have historically been identified in the soil that exceeded Michigan Act 451, Part 201 generic industrial direct contact criteria (IDCC).

Accordingly, there is no soil contamination risk from direct contact exposure. This exposure pathway will not be considered further.

2.1.8 GROUNDWATER CONTAMINATION RISKS DUE TO DRINKING WATER USES

As discussed in Section 2.1.2, the Site is located in an area serviced by a municipal water supply system. In addition, no production/domestic supply wells currently exist at the Site. Consequently, drinking water is provided entirely by an off-Site source.

Accordingly, there is no groundwater contamination risk due to drinking water use. This exposure pathway will not be considered further.

2.1.9 GROUNDWATER CONTAMINATION RISK OF HAZARD TO SURFACE WATER RESOURCES

As discussed in Section 2.1.3, no surface water bodies exist on Site. The nearest surface water body to the Site is the plant stormwater retention pond located approximately 100 feet to the west of the Site. The nearest natural surface water body is Cole Drain located

approximately 200 feet to the west of the Site. The stormwater retention pond discharges to the Cole Drain. Based on historic groundwater measurements and geology/hydrogeology, groundwater has the potential to migrate to Cole Drain. However, no constituents were identified in the groundwater collected at downgradient compliance points along Cole Drain that exceeded Michigan Act 451, Part 201 generic groundwater surface water interface criteria (GSIC).

Accordingly, there is no groundwater contamination risk of hazard to surface water resources. This exposure pathway will not be considered further.

2.1.10 GROUNDWATER CONTAMINATION RISKS FOR INDOOR AIR HAZARDS

Certain contaminants in shallow groundwater have the potential to migrate to indoor air through volatilization and vapor intrusion through building floors. Buildings exist on Site and indoor air inhalation exposures from groundwater are likely. Historically, TCE and a minimal number of SVOCs were detected in the groundwater samples collected from a limited area above Michigan Act 451, Part 201 generic industrial groundwater volatilization to indoor air inhalation criteria (IGVIIC). Recent groundwater sampling analytical data demonstrated TCE concentrations are currently below IGVIIC. No recent groundwater sampling data was available for the minimal number of SVOCs historically identified, however, these compounds are not expected to be present at unacceptable levels based on the decreasing attenuated TCE concentrations that have occurred over time.

Accordingly, groundwater contamination risk for indoor air hazard is a relevant exposure pathway and will be evaluated further in Section 4.0.

2.1.11 GROUNDWATER CONTAMINATION RISKS FROM DERMAL EXPOSURES

Based on historic groundwater measurements, groundwater is encountered below 20 feet below ground surface. With groundwater at this depth, dermal exposure to groundwater by construction and/or utility workers performing subsurface activities is unlikely but possible. Historically, TCE and a minimal number of SVOCs were detected in the groundwater from limited sized areas above Michigan Act 451, Part 201 generic groundwater contact criteria (GCC). Recent groundwater sampling analytical data demonstrated TCE concentrations are currently below GCC. No recent groundwater sampling data was available for the minimal number of SVOCs historically identified, however, these compounds are not expected to be present at unacceptable levels based on the decreasing attenuated TCE concentrations that have occurred over time.

Accordingly, groundwater contamination risk from dermal exposure is a relevant exposure pathway and will be evaluated further in Section 4.0.

2.1.12 RISK OF CONTAMINATED SOILS RUNOFF TO SURFACE WATERS

As discussed in Section 2.1.3, no surface water bodies exist on Site. The nearest surface water body to the Site is the plant stormwater retention pond located approximately 100 feet west of the Site. The nearest natural surface water body is Cole Drain located approximately 200 feet to the west of the Site. However, the Site is entirely covered by asphalt/concrete or landscaped with sustaining vegetation. In addition, stormwater runoff is controlled to a stormwater management system and the extent of exposed and/or erodible soils is negligible.

Accordingly, there is no risk of contaminated soils runoff to surface water. This exposure pathway will not be considered further.

2.1.13 SURFACE WATER SEDIMENT CONTAMINATION RISKS

As discussed in Section 2.1.3, no surface water bodies exist on Site; therefore, no sediment exists on Site. The nearest surface water body to the Site is the plant stormwater retention pond located approximately 100 feet to the west of the Site. The nearest natural surface water body is Cole Drain located approximately 200 feet to the west of the Site. No sediment samples have been collected from the stormwater retention pond or Cole Drain to date; therefore, sediment contamination is most appropriately assessed through evaluation of the groundwater surface water interface. As discussed in Sections 2.1.3 and 2.1.9, no constituents were identified in the soil or groundwater samples collected at downgradient compliance points along Cole Drain that exceeded GSIPC or GSIC, respectively.

Accordingly, there is no surface water sediment contamination risk. This exposure pathway will not be considered further.

2.1.14 ACUTE TOXIC AND PHYSICAL HAZARD RISKS

Acute toxicity and physical hazards deal with the ignitability, reactivity, corrosivity, and acute inhalation hazards. According to Guidesheet D of the Part 201 Training Manual, consideration should be given constituents noted as having ignitable characteristics on the Part 201 cleanup criteria tables, and those parameters which are present at concentrations approaching or exceeding soil saturation or water solubility levels. Also, flammability, explosivity, and acute inhalation screening levels are available for constituents in groundwater. No constituents were identified in soil that exceeded soil saturation concentration screening levels and no constituents were identified in groundwater exceeding flammability and explosivity screening levels or acute inhalation screening levels.

Accordingly, there is no acute toxic and physical hazard risk. This exposure pathway will not be considered further.

2.1.15 OTHER HAZARDOUS SUBSTANCE RISKS AT OR POSED BY THE SITE

Previous investigation activities have not identified any other hazardous substance risks at or posed by the Site other than those presented in Sections 2.1.1 through 2.1.14. It is unlikely that additional significant dissimilar contamination will be identified at the Site.

Accordingly, there is no other hazardous substance risk at or posed by the Site. This exposure pathway will not be considered further.

2.1.16 SUMMARY OF RELEVANT EXPOSURE PATHWAYS

The following presents a summary of the relevant exposure pathways for the Site:

- Groundwater contamination risk for indoor air hazards; and
- Groundwater contamination risk from dermal exposure.

These exposure pathways will be assessed by the implementation of the response activities discussed in Section 4.0.

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3.0 HAZARDOUS SUBSTANCES PRESENT AT ELEVATED CONCENTRATIONS

ii) Information about the concentrations of hazardous substances to which persons may be exposed in each pathway identified through the analysis described in Section 2.0, unless a conclusion that quantification of hazardous substance exposures is not necessary to determine that there is no unacceptable exposure under R 299.51013.

A summary of hazardous substances present at elevated concentrations at the Site is presented in Table 3.1.

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4.0 RESPONSE ACTIVITIES

iii) A description of the response activity or other measures, such as work schedule adjustments or personal protective equipment, if any, that are or may be required to mitigate any unacceptable exposure in compliance with R 299.51013.

As identified in Section 2.0, all potential exposure pathways have been eliminated with the exception of the following:

- Groundwater contamination risk for indoor air hazards; and
- Groundwater contamination risk from dermal exposure.

These exposure pathways were identified upon re-evaluation of available historical environmental investigation documentation for the Site. Based on the minimal number of SVOCs detected at elevated concentrations in the groundwater from limited sized area, it is not expected that the minimal number of SVOCs are currently present at unacceptable levels. In addition, the concentrations of the minimal number of SVOCs, similar to demonstrated TCE concentrations, most likely have decreased over time to acceptable levels through natural attenuation processes.

Nevertheless, response activities to eliminate potential exposure pathways will be implemented. Response activities will include conducting groundwater sampling of existing monitoring wells in the vicinity of the historical contamination to evaluate current risk levels.

These response activities will be conducted by GM to eliminate potential unacceptable exposure to hazardous substances and/or exacerbation of existing identified contamination.

A summary of hazardous substances present at elevated concentrations at the Site is presented in Table 3.1.

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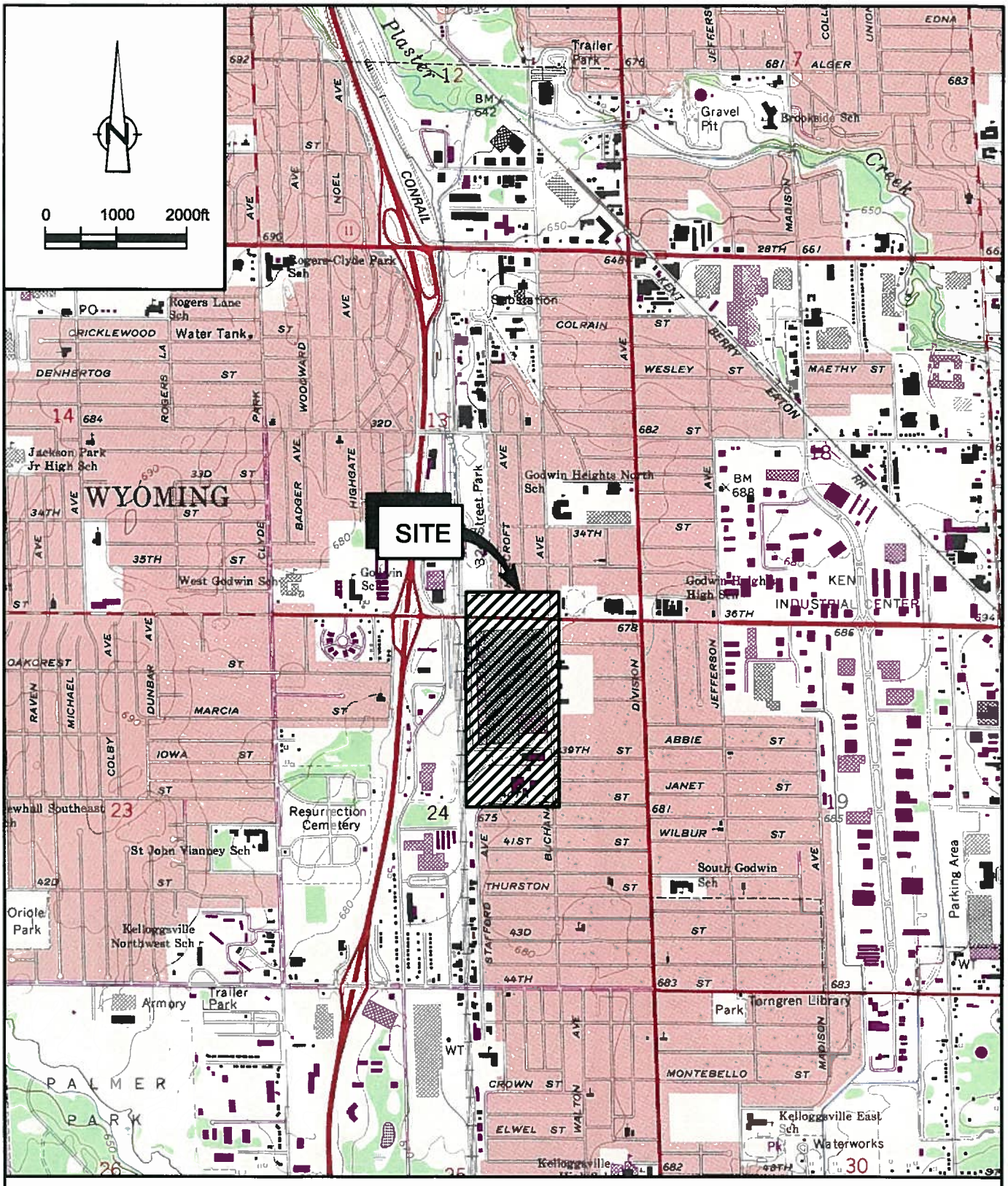
5.0 RECORDS

iv) Records about the implementation of any response activity or other measures not evident through inspection.

Documentation has and will continue to be provided to employees regarding potential exposures. All records regarding implementation of the response activities not evident through a Site inspection are filed with the Plant Environmental Engineer at the Site.

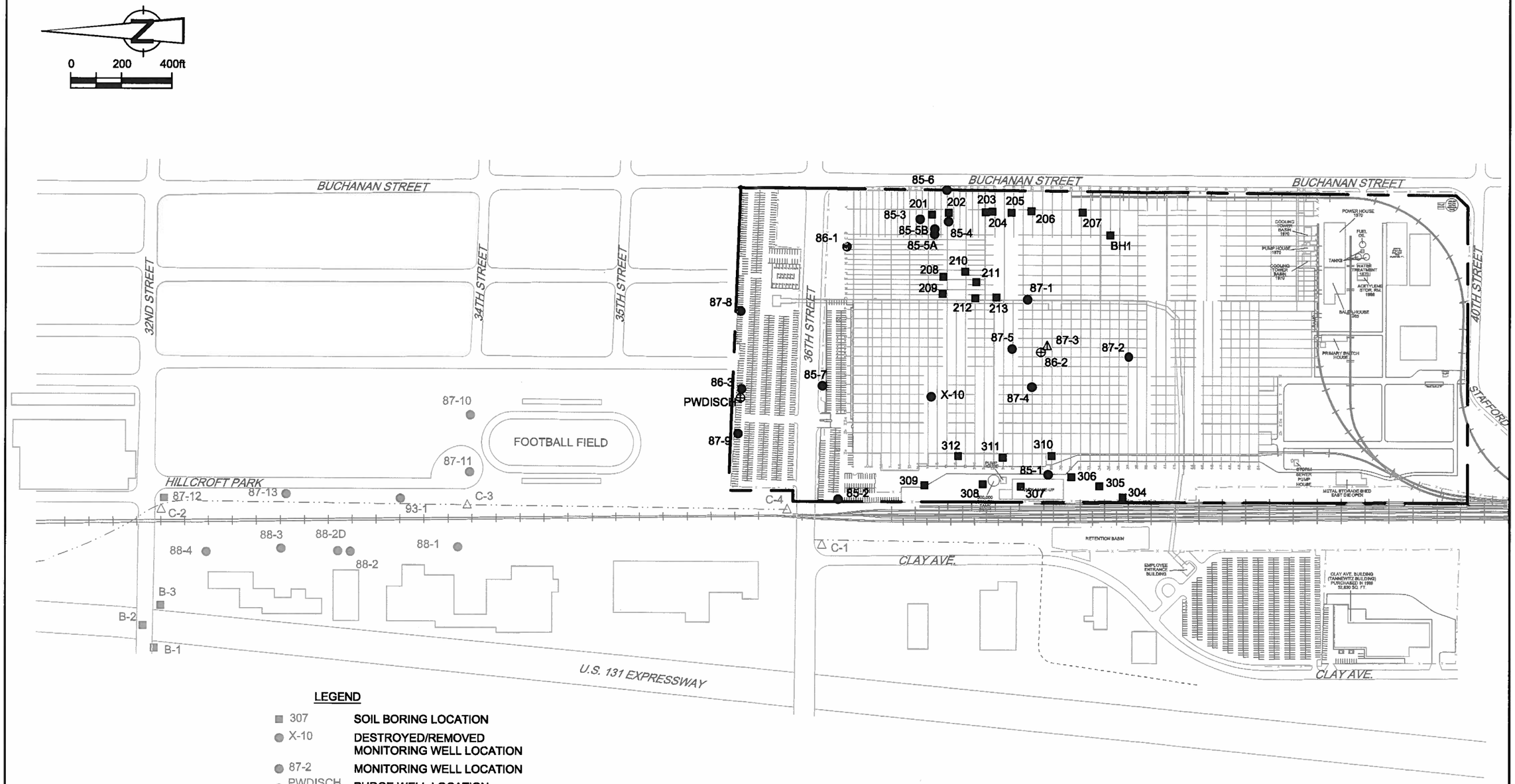


SOURCE: USGS QUADRANGLE MAP;
GRAND RAPIDS WEST, MICHIGAN

figure 1.1

SITE LOCATION
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(001)GN-DE001 APR 29/2002



LEGEND

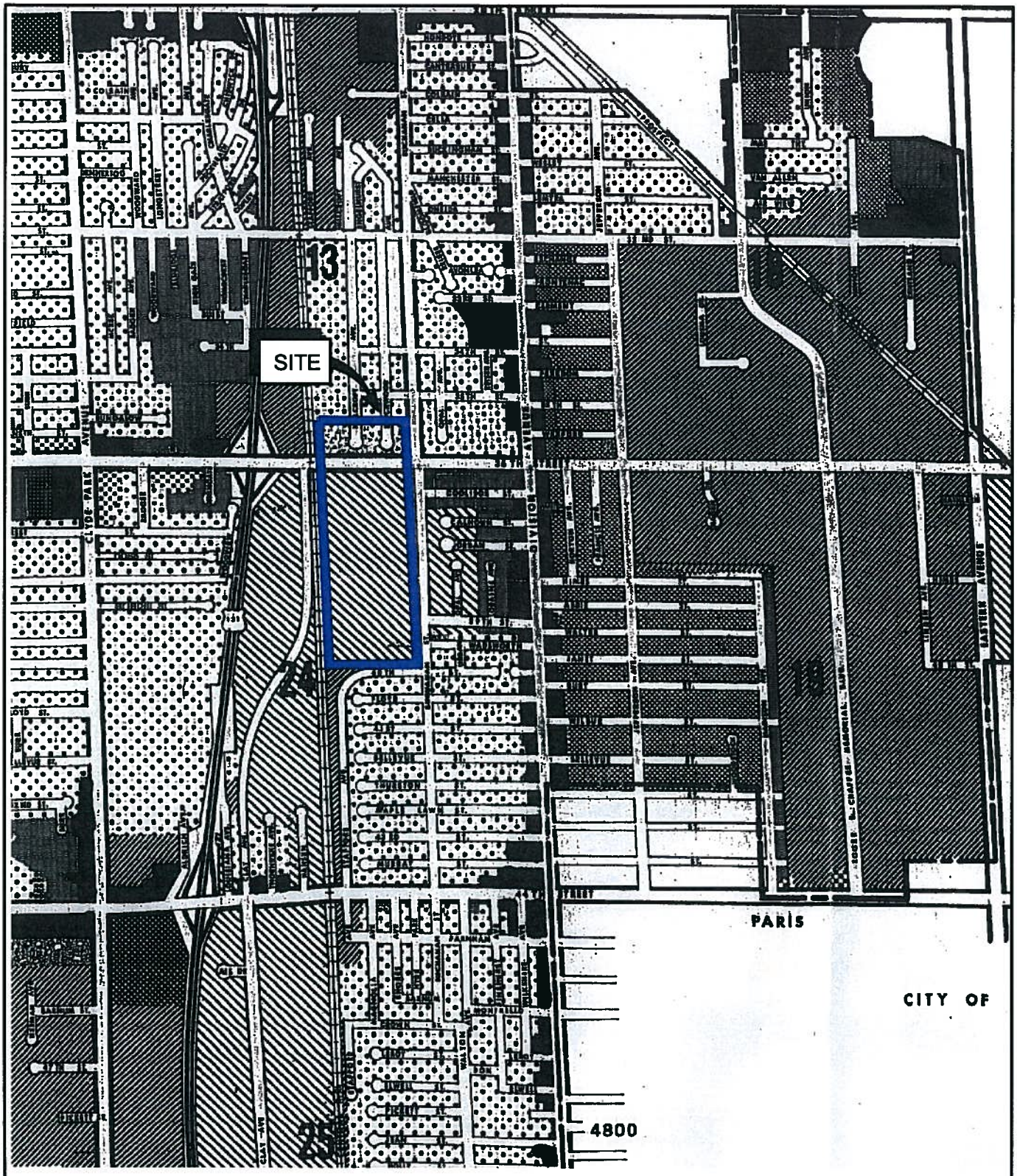
■ 307	SOIL BORING LOCATION
● X-10	DESTROYED/REMOVED MONITORING WELL LOCATION
● 87-2	MONITORING WELL LOCATION
⊕ PWDISCH	PURGE WELL LOCATION
△ C-2	CULVERTS USED TO MEASURE WATER LEVELS IN COLE DRAIN
⚠ 87-3	AIR SPARGING WELL
▬	APPROXIMATE SITE BOUNDARY
▬ x ▬ x ▬	FENCE
▬ + ▬ + ▬	RAILROAD
▬ · ▬ · ▬	COLE DRAIN

SOURCE: EDI ENGINEERING & SCIENCE, JUNE 1987 AND JUNE 1988 AND EARTH TECH, SEPTEMBER 2001.

figure 1.2

SITE PLAN
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(001)GN-DE003 APR 29/2002



SOURCE: CITY OF WYOMING, MICHIGAN ZONE MAP, MAY 2001

LEGEND

- SINGLE FAMILY RESIDENTIAL
- SINGLE FAMILY RESIDENTIAL
- TWO FAMILY RESIDENTIAL
- LOW DENISTY MULTIPLE FAMILY RESIDENTIAL
- LIGHT INDUSTRIAL
- GENERAL INDUSTRIAL

figure 1.3

ZONING MAP
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(001)GN-DE002 APR 29/2002

TABLE 1.1

LISTING OF AVAILABLE ENVIRONMENTAL INVESTIGATION DOCUMENTATION REVIEWED
GENERAL MOTORS CORPORATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Report Name	Author	Date
Hydrogeologic Evaluation of an Oil Leakage	Environmental Data, Inc.	December 1981
Hydrogeologic Investigation	EDI Engineering & Science	March 1986
Phase II Hydrogeologic Investigation	EDI Engineering & Science	June 1986
Phase IIIA Hydrogeologic Investigation	EDI Engineering & Science	March 1987
Phase IIIB Hydrogeologic Investigation	EDI Engineering & Science	July 1987
Phase IVA Hydrogeologic Investigation	EDI Engineering & Science	August 1988
Phase IVB Hydrogeologic Investigation	EDI Engineering & Science	July 1988
Phase IVC Hyrdogeologic Investigation	EDI Engineering & Science	July 1988
TCE Monitoring Plan Documentation	EDI Engineering & Science	March 1989 - December 2001
Various Correspondence	Various Authors	1981 - 2002

TABLE 3.1

SUMMARY OF HAZARDOUS SUBSTANCES PRESENT AT ELEVATED CONCENTRATIONS
GENERAL MOTORS CORPORATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451 Part 201*	*Michigan Act 451 Part 201*	*Baler House*	*Oil Storage*	*BH-1*	*BH-2*	*BH-3*	*BH-4*	*Oil Storage*	*Pond*	*85-1*	*85-2*	*85-3*
Sample ID	*Part 201*	*Part 201*	*Discharge*	*Discharge*	*Dewatering*	*Dewatering*	*Dewatering*	*Dewatering*	*Discharge*	*Effluent*	*85-1*	*85-2*	*85-3*
Depth (feet bgs)	*Residential &*	*Groundwater*	--	--	--	--	--	--	--	--	*15.5 - 20.5*	*13.5 - 18.5*	*20.3 - 30.3*
Date Sampled	*Commercial I*	*Contact*	*11/13/85*	*11/13/85*	*1/13/85*	*1/13/85*	*1/13/85*	*1/13/85*	*1/13/85*	*1/13/85*	*5/5/86*	*5/5/86*	*5/5/86*
Date Analyzed	*Groundwater*	*Criteria* [1]	*11/20/85*	*11/20/85*	*1/28/85*	*1/28/85*	*1/28/85*	*1/28/85*	*1/28/85*	*1/28/85*	*5/9/86*	*5/7/86*	*5/9/86*
Units	*Volatilization to Indoor Air Criteria* [1]		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)													
Volatile Organic Compounds													
Tricluroethylene	15,000	37,000	42	8	130	ND (1.0)	10	ND (1.0)	38	3	ND (2.0)	6	ND (2.0)
Semi-Volatile Organic Compounds													
Fluoranthene	210	210	NA	NA	NA	NA	NA	NA	NA	NA	ND (1.0)	ND (1.0)	**460**
Fluorene	2,000	2,000	NA	NA	NA	NA	NA	NA	NA	NA	ND (2.0)	ND (2.0)	**3,200**
Naphthalene	31,000	31,000	NA	NA	NA	NA	NA	NA	NA	NA	ND (100)	ND (100)	**170**
Phenanthrene	1,000	1,000	NA	NA	NA	NA	NA	NA	NA	NA	ND (1.0)	ND (1.0)	**2,800**
Pyrene	140	140	NA	NA	NA	NA	NA	NA	NA	NA	ND (1.0)	ND (1.0)	**5,600**

Notes:

[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.

Boxed concentration indicates exceedance of one or more criteria.

NA - Parameter not analyzed.

Groundwater samples analyzed between December 16, 1985 and December 23, 1985.

TABLE 3.1

SUMMARY OF HAZARDOUS SUBSTANCES PRESENT AT ELEVATED CONCENTRATIONS
GENERAL MOTORS CORPORATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*85-4*	*85-5B*	*85-6*	*85-7*	*85-7*	*86-1*	*86-2*	*86-3*	*BH-3*	*Drain Sump*	*86-2*
Sample ID	*Part 201*	*Part 201*	*85-4*	*85-5B*	*85-6*	*85-7*	*85-7*	*86-1*	*86-2*	*86-3*	*Sump*	*Conveyor*	*86-2*
Depth (feet bgs)	*Residential &*	*Groundwater*	*20.7 - 30.7*	*21.9 - 31.9*	*19.5 - 24.5*	*20.6 - 25.6*	*20.6 - 25.6*	*18.5 - 29.0*	*27.5 - 32.5*	*41.5 - 46.5*	*--*	*--*	*30 - 33*
Date Sampled	*Commercial I*	*Contact*	*12/6/85*	*12/6/85*	*5/5/86*	*12/6/85*	*12/19/01*	*5/5/86*	*5/5/86*	*5/5/86*	*5/5/86*	*5/5/86*	*4/29/86*
Date Analyzed	*Groundwater*	*Criteria* [1]	*See Notes*	*See Notes*	*5/9/86*	*See Notes*	*--*	*5/9/86*	*5/9/86*	*5/9/86*	*5/9/86*	*5/9/86*	*5/5/86*
Units	*Volatilization to Indoor Air Criteria* [1]		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)													
Volatile Organic Compounds													
Trichloroethylene	15,000	37,000	2	4	ND (2.0)	84	1.1	ND (2.0)	**55,000**	1,400	ND (2.0)	31	**47,000**
Semi-Volatile Organic Compounds													
Fluoranthene	210	210	4	ND (1.0)	ND (1.0)	NA	ND (1.0)	NA	NA	NA	NA	NA	NA
Fluorene	2,000	2,000	ND (2.0)	4	ND (2.0)	NA	ND (2.0)	NA	NA	NA	NA	NA	NA
Naphthalene	31,000	31,000	ND (100)	ND (100)	ND (100)	NA	ND (100)	NA	NA	NA	NA	NA	NA
Phenanthrene	1,000	1,000	10	3	ND (1.0)	NA	ND (1.0)	NA	NA	NA	NA	NA	NA
Pyrene	140	140	3	5	ND (1.0)	NA	ND (1.0)	NA	NA	NA	NA	NA	NA

Notes:

[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: F

Boxed concentration indicates exceedance of one or more criteria.

NA - Parameter not analyzed.

Groundwater samples analyzed between December 16, 1985 and Decembe

TABLE 3.1

SUMMARY OF HAZARDOUS SUBSTANCES PRESENT AT ELEVATED CONCENTRATIONS
GENERAL MOTORS CORPORATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*86-2*	*86-2*	*86-3*	*86-3*	*86-3*	*86-3*	*86-3*	*87-1*	*87-1*	*87-1*	*87-1*
Sample ID	*Part 201*	*Part 201*	*86-2*	*86-2*	*86-3*	*86-3*	*86-3*	*86-3*	*86-3*	*87-1*	*87-1*	*87-1*	*87-1*
Depth (feet bgs)	*Residential &*	*Groundwater*	*40 - 43*		*21 - 24*	*34 - 36*	*44 - 46*	*53 - 55*	*41.5 - 46.5*	*25.0 - 28.0*	*34.5 - 37.5*	*43.5 - 46.5*	*24.0 - 29.0*
Date Sampled	*Commercial I*	*Contact*	*4/29/86*	*12/19/01*	*5/1/86*	*5/1/86*	*5/1/86*	*5/1/86*	*12/19/01*	*1/13/87*	*1/13/87*	*1/13/87*	*1/14/87*
Date Analyzed	*Groundwater*	*Criteria* [1]	*5/5/86*	*12/19/01*	*5/1/86*	*5/1/86*	*5/1/86*	*5/1/86*	*12/19/01*	*1/14/87*	*1/14/87*	*1/14/87*	*1/14/87*
Units	*Volatilization to Indoor Air Criteria* [1]		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)													
Volatile Organic Compounds													
Trichloroethylene	15,000	37,000	220	3.4	45	210	600	230	5.3	280	120	140	1,300
Semi-Volatile Organic Compounds													
Fluoranthene	210	210	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	2,000	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	31,000	31,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	1,000	1,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	140	140	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: F

Boxed concentration indicates exceedance of one or more criteria.

NA - Parameter not analyzed.

Groundwater samples analyzed between December 16, 1985 and Decembe

TABLE 3.1

SUMMARY OF HAZARDOUS SUBSTANCES PRESENT AT ELEVATED CONCENTRATIONS
GENERAL MOTORS CORPORATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*87-1*	*87-2*	*87-2*	*87-2*	*87-2*	*87-2*	*87-4*	*87-4*	*87-4*	*87-4*	*87-4*
Sample ID	*Part 201*	*Part 201*	*87-1*	*87-2*	*87-2*	*87-2*	*87-2*	*87-2*	*87-4*	*87-4*	*87-4*	*87-4*	*87-4*
Depth (feet bgs)	*Residential &*	*Groundwater*	*24.0 - 29.0*	*25.0 - 28.5*	*35.0 - 38.5*	*43.0 - 46.0*	*33.0 - 38.0*	*33.2 - 38.2*	*22.3 - 24.3*	*32.0 - 35.0*	*42.0 - 45.0*	*51.5 - 54.5*	*24.0 - 27.0*
Date Sampled	*Commercial I*	*Contact*	*12/19/01*	*1/14/87*	*1/14/87*	*1/14/87*	*1/15/87*	*12/19/01*	*1/19/87*	*1/19/87*	*1/19/87*	*1/20/87*	*12/19/01*
Date Analyzed	*Groundwater*	*Criteria* [1]	*12/19/01*	*1/16/87*	*1/16/87*	*1/16/87*	*1/16/87*	*12/19/01*	*1/19/87*	*1/19/87*	*1/19/87*	*1/20/87*	*12/19/01*
Units	*Volatilization to Indoor Air Criteria* [1]		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)													
Volatile Organic Compounds													
Trichloroethylene	15,000	37,000	110	6.6	54	9.5	45	38	220	8.3	1.3	4.9	ND (1.0)
Semi-Volatile Organic Compounds													
Fluoranthene	210	210	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	2,000	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	31,000	31,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	1,000	1,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	140	140	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: F
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.
Groundwater samples analyzed between December 16, 1985 and Decembe

TABLE 3.1

SUMMARY OF HAZARDOUS SUBSTANCES PRESENT AT ELEVATED CONCENTRATIONS
GENERAL MOTORS CORPORATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*87-5*	*87-5*	*87-5*	*87-5*	*87-5*	*87-8*	*87-8*	*87-8*	*87-8*	*87-8*	*87-8*
Sample ID	*Part 201*	*Part 201*	*87-5*	*87-5*	*87-5*	*87-5*	*87-5*	*87-8*	*87-8*	*87-8*	*87-8*	*87-8*	*87-8*
Depth (feet bgs)	*Residential &*	*Groundwater*	*22.0 - 24.0*	*31.0 - 34.0*	*41.0 - 44.0*	*51.0 - 54.0*	*39.5 - 50.5*	*18.7 - 19.7*	*28.0 - 31.0*	*38.0 - 41.0*	*48.0 - 51.0*	*58.0 - 61.0*	*19.7 - 22.7*
Date Sampled	*Commercial I*	*Contact*	*1/22/87*	*1/22/87*	*1/22/87*	*1/22/87*	*12/19/01*	*1/13/87*	*1/13/87*	*1/13/87*	*1/13/87*	*1/13/87*	*12/19/01*
Date Analyzed	*Groundwater*	*Criteria* [1]	*1/22/87*	*1/22/87*	*1/22/87*	*1/22/87*	*12/19/01*	*1/13/87*	*1/13/87*	*1/13/87*	*1/13/87*	*1/13/87*	*12/19/01*
Units	*Volatilization to Indoor Air Criteria* [1]		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)													
Volatile Organic Compounds													
Trichloroethylene	15,000	37,000	1,900	15	57	490	2.7	17	5.4	ND (1.0)	ND (1.0)	5.2	1.2
Semi-Volatile Organic Compounds													
Fluoranthene	210	210	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	2,000	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	31,000	31,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	1,000	1,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	140	140	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: F
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.
Groundwater samples analyzed between December 16, 1985 and Decembe

TABLE 3.1

SUMMARY OF HAZARDOUS SUBSTANCES PRESENT AT ELEVATED CONCENTRATIONS
GENERAL MOTORS CORPORATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*87-9*	*87-9*	*87-9*	*87-9*	*87-9*	*87-9*	*87-9*	*87-9*	*X-10*	*PW-DISCH*
Sample ID	*Part 201*	*Part 201*	*87-9*	*87-9*	*87-9*	*87-9*	*87-9*	*87-9*	*87-9*	*87-9*	*X-10*	*PW-DISCH*
Depth (feet bgs)	*Residential &*	*Groundwater*	*16.0 - 17.5*	*22.0 - 25.0*	*32.0 - 35.0*	*41.0 - 44.0*	*52.0 - 55.0*	*62.0 - 65.0*	*72.0 - 75.0*	*50.5 - 53.5*		
Date Sampled	*Commercial I*	*Contact*	*1/14/87*	*1/14/87*	*1/14/87*	*1/14/87*	*1/15/87*	*1/15/87*	*1/15/87*	*12/19/01*	*12/19/01*	*12/19/01*
Date Analyzed	*Groundwater*	*Criteria* [1]	*1/14/87*	*1/14/87*	*1/14/87*	*1/14/87*	*1/15/87*	*1/15/87*	*1/15/87*	*12/19/01*	*12/19/01*	*12/19/01*
Units	*Volatilization to Indoor Air Criteria* [1]		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)												
Volatile Organic Compounds												
Trichloroethylene	15,000	37,000	14	42	27	41	63	19	2.9	ND (1.0)	1	5.6
Semi-Volatile Organic Compounds												
Fluoranthene	210	210	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	2,000	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	31,000	31,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	1,000	1,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	140	140	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: F

Boxed concentration indicates exceedance of one or more criteria.

NA - Parameter not analyzed.

Groundwater samples analyzed between December 16, 1985 and Decembe

APPENDIX A

LEGAL PROPERTY DESCRIPTIONS

LIBER 2043 PG 87 NOTICE OF COMMENCEMENT

Dated (06-82)
Michigan only

State of Michigan County of Kent

Pursuant to the requirements of the Michigan Construction Lien Act No. 497, Public Acts 1980, as amended, Section 108, the undersigned being duly sworn, deposes and says to lien claimants and subsequent purchasers:

Take Notice that work is about to commence on an improvement to the real property described in this instrument. A person having a construction lien may preserve the lien by providing a Notice of Furnishing to the designee named herein and General Contractor, if any, and by timely recording a claim of lien in accordance with law.

A person having a construction lien arising by virtue of work performed on this improvement should refer to the name of the owner or lessee and the legal description appearing in this Notice. A person subsequently acquiring an interest in the land described is not required to be named in a claim of lien.

A copy of this Notice with an attached form for Notice of Furnishing may be obtained upon making a written request by certified mail to the person with whom you have contracted or the named owner, lessee or the designee.

The following parties are set forth pursuant to statute:

A. Owner/Lessee of real property contracting for the improvement:

NAME: General Motors Corporation - Fisher Body Div. Grand Rapids Metal Fa
ADDRESS: 3044 West Grand Blvd., Detroit, Michigan 48202
CAPACITY (indicate whether Owner or Lessee): Owner

B. Fee owner of the real property:

NAME: General Motors Corporation - Fisher Body Div. Grand Rapids Metal Fab
ADDRESS: 3044 West Grand Blvd., Detroit, Michigan 48202

C. Designee:

CAPACITY: CHIEF FINANCIAL OFFICER (Title Only) Resident Comptroller
NAME: GENERAL MOTORS CORPORATION - Fisher Body Division- Grand Rapids Metal Fa
Division/Unit
ADDRESS: 300 - 36th Street S.W. Grand Rapids, Michigan 49508

D. General Contractor (if any): (see Notice of Furnishing provided by Owner/Lessee)

The legal description of the real property on which the improvement is to be made is:

(SEE ATTACHED EXHIBIT - "PROPERTY LEGAL DESCRIPTION" CONSISTING OF 10 PAGES)

This instrument was prepared by T. J. Desser
who verifies the truth and accuracy of the statements and contents of this Notice of Commencement
and whose address is 300 - 36th Street Grand Rapids, Michigan 49508

SIGNATURE: T. J. Desser Date: 9/1/82 19

NAME: T. J. Desser (print or type) CAPACITY: Resident Comptroller (print or type)

Subscribed, sworn to and acknowledged before me this 2nd day of September 1982

NOTARY PUBLIC NAME: H. G. Perrin (print or type) H. G. Perrin (signature)

My Commission Expires: Feb. 26. 1986, 19 . Ottawa County, Michigan

Liber 2043 Pg 96

Property Description For: FISHER BODY DIVISION
General Motors Corporation

Site Name and Address: FISHER BODY METAL FABRICATING PLANT
300 - 36th Street, S.W.
Grand Rapids, Michigan 49508

Site Location: City of Wyoming, Kent County, Michigan

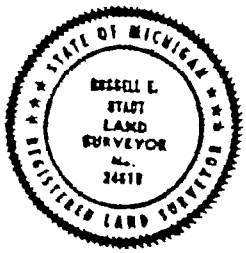
PROPERTY DESCRIPTION:

All that part of the E½ NW¼ of Section 24, Town 6 North, Range 12 West, City of Wyoming, Kent County, Michigan, described as: Commencing at the North one-quarter corner of said Section 24, thence South 88°04' West 163.4 feet along the north line of said NW¼, thence South 4°32'40" East 990.0 feet to THE PLACE OF BEGINNING OF THIS DESCRIPTION; Thence South 4°32'40" East 1097.25 feet, thence South 88°04' West 465.75 feet to the easterly right-of-way line of Clay Avenue, thence North 4°26' West 225.74 feet along said right-of-way line, thence Northeasterly 443.47 feet along said right-of-way line on a 533.66 foot radius curve to the right, the chord of which bears North 19°22'23" East 430.82', thence North 43°10'45" East 134.26 feet along said right-of-way line, thence Northeasterly and Northerly 421.36 feet along a 595.22 foot radius curve to the left, the chord of which bears North 22°53'58" East 412.62 feet, to a point which is 0.66 foot South 88°04' West from the place of beginning of this description, thence North 88°04' East 0.66 foot to the place of beginning.

Prepared By: WILLIAMS & WORKS, INC.
611 Cascade West Parkway, S.E.
Grand Rapids, Michigan 49506

R. E. Stadt

Russell E. Stadt, RLS



February 4, 1982

S-86571-E

STATE OF MICHIGAN
COUNTY OF KENT
RECEIVED FOR RECORD

Sep 23 1 45 PM '82

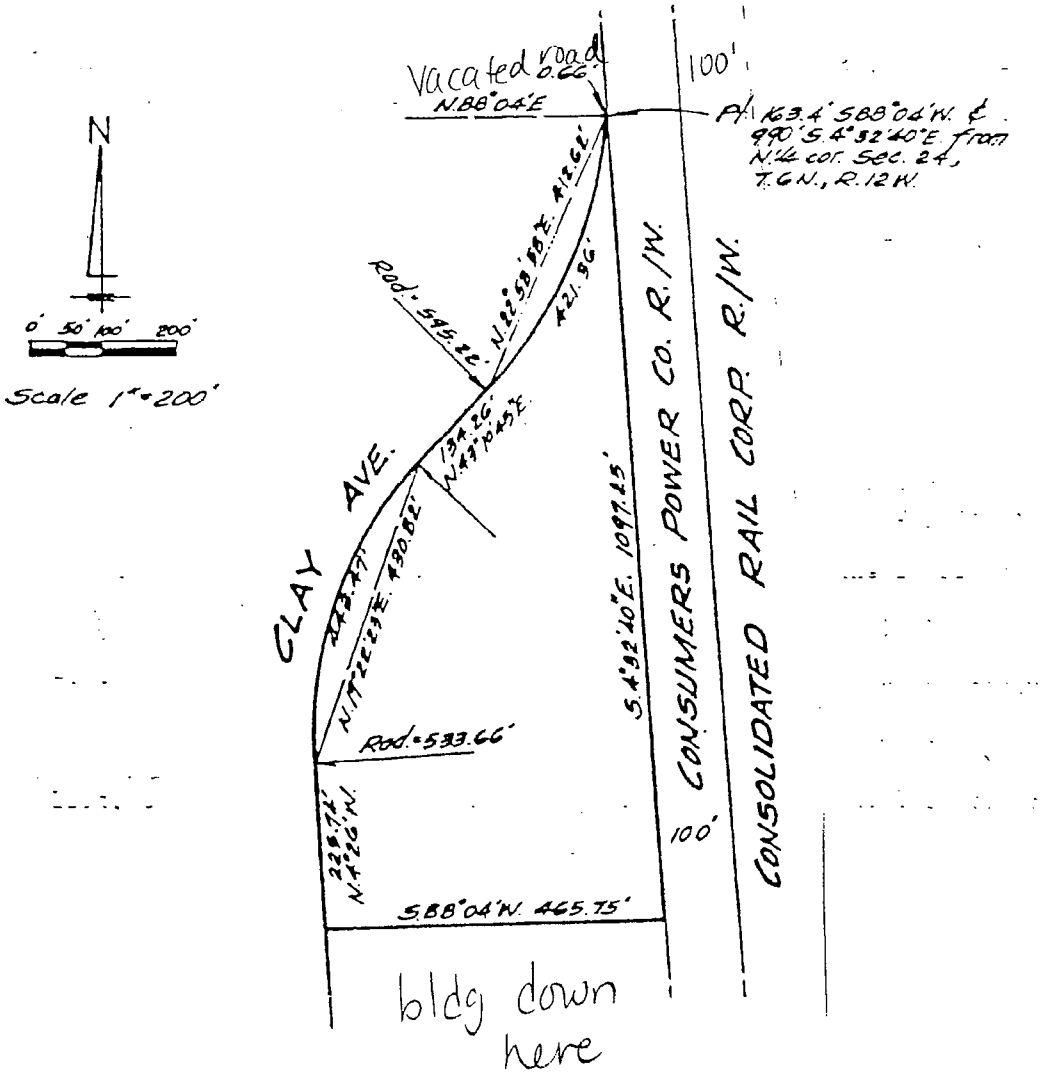
Monica J. de Jonge
REG. OF DEEDS

LIBER 2043 PG 97

Property Map Prepared For: FISHER BODY DIVISION
General Motors Corporation

Site Name and Address: FISHER BODY METAL FABRICATING PLANT
300 - 36th Street, S.W.
Grand Rapids, Michigan 49508

Site Location: City of Wyoming, Kent County, Michigan.



February 4, 1982

S-86571-E

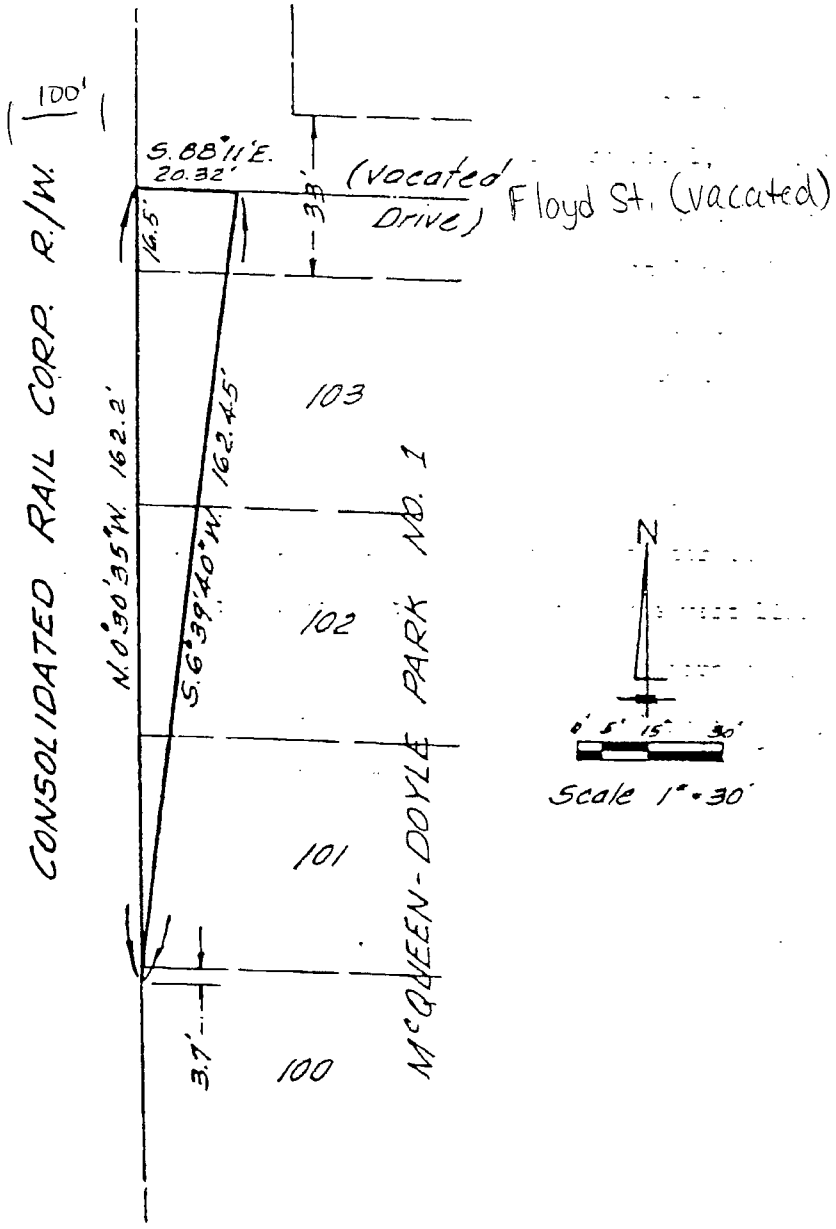
WILLIAMS & WORKS
ENGINEERS/SURVEYORS/PLANNERS/GEOLOGISTS
611 CASCADE WEST PARKWAY, S.E. GRAND RAPIDS, MICHIGAN 49506

LIBER 2043 PG 95

Property Map Prepared For: FISHER BODY DIVISION
General Motors Corporation

Site Name and Address: FISHER BODY METAL FABRICATING PLANT
300 - 36th Street, S.W.
Grand Rapids, Michigan 49508

Site Location: City of Wyoming, Kent County, Michigan.



February 4, 1982

S-86571-D

WILLIAMS & WORKS
ENGINEERS/SURVEYORS/PLANNERS/GEOLOGISTS
811 CASCADE WEST PARKWAY, S.E. GRAND RAPIDS, MICHIGAN 49506

LIBER 2043 PG 94

Property Description For: FISHER BODY DIVISION
General Motors Corporation

Site Name and Address: FISHER BODY METAL FABRICATING PLANT
300 - 36th Street, S.W.
Grand Rapids, Michigan 49508

Site Location: City of Wyoming, Kent County, Michigan

PROPERTY DESCRIPTION:

That part of Lots 100, 101, 102, 103 and part of the vacated Drive adjacent to Lot 103 on the north, McQueen-Doyle Park No. 1, Wyoming Township, Kent County, Michigan, (now situated in the City of Wyoming), described as: Commencing at a point on the west line of said plat at a point 16.5 feet North of the northwest corner of said Lot 103, said point being the intersection of the center line of said vacated Drive (33.0 feet wide) extended westerly to the west line of said plat for THE PLACE OF BEGINNING OF THIS DESCRIPTION: Thence South 88°11' East 20.32 feet along said center line, thence South 6°39'40" West 162.65 feet to a point on the west line of said plat which is 3.7 feet South from the northwest corner of said Lot 100, thence North 0°30'35" West 162.20 feet along the west line of said plat to the place of beginning.

Prepared By: WILLIAMS & WORKS, INC.
611 Cascade West Parkway, S.E.
Grand Rapids, Michigan 49506

Russell E. Stadt, RLS

STATE OF MICHIGAN
RUSSELL E. STADT
LAND SURVEYOR
No. 24519
REGISTERED LAND SURVEYOR

February 4, 1982

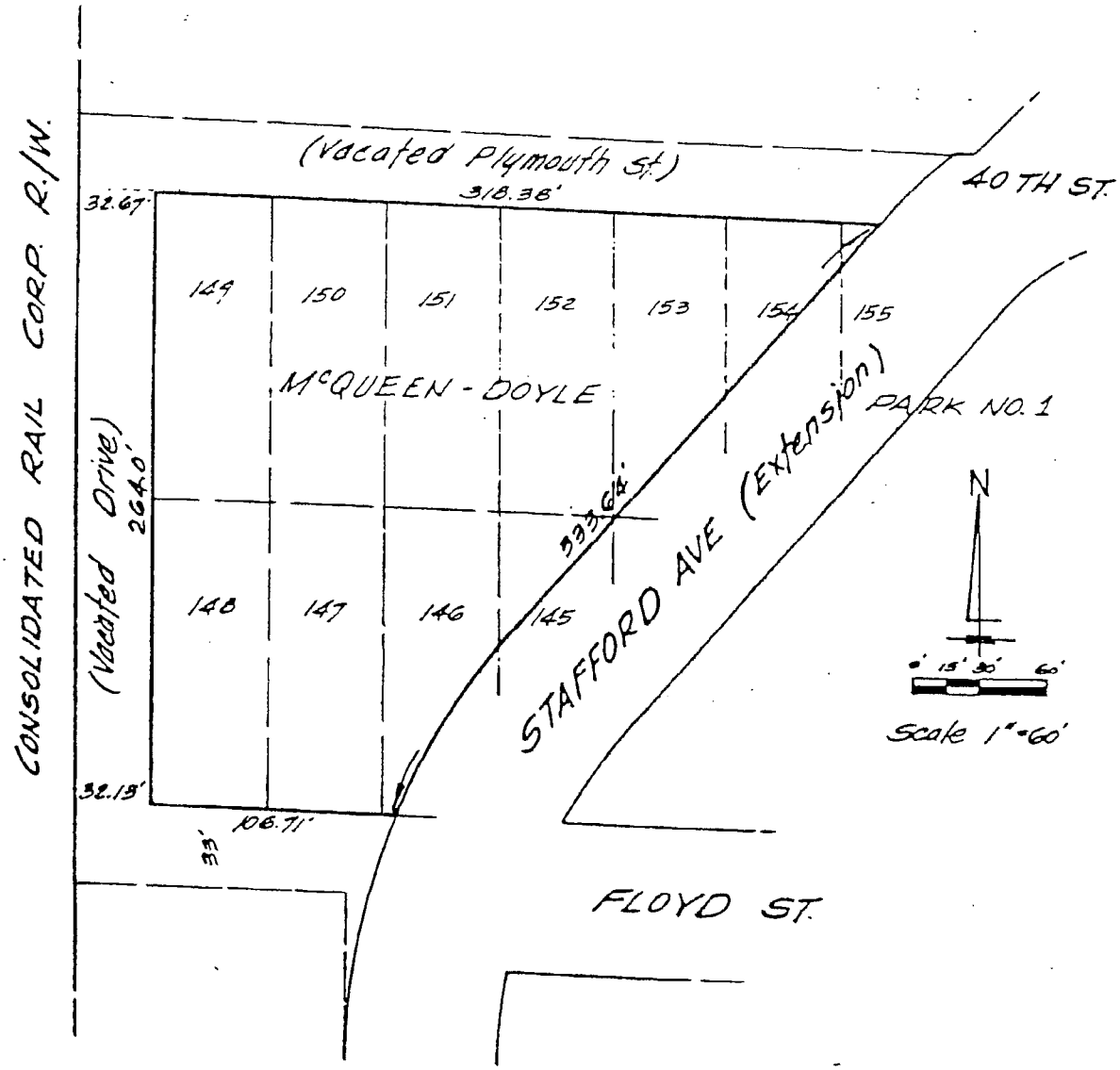
S-86571-D

LIBER 2043 PAGE 93

Property Map Prepared For: FISHER BODY DIVISION
General Motors Corporation

Site Name and Address: FISHER BODY METAL FABRICATING PLANT
300 - 36th Street, S.W.
Grand Rapids, Michigan 49508

Site Location: City of Wyoming, Kent County, Michigan.



February 4, 1982

S-86571-C

WILLIAMS & WORKS
ENGINEERS/SURVEYORS/PLANNERS/GEOLOGISTS
611 CASCADE WEST PARKWAY, S.E. GRAND RAPIDS MICHIGAN 49506

LIBER 2043 PG 92

Property Description For: FISHER BODY DIVISION
General Motors Corporation

Site Name and Address: FISHER BODY METAL FABRICATING PLANT
300 - 36th Street, S.W.
Grand Rapids, Michigan 49508

Site Location: City of Wyoming, Kent County, Michigan

PROPERTY DESCRIPTION:

All of Lots 147 through 152 inclusive and also all that part of Lots 144, 145, 146, 153, 154 and 155 lying northwesterly of the northwesterly right-of-way line of Stafford Avenue extension (so-called), McQueen-Doyle Park No. 1, City of Wyoming, Kent County, Michigan.

Prepared By: WILLIAMS & WORKS, INC.
611 Cascade West Parkway, S.E.
Grand Rapids, Michigan 49506

R. E. Stadt

Russell E. Stadt, RLS

February 4, 1982

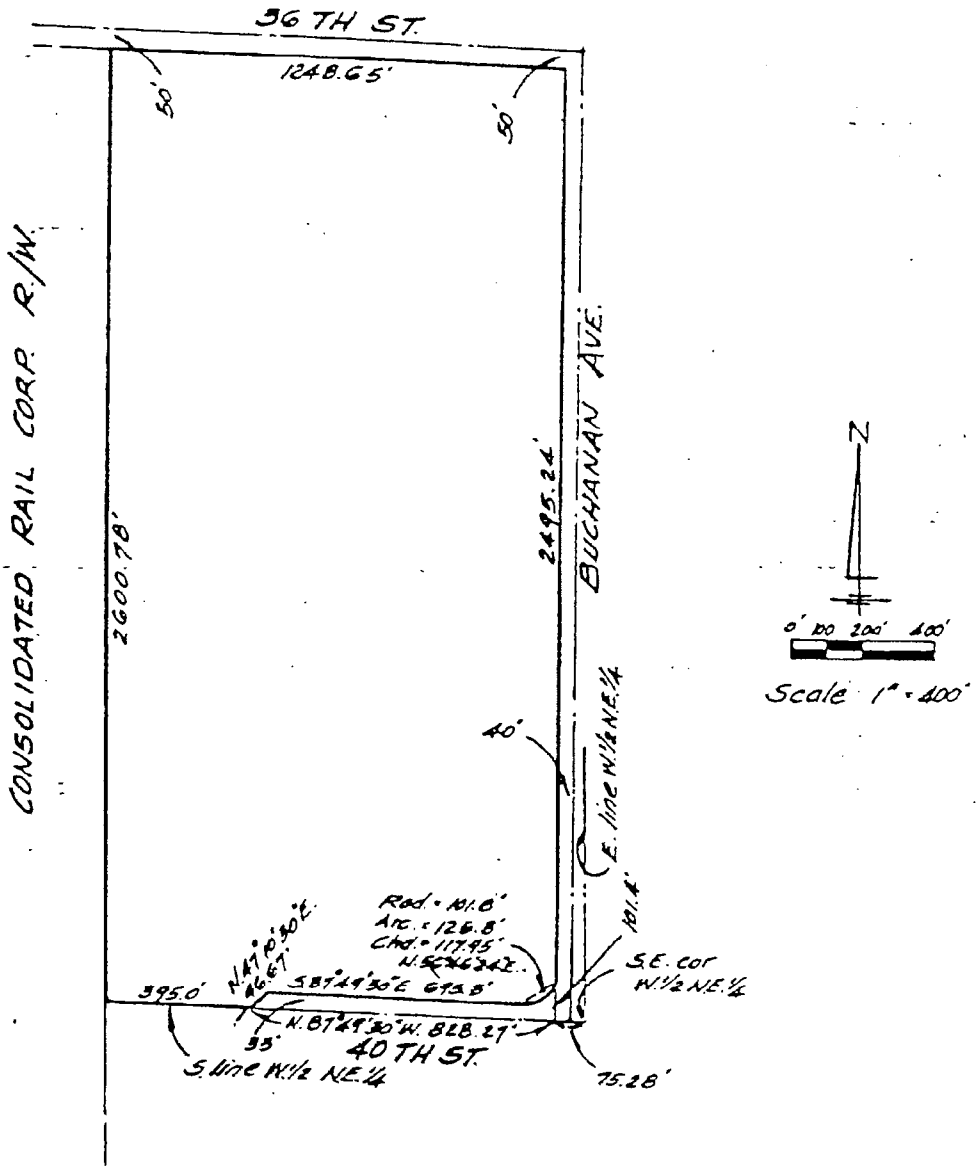
S-86571-C

LIBER 2043 PAGE 91

Property Map Prepared For: FISHER BODY DIVISION
General Motors Corporation

Site Name and Address: FISHER BODY METAL FABRICATING PLANT
300 - 36th Street, S.W.
Grand Rapids, Michigan 49508

Site Location: City of Wyoming, Kent County, Michigan.



February 4, 1982

S-86571-B

WILLIAMS & WORKS
ENGINEERS/SURVEYORS/PLANNERS/GEOLOGISTS
611 CASCADE WEST PARKWAY S.E. GRAND RAPIDS MICHIGAN 49506

LIBER 2043 PAGE 90

Property Description For: FISHER BODY DIVISION
General Motors Corporation

Site Name and Address: FISHER BODY METAL FABRICATING PLANT
300 - 36th Street, S.W.
Grand Rapids, Michigan 49508

Site Location: City of Wyoming, Kent County, Michigan

PROPERTY DESCRIPTION:

All that part of the W½ NE¼ of Section 24, Town 6 North, Range 12 West, City of Wyoming, Kent County, Michigan, lying East of the east line of the Consolidated Rail Corporation (formerly Pennsylvania Railroad) right-of-way and also lying West of a line which is 40.0 feet West from and parallel with the center line of Buchanan Avenue; Except therefrom the North 50.0 feet of said W½ NE¼ and also except therefrom that part described as: Commencing at the point of intersection of the south line of said W½ NE¼ with the west line of Buchanan Avenue (being 40.0 feet distant Westerly from the center line of Buchanan Avenue), said point being 75.28 feet North 87°49' 30" West from the southeast corner of said W½ NE¼, thence North 87° 49'30" West 828.27 feet along the south line of said W½ NE¼, thence North 47°10'30" East 46.67 feet to a point 33.0 feet distant North from the south line of said W½ NE¼, thence South 87°49'30" East 695.3 feet, thence Northeasterly 125.8 feet along a 101.8 foot radius curve to the left, the chord of which bears North 56°46'24" East 117.95 feet to said west line of Buchanan Avenue, thence South 101.4 feet along the west line of Buchanan Avenue to the place of beginning.

Prepared By: WILLIAMS & WORKS, INC.
611 Cascade West Parkway, S.E.
Grand Rapids, Michigan 49506

Russell E. Stadt, RLS

STATE OF MICHIGAN
RUSSELL E. STADT
LAND SURVEYOR
No. 24618
REGISTERED LAND SURVEYOR

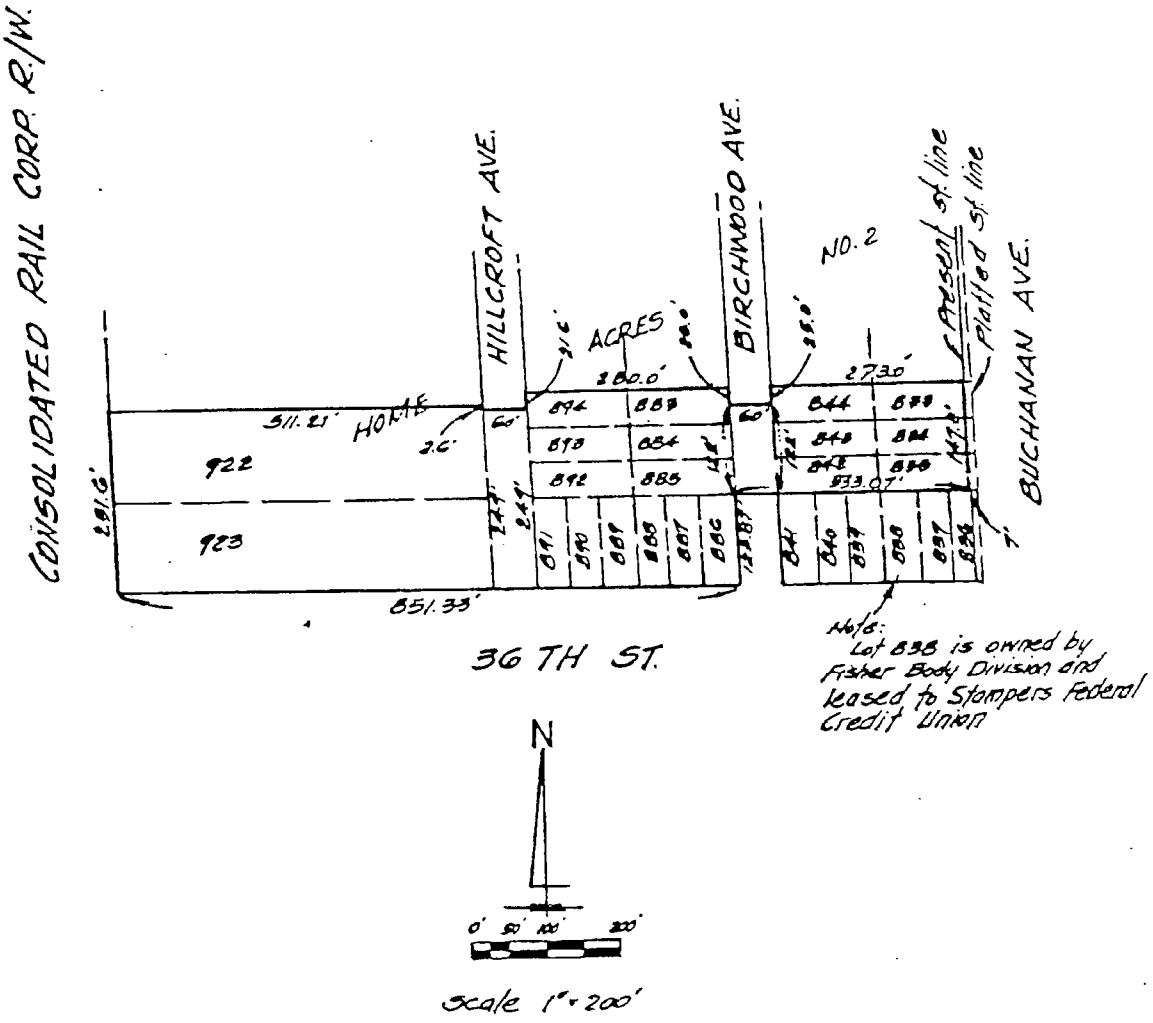
February 4, 1982
S-86571-B

LIBER 2043 PG 89

Property Map Prepared For: FISHER BODY DIVISION
General Motors Corporation

Site Name and Address: FISHER BODY METAL FABRICATING PLANT
300 - 36th Street, S.W.
Grand Rapids, Michigan 49508

Site Location: City of Wyoming, Kent County, Michigan.



February 4, 1982

S-86571-A

Revised: 2-23-82

WILLIAMS & WORKS
ENGINEERS/SURVEYORS/PLANNERS/GEOLOGISTS
611 CASCADE WEST PARKWAY, S.E. GRAND RAPIDS, MICHIGAN 49506

LIBER 2043 PAGE 88

Property Description For: FISHER BODY DIVISION
General Motors Corporation

Site Name and Address: FISHER BODY METAL FABRICATING PLANT
300 - 36th Street, S.W.
Grand Rapids, Michigan 49508

Site Location: City of Wyoming, Kent County, Michigan

PROPERTY DESCRIPTION:

All of Lots 833, 834 and 835 except the East 7.0 feet of said Lots 833, 834 and 835; All of Lots 842, 843 and 844; All of Lots 883 through 894 inclusive; All of Lots 922 and 923; Also all of that part of vacated Hillcroft Avenue (formerly Hillcrest Avenue) described as: Commencing at the southeast corner of Lot 923, thence East 60 feet to the southwest corner of Lot 891, thence North 249.0 feet to a point on the west line of Lot 894, thence West 60 feet to a point on the east line of Lot 922, thence South 249.0 feet to the place of beginning; and also all that part of vacated Birchwood Avenue described as: Commencing at the southeast corner of Lot 885, thence East 60 feet to the southwest corner of Lot 842, thence North 122.0 feet to a point on the west line of Lot 844, thence West 60 feet to a point on the east line of Lot 883 which is 122.0 feet North from the southeast corner of Lot 885, thence South 122.0 feet to the place of beginning. All of said Lots and vacated Avenues being a part of Home Acres No. 2, Section 13, Town 6 North, Range 12 West, City of Wyoming, Kent County, Michigan, according to the recorded plat thereof.

Prepared By: WILLIAMS & WORKS, INC.
611 Cascade West Parkway, S.E.
Grand Rapids, Michigan 49506

Russell E. Stadt, RLS

STATE OF MICHIGAN
RUSSELL E. STADT
LAND SURVEYOR
No. 24619
REGISTERED LAND SURVEYOR

February 4, 1982 (Revised: 2-23-82)
S-86571-A

DESCRIPTION (PARCEL) No. 1

All that part of the Southeast 1/4 of the Northwest 1/4 of Section 24, Town 6 North, Range 12 West, described as: Commencing on the East and West 1/4 line of said Section, 261.22 feet West of the Center of said Section; thence West along said East and West 1/4 line 50 feet, thence North parallel to the North and South 1/4 line 205.71 feet, thence East parallel with the East and West 1/4 line 50 feet, thence South to beginning, Except the South 33 feet thereof. City of Wyoming, Kent County, Michigan.

DESCRIPTION (PARCEL) No. 2

That part of the Southeast 1/4 of the Northwest 1/4 of Section 24, Town 6 North, Range 12 West, described as: Commencing on the East and West 1/4 line of said Section, 161.22 feet West of the Center of said Section; Thence West along the said East and West 1/4 line 100 feet, thence North parallel to the North and South 1/4 line 205.71 feet, thence East parallel to the East and West 1/4 line 99.84 feet, thence South 205.71 feet to the place of beginning. City of Wyoming, Kent County, Michigan.

DESCRIPTION (PARCEL) No. 3

All that part of the East 1/2 of the Southeast 1/4 of the Northwest 1/4 of Section 24, Town 6 North, Range 12 West, described as: Commencing 311.22 feet West along the East-West 1/4 line of Section 24 from the Center of said Section; Thence North parallel with the North-South 1/4 line of said Section 205.71 feet, thence East parallel with said East-West 1/4 line 149.80 feet to a point 100 feet distant West of the west line of the Pennsylvania Railroad Company right-of-way (100 feet wide), thence Northerly parallel with said right-of-way line 350.75 feet to a point 768.95 feet South from the north line of said East 1/2 of the Southeast 1/4 of the Northwest 1/4, thence West parallel with the north line of said East 1/2 of the Southeast 1/4 of the Northwest 1/4, 465.91 feet to a point 33 feet distant East from the west line of the East 1/2 of the Southeast 1/4 of the Northwest 1/4, thence South parallel with the west line of the East 1/2 of the Southeast 1/4 of the Northwest 1/4, 248.57 feet to a point which is 308.58 feet North from the East-West 1/4 line, thence East parallel with the East-West 1/4 line 7.37 feet to a point which is 701.25 feet East of the west line of the Southeast 1/4 of the Northwest 1/4 of said Section and the east line of Clay Avenue, thence South along the east line of Clay Avenue, being parallel with the west line of said Southeast 1/4 of the Northwest 1/4, 102.87 feet, thence East parallel with the East-West 1/4 line 1.44 feet to the east line of Clay Avenue, which is 619.25 feet West from the North-South 1/4 line of said Section, thence South along the east line of Clay Avenue and parallel with the North-South 1/4 line 205.71 feet to the East-West 1/4 line, thence East along the East-West 1/4 line 308.03 feet to the place of beginning, Except therefrom the South 33 feet for highway pur-

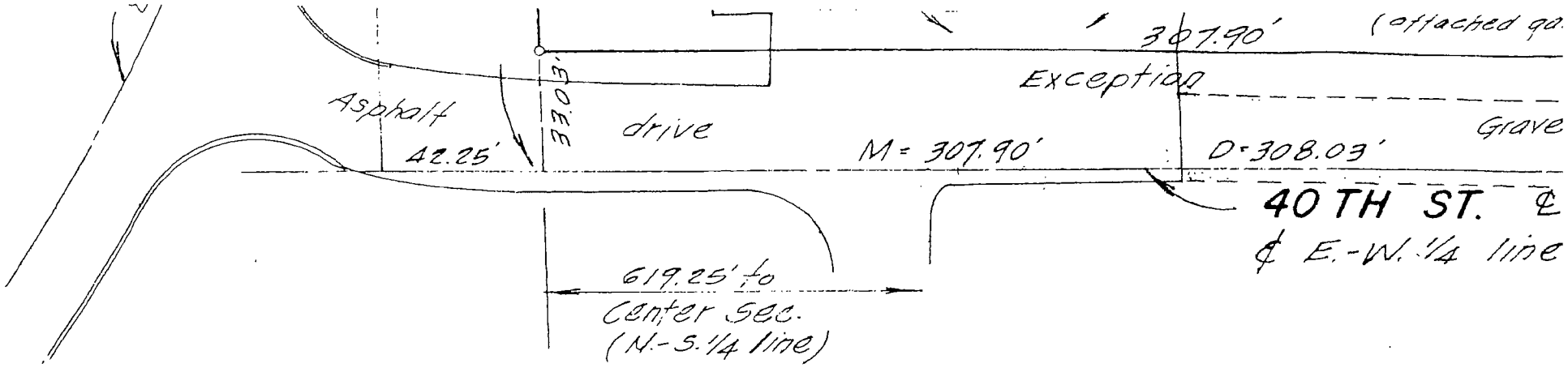
City of Wyoming, Kent County, Michigan

(Tax Id. No. 41-18-24-200-026)

PROPOSED DESCRIPTION
(Combining Descriptions (Parcels) No.1, 2, and 3 as one parcel)

All that part of the E 1/2 of the SE 1/4 of the NW 1/4 of Section 24, Town 6 North, Range 12 West, City of Wyoming, Kent County, Michigan, described as: Commencing at the North One-Quarter corner of said Section 24, thence South 4°30'00" East 2650.80 feet along the North & South 1/4 line of said Section to the Center of said Section, thence South 87°53'20" West 161.35 feet along the East & West 1/4 line of said Section to a point being 100.0 feet distant West (perpendicular measurement) from the west line of the Consolidated Rail Corporation (formerly Pennsylvania Railroad Company) right-of-way for THE PLACE OF BEGINNING OF THIS DESCRIPTION; Thence North 4°32'38" West 556.72 feet parallel with and being 100.0 feet distant West (perpendicular measurement) from said westerly railroad right-of-way line to a point that is 768.95 feet South from the north line of said E 1/2 of the SE 1/4 of the NW 1/4, thence South 87°58'45" West 466.05 feet parallel with said north line of the E 1/2 of the SE 1/4 of the NW 1/4 to a point 33.00 feet distant East (perpendicular measurement) from the west line of said E 1/2 of the SE 1/4 of the NW 1/4, thence South 4°25'48" East 248.85 feet parallel with said west line of the E 1/2 of the SE 1/4 of the NW 1/4 to a point that is 308.58 feet North from the East & West 1/4 line of said Section, thence North 87°53'20" East 7.10 feet parallel with said East & West 1/4 line to a point that is 701.25 feet East from the west line of the SE 1/4 of the NW 1/4 of said Section and also being the east right-of-way line of Clay Avenue, thence South 4°21'37" East 102.87 feet along said east right-of-way line and being parallel with said west line of the SE 1/4 of the NW 1/4, thence North 87°53'20" East 2.0 feet to the east right-of-way line of Clay Avenue (described as being 619.25 feet West from the North & South 1/4 line of said Section), thence South 4°30'00" East 172.67 feet along said east right-of-way line being parallel with the North & South 1/4 line of said Section to a point that is 33.00 feet North (perpendicular measurement) from the East & West 1/4 line of said Section, thence North 87°53'20" East 357.90 feet parallel with said East & West 1/4 line to a point that is 33.00 feet North (perpendicular measurement) from a point on said East & West 1/4 line that is 100.00 feet South 87°53'20" West along said East & West 1/4 line from the place of beginning of this description, thence South 4°30'00" East 33.03 feet parallel with the North & South 1/4 line to the East & West 1/4 line at said point being 100.00 feet South 87°53'20" West from the place of beginning of this description, thence North 87°53'20" East 100.00 feet to the place of beginning. Subject to a right-of-way for highway purposes across that part thereof lying South of a line that is 33.00 feet North (perpendicular measurement) from and parallel with the East & West 1/4 line of said Section.

Containing 241,984.23 Sq/Ft. (5.552 Acres)



PROPOSED DESCRIPTION FOR GAP STRIP LYING NORTH OF DESCRIPTION (PARCEL) No. 3:

All that part of the E 1/2 of the SE 1/4 of the NW 1/4 of Section 24, Town 6 North, Range 12 West, City of Wyoming, Kent County, Michigan, described as: Commencing at the Center of said Section 24, thence South 87°53'20" West 161.35 feet along the East & West 1/4 line of said Section to a point being 100.0 feet distant West (perpendicular measurement) from the west line of the Consolidated Rail Corporation (formerly Pennsylvania Rail Company) right-of-way, thence North 4°32' 38" West 556.72 feet parallel with said railroad right-of-way line and 100.0 feet distant West (perpendicular measurement) therefrom to a point that is 768.95 feet South from the north line of said E 1/2 of the SE 1/4 of the NW 1/4 for THE PLACE OF BEGINNING OF THIS DESCRIPTION; Thence South 87°58'45" West 466.05 feet parallel with said north line of the E 1/2 of the SE 1/4 of the NW 1/4 to a point being 33.00 feet distant East (perpendicular measurement) from the west line of said E 1/2 of the SE 1/4 of the NW 1/4, thence North 4°25'48" West 8.15 feet parallel with said west line of the E 1/2 of the SE 1/4 of the NW 1/4 to a point that is 2087.25 feet South from the north line of said Section 24, thence North 88°04'00" East 466.08 feet parallel with the north line of said Section to a line bearing North 4°32'38" West from the place of beginning of this description, said line being 100.0 feet distant West (perpendicular measurement) from the west line of said Consolidated Rail Corporation right-of-way, thence South 4°32'38" East 7.43 feet to the place of beginning.

Containing 3,627.22 Sq/Ft. (0.0832 Acre)

APPENDIX B

NOTICE OF MIGRATION OF CONTAMINATION

For DEQ Use Only
ITS # _____
Site ID # _____

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL RESPONSE DIVISION

NOTICE OF MIGRATION OF CONTAMINATION (FORM EQP4482)

(Under the authority of Part 201, 1994 Act 451, as amended, and the Rules promulgated thereunder)

An owner or operator of property that is a facility who has knowledge that a hazardous substance is emanating from, has emanated from, or is likely to be emanating from the property and migrating beyond the boundaries of the property that he or she owns or operates is required under R 299.51017(1) to notify the Michigan Department of Environmental Quality ("DEQ"), unless he or she is exempt from MCL 324.20107a (see MCL 324.20107a(4) for exemptions). With regard to conditions known to the owner or operator prior to March 11, 1999 (the effective date of R 299.51017), this notice must be provided to the DEQ by June 9, 1999 (90 days after the effective date). With regard to conditions that were not known to the owner or operator prior to March 11, 1999, the report must be submitted to the DEQ within 45 days after the owner or operator has knowledge that hazardous substances have migrated, or are likely to have migrated, to or beyond the boundary of his or her property in reportable concentrations. Use of this form is mandatory for the notice required by R 299.51017(1). Completing this notice in no way relieves a person who is subject to MCL 324.20114 from the responsibility to undertake required response activities.

This notice must be sent to the DEQ office that serves the county in which the property is located. A list of DEQ offices is attached. The DEQ will not prepare acknowledgement of receipt of these notices. The sender is responsible for sending the report using a method that provides proof of delivery if such proof is desired. Please label the outside of the envelope "Rule 1017 Notice."

Please answer the following questions as completely as possible.

1. Name and address of owner or operator making the report.
   General Motors Corporation
   100 Renaissance Center
   PO Box 431301
   Detroit, MI
   48265

2. Status relative to the property. (Check one or both, as applicable.)
   Owner ☒
   Operator ☒

3. Name and telephone number of contact person for owner or operator.
   Mr. Tobe Allen
   (616) 246-2870

4. Address/location of the property that is the subject of this notice (i.e., owned or operated by the person identified in item #1).
   GM Grand Rapids Metal Fabrication Plant
   300 36th Street SW
   Grand Rapids, MI
   49548

   County Kent

5. Complete the Table on Page 3 of this Form for each hazardous substance which has migrated, or is likely to have migrated, up to or beyond the property boundary at a concentration that exceeds a Generic Residential Cleanup Criterion developed by the DEQ pursuant to MCL 324.10120a(1).

Complete additional copies of Page 3, if necessary, to list all hazardous substances that must be reported. Include a scaled map or drawing that shows the location of sampling points identified on the Table on Page 3.

6. If a map, report, or other additional information is available which depicts or describes the conditions reported on this form, and the basis for your conclusion that this report is required, that information may be (but is not required to be) submitted with this form. You may also identify by title and date any reports previously submitted to the DEQ that contain relevant information. Include the name of the site or facility that the report addresses. This additional information may assist the DEQ in determining whether response activity is required to address conditions described in this notice.

With my signature below, I certify that I am legally authorized to execute this notice on behalf of the owner or operator named on this form, and that to the best of my knowledge and belief the above representations are complete and accurate. I understand that intentionally submitting false information to the DEQ is a felony and may result in fines up to $25,000 for each violation.

Signature _____ Date 6/9/99
(Person legally authorized to bind the person making this report)

Name (Typed or Printed) Tom McLean

Title (Typed or Printed) Plant Manager

Letter report by Earth Tech dated March 9, 1999 to Tobe Allen titled: GM Grand Rapids Metal Fabrication Plant Groundwater Monitoring Program, December 1998 Quarterly Report and 1998 Annual Report

EDI Engineering and Sciences report titled: Results of Phase III-A Hydrogeological Investigation for General Motors Corporation, CPC Group, Grand Rapids, Michigan, March 1987

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL RESPONSE DIVISION

NOTICE OF MIGRATION OF CONTAMINATION (FORM EQP4482)

(Under the authority of Part 201, 1994 Act 451, as amended, and the Rules promulgated thereunder)

See Item 5 on Page 1 of this Form for instructions to be used in completing this Table. The information to be included in each column of the Table is:

Column A Name of hazardous substance.
Column B Chemical Abstract Service (CAS) Number for the hazardous substance.
Column C Sample location for Column D (relate to label on map).
Column D Maximum hazardous substance concentration measured on the property, including units (e.g., 100 ug/l or 20 mg/kg). Report maximum concentration separately for each environmental medium.
Column E Environmental medium in which concentration reported in Column D was measured (e.g., soil or groundwater).
Column F Distance from point of maximum measured concentration (Column C) to property boundary, in direction of contaminant migration, if direction is known or can reasonably be inferred. If direction is unknown, list distance to nearest property boundary.
Column G Direction of contaminant migration, if known.
Column H Sample location for Column I (relate to label on map).
Column I Concentration closest to property boundary, if known. If a concentration lower than the maximum concentration reported in Column D has been measured at a point closer to the property boundary in the direction of contaminant migration, use Column I to list the concentration that was measured closest to the property boundary in the direction of contaminant migration.
Column J Environmental medium for measurement reported in Column I, if applicable.

A Hazardous Substance	B CAS Number	C Sample Location for "D"	D Maximum Concentration	E Environmental Medium for "D"	F Distance to Property Boundary	G Direction of Migration	H Sample Location for "I"	I Boundary Concentration	J Environmental Medium for "I"
Trichloroethylene	79016	MW86-2 12/1988	100,000 ug/l	groundwater	1200 ft	N	MW86-3 12/1998	4 ug/l	groundwater
Cis 1,2-dichloroethylene	156592	MW87-5 3/1992	150 ug/l	groundwater	1000 ft	N	Mw86-3 12/1998	<1 ug/l	groundwater

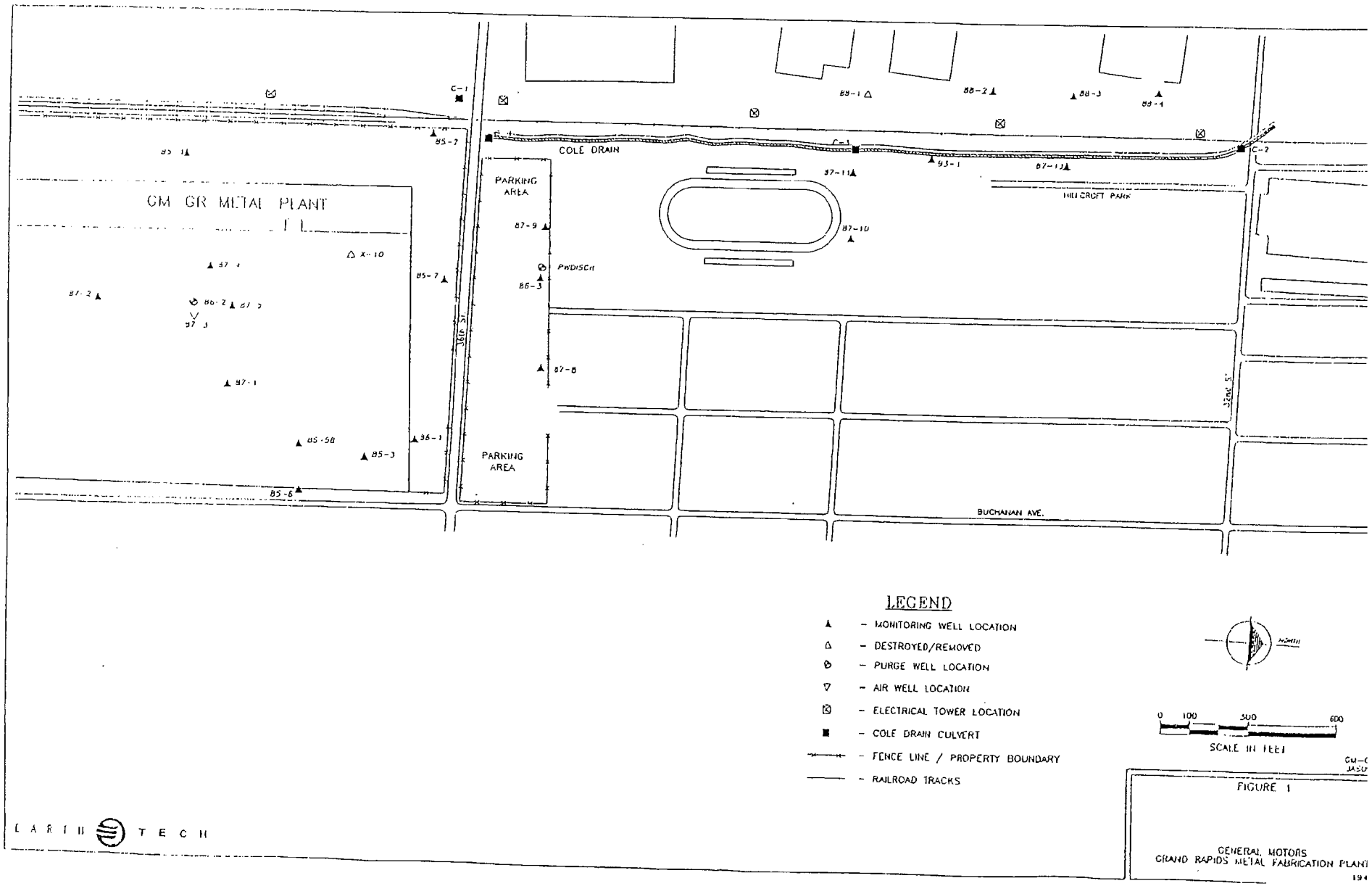
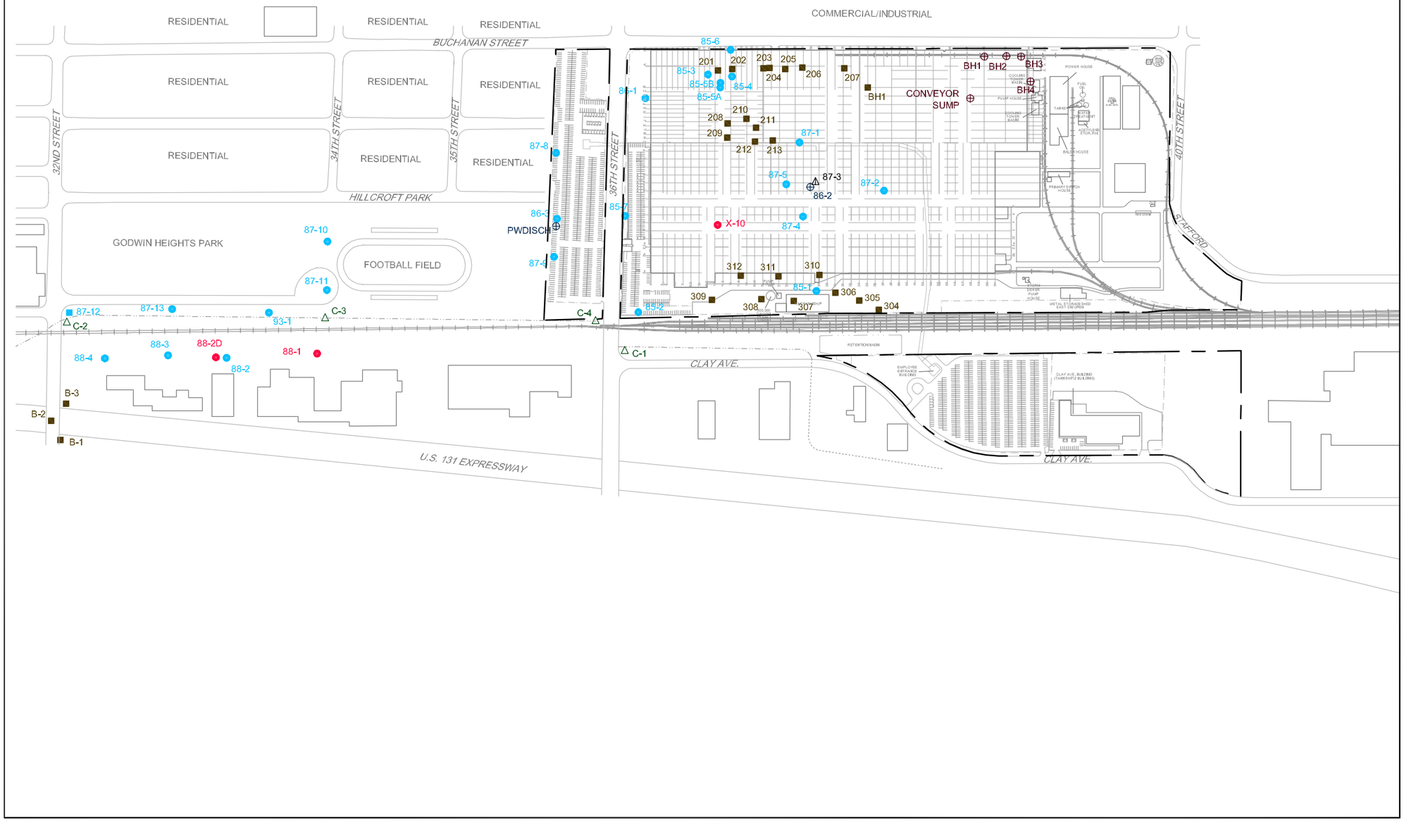


FIGURE 1

GENERAL MOTORS
GRAND RAPIDS METAL FABRICATION PLANT



NO	Revision	Date	Initial

LEGEND

■ 307	SOIL BORING LOCATION
● X-10	DESTROYED/REMOVED MONITORING WELL LOCATION
● 87-2	MONITORING WELL LOCATION
⊕ PWDISCH	PURGE WELL LOCATION
△ C-2	CULVERT LOCATION
⚠ 87-3	AIR SPARGING WELL
⊕ BH1	APPROXIMATE LOCATION OF DEWATERING WELLS
— — —	APPROXIMATE SITE BOUNDARY
	FENCE
	RAILROAD
	COLE DRAIN

SOURCE: EDI ENGINEERING & SCIENCE, JUNE 1987 AND JUNE 1988 AND EARTH TECH, SEPTEMBER 2001.

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GRAND RAPIDS METAL PLANT

WYOMING, MICHIGAN

SITE PLAN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
G.K.	J.O.	MAY 2002	
Scale: 1"=250'	Project No: 17360-01	Report No: 001	Drawing No: 1

17360-01(001)GN-DE004 JUL 25/2002

CONESTOGA-ROVERS & ASSOCIATES

14496 Sheldon Road, Suite #200
Plymouth, Michigan 48170
Telephone: (734) 453-5123 Fax: (734) 453-5201
www.CRAworld.com

MEMORANDUM

PRIVILEGED AND CONFIDENTIAL
PREPARED AT ENCORE COUNSEL'S REQUEST

TO: Kurt Blizzard

REF. NO.: 17360-01

FROM: Jennifer Maude/jq/7/Det.

DATE: August 13, 2002

C.C.: Marilyn Dedyne, GM
Gary Klepper, CRA
Jennifer Quigley, CRA

RE: **Evaluation of Groundwater and Soil Vapor Extraction Treatment Systems**
General Motors Corporation
Grand Rapids Metal Plant
Wyoming, Michigan

1.0 INTRODUCTION

Conestoga-Rovers & Associates, Inc. (CRA) has prepared this memorandum for the General Motors Corporation (GM) Metal Fabrication Division (MFD) Grand Rapids Metal Plant located at 300 36th Street S.W. in Wyoming, Michigan (Site). The purpose of this memorandum is to provide the results of the preliminary evaluation of the groundwater extraction (GWE) and soil vapor extraction (SVE) and treatment systems currently active at the Site to address the presence of chlorinated compounds in Site soil and groundwater. The evaluation was undertaken by review of existing information and analytical data for the chlorinated compounds, primarily trichloroethene (TCE), to meet the following objectives:

1. Establish historical analytical data trends;
2. Evaluate historical performance to verify the adequacy of the treatment systems' design;
3. Identify whether the existing systems should be maintained, abandoned or upgraded and recommend improvements to current systems, if applicable; and
4. Discuss potential alternatives.

In addition, this evaluation has been conducted concurrently with an evaluation of the current monitoring well network present at the Site. The results of the monitoring well network evaluation and the recommendations therefrom are presented under separate cover in a memorandum to ENCORE dated August 13, 2002.

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

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PREPARED AT ENCORE COUNSEL'S REQUEST

2.0 SCOPE OF WORK

Each of the objectives listed above has been evaluated for the SVE and GWE systems and the results of these evaluations are summarized in the corresponding sections that follow.

2.1 ESTABLISH HISTORICAL DATA TRENDS

Evaluation of analytical data trends for TCE in the SVE system influent are presented on Figure 1. These data indicate the following:

- TCE concentrations in the SVE system influent streams have consistently decreased over time from 135,000 mg/m^3 in February 1989 to less than 1 mg/m^3 in recent years;
- TCE concentrations in the SVE influent have remained stable at concentrations between 1 mg/m^3 and 1.5 mg/m^3 for the seven monitoring rounds conducted from June 13, 2000 to December 19, 2001;
- TCE concentrations in the SVE influent have remained less than 5 mg/m^3 since March 1993; and
- SVE effluent monitoring indicates that TCE has generally been non-detect after treatment. On the few occasions during which TCE was detected in SVE effluent, the concentration ranged from 0.51 mg/m^3 (December 2000) to 10 mg/m^3 (January 1990).

Historical TCE concentration trends for the GWE system pumping wells' PW and 86-2 influent are presented on Figure 2 and Figure 3, respectively. Evaluation of these data indicate the following:

- TCE concentrations in the pumping well influent streams have decreased consistently over time from concentrations of 600 ug/L (July 1992) to 6.6 ug/L (September 2001) at 86-2, and from 180 ug/L (May 1990) to 4.5 ug/L (September 2001) at PW; and
- TCE concentrations in the pumping well influent streams have remained stable at 86-2 at concentrations less than 10 ug/L since September 1995, and at PW at concentrations less than 5 ug/L since September 1998.

Historical TCE concentration trends for groundwater monitoring wells located throughout the Site and downgradient of the Site are presented in Attachment A. These data indicate the following:

- TCE concentrations have been decreasing or stable over time at the groundwater monitoring wells since at least September 1991;
- 1,2-dichloroethene (DCE), which has generally not been detected in the pumping well influent samples, is present in the vicinity of monitoring wells 86-3, 87-1, 87-2, 87-5 and 87-11. The presence of 1,2 DCE, a degradation product of TCE, may indicate the occurrence of TCE biodegradation; and
- TCE and 1,2-DCE concentrations generally exhibit a decreasing concentration trend along the groundwater flow path, with the exception of the high TCE concentrations detected at 87-10 and 87-11. The TCE concentration trend along the groundwater flow path downgradient of 87-10 and 87-11 cannot be determined due to the absence of monitoring wells directly downgradient of these wells.

It should be noted that although PCE and 1,1,1-trichloroethane (TCA) also have been detected in Site groundwater in the past, these VOCs were not included in the routine groundwater sampling and analysis

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plan. Therefore, there is insufficient analytical data for evaluating the trends of these volatile organic compounds (VOCs) in Site groundwater.

2.2 EVALUATE HISTORICAL PERFORMANCE TO VERIFY THE ADEQUACY OF THE TREATMENT SYSTEMS' DESIGN

Historical SVE and treatment system influent and effluent data indicate that this system has successfully withdrawn and treated TCE mass from the soil vapor in the vicinity of the SVE system. There are no remote soil vapor data (i.e., from locations other than the SVE system influent stream) to confirm the actual areal extent of SVE system influence and effectiveness. However, influent TCE data indicate that the SVE system has not been capturing significant TCE mass from the soil vapor for approximately 10 years. The plateau observed for the SVE system TCE capture is typical for such systems and is not considered to be the result of a design flaw.

Historical and current performance of the GWE and treatment system indicate that the extent of groundwater capture is limited. Evaluation of the current groundwater contour figure (see Figure 4) indicates limited influence of pumping wells 86-2 and PW. This observation is substantiated by the historical groundwater level data provided for the groundwater monitoring wells located nearest the two GWE wells (i.e., 86-3 and 87-9 in the vicinity of PW and 87-1, 87-2, 87-4 and 87-5 in the vicinity of 86-2). The historical static groundwater level data from the GWE wells and the nearby groundwater monitoring wells indicate that drawdown ranged from 0 to 0.5 feet in observation wells 86-3 and 87-9 when GWE was initiated at PW. Drawdown ranged from 0 to 1 foot in the observation wells near 86-2.

The chemistry data from the GWE wells 86-2 and PW influent streams indicate that TCE concentrations stabilized at concentrations less than 10 ug/L and 5 ug/L, respectively, and have remained stable since at least 1995 and 1998, respectively. The peak TCE concentrations were 600 ug/L and 180 ug/L at 86-2 and PW, respectively. These data indicate that the GWE system was successful at removing significant TCE mass from the groundwater in the vicinity of the GWE wells. However, the GWE system influent data indicate that the system has reached a plateau and has been capturing relatively low TCE concentrations over the past 5 to 8 years.

The TCE concentration data from groundwater monitoring wells across the site overall have decreased or remained stable since GWE was initiated at 86-2 and PW. Furthermore, the TCE and 1,2-DCE concentrations generally exhibit a decreasing concentration trend along the groundwater flow path, with the exception of the high TCE concentrations detected at 87-10 and 87-11. These data trends suggest that natural attenuation of TCE downgradient of the Site has been occurring during operation of the GWE system. This also indicates that the historical and current operation of the GWE system is exerting sufficient source area control such that the TCE attenuation is occurring in the vicinity of most groundwater quality monitoring wells.

While it is clear that the SVE and GWE systems have resulted in the removal of TCE mass from Site soil and groundwater, there is no data to determine spatial or temporal trends of PCE and 1,1,1-TCA concentrations at the Site, although it is likely that mass removal of these VOCs has occurred. Based on the detections of PCE and 1,1,1-TCA at MW87-2 and the expectation that the source of these VOCs is located upgradient of Column T-27 it is believed that the GWE system has provided some degree of containment of the PCE and

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1,1,1-TCA; however, this cannot be verified or quantified due to the absence of monitoring data during the time period that the systems have been operational.

2.3 IDENTIFY WHETHER THE EXISTING SYSTEMS SHOULD BE MAINTAINED, ABANDONED OR UPGRADED AND RECOMMEND IMPROVEMENTS TO CURRENT SYSTEMS

Due to the insignificant TCE mass capture of the SVE system, it is recommended that the SVE system be transferred from continuous to intermittent operation. During the initial period of intermittent operation, measurements of TCE influent concentration data should be collected and evaluated to determine whether significant TCE mass is being captured in soil vapor. In addition, influent PCE and 1,1,1-TCA concentrations should be measured to confirm that the SVE system is not withdrawing significant PCE or 1,1,1-TCA mass. Based on the findings after a period of intermittent use of the SVE system, it may be recommended that the SVE system be abandoned.

While the TCE mass capture of the GWE system has been relatively insignificant in recent years, continued operation for the near term is advised in order to maintain source area control and to ensure the continued natural attenuation of the plume downgradient of the Site. Cessation of GWE at 86-2 and PW could result in loss of source area control and a rebound effect causing increased TCE concentrations downgradient of the Site. Until the status of source control has been verified, it is recommended that operation of the GWE system be maintained. In order to evaluate the source control effects of decommissioning the GWE system, CRA proposes to cease pumping for a period of time and monitoring groundwater quality directly downgradient of the GWE wells. This would require the installation of an additional monitoring well directly downgradient of PW. Figure 5 presents the proposed approximate location of the additional downgradient monitoring well, MW7-02. In addition, Figure 5 presents the approximate locations of additional monitoring wells, MW1-02 through MW6-02, to be installed based on the results of the monitoring well network evaluation, as previously detailed in Section 1.0.

In order to completely monitor potential Site-related VOCs and to obtain preliminary biodegradation indicator data, it is recommended that future groundwater samples be analyzed for PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, vinyl chloride, 1,1,1-TCA, 1,1-DCA and chloroethane. In addition, measurement and analysis of the following biodegradation evaluation parameters are recommended in order to conduct a preliminary evaluation of VOC natural attenuation at the Site: dissolved oxygen, oxidation-reduction potential, nitrate, dissolved iron, sulfate, methane, ethane and ethene.

2.4 DISCUSS POTENTIAL ALTERNATIVES

Decreasing TCE concentration trends downgradient of the Site and the presence of 1,2-DCE, a biodegradation product of TCE, in groundwater monitoring wells (but not in the source area purge wells) indicate that biodegradation of TCE may be occurring in soil and groundwater beneath the Site. Furthermore, the presence of TCE may be in part due to degradation of PCE, which was historically detected in upgradient portions of Site groundwater, but which was not monitored. Degradation is an important natural attenuation mechanism because it destroys contaminant mass. A preliminary natural attenuation evaluation would determine whether or not natural attenuation mechanisms, including degradation, are occurring at significant rates at the Site. A monitored natural attenuation remedy may be

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considered either on its own, or for the downgradient portion of the plume in conjunction with active remediation (e.g., continued pumping or enhanced in situ remediation) in the source areas.

Another method that could be considered in lieu of continued SVE and GWE is enhanced bioremediation. The rate of biodegradation of organic compounds by microbes (indigenous or inoculated) is enhanced by adding co-substrate and nutrients, or by creating conditions favorable for microbe development. This method can be used to enhance natural conditions or cause a shift in natural conditions depending on what type of co-substrate and nutrients are added. Typically, an Oxygen Releasing Compound (ORC) will enhance or create oxidizing conditions where as a Hydrogen Releasing Compound (HRC), ethyl lactate or molasses will enhance reducing conditions. For TCE, reducing conditions favor biodegradation. Applicable reducing enhancements include:

- HRC is a proprietary formulation of food-grade polylactate ester specially formulated for slow release (over approximately 1 year) of lactic acid upon hydration. Microbes degrade the lactic acid to form hydrogen, which is then used by other microbes in reductive dehalogenation of chlorinated VOCs. The viscous HRC is injected into the soil matrix under pressure.

- Ethyl lactate also releases lactic acid and subsequently hydrogen as in the case of HRC. A solution of ethyl lactate is injected into the subsurface, generally using wells, on a regular basis depending on the rate of groundwater flow.

- Molasses injection has similar effects to those from the injection of ethyl lactate. Microbes degrade the molasses creating conditions that are reducing enough to degrade vinyl chloride. Like ethyl acetate injection, molasses must be periodically injected over the lifespan of the treatment program.

3.0 SUMMARY AND RECOMMENDATIONS

Based on the available historical and recent data for the Site, the following observations were made:

- SVE system data indicate that TCE concentrations in the SVE influent have consistently decreased since initial operation of the SVE system and that SVE influent concentrations have remained steady at very low concentrations for approximately 10 years;
- SVE historical data indicate that the SVE system has removed and treated significant TCE mass from soil vapor, however, the SVE system has not been capturing significant TCE mass for approximately 10 years due to having reached steady state as is typical of such systems;
- TCE concentration trends in groundwater collected at the GWE system influent and at groundwater quality monitoring wells indicate that TCE concentrations have steadily decreased or remained stable since the initiation of GWE and treatment at the Site;
- TCE concentrations in the GWE influent streams have remained stable and relatively low for approximately 5 to 8 years;
- TCE and 1,2-DCE concentrations in downgradient monitoring wells generally decrease along groundwater flow path, with the exception of high TCE concentrations detected in 87-10 and 87-11;

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- PCE and 1,1,1-TCA have historically been detected in Site groundwater and may be Site-related contaminants; however, there is insufficient monitoring data to determine spatial or temporal concentration trends for PCE and 1,1,1-TCA; and
- Groundwater quality data indicate that natural attenuation processes, including biodegradation, may be contributing significantly to the attenuation of TCE in Site groundwater.

CRA presents the following recommendations in light of the observations listed above:

- Based on the long-term evidence of steady-state function and very low TCE concentrations in the SVE system influent, it is appropriate to consider decommissioning of the SVE system at this time;
- Based on the steady-state function of the GWE system and relatively low concentrations of TCE in the GWE system influent it is recommended that alternatives to the GWE system be considered, such as monitored natural attenuation and/or enhanced in situ remediation, including bioremediation;
- It is recommended that the source, nature and extent of PCE and 1,1,1-TCA previously detected in Site groundwater be investigated;
- It is recommended that the next groundwater sampling event include analysis of VOCs and natural attenuation parameters including PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, vinyl chloride, 1,1,1-TCA, 1,1-DCA, chloroethane, ethene, ethane, dissolved oxygen, oxidation-reduction potential, methane, nitrate, sulfate and dissolved iron;
- It is recommended that the GWE system continue to operate pending initial evaluation of remedial alternatives because there is some uncertainty regarding adequate source control at the Site; and
- It is further recommended that an additional groundwater monitoring well be installed directly downgradient and near the PW well so that a test can be conducted to evaluate the effects of decommissioning of the GWE system on groundwater quality.

Should you have any questions regarding the results of the evaluation of groundwater and SVE treatment systems presented in this memorandum, please contact Jeni Quigley or Gary Klepper at (517) 316-2397.

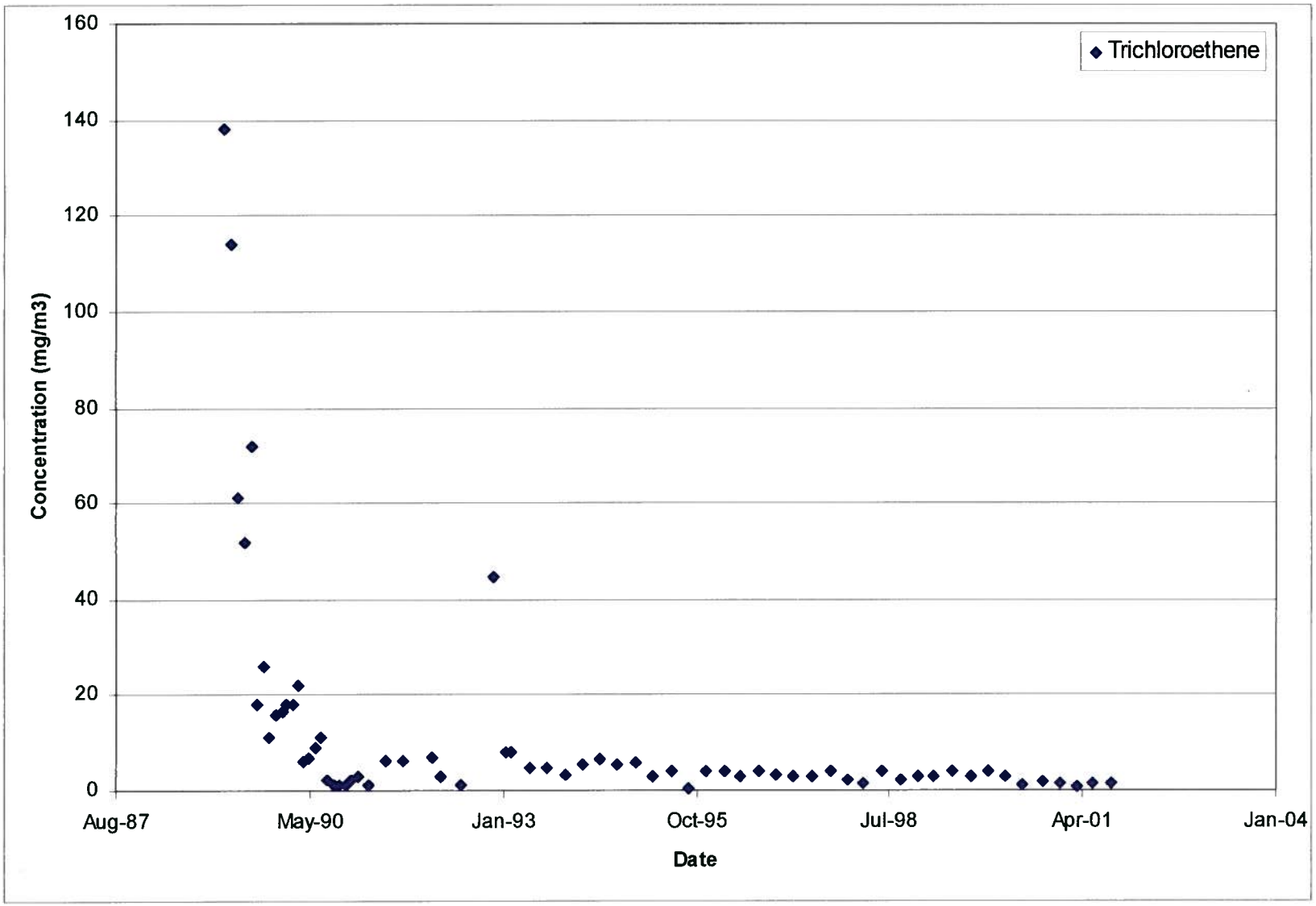


figure 1

TCE INFLUENT CONCENTRATION TRENDS AT 87-3
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

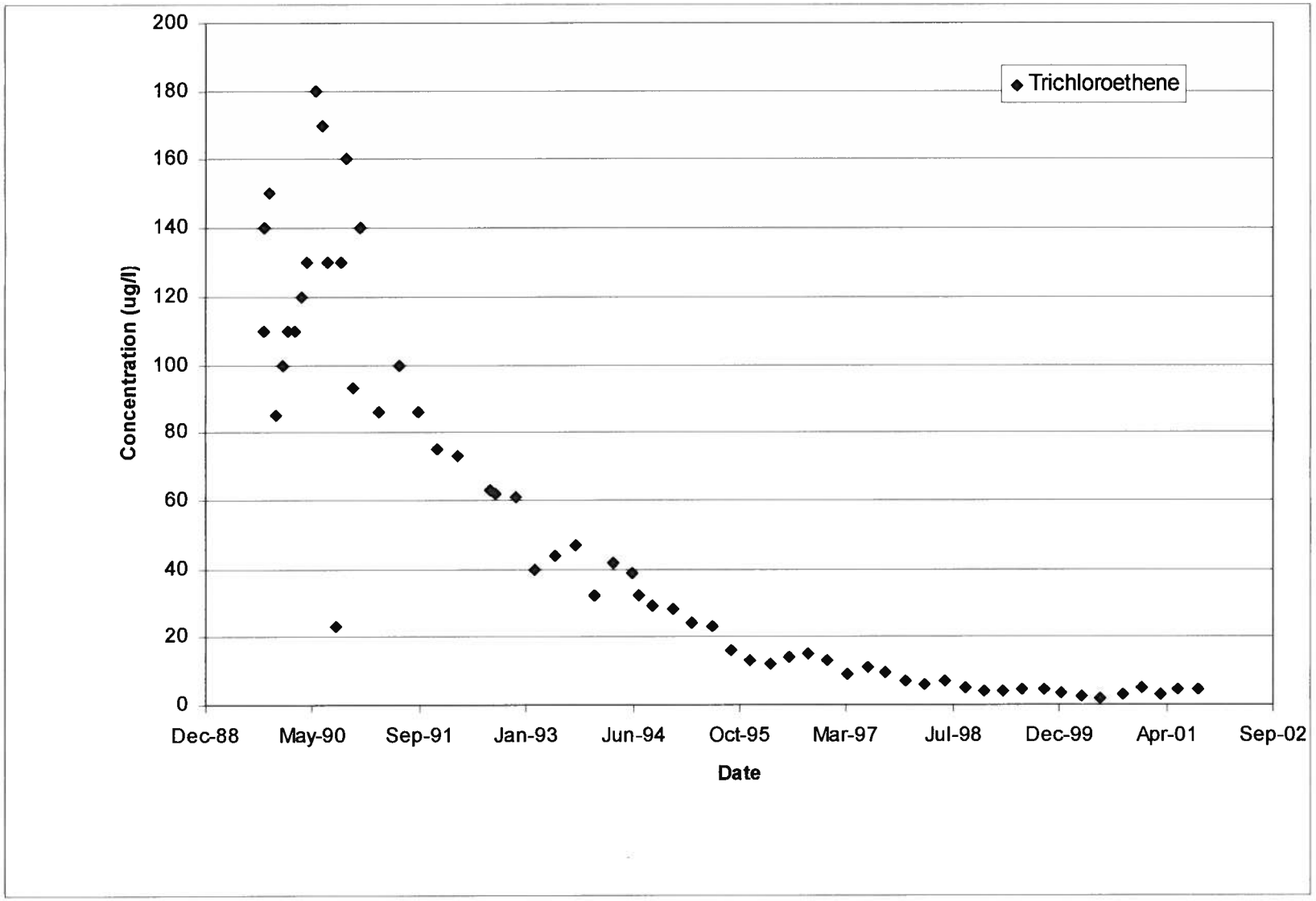


figure 2

TCE INFLUENT CONCENTRATION TRENDS AT PW
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

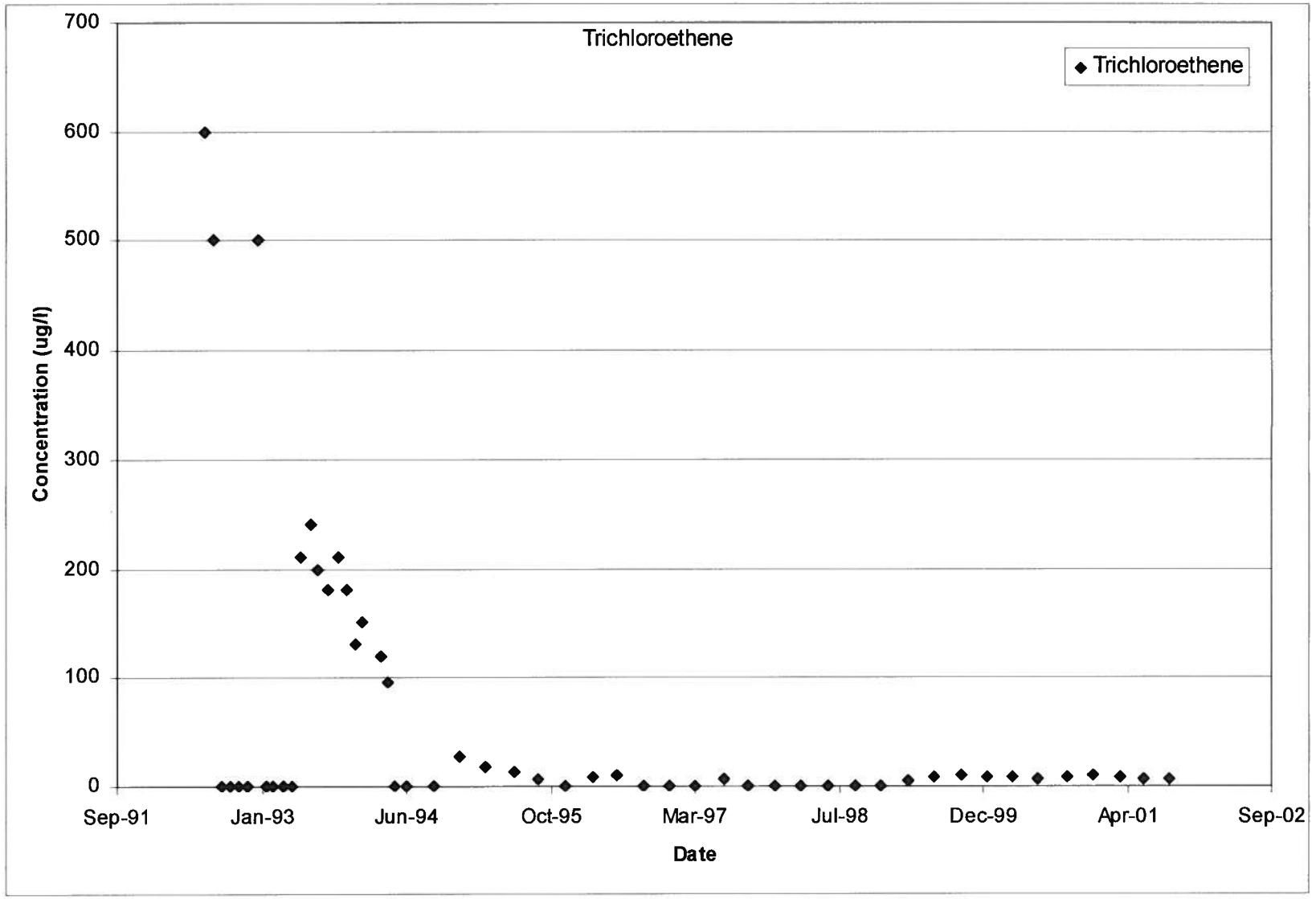
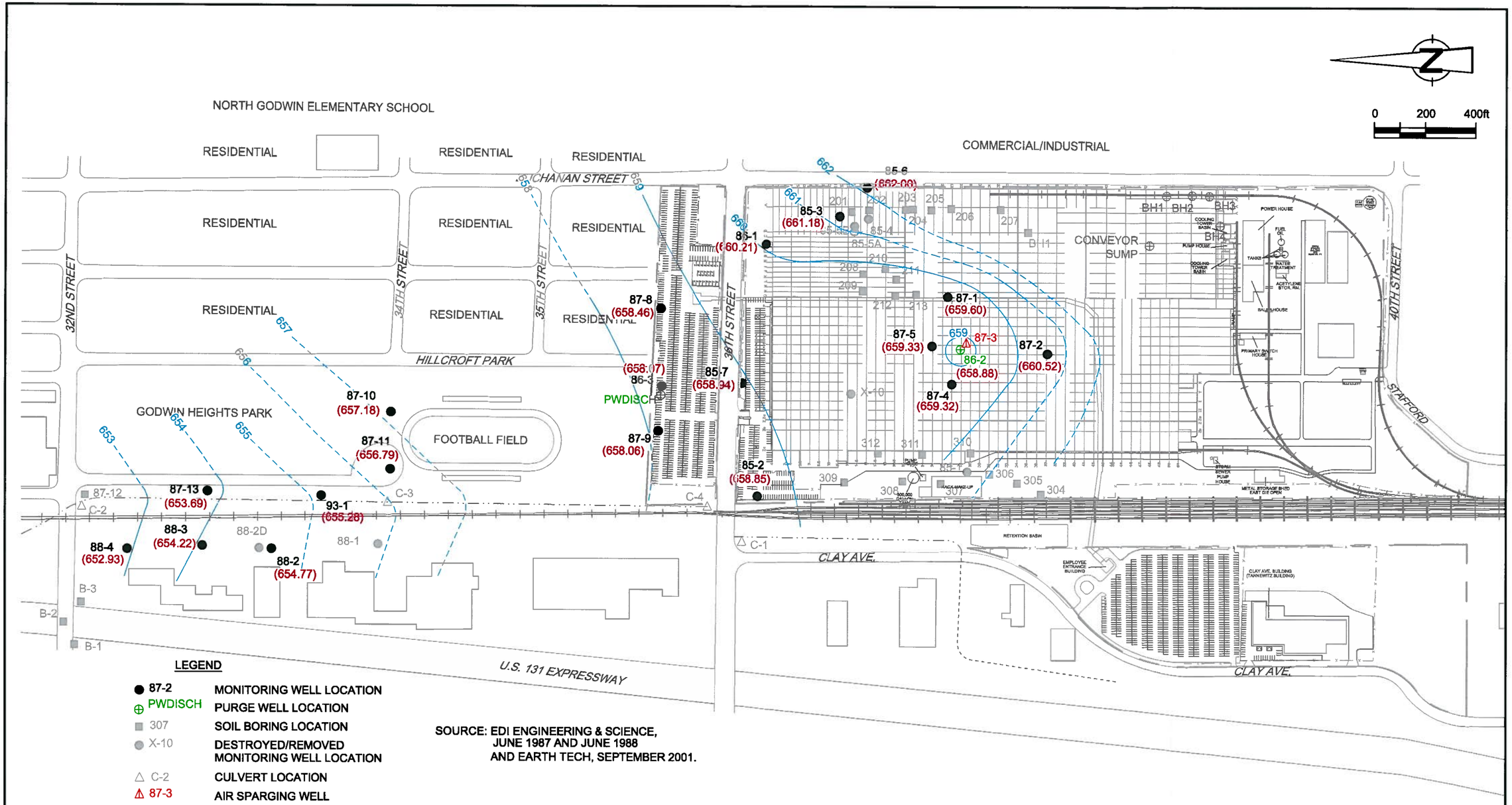


figure 3

TCE INFLUENT CONCENTRATION TRENDS AT 86-2
GRAND RAPIDS METAL PLANT
Wyoming, Michigan



LEGEND

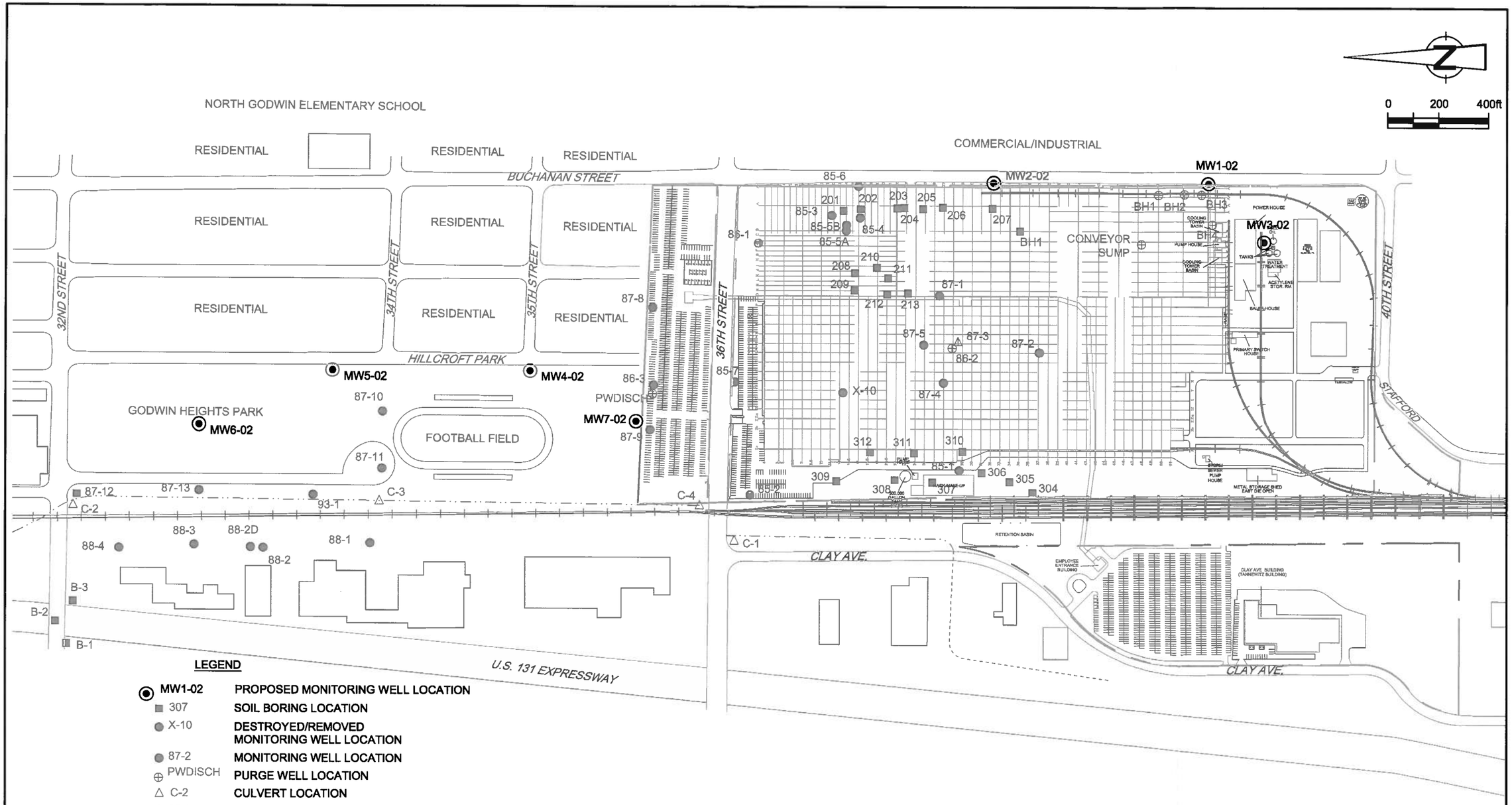
● 87-2	MONITORING WELL LOCATION
⊕ PWDISCH	PURGE WELL LOCATION
■ 307	SOIL BORING LOCATION
● X-10	DESTROYED/REMOVED MONITORING WELL LOCATION
△ C-2	CULVERT LOCATION
⚠ 87-3	AIR SPARGING WELL
⊕ BH1	APPROXIMATE LOCATION OF DEWATERING WELLS
	APPROXIMATE SITE BOUNDARY
	FENCE
	RAILROAD
	COLE DRAIN
	GROUNDWATER CONTOUR
	INFERRED GROUNDWATER CONTOUR
(652.93)	MARCH 28, 2002 STATIC GROUNDWATER ELEVATION

SOURCE: EDI ENGINEERING & SCIENCE, JUNE 1987 AND JUNE 1988 AND EARTH TECH, SEPTEMBER 2001.

figure 4

MARCH 28, 2002 GROUNDWATER FLOW DIRECTION
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(MEMO007)GN-DE001 AUG 12/2002



LEGEND

MW1-02	PROPOSED MONITORING WELL LOCATION
307	SOIL BORING LOCATION
X-10	DESTROYED/REMOVED MONITORING WELL LOCATION
87-2	MONITORING WELL LOCATION
PWDISCH	PURGE WELL LOCATION
C-2	CULVERT LOCATION
87-3	AIR SPARGING WELL
BH1	APPROXIMATE LOCATION OF DEWATERING WELLS
	APPROXIMATE SITE BOUNDARY
	FENCE
	RAILROAD
	COLE DRAIN

SOURCE: EDI ENGINEERING & SCIENCE, JUNE 1987 AND JUNE 1988 AND EARTH TECH, SEPTEMBER 2001.

figure 5

PROPOSED MONITORING WELL LOCATIONS
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(MEMO007)GN-DE012 AUG 12/2002

ATTACHMENT A

TCE INFLUENT CONCENTRATION TREND GRAPHS

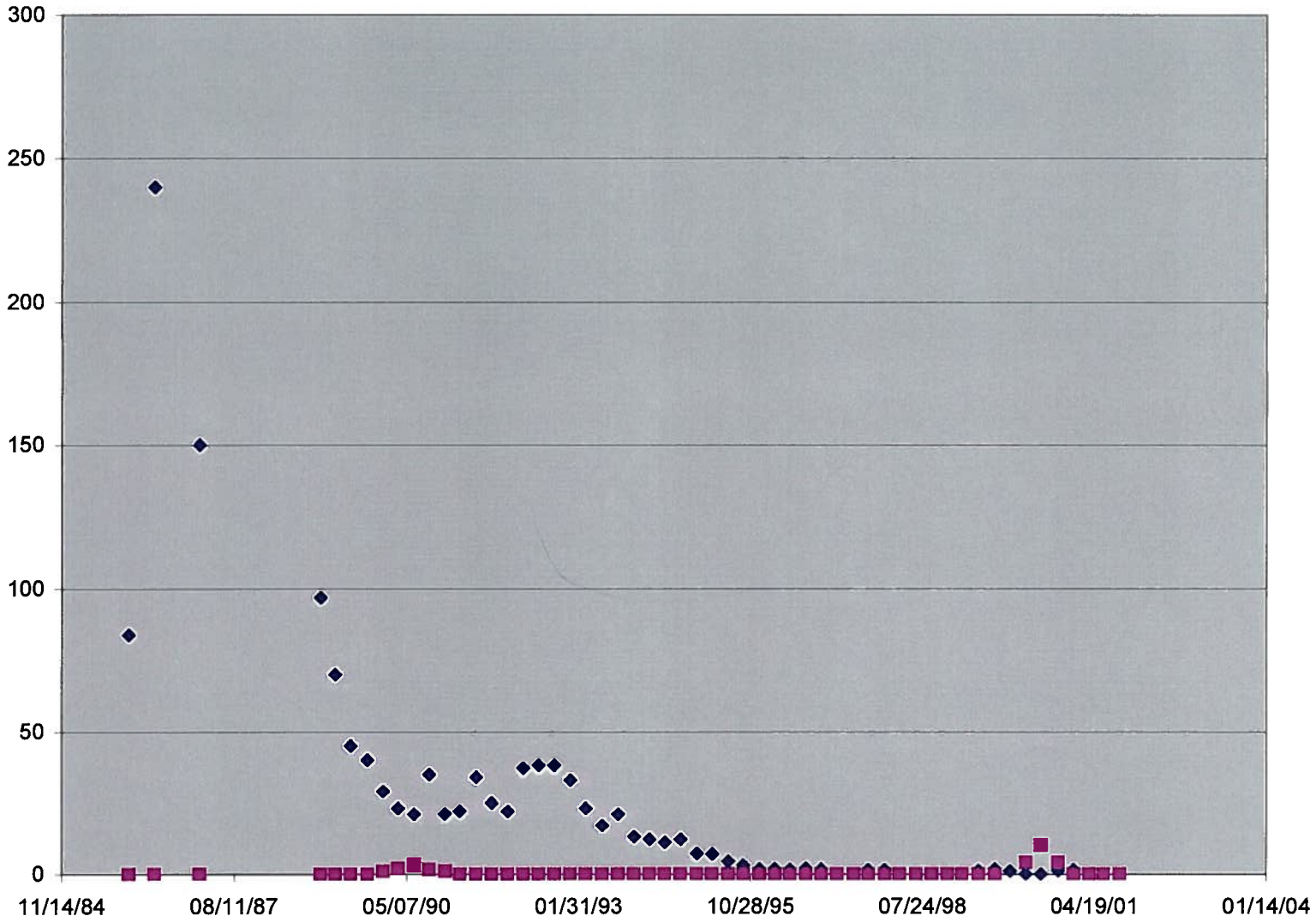


figure A-1

TCE INFLUENT CONCENTRATION TRENDS AT 85-7
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(MEMO007)GN-DE005 AUG 12/2002

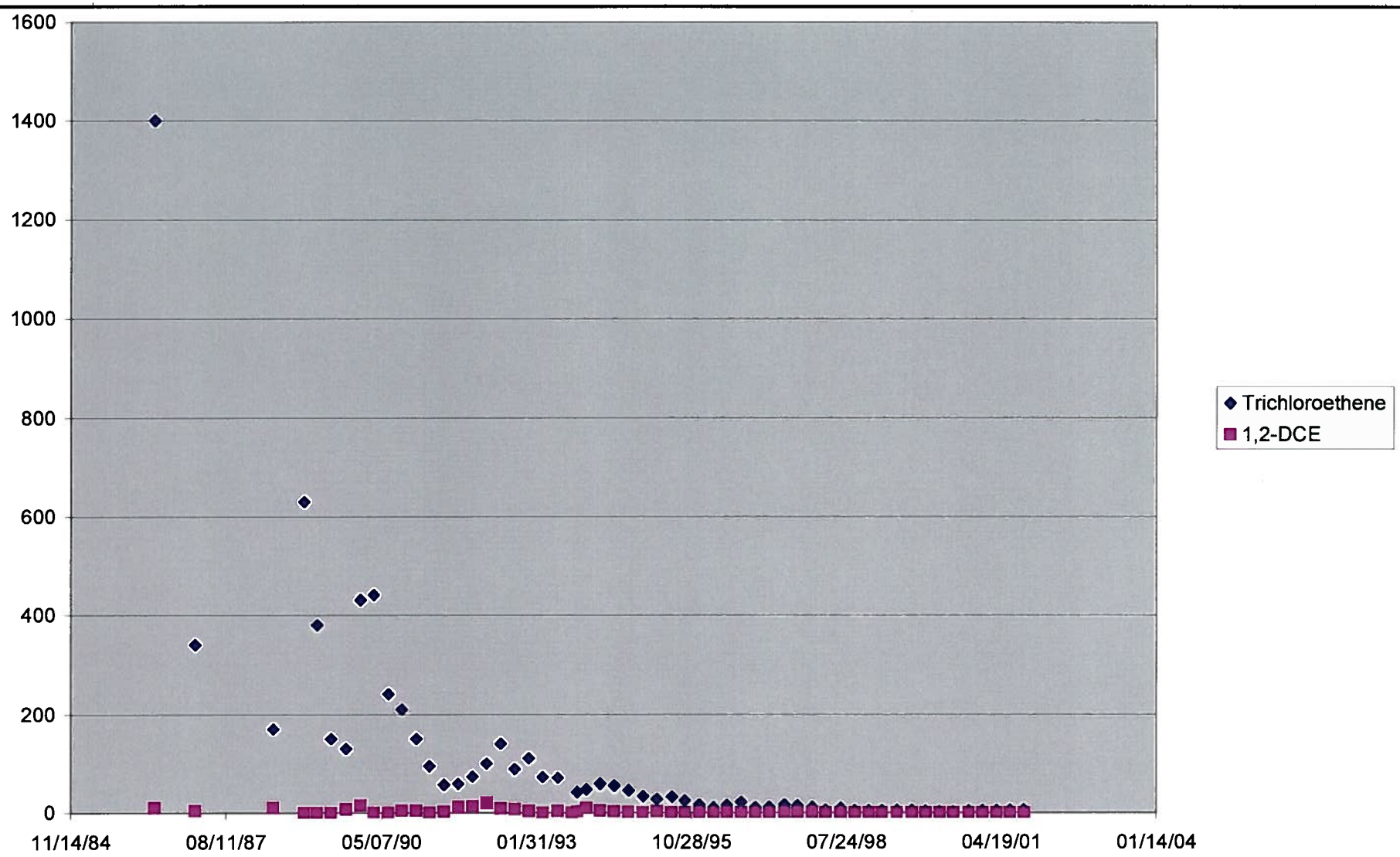


figure A-2

TCE INFLUENT CONCENTRATION TRENDS AT 86-3
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(MEMO007)GN-DE006 AUG 12/2002

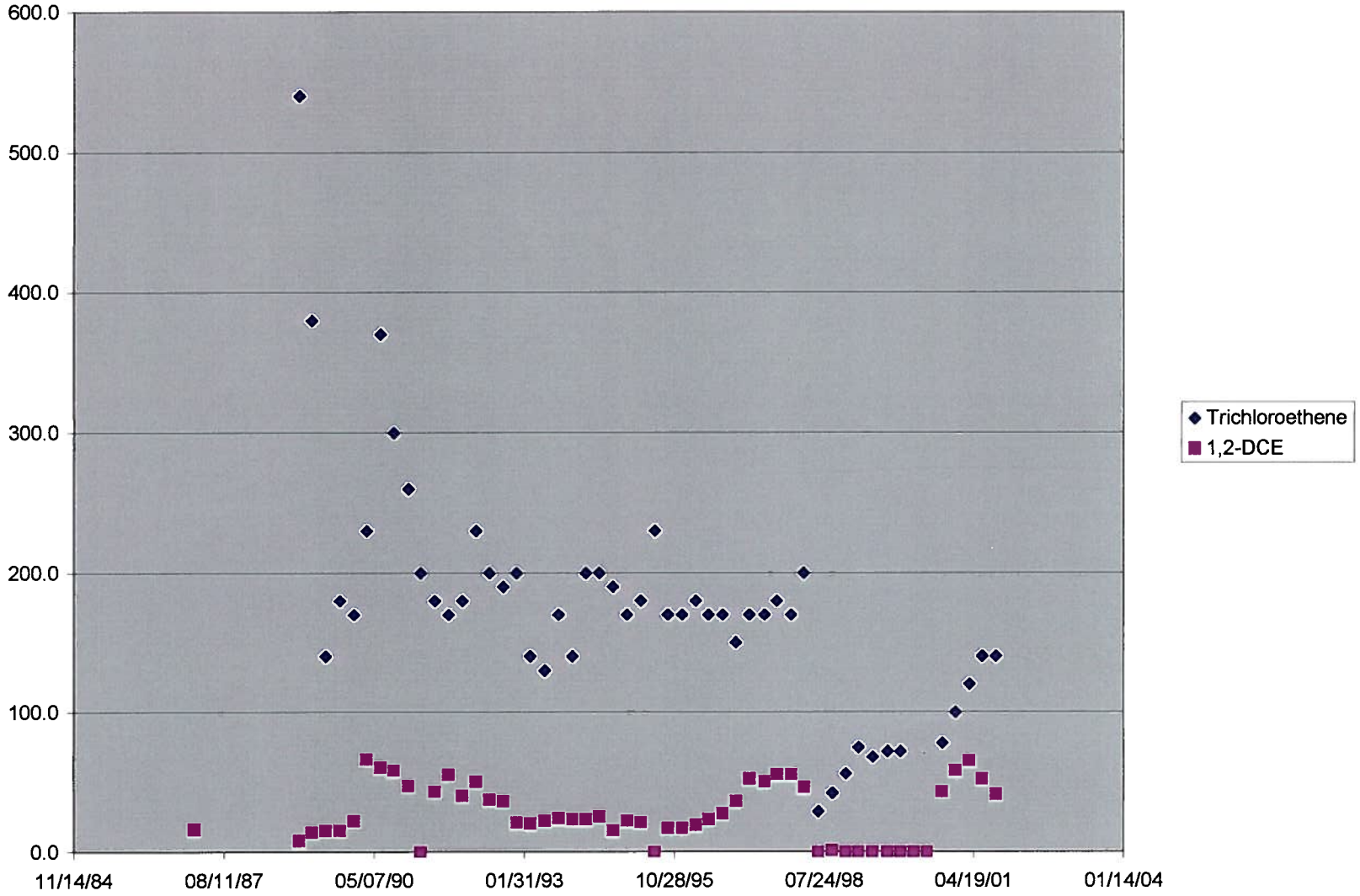


figure A-3

TCE INFLUENT CONCENTRATION TRENDS AT 87-01
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(MEMO007)GN-DE007 AUG 12/2002

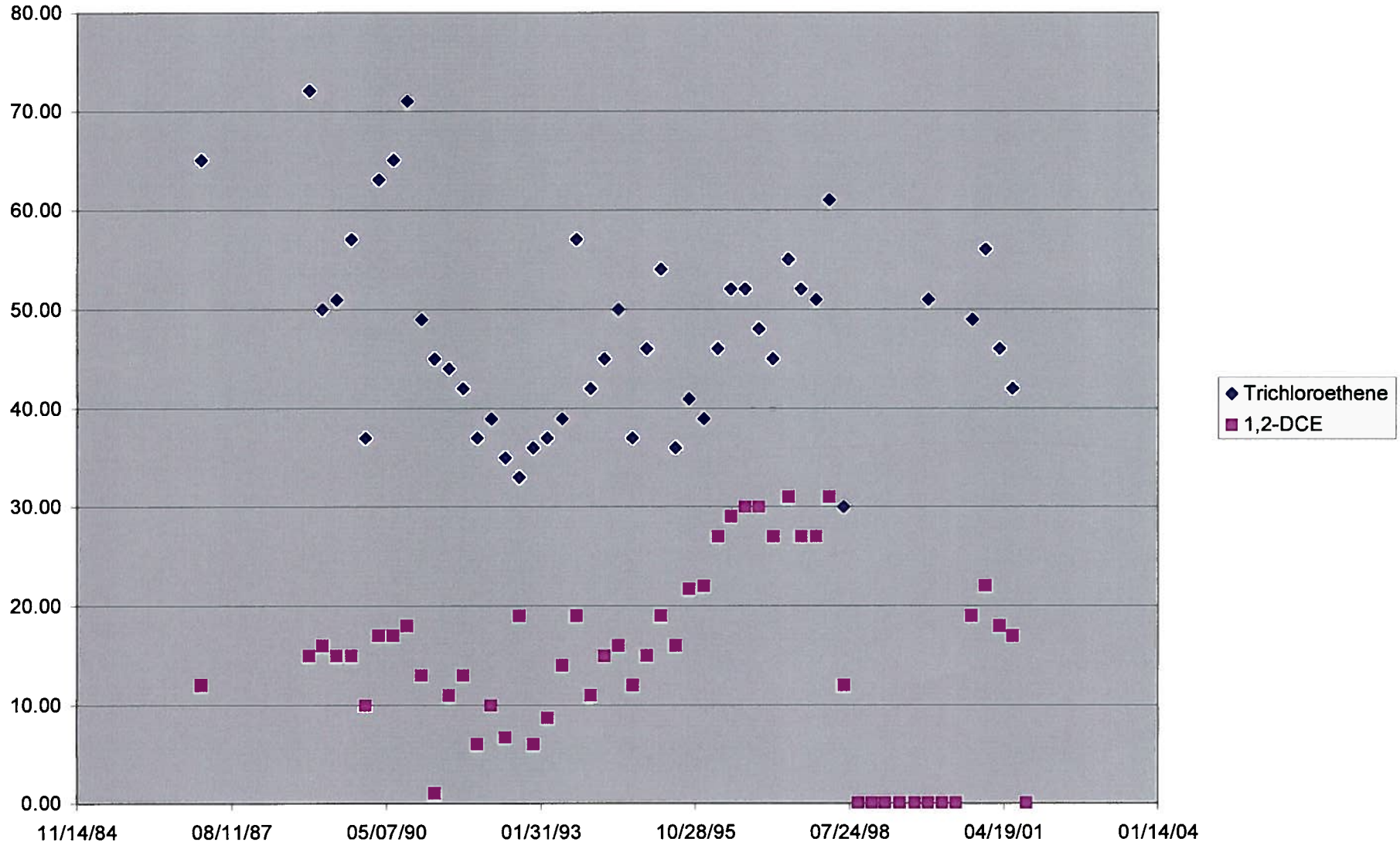


figure A-4

TCE INFLUENT CONCENTRATION TRENDS AT 87-2
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(MEMO007)GN-DE008 AUG 12/2002

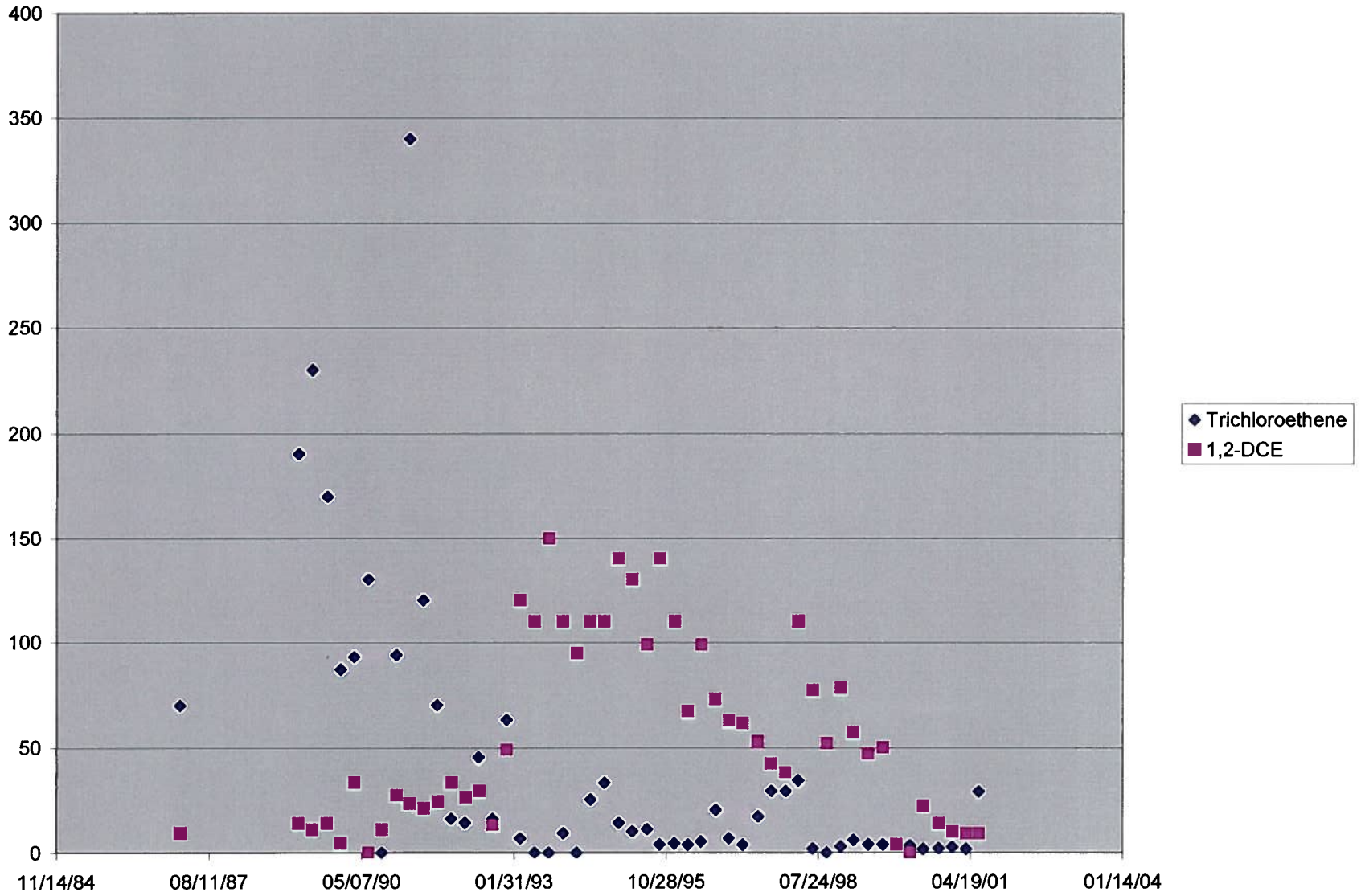


figure A-5

TCE INFLUENT CONCENTRATION TRENDS AT 87-5
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(MEMO007)GN-DE009 AUG 12/2002

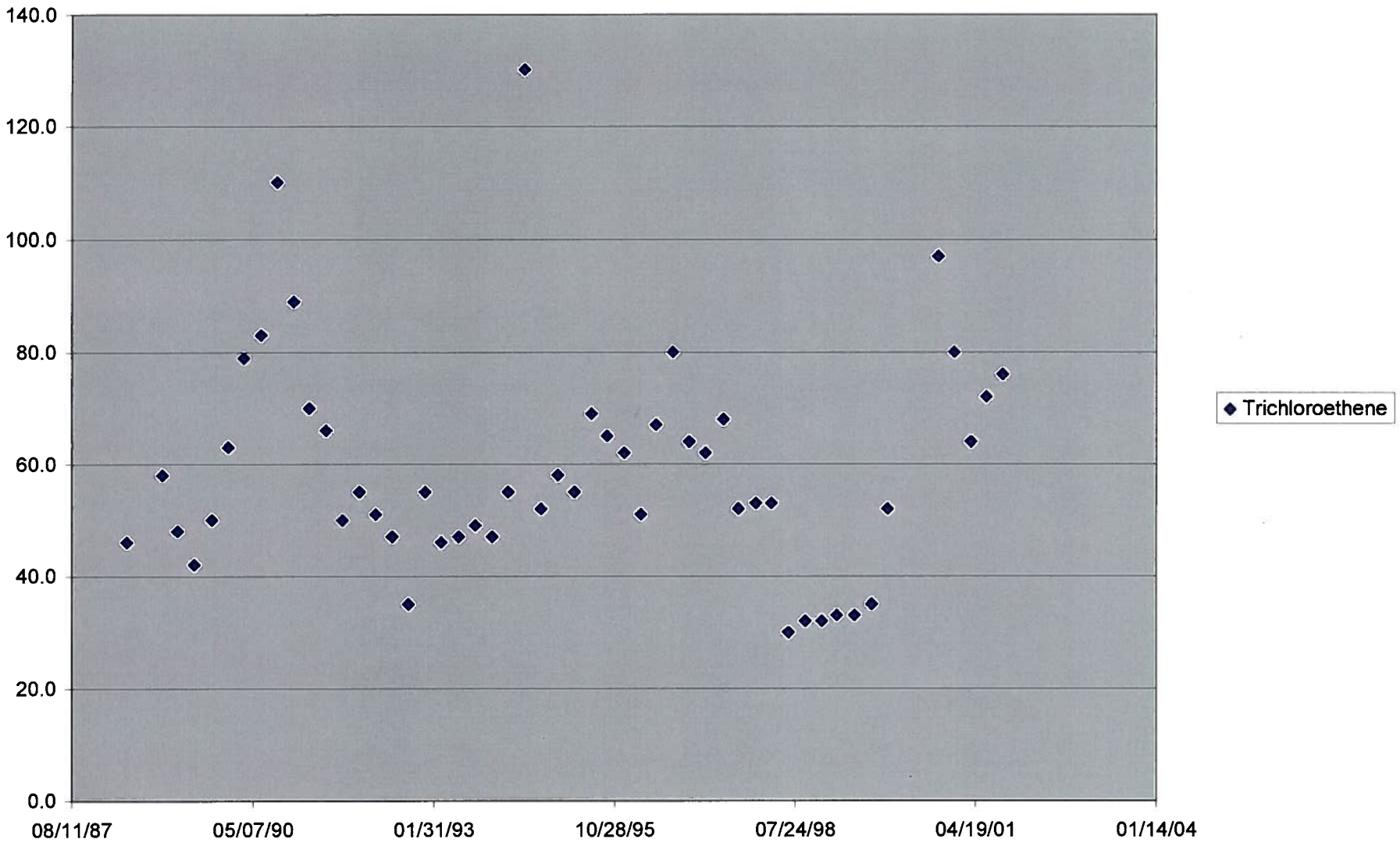


figure A-6

TCE INFLUENT CONCENTRATION TRENDS AT 87-10
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

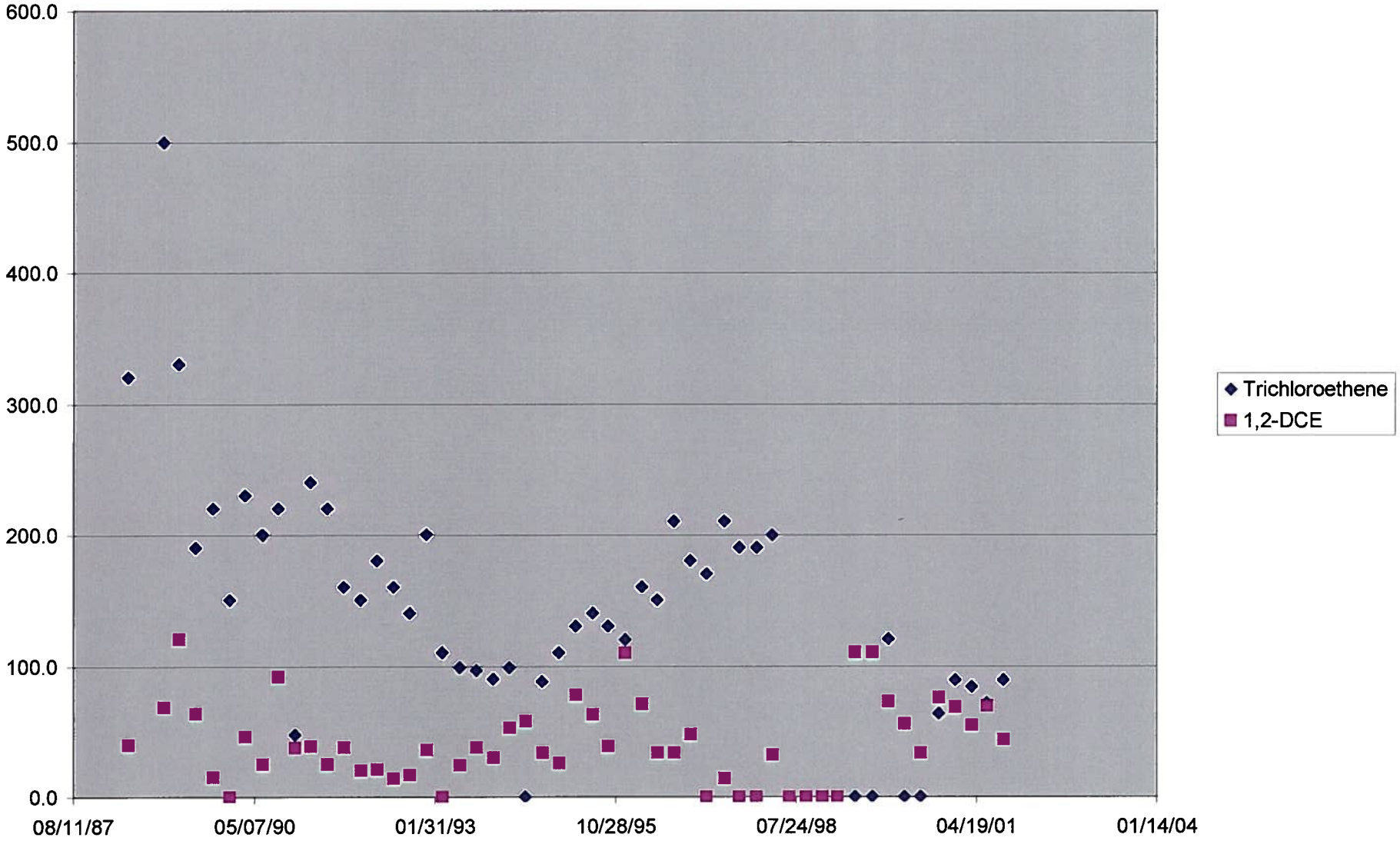


figure A-7

TCE INFLUENT CONCENTRATION TRENDS AT 87-11
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

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EXHIBIT P

EDI ENGINEERING & SCIENCE
ENGINEERS / GEOLOGISTS / BIOLOGISTS / CHEMISTS

February 14, 1986

Mr. Merl Petzold
Grand Rapids Metal Fabrication Plant
General Motors Corporation
300 36th Street SW
Grand Rapids, MI 49508

Dear Mr. Petzold:

RE: RESULTS OF WATER SAMPLING AND ANALYSIS AT THE PLANT CONSTRUCTION AREA

On November 13, 1985 and January 13, 1986, EDI collected water samples from discharge points and dewatering wells in the area of new construction at the south end of the plant. The MDNR requested that the dewatering wells and intermediate discharge points that drain into the retention basin be sampled to determine the chemical quality of the groundwater. We also collected a sample of the effluent from a discharge point at the north end of the retention basin on January 13, 1986. The location of the plant is shown in Figure 1. In addition to the work outlined above, a Phase I study of the column A-15 excavation in the northeast section of the plant was completed and sent to you during the middle of February, 1986.

Dewatering is currently taking place at five wells near the edge of the excavation at the construction area. The wells are designated BH-1, BH-2, BH-3, BH-4 and 1 as shown in Figure 2. The water from wells BH-1, BH-2, BH-3 and BH-4 is collected in an 8-inch white plastic drain pipe which discharges at the baler house discharge point (Figure 2). The water from well 1 is also collected in an 8-inch white plastic drain pipe which discharges at the oil storage/truck dock discharge point (Figure 2). Water moving away from the two discharge pipes travels west through storm drains until reaching the retention basin.

Water samples were collected from the baler house discharge point and the oil storage/truck dock discharge point on November 13, 1985. The samples were analyzed for volatile organic compounds that are on the priority pollutant list, and the results are shown on Table 1. In order to better define the impact of the volatile compounds on the area of dewatering, a second set of water samples was collected from wells BH-1, BH-2, BH-3, and BH-4 on January 13, 1986. The oil storage/truck dock discharge point and the retention basin (pond) effluent were also sampled on the same date. The results for the second set of samples are shown on Table 2. The complete analytical results are shown in Appendices A and B, which include compounds that were not detected.

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All of the November 13, 1985 samples had detectable quantities of tetrachloroethylene, 1,1,1-trichloroethane, and trichloroethylene. The baler house discharge also had detectable 1,1-dichloroethane and 1,1-dichloroethylene. The highest concentrations, consisting of 0.160 mg/1 for tetrachloroethylene and 0.500 mg/1 for 1,1,1-trichloroethane, were also from the baler house discharge (Table 1).

The January 13, 1986 water samples were analyzed for tetrachloroethylene, 1,1,1-trichloroethane, and trichloroethylene which were the principal compounds detected in the first set of analyses. All six of the samples contain detectable levels of the three compounds except BH-2 and BH-4 which do not have trichloroethylene (Table 2). The highest concentrations of the three compounds were found in BH-1, BH-3 and the oil storage/truck dock discharge. Relatively small quantities of volatile compounds were detected in the retention basin (pond) effluent.

We recommend that a meeting be arranged with Bonnie White at the MDNR in Grand Rapids to discuss the results of the water sampling and analysis at the plant construction area.

If you have any questions regarding these results, please feel free to contact me.

Sincerely yours,

EDI ENGINEERING & SCIENCE

Theodore A. Lietzke JGV

Theodore A. Lietzke
Project Geologist

James G. Venn

James G. Venn
Project Geologist

TAL/mck

Enclosure

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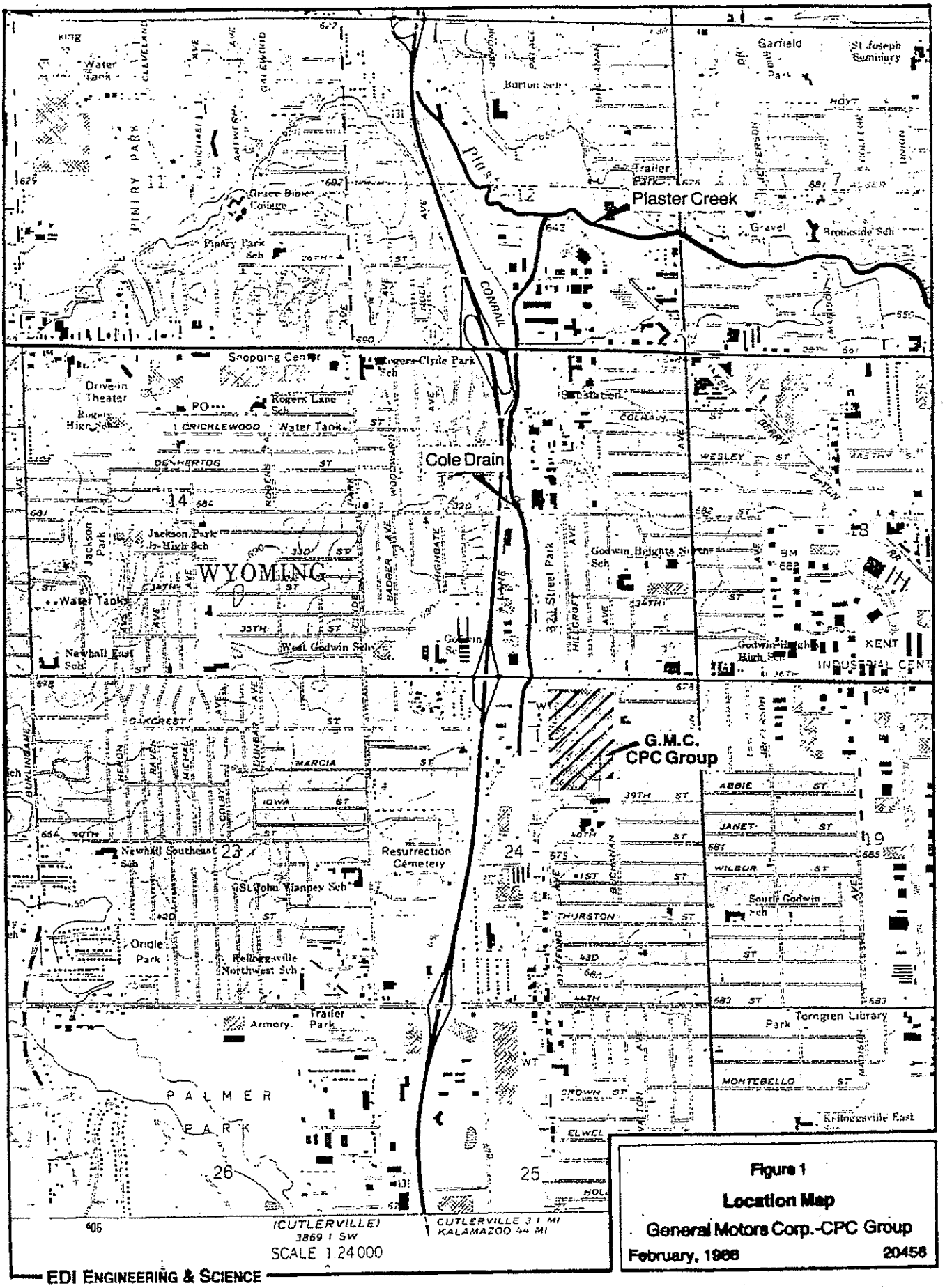
Plaster Creek
Cole Drain
WYOMING
G.M.C.
CPC Group
Resurrection
Cemetery
PALMER
PARK
Oriole
Park
Armory
Trailer
Park
Newhall East
Sch
Newhall Southeast
Sch
Jackson Park
Jr High Sch
West Godwin Sch
Godwin Heights
Sch
Godwin High
High Sch
Rogers Lane
Sch
Rogers-Clyde Park
Sch
Burton Sch
Pinery Park
Sch
Grace Bible
College
Trailer
Park
Gravel
Pit
Brookside Sch
St Joseph
Seminary
Garfield
Park
Water
Tank
Drive-In
Theater
Shopping Center
PO
Water Tank
Gas Station
32nd Street Park
Torngren Library
Park
South Godwin
Kellogg
Kellogg
Kellogg

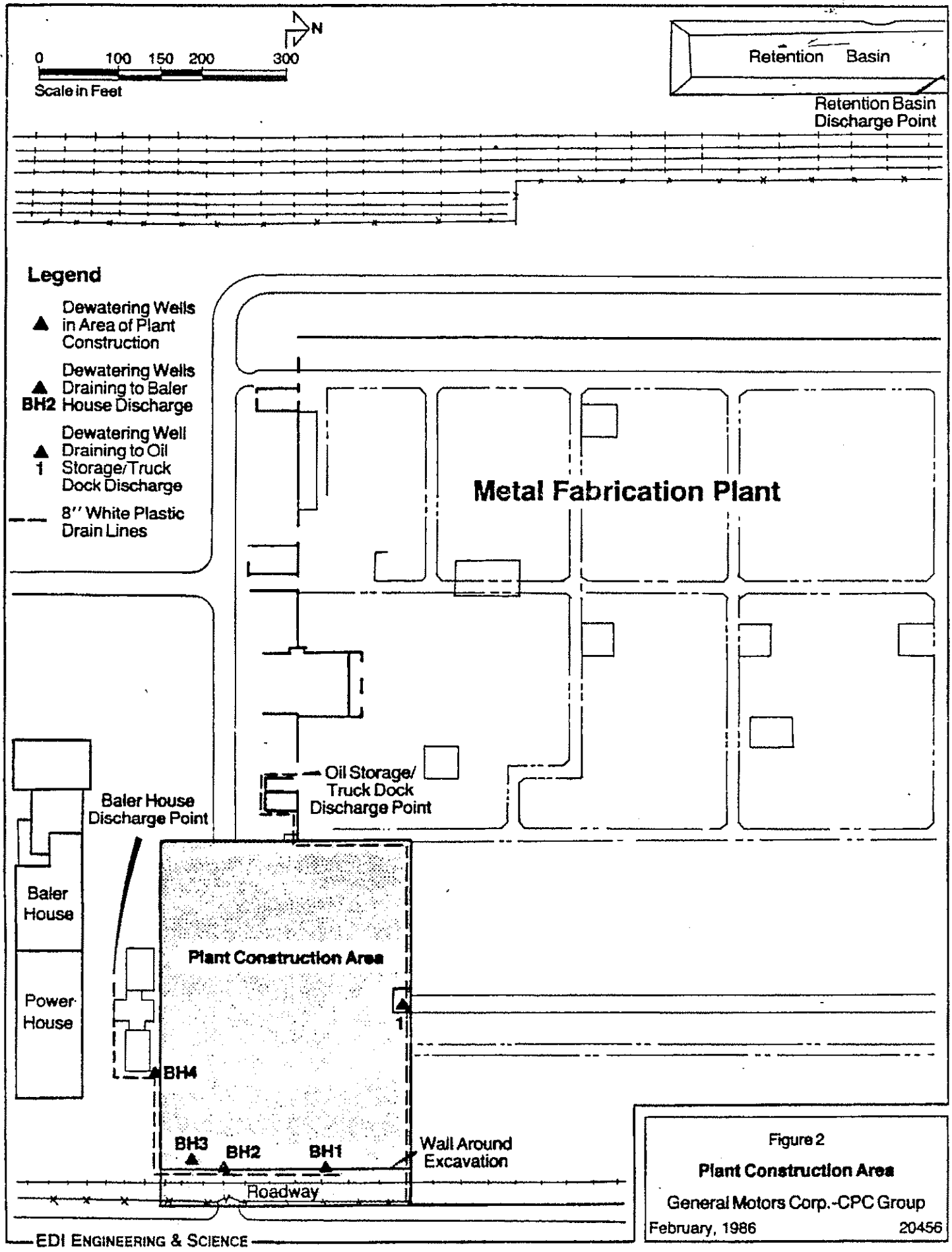

Figure 2

Plant Construction Area

General Motors Corp.-CPC Group

February, 1986 20456

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TABLE 1

RESULTS OF CHEMICAL ANALYSES
OF WATER SAMPLES COLLECTED ON
NOVEMBER 13, 1985
VOLATILE FRACTION*

(Concentrations in mg/l)

SAMPLING POINT	1,1-DICHLORO-ETHANE	1,1-DICHLORO-ETHYLENE	TETRACHLORO-ETHYLENE	1,1,1-TRICHLORO-ETHANE	TRICHLORO-ETHYLENE
Bailer House Discharge	0.002	0.010	0.160	0.500	0.042
Oil Storage Discharge	---	---	0.010	0.011	0.008
Detection Limit	0.001	0.001	0.001	0.001	0.001

*The compounds shown here are those compounds in detectable concentrations from a scan of 28 volatile compounds.

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TABLE 2

RESULTS OF CHEMICAL ANALYSES
OF WATER SAMPLES COLLECTED ON
JANUARY 13, 1986
VOLATILES

(Concentrations in mg/l)

SAMPLING POINT	TETRACHLOROETHYLENE	1,1,1-TRICHLOROETHANE	TRICHLOROETHYLENE
BH 1	0.072	0.081	0.130
BH 2	0.030	0.010	---
BH 3	0.008	0.047	0.010
BH 4	0.007	0.004	---
Oil Storage Discharge	0.015	0.092	0.038
Pond Effluent	0.003	0.012	0.003
Detection Limit	0.001	0.001	0.001

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APPENDIX A

ANALYTICAL RESULTS FOR
VOLATILE ORGANIC COMPOUNDS

November 13, 1985

ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25615
SAMPLE: BALER HOUSE

DATE SAMPLED: 11/13/85 TIME: 1:55 PM
DATE RECEIVED: 11/13/85 TIME: 3:00 PM
DATE COMPLETED: 11/20/85

SAMPLE NO. 57535

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
BENZENE	*	0.001	TRANS-1,2-DICHLOROETHYLENE	*	0.001
BROMODICHLOROMETHANE	*	0.001	1,2-DICHLOROPROPANE	*	0.001
BROMOFORM	*	0.001	CIS-1,3-DICHLOROPROPYLENE	*	0.001
BROMOMETHANE	*	0.010	TRANS-1,3-DICHLOROPROPYLENE	*	0.001
CARBON TETRACHLORIDE	*	0.001	ETHYL BENZENE	*	0.001
CHLOROBENZENE	*	0.001	METHYLENE CHLORIDE	*	0.001
CHLORODIBROMOMETHANE	*	0.001	1,1,2,2-TETRACHLOROETHANE	*	0.001
CHLOROETHANE	*	0.010	TETRACHLOROETHYLENE	0.16	0.001
2-CHLOROETHYLVINYL ETHER	*	0.010	TOLUENE	*	0.001
CHLOROFORM	*	0.001	1,1,1-TRICHLOROETHANE	0.50	0.001
CHLOROMETHANE	*	0.010	1,1,2-TRICHLOROETHANE	*	0.001
1,1-DICHLOROETHANE	0.002	0.001	TRICHLOROETHYLENE	0.042	0.001
1,2-DICHLOROETHANE	*	0.001	TRICHLOROFLUOROMETHANE	*	0.001
1,1-DICHLOROETHYLENE	0.010	0.001	VINYL CHLORIDE	*	0.010

*COMPOUND NOT PRESENT AT DETECTION LIMIT

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ANALYTICAL SERVICES
PRIORITY POLLUTANT ANALYSIS

TABLE 1
VOLATILE FRACTION

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25615
SAMPLE: OIL STORAGE; TRUCK DOCK

DATE SAMPLED: 11/13/85 TIME: 11:10 AM
DATE RECEIVED: 11/13/85 TIME: 3:00 PM
DATE COMPLETED: 11/20/85

SAMPLE NO. 57534

COMPOUND	RESULT (mg/l)	D.L.	COMPOUND	RESULT (mg/l)	D.L.
BENZENE	*	0.001	TRANS-1,2-DICHLOROETHYLENE	*	0.001
BROMODICHLOROMETHANE	*	0.001	1,2-DICHLOROPROPANE	*	0.001
BROMOFORM	*	0.001	CIS-1,3-DICHLOROPROPYLENE	*	0.001
BROMOMETHANE	*	0.010	TRANS-1,3-DICHLOROPROPYLENE	*	0.001
CARBON TETRACHLORIDE	*	0.001	ETHYL BENZENE	*	0.001
CHLOROBENZENE	*	0.001	METHYLENE CHLORIDE	*	0.001
CHLORODIBROMOMETHANE	*	0.001	1,1,2,2-TETRACHLOROETHANE	*	0.001
CHLOROETHANE	*	0.010	TETRACHLOROETHYLENE	0.010	0.001
2-CHLOROETHYLVINYL ETHER	*	0.010	TOLUENE	*	0.001
CHLOROFORM	*	0.001	1,1,1-TRICHLOROETHANE	0.011	0.001
CHLOROMETHANE	*	0.010	1,1,2-TRICHLOROETHANE	*	0.001
1,1-DICHLOROETHANE	*	0.001	TRICHLOROETHYLENE	0.008	0.001
1,2-DICHLOROETHANE	*	0.001	TRICHLOROFLUOROMETHANE	*	0.001
1,1-DICHLOROETHYLENE	*	0.001	VINYL CHLORIDE	*	0.010

*COMPOUND NOT PRESENT AT DETECTION LIMIT
*COMPOUND NOT PRESENT AT DETECTION LIMIT

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APPENDIX B

ANALYTICAL RESULTS FOR
VOLATILE ORGANIC COMPOUNDS

January 13, 1986

ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
LOCATION: GRAND RAPIDS, MI
SAMPLED BY: MVC
DESCRIPTION: DEWATERING SYSTEM

DATE SAMPLED: 01/13/86 TIME:
DATE RECEIVED: 01/13/86 TIME: 3:20 PM
DATE COMPLETED: 01/28/86
SCHEDULED COMPLETION: 1/27/86
ANALYST: JE,PT
QUALITY CONTROL REVIEW BY: SJL
WORKSHEET NO: 1

	BH1	BH2	BH3	BH4	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	59103	59104	59105	59106		
111-TRICHLOROETHANE	81	9.7	47	3.5	1.0	ug/l
TRICHLOROETHYLENE	130	<1.0	9.7	<1.0	1.0	ug/l
TETRACHLOROETHYLENE	72	30	7.6	6.8	1.0	ug/l

ANALYSIS BY "METHODS FOR ORGANIC CHEMICAL ANALYSIS OF MUNICIPAL AND INDUSTRIAL WATSEWATER", USEPA-600/4-82-057.

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ANALYTICAL SERVICES
EDI LABORATORY REPORT

CLIENT: GMC-CPC DIVISION
PROJECT NO.: 25554
LOCATION: GRAND RAPIDS, MI
SAMPLED BY: MVC
DESCRIPTION: DEWATERING SYSTEM

DATE SAMPLED: 01/13/86 TIME:
DATE RECEIVED: 01/13/86 TIME: 3:20 PM
DATE COMPLETED: 01/28/86
SCHEDULED COMPLETION: 1/27/86
ANALYST: JE,PT
QUALITY CONTROL REVIEW BY: SJL
WORKSHEET NO: 2

	POND EFFLUENT	OIL STOR. DISCHARGE	DETECTION LIMIT	UNITS
EDI SAMPLE NO:	59107	59108		
111-TRICHLOROETHANE	12	92	1.0	ug/l
TRICHLOROETHYLENE	3.4	38	1.0	ug/l
TETRACHLOROETHYLENE	2.6	15	1.0	ug/l

ANALYSIS BY "METHODS FOR ORGANIC CHEMICAL ANALYSIS OF MUNICIPAL AND INDUSTRIAL WATSEWATER", USEPA-600/4-82-057.

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Mar 01 05 10:25a JENNIFER QUIGLEY 616 891 7952 p.13

CONESTOGA-ROVERS
& ASSOCIATES

14496 Sheldon Road, Suite #200, Plymouth, MI 481 70
Telephone: 734-453-5123 Facsimile: 734-453-5201
www.CRAworld.com

December 23, 2002

Reference No. 17360

PRIVILEGED AND CONFIDENTIAL
PREPARED AT ENCORE COUNSEL'S REQUEST

Mr. Kurt Blizzard
ENCORE
920 Townsend Street
Mail Code: 482-310-004
Lansing, Michigan 48921

OFFICE COPY

Dear Mr. Blizzard:

Re: Historical Documentation Review Summary
General Motors Corporation Metal Fabrication Division
Grand Rapids Metal Plant
Wyoming, Michigan

1.0 INTRODUCTION

Conestoga-Rovers & Associates, Inc. (CRA) has prepared this Historical Documentation Review Summary (Summary) for the General Motors Corporation (GM) Metal Fabrication Division (MFD) Grand Rapids Metal Plant located at 300 36th Street S.W. in Wyoming, Michigan (Site). The purpose of the Summary was to obtain and review documentation regarding historical investigations and remedial measures conducted at the Site.

2.0 BACKGROUND AND REVIEW OF HISTORICAL INVESTIGATION

The Grand Rapids Metal Plant is a metal fabrication and assembly plant for GM located at 300 36th Street in Wyoming, Kent County, Michigan. Figure 1 presents the Site location. The Site consists of 45 acres of production activities on approximately 88 acres of land. The Site manufactures quarter panels, floor pans, roof panels, deck lids, doors, and center pillars for assembly plant use. In addition, the Site constructs the dies, fixtures, mechanical devices, and manufacturing aids used internally to produce the aforementioned parts. The Site is located in a mixed industrial, commercial, and residential area of the City of Wyoming. Figure 2 presents a portion of the City of Wyoming zoning map illustrating the zoning of the Site and surrounding area.

Numerous environmental investigations have been conducted at the Site to date. Based on the review of available documentation regarding environmental investigations previously conducted at the Site, two areas of concern were identified, an oil release from a press pit sump pan and chlorinated compounds in soil and groundwater beneath the Site. In addition, free product was observed in groundwater in monitoring wells located in the vicinity of the source

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area of the chlorinated compound contamination. Figure 3 presents a historical timeline of environmental activities conducted at the Site.

Contamination from a release of water soluble oil from a press pit sump pan was identified in soil and groundwater at the Site in 1981. Based on analytical results from soil and groundwater samples collected in the vicinity of the release and a review of the material safety data sheet (MSDS) for the oil, no chemicals of concern were detected in the soil and groundwater samples collected above the applicable regulatory limits at the time that the samples were collected.

From 1953 to 1979, the Site conducted degreasing operations inside the facility utilizing chlorinated compounds. This area is the suspected source of chlorinated compound contamination to soil and groundwater beneath the facility. The Site is currently listed on the Act 451, Part 201 Contaminated Sites List. Numerous subsurface investigations were conducted at the Site between 1985 and 1989 to identify and delineate the chlorinated compound contamination and the geological/hydrogeological conditions at the Site and on the area located hydraulically downgradient of the Site. Based on the results of the investigations, a remediation system, consisting of a combination soil vapor extraction (SVE) well with activated carbon filtration and a series of extraction wells with activated carbon filtration was constructed in 1989 and is currently in place at the facility to remediate the soil and groundwater at the Site.

CRA obtained copies of pertinent available information from the Site. Documentation obtained includes information regarding the oil release from press pit, the investigations and remedial actions conducted to date associated with the chlorinated compounds in groundwater, and environmental permits currently maintained by the facility associated with the remedial actions. Summaries of the documents obtained from the Site are further discussed in the subsections below.

2.1 HYDROGEOLOGIC EVALUATION OF AN OIL LEAKAGE

A Hydrogeologic Evaluation of an Oil Leakage (HE) report was prepared for the Site by Environmental Data, Inc. (EDI) in December 1981.

An oil leak was identified at the Site from the sump pan of press HS-5 in 1979. Approximately 5,500 gallons of water soluble oil was released from the sump to the underlying and adjacent sandy soils. The leak was detected when oil from the release began infiltrating an adjacent press pit. The sump was repaired, and the infiltration ceased. In June 1981, the infiltration resumed and it was determined that the sump pan containment was releasing the oil to the ground. No information regarding the construction or depth of the sump was available. To investigate the extent of the impact from the releases, a section of the floor in the plant was removed and the underlying soil was examined. Black staining was observed directly beneath

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the floor, and odors were detected in soil samples collected to a depth of 5 feet below ground surface (bgs). According to individuals associated with the Site, press HS-5 was formerly located at Column B-35 in the plant. Based on the aforementioned information, EDI was contracted to conduct a hydrogeologic investigation.

Available geologic information from the installation of the building foundation indicated that the overburden below the plant consists of sand to a depth of approximately 40 feet bgs. A silty blue clay layer is present beneath the surficial sand, with interbedded sand and clay layers below the blue clay to bedrock. Bedrock below the plant has been identified to vary from 60 to 120 feet bgs. The Michigan formation underlies the glacial overburden. The HE identifies this formation is a fresh water aquifer, and is the source of potable water for a City of Wyoming well field, which is located to the west of the Site, across the Cole Drain (recent information from the City of Wyoming indicates the source of water is Lake Michigan). Static water levels in the upper aquifer are located at approximately 21 feet bgs. The groundwater flow direction in the upper aquifer would be anticipated to be to the west, towards the Cole Drain. The Cole Drain would most likely be anticipated to act as a discharge boundary for the upper aquifer. Based on the above information, potential impacts from the oil release would be to the upper aquifer below the GM property, with no potential downgradient receptors.

The SOW for the HE included: the evaluation of the toxicity and degradability of the leaked oil; an analytical scan for phenolic compounds; the collection of soil samples for analysis for grease and oil, and chlorinated paraffin; and the installation of one temporary monitoring well and the collection of groundwater samples for analysis for grease and oil, total organic carbon (TOC), and chlorinated paraffin.

The oil used in the press was Tuf-Draw D-S Compound 21305 and was supplied by the Franklin Oil Company. Based on the review of the material safety data sheet (MSDS) for the product, the constituents of the oil are liquefied paraffin wax, oil soluble petroleum sulfonate, lard oil, ethoxylated alcohols, tri-ethanolamine, and chlorinated paraffin.

A soil boring was installed near the HS-5 press to a depth of approximately 45 feet bgs, to the blue clay layer. A copy of the stratigraphic boring log is presented in Attachment A. A total of 11 soil samples and 4 groundwater samples were collected and analyzed for grease and oil, and chlorinated paraffin. In addition, the groundwater samples were analyzed for TOC. Analytical results for grease and oil, and chlorinated paraffins indicated decreasing concentrations with depth in soil. Analytical results for groundwater indicated higher concentrations of grease and oil, and TOC in the sample collected from 40.5 to 43.5 feet bgs. Soil samples were collected from 2-foot split spoon intervals from 0.7 to 2 feet bgs, 2 to 4 feet bgs, 4 to 6 feet bgs, 6 to 8 feet bgs, 8 to 10 feet bgs, 10 to 12 feet bgs, 12 to 14 feet bgs, 14 to 16 feet bgs, 16 to 18 feet bgs, 18 to 20 feet bgs, and 20 to 22 feet bgs. Table 1A presents a summary of detected parameters in

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soil. Groundwater grab samples were collected during the installation of the soil boring at 21 to 24 feet bgs, 25.5 to 28.5 feet bgs, and 30.5 to 32.5 feet bgs. The monitoring well was installed with a screen from 40.5 to 43.5 feet bgs and a groundwater sample was collected from the monitoring well. Table 1B presents a summary of detected parameters in groundwater. Based on the review of the soil boring/monitoring well construction log, upon completion the monitoring well was covered with a 2 ½-inch thick, 18-inch by 18-inch steel plate. No information regarding the current status of the well was available and individuals associated with the Site were unaware of the former location of the monitoring well.

Based on the results of the HE, EDI provided the following conclusions:

- All of the constituents in the oil are non-toxic, with the exception of the chlorinated paraffins, which are biodegradable. However, a detailed description of the contents of the chlorinated paraffins could not be obtained from the manufacturer;
- Oil has penetrated the unsaturated soils to the water table. The highest concentrations were detected in the upper 6 feet of soil. Based on the lack of precipitation and the potential for migration to the groundwater table therefrom, the soil contamination will naturally degrade without impact to potential receptors beneath the floor of the plant; and
- Groundwater does not appear to be impacted by the release; however, TOC and grease and oil were detected in the groundwater sample collected above the clay layer.

Based on the results of the HE, EDI provided the following recommendations:

- Collection of one additional groundwater sample from the monitoring well for grease and oil, and TOC. If analytical results indicate the same levels of grease and oil, and TOC, further analysis for Priority Pollutants is recommended. In addition, EDI recommended that the monitoring well be left in place and screened at the water table. No information regarding additional groundwater sample collection from the well or the abandonment of the well was available.

2.2 WATER SAMPLING AND ANALYSIS AT THE PLANT CONSTRUCTION AREA

Water sampling was conducted on November 13, 1985 and January 13, 1986 from discharge points and dewatering wells in an area under construction at the south end of the plant. The results of the sampling were summarized in a letter dated February 14, 1986.

Sampling activities at the dewatering wells and the intermediate discharge points that drain into the stormwater retention basin were conducted at the request of the Michigan Department

of Natural Resources (MDNR)(currently the Michigan Department of Environmental Quality (MDEQ)).

Dewatering was conducted from five wells, BH-1, BH-2, BH-3, BH-4, and 1, near the edge of the excavation in the southern portion of the building where new building construction was occurring. Figure 4 presents the locations of the dewatering wells and discharge points. Water collected from the dewatering wells was collected and discharged to the baler house discharge point. In addition, the water from dewatering well 1 discharged to the oil storage discharge point. Both the baler house and oil storage points discharged to the stormwater retention pond. Individuals associated with the Site were unaware of any currently operational dewatering wells at the Site.

Water samples were collected on November 13, 1985 from the baler house and oil storage discharge points and were analyzed for volatile Priority Pollutants. 1,1-dichloroethene was detected in the baler house discharge at a concentration of 10 µg/L, which is above the Michigan Act 451 Part 201 RDWC of 7 µg/L. Tetrachloroethene (PCE) was detected in the baler house and oil storage discharges at concentrations of 160 µg/L and 10 µg/L, respectively, which are above the Michigan Act 451 Part 201 RDWC of 5 µg/L. 1,1,1-trichloroethane was detected in the baler house discharge at a concentration of 500 µg/L, which are above the Michigan Act 451 Part 201 RDWC of 200 µg/L. TCE was detected in the baler and oil storage discharges at concentrations of 42 µg/L and 8 µg/L, respectively, which area above the Michigan Act 451 Part 201 RDWC of 5 µg/L. Table 2 presents a summary of detected parameters in groundwater samples.

Water samples were collected on January 13, 1985 from the dewatering well discharge points BH-1, BH-2, BH-3, and BH-4, the oil storage discharge, and the stormwater retention pond effluent and were analyzed for volatile Priority Pollutants. PCE was detected in the water samples collected from BH-1, BH-2, BH-3, and the oil storage at concentrations of 72 µg/L, 30 µg/L, 8 µg/L, 7 µg/L, and 15 µg/L, respectively, which are above the Michigan Act 451 Part 201 RDWC of 5 µg/L. TCE was detected in the groundwater samples collected from BH-1, BH-3, and the oil storage discharge at concentrations of 130 µg/L, 10 µg/L, and 38 µg/L, which are above the Michigan Act 451 Part 201 RDWC of 5 µg/L. Table 2 presents a summary of detected parameters in groundwater samples.

2.3 HYDROGEOLOGIC INVESTIGATION

A Hydrogeologic Investigation (HI) was conducted at the Column A-15 excavation at the Site by EDI Engineering & Science (EDI) and was summarized in a report dated March 1986.

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An excavation was installed during plant modernization activities in June 1985. The excavation was approximately 20 feet in depth, and was located near Column A-15 of the plant. Plan 1 presents the approximate excavation location. Soil was removed in particular areas to the water table, where a layer of free product was observed. The free product was believed to consist of mineral spirits. Based on the visual and olfactory presence of contamination, a HI was undertaken by EDI to determine the extent of the oil contamination.

A total of seven monitoring wells, 85-1, 85-2, 85-3, 85-4, 85-5B, 85-6, and 85-7, were installed during the HI in November and December 1985. In addition to the seven monitoring wells installed by EDI in November and December 1985, soil borings 201 through 213 and 304 through 312 were installed in March and April 1985 by Soils and Materials Engineers, Inc. (SME). Copies of the stratigraphic soil boring logs are presented in Attachment A. A copy of a report summarizing the field activities conducted by SME was not available for review. Plan 1 presents the approximate soil boring and monitoring well locations. Four of the wells were installed around the excavation, in the northeastern portion of the plant, and three wells were installed outside the plant on the north, northwest, and west sides of the plant. The monitoring wells were installed to monitor the static groundwater levels and the levels of potential free product in select monitoring wells. Free product was observed in monitoring wells 85-3, 85-4, and 85-5B. Table 3 presents the historical free product levels. Groundwater flow was determined to be to the north-northwest in the monitoring wells, towards Cole Drain and Plaster Creek. Geology and hydrogeology at the Site were investigated during the HI. Based on the HI, the plant is underlain by glacial outwash sediments comprised of sand and gravelly sand.

Groundwater samples were collected from each of the monitoring wells for laboratory analysis for Priority Pollutants. Based on the analytical results, trichloroethene (TCE) was detected in groundwater samples collected from monitoring wells 85-2 and 85-7 at concentrations of 6 µg/L and 84 µg/L, respectively, which are above the Michigan Act 451, Part 201 Residential Drinking Water Criterion (RDWC) of 5 µg/L. Fluoranthene was detected in the groundwater sample collected from monitoring well 85-3 at a concentration of 460 µg/L, which is above the Michigan Act 451, Part 201 RDWC, Residential Volatilization to Indoor Air Inhalation Criterion (RVIAC), and Residential Groundwater Contact Criterion (RGCC) of 210 µg/L. Fluorene was detected in the groundwater sample collected from monitoring well 85-3 at a concentration of 3,200 µg/L, which is above the Michigan Act 451, Part 201 RDWC of 880 µg/L and the RVIAC and RGCC of 2,000 µg/L. Phenanthrene was detected in the groundwater sample collected from monitoring well 85-3 at a concentration of 2,800 µg/L, which is above the Michigan Act 451, Part 201 RDWC of 52 µg/L, and the RVIAC and RGCC of 1,000 µg/L. Pyrene was detected in the groundwater sample collected from monitoring well 85-3 at a concentration of 5,600 µg/L, which is above the Michigan Act 451, Part 201 RDWC, RVIAC, and RGCC of

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140 µg/L. No other parameters were detected above the Michigan Act 451, Part 201 ResidentialCleanup Criteria; however, trans-1,2-dichloroethene, toluene, 1,1-dichloroethane, tetrachloroethene, 1,1,1-trichloroethane, naphthalene, bis(2-ethylhexyl) phthalate, and di-n-butyl phthalate were identified above the laboratory method detection limits. Table 4 presents detected parameters identified in groundwater.

Based on the results of the HI, EDI provided the following recommendations:

- The collection of groundwater samples on a semi-annual basis and analyzed for Priority Pollutant volatiles in all monitoring wells, and for Priority Pollutant base neutrals in monitoring wells 85-3, 85-4, and 85-5B;
- Monitoring should be reduced to detected constituents only after one year;
- The installation of four additional monitoring wells along the north side of the plant and the collection of groundwater samples for Priority Pollutants;
- The installation of one additional well adjacent to 85-7 for the detection of TCE; and
- The installation of a nested well series comprised of two wells, one well set to straddle the water table and one well set on top of the clay layer, near the north end of the plant downgradient of 85-7.

2.4 PHASE II HYDROGEOLOGIC INVESTIGATION

A Phase II HI was conducted at the Site by EDI and was summarized in a report dated June 1986.

The MDNR reviewed the previous HI report prepared by EDI. The work plan for the Phase II HI report incorporated MDNR's comments received by GM in a letter dated April 2, 1986.

The purpose of the Phase II HI was to determine the source of the TCE contamination identified during the HI in monitoring well 85-7, if the TCE contamination was limited to the Site, and to identify if the oil identified in the excavation near Column A-15 had migrated downgradient to the edge of the plant.

The Phase II HI indicated that historical plant records identified a former parts cleaner station near Column T-27. Records indicated that the parts cleaner was installed in 1953, removed in 1979, and utilized TCE as a degreaser. One monitoring well, 86-2, was installed near the former parts cleaner station location. A copy of the stratigraphic soil boring log is presented in Attachment A. Six soil and three groundwater samples were collected during the installation of 86-2 for vertical definition of contamination in the suspected source area for analysis for TCE. TCE was detected in the soil sample collected from 86-2 (at 24 to 25.5 feet bgs) at a

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concentration of 260 µg/kg, which is above the Michigan Act 451, Part 201 Residential Drinking Water Protection Criterion (RDWPC) of 100 µg/kg. TCE was detected in the groundwater samples collected from 86-2 (at 40 to 43 feet bgs and 45 to 48 feet bgs) at concentrations of 220 µg/L and 9.8 µg/L, respectively, which are above the Michigan Act 451, Part 201 RDWC of 5 µg/L. TCE was detected in the groundwater sample collected from 86-2 (at 30 to 33 feet bgs) at a concentration of 47,000 µg/L, which is above the Michigan Act 451, Part 201 Residential Groundwater Contact Criterion (RGCC) of 37,000 µg/L, RVIAC of 15,000 µg/L, and the RDWC of 5 µg/L. TCE was not identified in any other groundwater samples above the applicable Michigan Act 451, Part 201 Residential Cleanup Criteria. Plan 1 presents the soil boring and monitoring well locations. Tables 5A and 5B present summaries of detected parameters in soil and groundwater, respectively.

One monitoring well, 86-3, was installed to investigate the contamination at the downgradient boundary of the Site. A copy of the stratigraphic soil boring log is presented in Attachment A. Six groundwater samples were collected during installation from monitoring well 86-3 for analysis for TCE. TCE was detected in all of the groundwater samples collected from monitoring well 86-3 (at 21 to 24 feet bgs, 34 to 36 feet bgs, 44 to 46 feet bgs, 53 to 55 feet bgs, 63 to 65 feet bgs, and 64 to 69 feet bgs) at concentrations of 45 µg/L, 210 µg/L, 600 µg/L, 230 µg/L, 15 µg/L, and 14 µg/L, respectively, which are above the Michigan Act 451, Part 201 RDWC of 5 µg/L. TCE was not identified in any other groundwater samples above the applicable Michigan Act 451, Part 201 Residential Cleanup Criteria. Plan 1 presents the soil boring and monitoring well locations. Tables 5A and 5B present summaries of detected parameters in soil and groundwater, respectively.

One monitoring well, 86-1, was installed to determine if the oil observed near the excavation at Column A-15 has migrated downgradient. A copy of the stratigraphic soil boring log is presented in Attachment A. Six soil samples and three groundwater samples were collected during the installation of 86-1. TCE was not reported to be detected in soil or groundwater samples at concentrations above the applicable Michigan Act 451, Part 201 Residential Cleanup Criteria. Plan 1 presents the soil boring and monitoring well locations. Tables 5A and 5B present summaries of detected parameters in soil and groundwater, respectively.

In addition, a total of eight groundwater samples were collected from each of the on-Site monitoring wells, 85-1, 85-2, 85-3, 85-6, 85-7, 86-1, 86-1, and 86-3, for analysis for Priority Pollutant volatiles. TCE was detected in the groundwater samples collected from monitoring wells 85-2, 85-7, and 86-3 at concentrations of 6 µg/L, 240 µg/L, and 1,400 µg/L, respectively, which are above the Michigan Act 451, Part 201 RDWC of 5 µg/L. TCE was detected in the groundwater sample collected from monitoring well 86-2 at a concentration of 55,000 µg/L, which is above the Michigan Act 451, Part 201 RDWC of 5 µg/L, the RVIAC of 15,000 µg/L,

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and the RGCC of 37,000 µg/L. Tetrachloroethene (PCE) was detected in the groundwater samples collected from monitoring wells 85-6 and 86-2 at concentrations of 7 µg/L and 14 µg/L, respectively, which are above the RDWC of 5 µg/L. No other parameters were identified above the Michigan Act 451, Part 201 Residential Cleanup Criteria; however, 1,1,1-TCA, trans-1,2-DCE, 1,1-DCE, and chloroform were detected in the groundwater samples. Plan 1 presents the soil boring and monitoring well locations. Tables 5A and 5B present summaries of detected parameters in soil and groundwater, respectively.

In addition to the installation of monitoring wells, field activities included a city water search for potential downgradient off-Site receptors (i.e., private water supply wells). The City of Wyoming was contacted by ET to obtain a list of the residences that were connected to the municipal water supply immediately downgradient of the Site. Locations of residences searched included those located on Hillcroft, Birchwood, Buchanan, 34th and 35th Streets. Based on the results of the search, a survey was further conducted for field verification of addresses not appearing on the City of Wyoming provided list. The results of the search indicated that three wells were present within a mile radius of the Site. One well, located approximately three-quarters of a mile north of the Site, was identified to be utilized for commercial purposes. The other two wells are located upgradient of the Site, approximately one half-mile southwest of the Site. The remainder of the properties appeared to be connected to the City of Wyoming municipal water supply at the time of the search.

Static water levels were collected from the monitoring wells on May 5, 1986 in order to determine the groundwater flow direction and velocity. The groundwater flow direction was determined to be north, the hydraulic gradient was calculated to be 6.9 ft/mile, and the groundwater flow velocity was calculated to be between 0.089 to 1.01 ft/day. In-situ tests were conducted at select wells to determine the hydraulic conductivity of the upper groundwater unit.

Based on the results of the Phase II HI, the concentration of TCE is highest in the vicinity of the suspected source area, the former parts cleaner. In addition, elevated levels of TCE were identified in the groundwater samples collected from the monitoring well located on the northern portion of the Site. Based on the geologic information collected to date, it had not been determined if the clay layer under the Site is continuous. The highest levels of TCE were identified near the water table and at the top of the confining layer. Based on the hydrogeologic information collected to date, groundwater flow is in the northerly direction. Information collected from Cole Drain indicated that there is some groundwater discharge to the Cole Drain.

2.5 PHASE III-A HYDROGEOLOGICAL INVESTIGATION

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A Phase III-A HI was conducted at the Site by EDI and was summarized in a report dated March 1987.

The purpose of the Phase III-A HI was to delineate the extent of TCE contamination in soil and groundwater at the Site.

Soil vapor samples were collected from below the plant floor in three areas (Column T-27, Column O-44, and Column RS-9) and along the south side of 36th Street. A total of 50 soil vapor samples were collected for analysis for TCE. Table 6A presents a summary of TCE in soil vapor samples. Elevated levels of TCE were identified in soil vapor samples collected from the area near Column T-27. Based on the results of the Phase III-A HI, EDI determined that the extent of the soil vapor contamination had been defined and was sufficient for removal utilizing soil vapor extraction.

A total of five soil borings/monitoring wells, 87-1, 87-2, 87-3, 87-4, and 87-5, were installed during the Phase III-A HI. Copies of the stratigraphic soil boring/monitoring well logs are presented in Attachment A. A total of 25 soil and 16 groundwater samples were collected during the Phase III-A HI. Soil and discrete groundwater samples were analyzed for TCE. Groundwater samples collected from monitoring wells were analyzed for volatile, acid, and base neutral Priority Pollutants, hardness, pH, iron, and grease and oil. TCE was identified in the soil samples collected from soil boring 87-3 (at 14 to 15.5 feet bgs and 18 to 19.5 feet bgs) at concentrations of 110 µg/kg and 140 µg/kg, respectively, which are above the Michigan Act 451, Part 201 RDWPC of 100 µg/kg. TCE was not detected in any other soil samples above the applicable Michigan Act 451, Part 201 Residential Cleanup Criteria. TCE was identified in the discrete groundwater samples collected from soil boring 87-1 (at 25 to 28 feet bgs, 34.5 to 37.5 feet bgs, and 43.5 to 46.5 feet bgs) at concentrations of 280 µg/L, 120 µg/L, and 140 µg/L, respectively, which are above the Michigan Act 451, Part 201 RDWC of 5 µg/L. TCE was identified in the discrete groundwater samples collected from soil boring 87-2 (at 25 to 28.5 feet bgs, 35 to 38.5 feet bgs, and 43 to 46 feet bgs) at concentrations of 6.6 µg/L, 54 µg/L, and 9.5 µg/L, respectively, which are above the Michigan Act 451, Part 201 RDWC of 5 µg/L. TCE was identified in the discrete groundwater samples collected from soil boring 87-4 (at 22.3 to 24.3 feet bgs and 32 to 35 feet bgs) at concentrations of 220 µg/L and 8.3 µg/L, respectively, which are above the Michigan Act 451, Part 201 RDWC of 5 µg/L. TCE was identified in the discrete groundwater samples collected from soil boring 87-5 (at 22 to 24 feet bgs, 31 to 34 feet bgs, 41 to 44 feet bgs, and 51 to 54 feet bgs) at concentrations of 1,900 µg/L, 15 µg/L, 57 µg/L, and 490 µg/L, respectively, which are above the Michigan Act 451 Part 201 RDWC of 5 µg/L. TCE was identified in the discrete groundwater samples collected from monitoring wells 87-1, 87-2, and 87-5 at concentrations of 1,300 µg/L and 45 µg/L, respectively, which area above the Michigan Act 451 Part 201 RDWC of 5 µg/L. TCE was detected in the

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groundwater sample collected from monitoring well 86-2 at a concentration of 90,000 µg/L, which is above the Michigan Act 451 Part 201 RDWC of 5 µg/L, RGVIAC of 15,000 µg/L, and the RGCC of 37,000 µg/L. TCE was detected in the groundwater samples collected from monitoring wells 87-1, 87-2, 87-4, and 87-5 at concentrations of 1,200 µg/L, 65 µg/L, 87 µg/L, and 70 µg/L, respectively, which are above the Michigan Act 451 Part 201 RDWC of 5 µg/L. Bis-2-ethyl hexyl phthalate was detected in groundwater samples collected from monitoring wells 86-2, 87-2, and 87-4 at concentrations of 36 µg/L, 9 µg/L, and 29 µg/L, which are above the Michigan Act 451 Part 201 RDWC of 6 µg/L. No other parameters were identified in the soil or groundwater samples above the applicable Michigan Act 451 Part 201 Residential Cleanup Criteria. Tables 6B and 6C present detected parameters in soil and groundwater, respectively.

Static water levels were collected on two occasions during the implementation of the Phase III-A HI. Groundwater flow direction was determined to be to the north-northwest, which is consistent with previous groundwater flow calculations. The groundwater flow velocity and gradient were observed to be consistent with previous calculations.

The wells installed in the source area were constructed for use in vapor recovery. Wells 87-1, 87-2, 87-4, and 87-5 have 10-foot screens in the vadose zone for the removal for vapors. Based on the results of the soil vapor sampling conducted during the Phase III-A HI and the installation of the soil vapor wells, EDI recommended a work plan for soil vapor extraction.

2.6 PHASE III-B HYDROGEOLOGICAL INVESTIGATION

A Phase III-B HI was conducted at the Site by EDI and was summarized in a report dated July 1987.

The purpose of the Phase III-B HI was to determine the potential impact of the TCE plume on the water quality of the Cole Drain, to determine the width of the plume on the northern portion of the Site, and to obtain information about the aquifer characteristics on the northern portion of the Site.

Soil vapor samples were collected along the south side of 36th Street to determine the locations for two additional monitoring well installations. The results of the soil vapor sample collection identified that the TCE plume is present 400 feet east and 300 feet west of monitoring well 85-7. Based on the results of the soil vapor sampling, two additional monitoring wells, 87-8 and 87-9 were installed to the east and west of current monitoring well 86-3. Table 7A presents the results of the soil vapor survey.

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Seven surface water samples were collected from Cole Drain and analyzed for Priority Pollutant volatiles. Low, uniform levels of TCE were identified near the stormwater pond outfall, as well as upgradient and downgradient of the outfall location. It should be noted that PCE was identified at a concentration of 11 µg/L in the surface water sample collected from the Cole Drain adjacent to Clay Avenue, located upgradient of the Site. Table 7B presents detected parameters in surface water samples.

Five groundwater samples were collected during the installation of monitoring well 87-8 and seven groundwater samples were collected during the installation of monitoring well 87-9 for analysis for TCE. TCE was identified in the groundwater samples collected from monitoring well 87-8 (at 18.7 to 19.7 feet bgs, 28 to 31 feet bgs, and 58 to 61 feet bgs) at concentrations of 17 µg/L, 5.4 µg/L, and 5.2 µg/L, respectively, which are above the Michigan Act 451, Part 201 RDWC of 5 µg/L. TCE was identified in the groundwater samples collected from monitoring well 87-9 (at 16 to 17.5 feet bgs, 22 to 25 feet bgs, 32 to 35 feet bgs, 41 to 44 feet bgs, 52 to 55 feet bgs, and 62 to 65 feet bgs) at concentrations of 14 µg/L, 42 µg/L, 27 µg/L, 41 µg/L, 63 µg/L, and 19 µg/L, respectively, which are above the Michigan Act 451, Part 201 RDWC of 5 µg/L. Table 7C presents detected parameters in groundwater.

In addition, a total of four groundwater samples were collected from monitoring wells 85-7, 86-3, 87-8 and 87-9 for analysis for grease and oil, total iron, hardness, pH, and Priority Pollutants. TCE was detected in monitoring wells 85-7, 87-8, and 87-9 at concentrations of 150 µg/L, 9 µg/L, and 62 µg/L, respectively, which are above the Michigan Act 451, Part 201 RDWC of 5 µg/L. TCE was detected in monitoring well 86-3 at a concentration of 340 µg/L, which is above the Michigan Act 451, Part 201 RDWC of 5 µg/L and Groundwater Surface Water Interface Criterion (GSIC) of 200 µg/L. Bis-2(ethyl hexyl) phthalate was detected in monitoring well 85-7 at a concentration of 68 µg/L, which is above the Michigan Act 451, Part 201 RDWC of 6 µg/L and the GSIC of 32 µg/L. Butyl benzyl phthalate was detected in monitoring well 86-3 at a concentration of 26 µg/L, which is above the GSIC of 14 µg/L. No other parameters were reported to be detected above the applicable Michigan Act 451, Part 201 Residential Cleanup Criteria. Table 7C presents detected parameters in groundwater.

The average hydraulic conductivity across the Site was calculated to be 149 ft/day, with a hydraulic gradient of 7.2 ft/mile. Porosity at the Site was estimated to be 25%, with an estimated velocity of 0.8 ft/day.

Based on the results of the Phase III-B HI, the core of the plume is approximately 300 feet wide on the north Site boundary. The plume has traveled approximately 1,200 feet from the suspected source area; however, due to the lack of information regarding the date of the release, the extent of off-Site migration cannot be speculated.

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In addition, the Phase III-B HI included a work plan scope of work for the recommended next phase of work.

2.7 PHASE IV-A SOIL VAPOR PILOT STUDY

A Phase IV-A Soil Vapor Pilot Study (Pilot Study) was conducted at the Site by EDI and was summarized in a report dated August 1988.

The purpose of the Pilot Study was to develop the required data to design a remediation system.

Eight ½-inch probes, P1 through P8, were installed in the general vicinity of the vapor recovery well, 87-3. P1 was installed to a depth of 10 feet bgs and P2 through P8 were installed to a depth of 15 feet bgs. Three day trial runs were conducted on the probes at air flows of 38, 52, and 110 cubic feet per minute. In addition, a 30 day trial run at 110 cubic feet per minute was conducted separately after reviewing the results of the three initial trials.

Based on the results of the Pilot Study, EDI provided the following conclusions:

- The upper portion of the soil vapor extraction well screen should be blanked off to enhance the rate of TCE recovery;
- An air flow rate of 100 cubic feet per minute (cfm) is sufficient for removing the TCE from the soils and no economic advantage is gained by increasing the air flow above 100 cfm;
- Based on the available data, an asymtotic concentration of TCE or the anticipated duration of the TCE removal could not be determined; and
- Based on the available data, a Permit to Install (PTI) application could be submitted to the MDNR to propose operation of an SVE system.

2.8 PHASE IV-B HYDROGEOLOGICAL INVESTIGATION

A Phase IV-B HI was conducted at the Site by EDI and was summarized in a report dated July 1988.

The purpose of the Phase IV-B HI was to determine the potential for removal of TCE from the groundwater and the control of groundwater flow in the source area for future source migration to groundwater.

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Formation characteristics in the vicinity of monitoring wells 86-2, 87-1, 87-4, and 87-5 were determined through a pump test. In addition, the pump test was utilized to determine a potential location for a treatment system extraction well.

Pump tests conducted on monitoring well 87-5, previously installed with the intention of use as a purge well, indicated that the yield of the monitoring well was too low to use as a purge well.

Pump tests conducted on monitoring well 86-2 indicated that the yield was sufficient. In addition, monitoring well 86-2 is located near the source area. Based on pumping tests, the capture zone for monitoring well 86-2 is approximately 20,000 square feet. Based on this calculation, it would take 80 days to remove one capture zone of water.

Monitoring wells 87-1 and 87-4 are located to the east and west of the source area and are screened across the vadose zone for use with the SVE system, as well as screening in the saturated zone. Based on the configuration of these wells, the use of these wells for purging purposes would not be optimal. In addition, the yield of the wells was determined during pumping tests to be too low to use as a purge well.

Based on the results of the Phase IV-B HI, EDI provided the following conclusions:

- Monitoring well 87-5 cannot be utilized as a purge well due to low yield;
- Monitoring well 86-2 should be utilized as a purge well due to sufficient; and
- The zone of influence of monitoring well 86-2 includes a large portion of the source area.

Based on the results of the Phase IV-B HI, EDI provided the following recommendations:

- Installation of a shallow well pump in monitoring well 86-2 to recover impacted groundwater;
- Treatment of groundwater either through steam stripping or aqueous carbon adsorption;
- Discharge of the treated water to the sanitary or storm sewer;
- Evaluation of the performance of the groundwater recovery system during the first month of operation to determine the effectiveness of the system and estimate groundwater TCE concentration trends; and
- Installation of two additional shallow monitoring wells in the source area if the cone of depression for monitoring well 86-2 cannot be determined.

2.9 PHASE IV-C HYDROGEOLOGICAL INVESTIGATION

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A Phase IV-C HI was conducted at the Site by EDI and was summarized in a report dated July 1988.

The purpose of the Phase IV-C HI was to define the horizontal and vertical extent of the off-Site contamination for TCE and the applicable degradation products, determine the groundwater flow direction and velocity in the plume area, and determine the relationship between Cole Drain and the aquifer.

A soil gas survey was conducted within the area bounded by 36th Street to the north, Buchanan Avenue to the east, US 131 to the west, and 32nd Street to the south to determine potential soil boring locations. Three lines of sampling were conducted near the north Site boundary, northwest of the Site, and north of the Site. Soil gas sampling was terminated after the completion of the three lines of sampling, due to the fact that TCE was not detected in any of the samples collected from those lines.

Nine soil borings, 87-10, 87-11, 87-12, 87-13, 88-1, 88-2, 882D, 88-3, and 88-4 were installed in the area north of the Site, including five soil borings installed along the west side of Cole Drain. Soil borings 88-1, 88-2, 88-2D, 88-3, and 88-4 were installed in the right-of-way on Consumers Energy property. Groundwater samples were collected during the installation of all soil borings from temporary wells at 10 foot intervals. A total of 43 groundwater samples were collected for analysis for trans-1,2-DCE, TCE, and vinyl chloride (VC). TCE was detected in the groundwater samples collected from 87-10 (at 19.5 to 22.5 feet bgs, 29 to 32 feet bgs, 38.5 to 41.5 feet bgs, 48 to 51 feet bgs, and 58 to 61 feet bgs) at concentrations of 81 µg/L, 91 µg/L, 37 µg/L, 24 µg/L, and 32 µg/L, respectively, which are above the Michigan Act 451, Part 201 Residential DWC (RDWC) of 5 µg/L. TCE was detected in the groundwater samples collected from monitoring well 87-11 (at 36.4 to 39.4 feet bgs and 48 to 51 feet bgs) at concentrations of 170 µg/L and 46 µg/L, respectively, which are above the Michigan Act 451, Part 201 RDWC. In addition, TCE was detected in the groundwater sample collected from monitoring well 87-11 (at 28 to 31 feet bgs) at a concentration of 260 µg/L, respectively, which is above the Michigan Act 451, Part 201 RDWC of 5 µg/L and the GISC of 200 µg/L. TCE was detected in the groundwater samples collected from 87-13 (at 20 to 23 feet bgs, 30 to 33 feet bgs, and 40 to 43 feet bgs) at concentrations of 5 µg/L, 5 µg/L, and 7 µg/L, respectively, which is above the Michigan Act 451, Part 201 RDWC. Table 8A presents a summary of detected parameters in groundwater.

Seven monitoring wells, 87-10, 87-11, 87-13, 88-1, 88-2, 88-3, and 88-4, were installed at the Site. Monitoring wells 88-1, 88-2, 88-3, and 88-4 were installed in the right-of-way on Consumers Energy property. Groundwater samples were collected from the new monitoring wells and from monitoring wells for 86-3, 87-8, and 87-9 for analysis for volatiles. TCE was detected in

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the groundwater sample collected from monitoring well 86-3 at a concentration of 170 µg/L, which is above the Michigan Act 451, Part 201 RDWC of 5 µg/L. TCE was detected in the groundwater sample collected from 87-8 at a concentration of 6 µg/L, which is above the Michigan Act 451, Part 201 RDWC of 5 µg/L. TCE was detected in the groundwater sample collected from 87-10 at a concentration of 46 µg/L, which is above the Michigan Act 451, Part 201 RDWC of 5 µg/L. TCE was detected in the groundwater sample collected from 87-11 at a concentration of 320 µg/L, which is above the Michigan Act 451, Part 201 RDWC of 5 µg/L and the GISC of 200 µg/L. TCE was detected in the groundwater sample collected from 87-13 at a concentration of 10 µg/L, which is above the Michigan Act 451, Part 201 RDWC of 5 µg/L. Table 8A presents a summary of detected parameters in groundwater.

Three surface water samples were collected from the Cole Drain. Surface water samples were analyzed for TCE. TCE was not detected in any of the surface water samples above the applicable Michigan Act 451, Part 201 Residential Cleanup Criteria. Table 8B presents a summary of detected parameters in Cole Drain surface water samples.

Groundwater flow direction was determined to be towards the northeast west of Cole Drain and towards the northwest to the east of the Cole Drain (i.e., towards the Cole Drain).

Based on the results of the Phase IV-C HI, EDI provided the following conclusions beyond those identified in the Phase IV-B HI:

- The plume flows northwest upon exiting the Site with a final discharge into Cole Drain near monitoring well 87-11;
- The plume does not flow past the Cole Drain to the west and groundwater converges toward the Cole Drain;
- TCE levels identified in Cole Drain vary;
- The relatively low levels of TCE in the Cole Drain samples is indicative that TCE levels are being diluted upon entering the Drain;
- Under the assumption that the plume developed 9 years ago, the plume would have reached the Cole Drain; and
- Approximately 35 to 40 gallons per minute of groundwater with low levels of TCE is estimated to be migrating north of the Site property line.

2.10 TCE REMEDIATION MONITORING PROGRAM

A TCE Remediation Monitoring Program (RMP) report was prepared by EDI dated March 1989.

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The RMP includes the scope for groundwater monitoring and surface water sampling from Cole Drain.

The groundwater monitoring includes hydraulic monitoring in 22 monitoring wells and 2 purge wells. Hydraulic monitoring will be conducted on a quarterly basis. Groundwater samples were identified to be collected on a monthly basis from 85-7, 86-3, 87-1, 87-2, 87-4, 87-5, 87-8, 87-9, 87-10, 87-11, and 87-13, and the purge well discharge for analysis for TCE, cis-1,2-DCE, and trans-1,2-DCE. Groundwater samples from monitoring wells 86-3, 87-8, 87-9, 87-10, 87-11, and 87-13 and the purge well discharge will also be analyzed for 1,1-DCE and VC during the fourth quarter. Beginning in 1989, the purge well discharge was to be monitored monthly. Purge well 86-2 and the monitoring well at X-10 will be analyzed on a monthly basis for TCE. Table 9A presents a summary of groundwater monitoring data collected to date.

In addition to the groundwater monitoring, surface water monitoring will be conducted in the Cole Drain. Sampling would be conducted at three locations on a quarterly basis for analysis for TCE, cis-1,2-DCE, and trans-1,2-DCE. In addition, water levels will be collected on a monthly basis from the Cole Drain. Table 9B presents a summary of surface water monitoring data collected to date.

Soil vapor recovery monitoring will be conducted at the Site. Air flow readings will be collected on a monthly basis to verify that the vacuum well is steady. Air samples will be collected on a monthly basis for TCE. In addition, pressure readings and the air flow rate will be determined each month. Soil vapor samples will be collected from the influent and effluent for analysis for TCE on a quarterly basis.

Quarterly results will be summarized in a report for submittal to the MDNR within 60 days after sampling events.

2.11 TCE EMISSION TESTING REPORT

A TCE Emission Testing (ET) report was prepared by EDI dated September 21, 1989. The ET report was prepared for the soil vapor extraction (SVE) system exhaust.

The purpose of the ET was to determine compliance with the conditions set forth on the MDNR Permit to Install (PTI) No. 92-88.

Based on the results of the TCE emission testing, TCE was non-detect at a detection limit of 0.0017 mg/m^3 for the three samples collected, which is below the permitted limit of 16.0 mg/m^3.

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2.12 OFF-SITE GROUNDWATER PURGE EVALUATION

An Off-Site Groundwater Purge Evaluation (Evaluation) was prepared by WW Engineering & Science dated April 1993.

A combination system was installed in 1989 to remediate the chlorinated compounds plume at the Site. The remediation system consists of a SVE system for the removal of vapors from the vadose zone and two purge groundwater wells for removal of contamination from the groundwater. Both systems discharge to two activated carbon treatment systems consisting of two carbon tanks per system. The treated air is discharged to the outdoors via a roof stack and the treated groundwater is discharged to the on-Site stormwater retention pond and eventually to Cole Drain. The plume discharges to Cole Drain beyond the treatment system; however, the drain has been monitored during operations and maintenance activities and no adverse impact to the water quality of the drain has been identified.

The purpose of the Evaluation was to determine the capture and effectiveness of an off-Site treatment purge well. Three scenarios were assessed during the Evaluation: the current purging scenario, an additional purging well near Cole Drain at C-3 and monitoring well 87-11 at a pumping rate of 10 gallons per minute (gpm) and at 40 gpm.

A contaminant transport model and a groundwater flow model were utilized to determine the simulated Site-specific conditions. Based on the results of the modeling, scenario outputs were computed for December 1997, December 2002, and December 2007.

Based on the results of the Evaluation, WW Engineering & Science provided the following conclusions:

- The purge well in the north parking lot (PW-DISCH) is preventing the off-Site migration of TCE from beyond the Site boundary. Plume progress beyond PW-DISCH cannot be identified from historic data because of the off-Site monitoring well configuration;
- An off-Site purge well would reduce the TCE contamination in the vicinity of monitoring well 87-11; however, modeling has indicated that the additional purge well would not significantly decrease the duration of the clean up;
- Modeling indicated that off-Site purging at 40 gpm has the potential for the contaminants to bypass PW-DISCH;
- Between 7.5 and 11 pounds of contaminant mass was modeled to be collected by the additional purge well;
- Modeling indicated that the installation of the additional purge well would not increase the clean up rate and that the TCE plume in the off-Site area will be remediated within a reasonable time frame (approximately 10 to 15 years);

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- Cost analysis indicate that the costs associated with the additional well would be approximately $50,000 per pound of TCE; and
- Access would have to be obtained from off-Site property owners.

2.13 OPERATIONS AND MAINTENANCE MANUALS

The Operations and Maintenance Manuals (O&M Manuals) will be discussed during the update and evaluation of the O&M Manuals, and will be discussed under separate cover.

2.14 ENVIRONMENTAL PERMITS

A PTI was obtained for the Site for the off-gas emissions for the SVE system. The PTI is No. 92-88. The PTI will be discussed during the evaluation of the review of permit requirements, and will be discussed under separate cover.

A National Pollutant Discharge Elimination System (NPDES) Permit was obtained for the Site. The NPDES Permit is No. MI0043877. The NPDES Permit includes provisions and conditions for the discharge from the groundwater treatment system to the stormwater retention pond and eventually to a discharge point to Cole Drain. The NPDES Permit will be discussed during the evaluation of the review of permit requirements, and will be discussed under separate cover.

3.0 CONCLUSIONS

The aforementioned reports present a summary of the historical investigations conducted at the Site. Quarterly and monthly monitoring has been conducted as detailed above.

Based on the review of the historical information summarized above, geologic cross sections and groundwater flow direction figures were developed for the Site to identify geologic and hydrogeologic conditions at the Site. Figure 5 presents the geologic cross section location for cross sections A-A' and B-B'. Figures 6 and 7 present cross sections A-A' and B-B', respectively. Figure 8 presents the general groundwater flow direction across the Site, based on the static groundwater measurements collected on March 28, 2002. Groundwater flow was observed to be generally consistent with historical groundwater flow information.

Based on the review of the historical analytical results summarized above, figures were developed to illustrate the concentrations of the chemicals of concern over time. Plan 2 presents the historical concentrations of chlorinated compounds currently monitored in groundwater at the Site. Concentrations are presented for the initial sample collected or the highest observed concentration, and subsequent sampling events conducted in December 1990,

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December 1995, and December 2001. Plan 3 presents the initial and current concentrations of TCE detected in groundwater samples across the Site.

Please contact Mr. Gary Klepper or the undersigned at (517) 316-2397 or the undersigned at (616) 693-0004, should you have any questions or comments regarding this Summary.

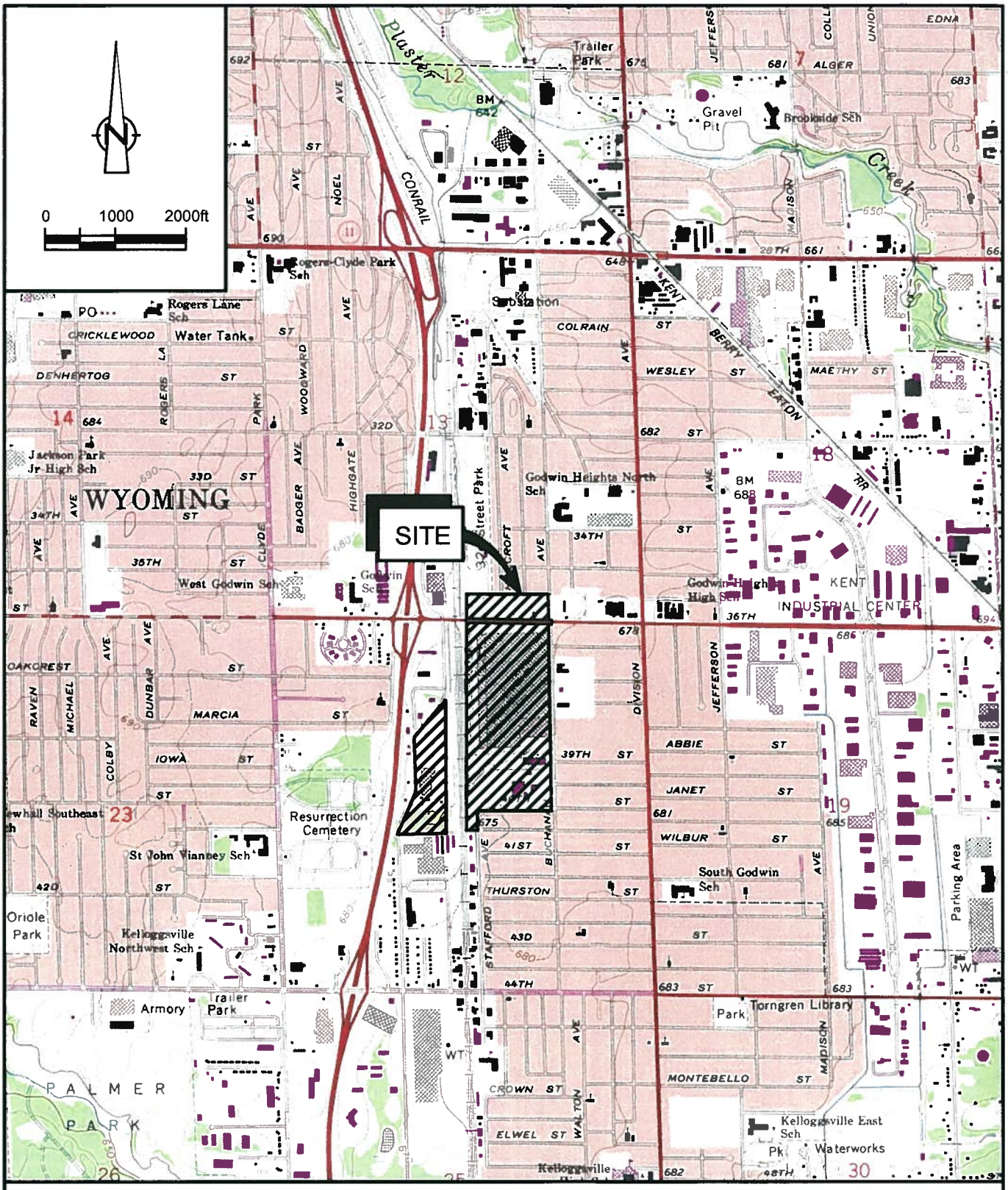
Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

Jennifer L. Quigley, B.S.En.E.

JQ/jq/1/Det.
Encl.

c.c.: Marilyn Dedyne, GM
Gary Klepper, CRA

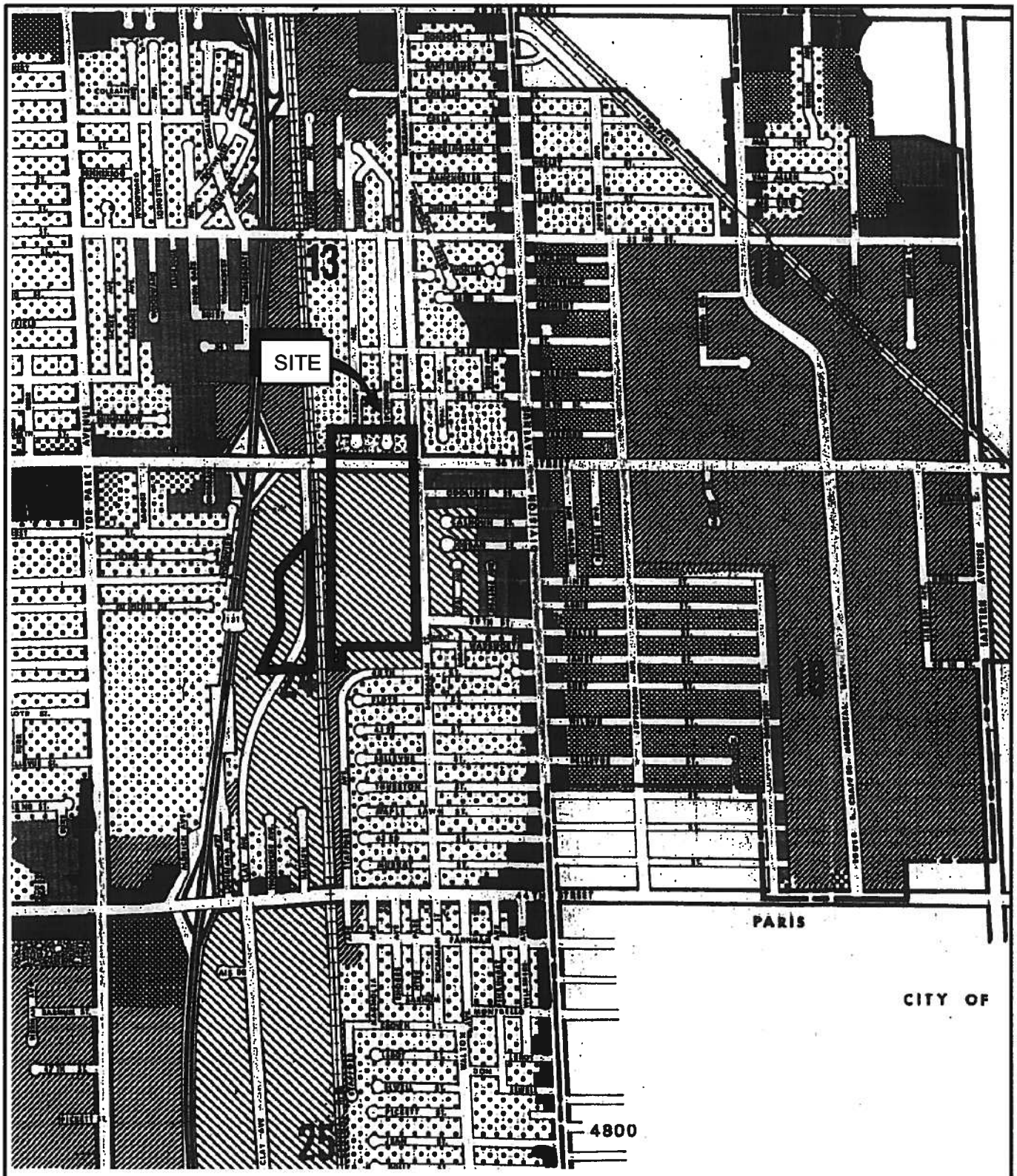


SOURCE: USGS QUADRANGLE MAP;
GRAND RAPIDS WEST, MICHIGAN

figure 1

SITE LOCATION
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(BLIZ001)GN-DE004 DEC 19/2002



SOURCE: CITY OF WYOMING, MICHIGAN ZONE MAP, MAY 2001

figure 2

LEGEND

- SINGLE FAMILY RESIDENTIAL
- SINGLE FAMILY RESIDENTIAL
- TWO FAMILY RESIDENTIAL
- LOW DENISTY MULTIPLE FAMILY RESIDENTIAL
- LIGHT INDUSTRIAL
- GENERAL INDUSTRIAL

CRA

ZONING MAP
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(BLIZ001)GN-DE005 DEC 19/2002

INCIDENT	TASK
OIL RELEASE	HYDROGEOLOGIC EVALUATION OF AN OIL LEAKAGE
DEGREASER RELEASE	HYDROGEOLOGIC INVESTIGATION
	PHASE II HYDROGEOLOGIC INVESTIGATION
	PHASE IIIA HYDROGEOLOGIC INVESTIGATION
	PHASE IIIB HYDROGEOLOGIC INVESTIGATION
	PHASE IVA HYDROGEOLOGIC INVESTIGATION
	PHASE IVB HYDROGEOLOGIC INVESTIGATION
	PHASE IVC HYDROGEOLOGIC INVESTIGATION
	TCE REMEDIATION

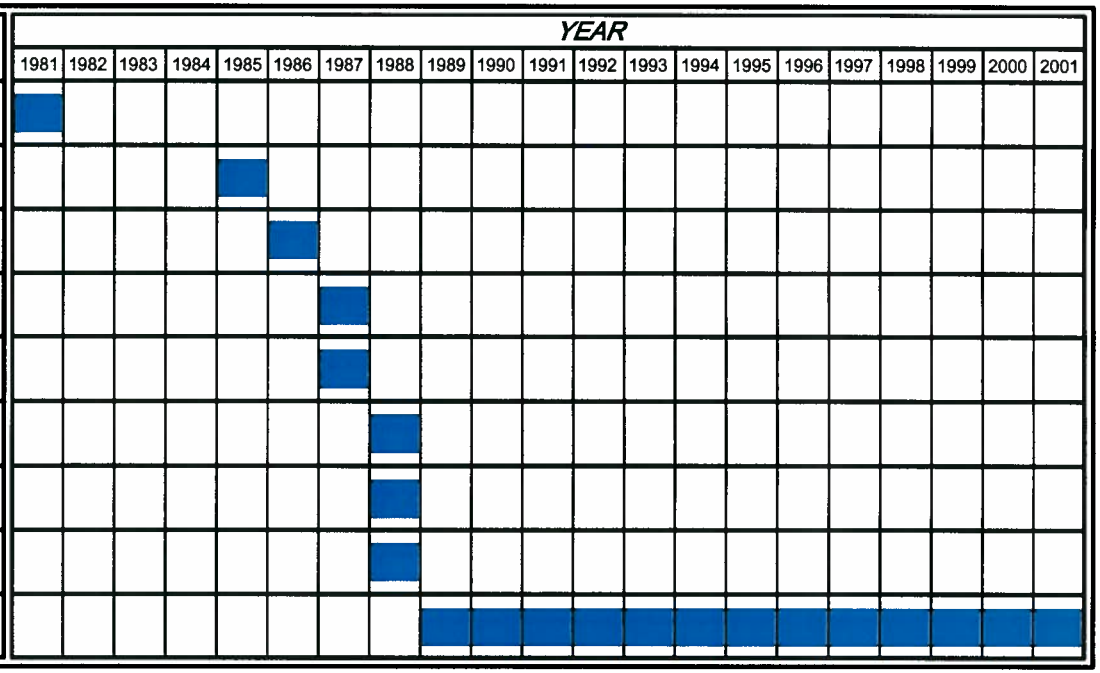


figure 3

HISTORICAL TIMELINE OF ENVIRONMENTAL ACTIVITIES
GRAND RAPIDS METAL PLANT
Grand Rapids, Michigan

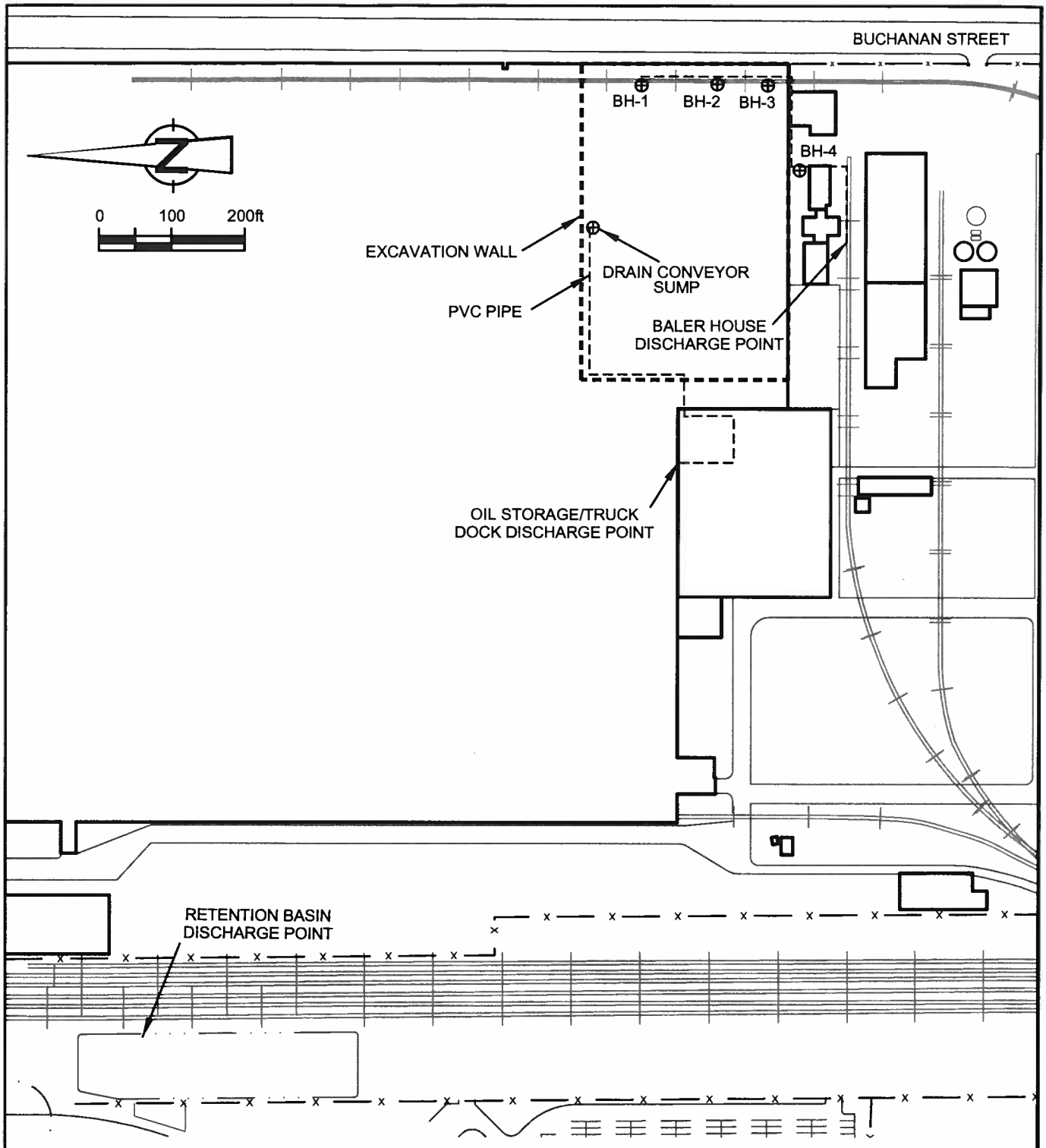
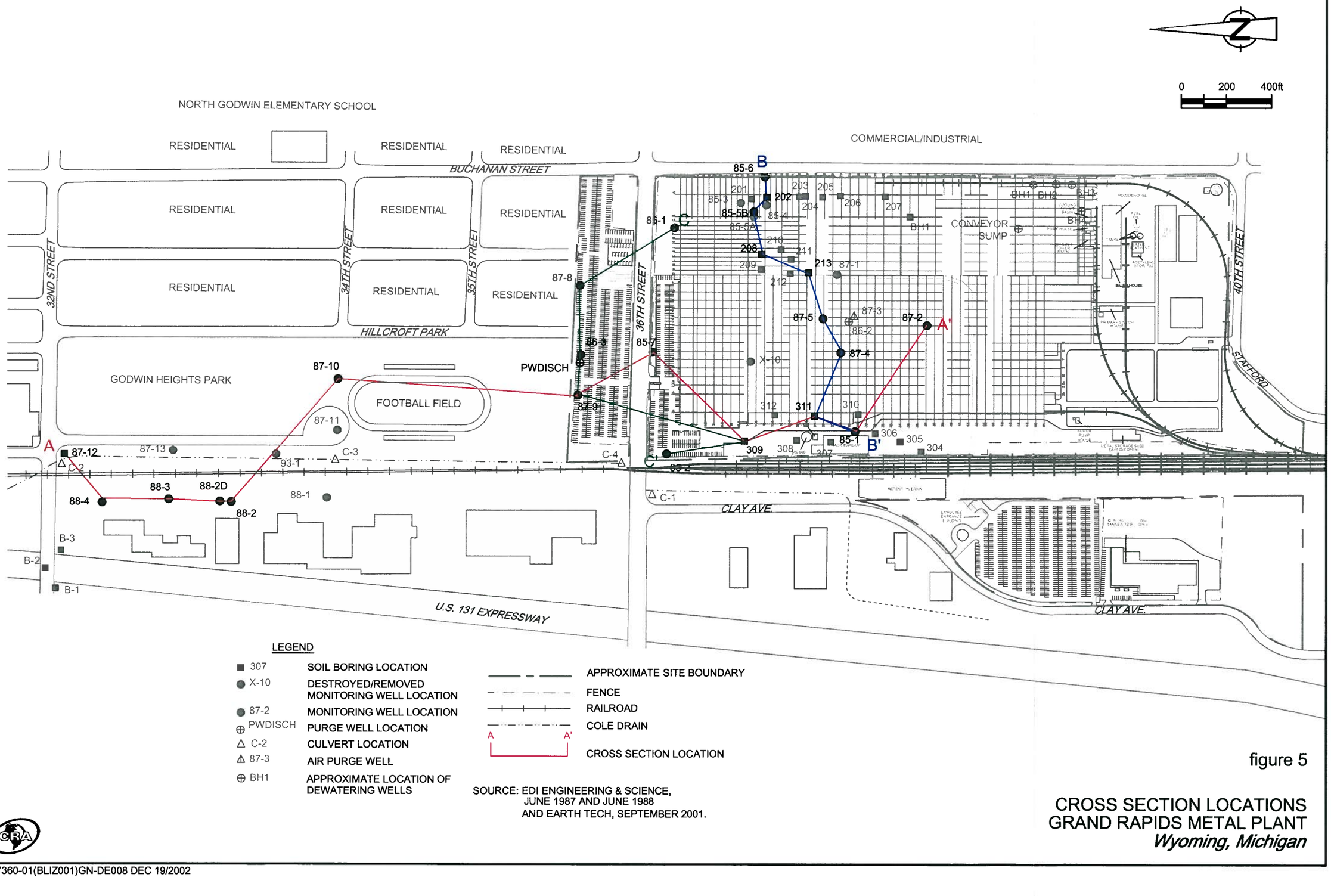


figure 4

DEWATERING WELLS AND DISCHARGE POINTS
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(BLIZ001)GN-DE007 DEC 19/2002



LEGEND

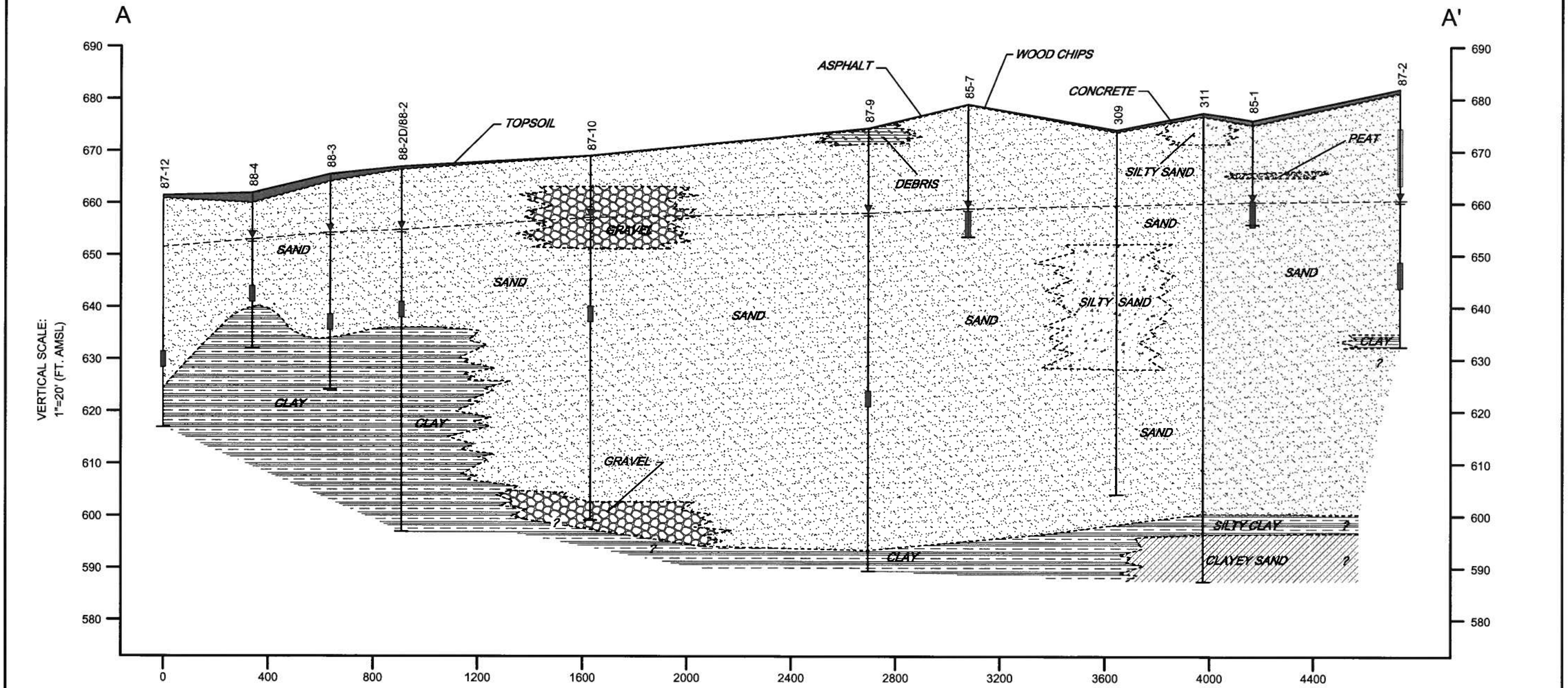
■ 307	SOIL BORING LOCATION
● X-10	DESTROYED/REMOVED MONITORING WELL LOCATION
● 87-2	MONITORING WELL LOCATION
⊕ PWDISCH	PURGE WELL LOCATION
△ C-2	CULVERT LOCATION
⚠ 87-3	AIR PURGE WELL
⊕ BH1	APPROXIMATE LOCATION OF DEWATERING WELLS
———	APPROXIMATE SITE BOUNDARY
- - - -	FENCE
—+—+—	RAILROAD
—·—·—	COLE DRAIN
A — A'	CROSS SECTION LOCATION

SOURCE: EDI ENGINEERING & SCIENCE, JUNE 1987 AND JUNE 1988 AND EARTH TECH, SEPTEMBER 2001.

figure 5

CROSS SECTION LOCATIONS
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(BLIZ001)GN-DE008 DEC 19/2002



HORIZONTAL SCALE:
1"=400'

LEGEND

- MARCH 28, 2002 STATIC WATER LEVEL
- UNSATURATED ZONE SCREEN
- SATURATED ZONE SCREEN
- INTERPRETIVE WATER TABLE
- INTERPRETIVE CONTACT
- KNOWN CONTACT
- ASPHALT/TOPSOIL/WOOD CHIPS/ WOOD FLOOR BLOCK/CONCRETE
- DEBRIS
- GRAVEL
- SAND
- CLAY
- SILTY SAND
- CLAYEY SAND
- PEAT

figure 6

A-A' CROSS SECTION
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(BLIZ001)GN-DE009 DEC 19/2002

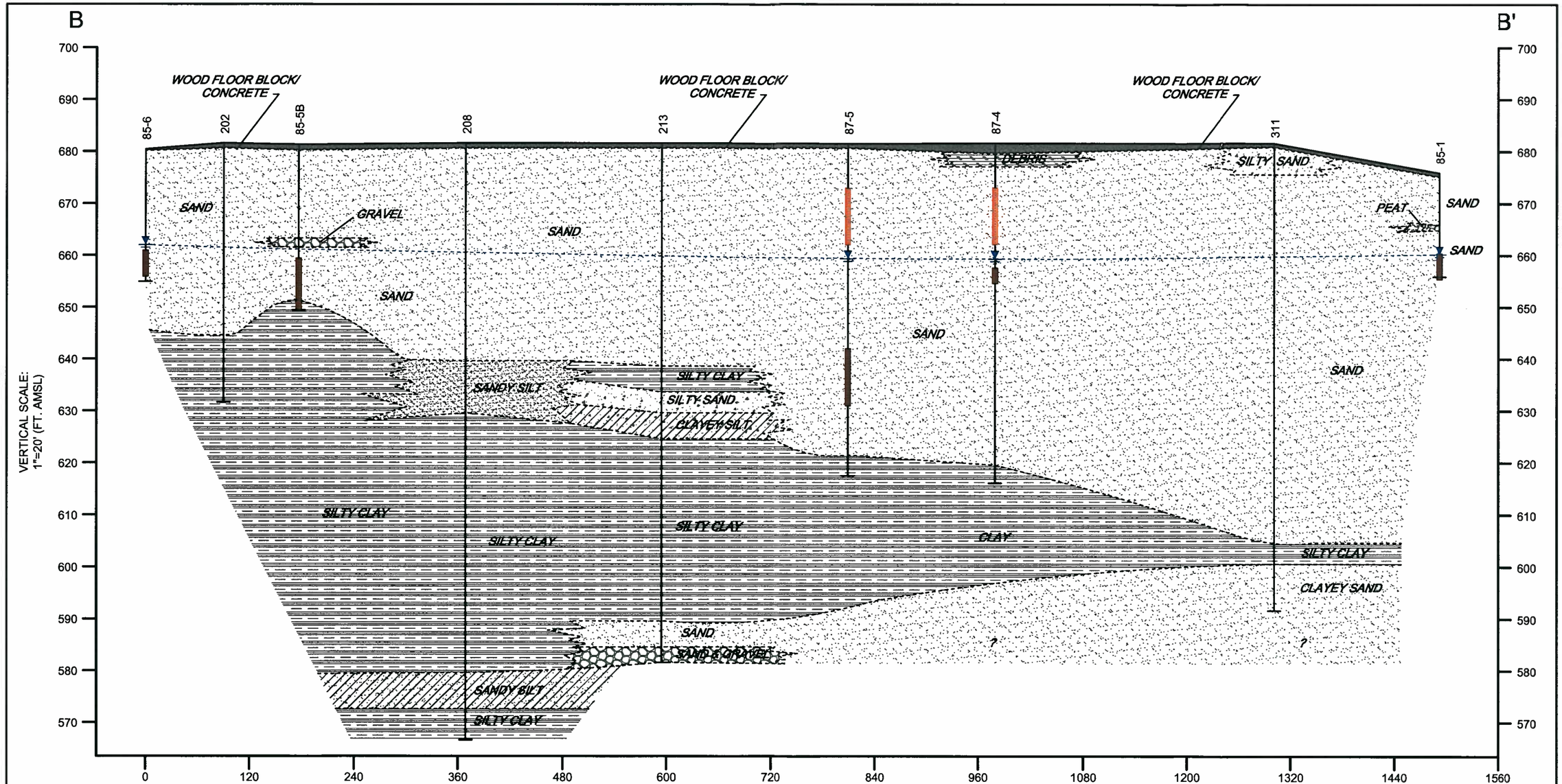


figure 7

B-B' CROSS SECTION
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(BLIZ001)GN-DE010 DEC 19/2002

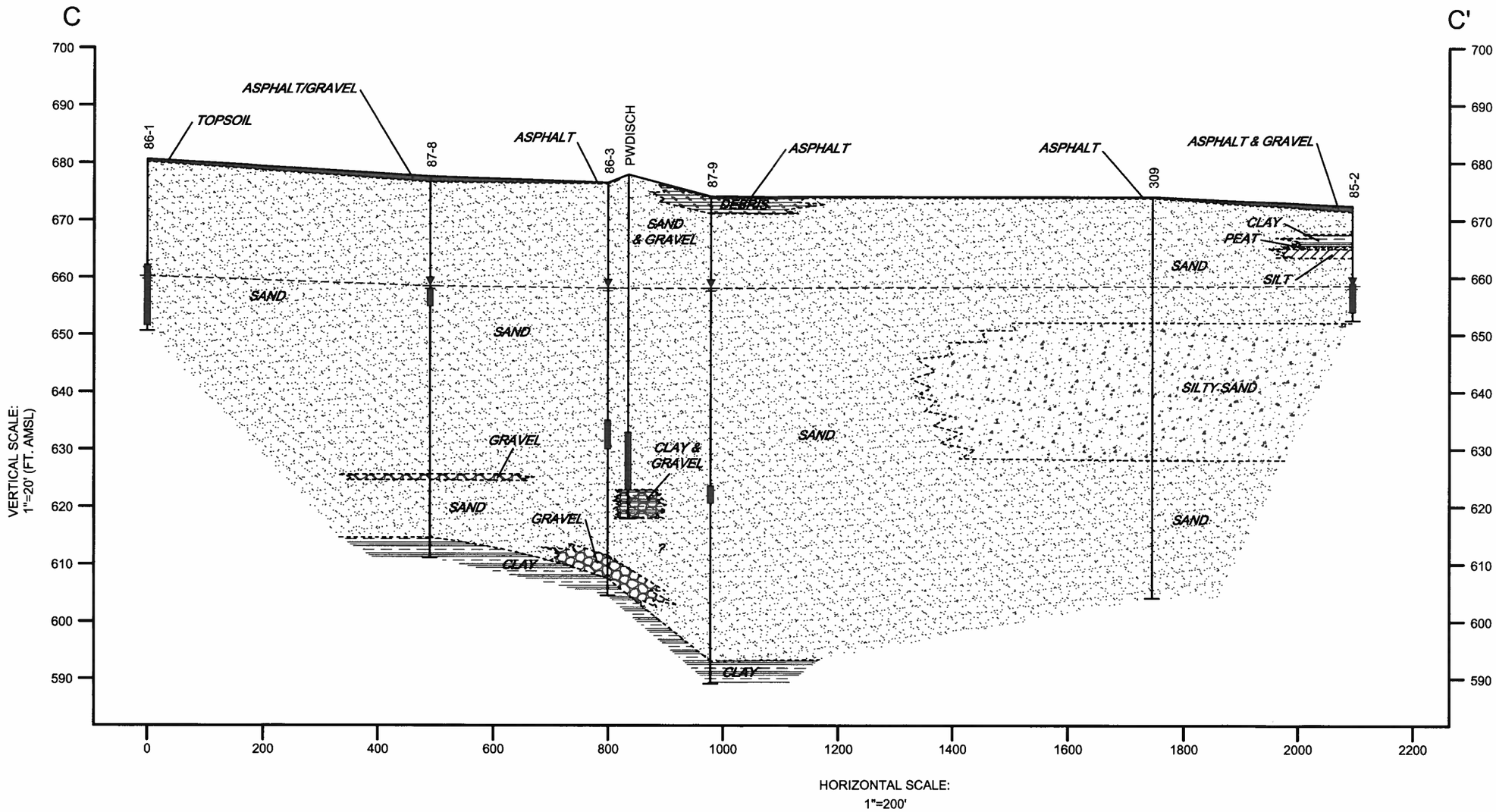


figure 8

C-C' CROSS SECTION
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(BLIZ001)GN-DE013 DEC 19/2002

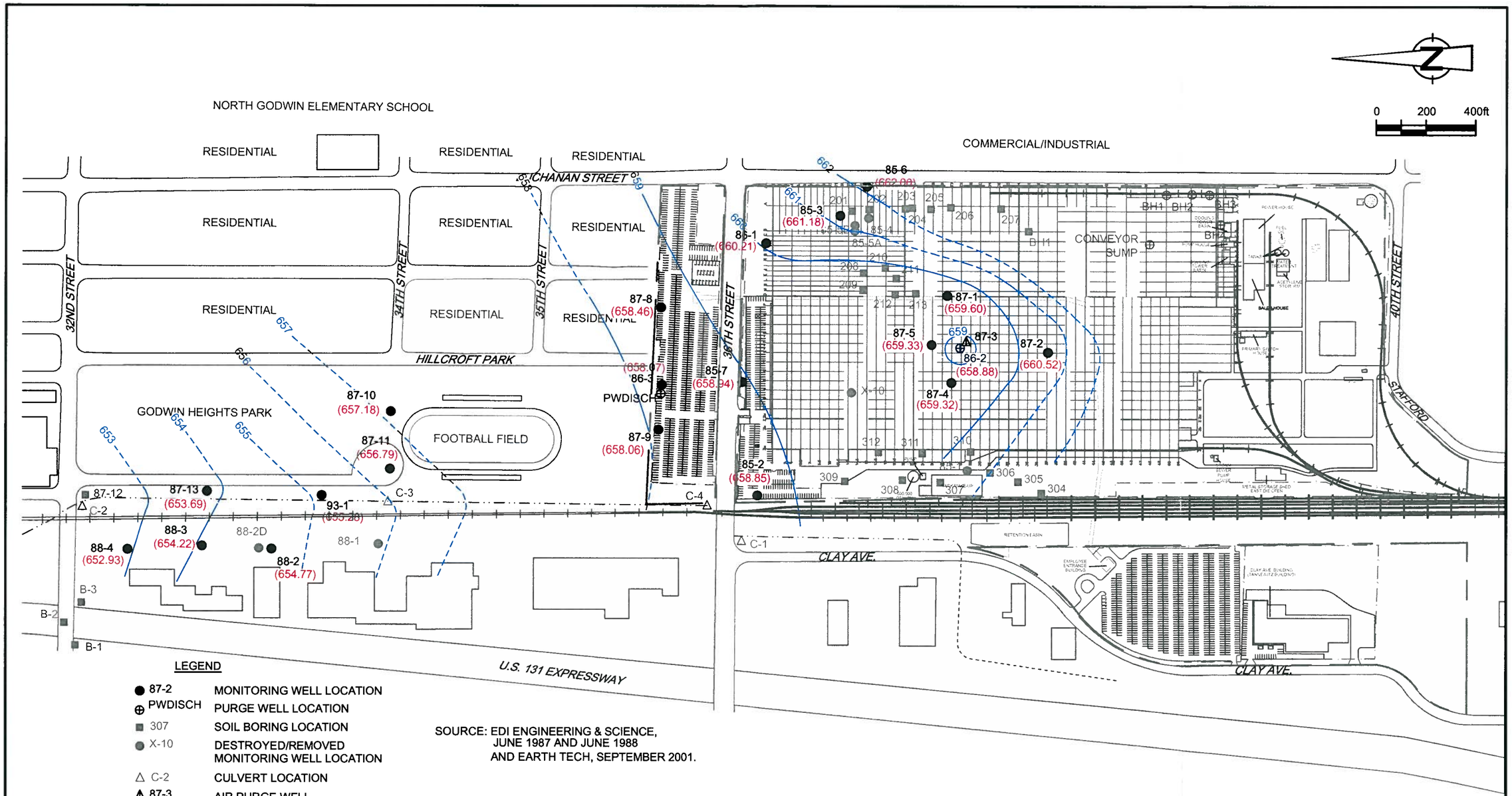


figure 9

MARCH 28, 2002 GROUNDWATER FLOW DIRECTION
GRAND RAPIDS METAL PLANT
Wyoming, Michigan

17360-01(BLIZ001)GN-DE011 DEC 19/2002

TABLE 1A

SUMMARY OF DETECTED PARAMETERS IN SOIL
HYDROGEOLOGIC EVALUATION OF AN OIL LEAKAGE
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*	*Soil*
Sample ID	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*	*Boring*
Depth (feet bgs)	*0.7 - 2*	*2 - 4*	*4 - 6*	*6 - 8*	*8 - 10*	*10 - 12*	*12 - 14*	*14 - 16*	*16 - 18*	*18 - 20*	*20 - 22*
Units	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*
Parameter (mg/kg)											
Chlorinated Paraffin	5,600	6,400	4,300	790	140	6.0	5.5	28	33	4.4	4.1
Grease and Oil	9,900	21,500	11,500	2,060	600	140	260	170	350	200	160

TABLE 1B

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
HYDROGEOLOGIC EVALUATION OF AN OIL LEAKAGE
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Soil*	*Soil*	*Soil*	*Soil*
Sample ID	*Boring*	*Boring*	*Boring*	*Boring*
Depth (feet bgs)	*21 - 24*	*25.5 - 28.5*	*30.5 - 32.5*	*40.5 - 43.5*
Units	*mg/L*	*mg/L*	*mg/L*	*mg/L*
Parameter (mg/L)				
Chlorinated Paraffin	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Grease and Oil	0.4	0.8	0.8	20
Total Organic Carbon	ND (5.0)	ND (5.0)	ND (5.0)	8.0

TABLE 2

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
DEWATERING WELLS AND DISCHARGE POINTS
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451 Part 201 Residential & Commercial I Drinking Water Criteria* [1]	*Michigan Act 451 Part 201 Groundwater Surface Water Interface Criteria* [1]	*Michigan Act 451 Part 201 Residential & Commercial I Groundwater Volatilization to Indoor Air Criteria* [1]	*Michigan Act 451 Part 201 Groundwater Contact Criteria* [1]	*Baler House Discharge*	*Oil Storage Discharge*	*BH-1 Dewatering*	*BH-2 Dewatering*	*BH-3 Dewatering*	*BH-4 Dewatering*	*Oil Storage Discharge*	*Pond Effluent*
Sample ID					--	--	--	--	--	--	--	--
Depth (feet bgs)					*11/13/1985*	*11/13/1985*	*1/13/1985*	*1/13/1985*	*1/13/1985*	*1/13/1985*	*1/13/1985*	*1/13/1985*
Date Sampled					*11/20/1985*	*11/20/1985*	*1/28/1985*	*1/28/1985*	*1/28/1985*	*1/28/1985*	*1/28/1985*	*1/28/1985*
Date Analyzed					*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Units												
Parameter (ug/L)												
1,1-dichloroethane	880	ID	1,000,000	2,400,000	2	ND (1.0)	NA	NA	NA	NA	NA	NA
1,1-dichloroethylene	7.0	65	200	11,000	**10**	ND (1.0)	NA	NA	NA	NA	NA	NA
Tetrachloroethylene	5.0	45	25,000	12,000	**160**	**10**	**72**	**30**	**8**	**7**	**15**	3
1,1,1-trichloroethane	200	200	660,000	1,300,000	**500**	11	81	10	47	4	92	12
Trichloroethylene	5.0	200	15,000	37,000	**42**	**8**	**130**	ND (1.0)	**10**	ND (1.0)	**38**	3

Notes:

[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.

Boxed concentration indicates exceedance of one or more criteria.

NA - Parameter not analyzed.

TABLE 3

SUMMARY OF FREE PRODUCT MEASUREMENTS
HISTORICAL INVESTIGATIONS
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Monitoring Well	*85-3* [1]	*85-5B* [1]	*85-6* [1]	*86-1* [1]
Date Measured				
12/21/88	0.02	none	none	--
01/18/89	--	--	--	--
02/17/89	0.02	none	none	none
03/16/89	trace	none	none	none
04/20/89	0.01	sheen	none	none
05/18/89	0.01	none	none	none
06/16/89	trace	none	none	none
07/18/89	0.01	none	none	none
08/22/89	0.01	none	none	none
09/22/89	0.01	none	trace	none
10/13/89	0.01	none	none	none
10/20/89	--	--	--	--
11/17/89	0.03	none	none	none
12/21/89	0.4	none	none	none
01/12/90	2.75	--	none	none
01/19/90	0.25	none	none	none
02/16/90	0.02	none	none	none
03/16/90	0.02	none	none	none
04/12/90	0.01	none	none	none
05/18/90	0.01	none	none	none
06/19/90	none	none	none	none
07/13/90	trace	none	none	none
08/20/90	none	--	none	none
09/14/90	trace	--	none	none
10/12/90	trace	--	none	none
11/15/90	trace	none	none	none
12/18/90	trace	--	none	none
01/15/91	none	--	--	--
02/20/91	none	--	--	--
03/11/91	none	--	none	none
04/18/91	none	--	--	--
05/16/91	none	--	--	--
06/13/91	trace	--	none	none
07/19/91	trace	--	--	--
08/19/91	0.01	--	--	--
09/12/91	0.46	--	none	none
10/16/91	0.3	--	--	--
11/15/91	0.19	none	none	none
12/13/91	0.16	none	none	none
01/17/92	0.06	--	--	--
02/14/92	0.47	--	--	--
03/13/92	0.22	--	none	none
04/21/92	0.14	--	--	--
05/15/92	0.14	--	--	--
06/12/92	0.09	--	none	none

Notes:

-- Free product was not measured.

[1] Measurements presented in feet. Data obtained from Earth Tech.

TABLE 3

SUMMARY OF FREE PRODUCT MEASUREMENTS
HISTORICAL INVESTIGATIONS
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Monitoring Well	*85-3* [1]	*85-5B* [1]	*85-6* [1]	*86-1* [1]
Date Measured				
07/17/92	0.15	--	--	--
08/13/92	0.16	--	--	--
09/11/92	0.26	--	none	none
10/16/92	0.46	--	--	--
11/12/92	0.34	--	--	--
12/10/92	0.15	none	none	none
01/15/93	0.04	--	--	--
02/12/93	0.08	--	--	--
03/11/93	0.14	--	none	none
04/15/93	0.15	--	--	--
05/13/93	0.06	--	--	--
06/14/93	0.12	--	none	none
07/16/93	0.04	--	--	--
08/11/93	0.03	--	--	--
09/15/93	0.17	--	none	none
10/19/93	0.05	--	--	--
11/17/93	0.04	--	--	--
12/17/93	0.37	none	none	none
01/13/94	0.47	--	--	--
02/15/94	0.89	--	--	--
03/16/94	0.19	--	none	none
04/13/94	0.01	--	--	--
05/12/94	0.11	--	--	--
06/14/94	0.16	--	none	none
07/13/94	0.04	--	--	--
08/12/94	0.02	--	--	--
09/14/94	0.07	--	none	none
10/18/94	0.09	--	--	--
11/11/94	none	--	--	--
12/16/94	0.09	none	none	none
01/13/95	0.26	--	--	--
02/14/95	0.02	--	--	--
03/17/95	0.14	--	none	none
04/13/95	0.21	--	--	--
05/15/95	none	--	--	--
06/20/95	none	--	none	none
07/13/95	none	--	--	--
08/11/95	0.14	--	--	--
09/14/95	0.23	--	none	none
10/17/95	0.59	--	--	--
11/17/95	0.08	--	--	--
12/18/95	none	none	none	none
01/06/96	0.33	--	--	--
02/19/96	0.72	--	--	--

Notes:

-- Free product was not measured.

[1] Measurements presented in feet. Data obtained from Earth Tech.

TABLE 3

SUMMARY OF FREE PRODUCT MEASUREMENTS
HISTORICAL INVESTIGATIONS
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Monitoring Well	*85-3* [1]	*85-5B* [1]	*85-6* [1]	*86-1* [1]
Date Measured				
03/19/96	0.89	--	none	none
04/12/96	0.72	--	--	--
05/16/96	0.01	--	--	--
06/13/96	none	--	none	none
07/16/96	none	--	--	--
08/16/96	0.01	--	--	--
09/13/96	none	--	none	none
10/17/96	0.19	--	--	--
11/19/96	0.30	--	--	--
12/12/96	0.68	0.01	none	none
01/20/97	0.39	--	--	--
02/14/97	none	--	--	--
03/13/97	none	--	none	none
04/18/97	none	--	--	--
05/15/97	none	--	--	--
06/19/97	none	--	none	none
07/17/97	none	--	--	--
08/14/97	none	--	--	--
09/11/97	0.05	--	none	none
10/17/97	0.15	--	--	--
11/14/97	0.24	--	--	--
12/16/97	0.93	none	none	none
01/14/98	0.53	--	--	--
02/16/98	0.04	--	--	--
03/12/98	0.02	--	none	none
04/22/98	none	--	--	--
05/20/98	0.38	--	--	--
06/16/98	0.51	--	none	none
07/16/98	none	--	--	--
08/19/98	0.51	--	--	--
09/17/98	0.78	--	none	none
10/14/98	0.77	--	--	--
11/18/98	0.84	--	--	--
12/16/98	0.96	0.02	none	none
01/12/99	0.96	--	--	--
02/16/99	0.05	--	--	--
03/10/99	0.09	--	none	none
04/12/99	0.12	--	--	--
05/18/99	none	--	--	--
06/15/99	none	--	none	none
07/21/99	none	--	--	--
08/17/99	0.02	--	--	--
09/20/99	0.15	--	none	none
10/19/99	0.52	--	--	--
11/17/99	0.45	--	--	--
12/16/99	0.47	0.03	none	none
01/11/00	0.49	--	--	--
02/15/00	0.55	--	--	--
03/16/00	0.38	--	none	none
04/19/00	0.35	--	--	--
05/15/00	none	--	--	--

Notes:

-- Free product was not measured.

[1] Measurements presented in feet. Data obtained from Earth Tech.

TABLE 3

SUMMARY OF FREE PRODUCT MEASUREMENTS
HISTORICAL INVESTIGATIONS
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Monitoring Well	*85-3* [1]	*85-5B* [1]	*85-6* [1]	*86-1* [1]
Date Measured				
06/13/00	none	--	none	none
07/25/00	none	--	--	--
08/23/00	none	--	--	--
09/22/00	0.02	--	none	none
10/23/00	none	--	--	--
11/16/00	0.02	--	--	--
12/20/00	none	0.04	none	none
01/18/01	none	--	--	--
02/21/01	none	--	--	--
03/21/01	none	--	none	none
04/17/01	none	--	--	--
05/15/01	none	--	--	--
06/13/01	none	--	none	none
07/16/01	none	--	--	--
08/22/01	none	--	--	--
09/13/01	none	--	none	none
10/09/01	none	--	--	--
11/13/01	none	--	--	--
12/19/01	none	0.03	none	none

Notes:

-- Free product was not measured.

[1] Measurements presented in feet. Data obtained from Earth Tech.

TABLE 4

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451 Part 201 Residential & Commercial I Drinking Water Criteria* [1]	*Michigan Act 451 Part 201 Groundwater Surface Water Interface Criteria* [1]	*Michigan Act 451 Part 201 Residential & Commercial I Groundwater Volatilization to Indoor Air Criteria* [1]	*Michigan Act 451 Part 201 Groundwater Contact Criteria* [1]	*85-1*	*85-2*	*85-3*	*85-4*	*85-5B*	*85-6*	*85-7*
Sample ID					*85-1*	*85-2*	*85-3*	*85-4*	*85-5B*	*85-6*	*85-7*
Depth (feet bgs)					*15.5 - 20.5*	*13.5 - 18.5*	*20.3 - 30.3*	*20.7 - 30.7*	*21.9 - 31.9*	*19.5 - 24.5*	*20.6 - 25.6*
Date Sampled					*12/6/1985*	*12/6/1985*	*12/6/1985*	*12/6/1985*	*12/6/1985*	*12/6/1985*	*12/6/1985*
Date Analyzed					*See Notes*	*See Notes*	*See Notes*	*See Notes*	*See Notes*	*See Notes*	*See Notes*
Units					*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)											
Volatile Organic Compounds											
1,1-dichloroethane	880	ID	1,000,000	2,400,000	ND (2.0)	ND (2.0)	ND (2.0)	2	6	ND (2.0)	ND (2.0)
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	12	21	ND (2.0)	ND (2.0)	12	ND (2.0)	4
Tetrachloroethylene	5.0	45	25,000	12,000	ND (2.0)	ND (2.0)	ND (2.0)	2	2	4	ND (2.0)
1,1,1-trichloroethane	200	200	660,000	1,300,000	ND (2.0)	ND (2.0)	ND (2.0)	5	3	ND (2.0)	ND (2.0)
Trichloroethylene	5.0	200	15,000	37,000	ND (2.0)	6	ND (2.0)	2	4	ND (2.0)	84
Toluene	790	140	530,000	530,000	ND (1.0)	ND (1.0)	3	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Semi-Volatile Organic Compounds											
Fluoranthene	210	1.6	210	210	ND (1.0)	ND (1.0)	460	4	ND (1.0)	ND (1.0)	ND (1.0)
Fluorene	880	12	2,000	2,000	ND (2.0)	ND (2.0)	3,200	ND (2.0)	4	ND (2.0)	ND (2.0)
Naphthalene	520	13	31,000	31,000	ND (100)	ND (100)	170	ND (100)	ND (100)	ND (100)	ND (100)
Phenanthrene	52	5.0	1,000	1,000	ND (1.0)	ND (1.0)	2,800	10	3	ND (1.0)	ND (1.0)
Pyrene	140	ID	140	140	ND (1.0)	ND (1.0)	5,600	3.0	5	ND (1.0)	ND (1.0)
Bis-(2ethyl hexyl)-phthalate	6.0	32	NLV	320	ND (2.0)	ND (2.0)	ND (2.0)	2.0	ND (2.0)	ND (2.0)	ND (2.0)
Di-n-buytl-phthalate	880	9.7	NLV	11,000	ND (1.0)	ND (1.0)	ND (1.0)	7.0	ND (1.0)	ND (1.0)	ND (1.0)

Notes:

[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.

Boxed concentration indicates exceedance of one or more criteria.

NA - Parameter not analyzed.

Groundwater samples analyzed between December 16, 1985 and December 23, 1985.

TABLE 5A

SUMMARY OF DETECTED PARAMETERS IN SOIL
PHASE II HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	86-2	86-2	86-2
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	86-2	86-2	86-2
Depth (feet bgs)	*Residential & Commercial I*	*Groundwater Surface Water*	*Residential & Commercial I*	*Residential & Commercial I*	*Residential & Commercial I*	*Residential & Commercial I*	*Direct Contact*	14.5 - 16.0	19.0 - 20.5	24.0 - 25.5
Date Sampled	*Drinking Water*	*Interface*	*Groundwater*	*Soil*	*Infinite Source*	*Particulate Soil*	*Criteria* [1]	4/29/1986	4/29/1986	4/29/1986
Date Analyzed	*Protection*	*Protection*	*Protection*	*Volatilization to*	*Volatile Soil*	*Inhalation*		5/5/1986	5/5/1986	5/5/1986
Units	*Criteria* [1]	*Criteria* [1]	*Criteria* [1]	*Indoor Air Criteria* [1]	*Inhalation Criteria* [1]	*Criteria* [1]		ug/kg	ug/kg	ug/kg
Parameter (ug/kg)										
Volatile Organic Compounds										
Trichloroethylene	100	4,000	500,000	7,100	78,000	1.8E+09	500,000	42	5.0	**260**

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 5B

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE II HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451 Part 201 Residential & Commercial I Drinking Water Criteria* [1]	*Michigan Act 451 Part 201 Groundwater Surface Water Interface Criteria* [1]	*Michigan Act 451 Part 201 Residential & Commercial I Groundwater Volatilization to Indoor Air Criteria* [1]	*Michigan Act 451 Part 201 Groundwater Contact Criteria* [1]	*85-1*	*85-2*	*85-3*	*85-6*	*85-7*	*86-1*
Sample ID					*85-1*	*85-2*	*85-3*	*85-6*	*85-7*	*86-1*
Depth (feet bgs)					*15.5 - 20.5*	*13.5 - 18.5*	*20.3 - 30.3*	*19.5 - 24.5*	*20.6 - 25.6*	*18.5 - 29.0*
Date Sampled					*5/5/1986*	*5/5/1986*	*5/5/1986*	*5/5/1986*	*5/5/1986*	*5/5/1986*
Date Analyzed					*5/9/1986*	*5/7/1986*	*5/9/1986*	*5/9/1986*	*5/9/1986*	*5/9/1986*
Units					*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)										
Volatile Organic Compounds										
1,1-dichloroethane	880	ID	1,000,000	2,400,000	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	26	18	ND (2.0)	ND (2.0)	10	ND (2.0)
Tetrachloroethylene	5.0	45	25,000	12,000	ND (2.0)	ND (2.0)	2.0	**7.0**	ND (2.0)	ND (2.0)
1,1,1-trichloroethane	200	200	660,000	1,300,000	ND (2.0)	ND (2.0)	2.0	ND (2.0)	2.0	ND (2.0)
Trichloroethylene	5.0	200	15,000	37,000	ND (2.0)	**6.0**	ND (2.0)	ND (2.0)	**240**	ND (2.0)
Toluene	790	140	530,000	530,000	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Benzene	5.0	18	170,000	170,000	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.0	ND (1.0)
Chloroform	100	170	28,000	150,000	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1-dichloroethylene	7.0	65	200	11,000	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 5B

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE II HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451 Part 201 Residential & Commercial I Drinking Water Criteria* [1]	*Michigan Act 451 Part 201 Groundwater Surface Water Interface Criteria* [1]	*Michigan Act 451 Part 201 Residential & Commercial I Groundwater Volatilization to Indoor Air Criteria* [1]	*Michigan Act 451 Part 201 Groundwater Contact Criteria* [1]	*86-2*	*86-3*	*BH-3*	*Drain Sump Conveyor*	*86-2*	*86-2*
Sample ID					*86-2*	*86-3*	*Sump*	*Conveyor*	*86-2*	*86-2*
Depth (feet bgs)					*27.5 - 32.5*	*41.5 - 46.5*	*--*	*--*	*30 - 33*	*40 - 43*
Date Sampled					*5/5/1986*	*5/5/1986*	*5/5/1986*	*5/5/1986*	*4/29/1986*	*4/29/1986*
Date Analyzed					*5/9/1986*	*5/9/1986*	*5/9/1986*	*5/9/1986*	*5/5/1986*	*5/5/1986*
Units					*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)										
Volatile Organic Compounds										
1,1-dichloroethane	880	ID	1,000,000	2,400,000	ND (2.0)	ND (10)	ND (2.0)	4.0	NA	NA
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	12	10	ND (2.0)	4.0	NA	NA
Tetrachloroethylene	5.0	45	25,000	12,000	**14**	ND (10)	2.0	**35**	NA	NA
1,1,1-trichloroethane	200	200	660,000	1,300,000	45	11	ND (2.0)	120	NA	NA
Trichloroethylene	5.0	200	15,000	37,000	**55,000**	**1,400**	ND (2.0)	**31**	**47,000**	**220**
Toluene	790	140	530,000	530,000	ND (1.0)	ND (5.0)	ND (1.0)	ND (1.0)	NA	NA
Benzene	5.0	18	170,000	170,000	ND (1.0)	ND (5.0)	ND (1.0)	ND (1.0)	NA	NA
Chloroform	100	170	28,000	150,000	4.0	ND (5.0)	ND (1.0)	1.0	NA	NA
1,1-dichloroethylene	7.0	65	200	11,000	4.0	ND (10)	ND (2.0)	4.0	NA	NA

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 5B

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE II HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451 Part 201 Residential & Commercial I Drinking Water Criteria* [1]	*Michigan Act 451 Part 201 Groundwater Surface Water Interface Criteria* [1]	*Michigan Act 451 Part 201 Residential & Commercial I Groundwater Volatilization to Indoor Air Criteria* [1]	*Michigan Act 451 Part 201 Groundwater Contact Criteria* [1]	*86-3*	*86-3*	*86-3*	*86-3*
Sample ID					*86-3*	*86-3*	*86-3*	*86-3*
Depth (feet bgs)					*21 - 24*	*34 - 36*	*44 - 46*	*53 - 55*
Date Sampled					*5/1/1986*	*5/1/1986*	*5/1/1986*	*5/1/1986*
Date Analyzed					*5/1/1986*	*5/1/1986*	*5/1/1986*	*5/1/1986*
Units					*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)								
Volatile Organic Compounds								
1,1-dichloroethane	880	ID	1,000,000	2,400,000	NA	NA	NA	NA
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	NA	NA	NA	NA
Tetrachloroethylene	5.0	45	25,000	12,000	NA	NA	NA	NA
1,1,1-trichloroethane	200	200	660,000	1,300,000	NA	NA	NA	NA
Trichloroethylene	5.0	200	15,000	37,000	**45**	**210**	**600**	**230**
Toluene	790	140	530,000	530,000	NA	NA	NA	NA
Benzene	5.0	18	170,000	170,000	NA	NA	NA	NA
Chloroform	100	170	28,000	150,000	NA	NA	NA	NA
1,1-dichloroethylene	7.0	65	200	11,000	NA	NA	NA	NA

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 6A

SUMMARY OF SOIL VAPOR SURVEY
PHASE III-A HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Sample Depth (feet)*	*Parts Per Million (ppm)*	*Mg/m^3*
1	3.0	140	740
	3.0(DS)	160	850
	6.0	160	860
2	3.0	7.4	39
	6.0	6.0	32
3	6.0	1.9	10
4	3.0	6.2	33
5	3.0	310	1,650
6	3.0	610	3,240
7	3.0	73	390
	3.0(DA)	77	410
	3.0(DA, DS)	60	320
8	3.0	4.9	26
9	3.0	180	960
10	3.0	330	1,750
11	3.0	630	3,350
12	3.0	360	1,900
13	3.0	480	2,550
14	3.0	83	440
15	3.0	620	3,300
16	3.0	360	1,900
17	3.0	160	850
18	3.0	550	2,900
19	3.0	180	960
	3.0(DS)	170	900
20	6.0	7.6	40
21	3.0	25	130
22	2.0	40	210
23	2.0	17	90

TABLE 6A

SUMMARY OF SOIL VAPOR SURVEY
PHASE III-A HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Sample Depth (feet)*	*Parts Per Million (ppm)*	*Mg/m^3*
24	3.0	2.6	14
25	3.0	710	3,800
26	3.0	5.0	27
	3.0(DS)	4.5	24
27	3.0	2.8	15
28	3.0	98	520
29	3.0	1.0	5.3
30	6.0	0.52	2.8
31	6.0	0.23	1.2
32	6.0	0.15	0.8
	6.0(DS)	2.3	12
33	6.0	0.33	0.41
	6.0(DS)	1.8	2.2
34	6.0	0.2	1.1
	6.0(DS)	0.16	0.85
35	6.0	0.89	4.7
	6.0(DS)	0.23	1.2
36	3.3	--	--
37	2.7	--	--
38	3.0	--	--
39	3.5	--	--
40	3.0	--	--
41	2.0	--	--
42	3.2	0.3	1.6
43	3.0	0.11	0.59
44	1.5	0.42	2.2
45	4.0	0.40	2.1
46	3.6	3.0	16
47	3.5	0.44	2.3

TABLE 6A

SUMMARY OF SOIL VAPOR SURVEY
PHASE III-A HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Sample Depth (feet)*	*Parts Per Million (ppm)*	*Mg/m^3*
48	3.0	0.15	0.8
49	4.0	1.4	7.4
50	3.0	0.2	1.1

Notes:
(DS) Duplicate Sample
(DA) Duplicate Analysis
-- Non Detect

TABLE 6B

SUMMARY OF DETECTED PARAMETERS IN SOIL
PHASE III-A HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-1*	*87-1*	*87-1*	*87-1*	*87-1*	*87-2*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-1*	*87-1*	*87-1*	*87-1*	*87-1*	*87-2*
Depth (feet bgs)	*Residential & Commercial I*	*Groundwater Surface Water*	*Residential & Commercial I*	*Residential & Commercial I*	*Residential & Commercial I*	*Residential & Commercial I*	*Direct Contact*	*4.0 - 5.5*	*9.0 - 10.5*	*14.0 - 15.5*	*19.0 - 20.5*	*24.0 - 25.5*	*4.0 - 5.5*
Date Sampled	*Drinking Water Protection*	*Interface Protection*	*Groundwater Protection*	*Soil Volatilization to*	*Infinite Source Volatile Soil*	*Particulate Soil Inhalation*	*Criteria* [1]	*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/14/1987*
Date Analyzed	*Criteria* [1]	*Criteria* [1]	*Criteria* [1]	*Indoor Air Criteria*	*Inhalation Criteria*	*Criteria* [1]		*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/14/1987*
Units								*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*
Parameter (ug/kg)													
Volatile Organic Compounds													
Trichloroethylene	100	4,000	500,000	7,100	78,000	1.8E+09	500,000	ND (4.0)	ND (4.0)	25	40	81	ND (4.0)

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 6B

SUMMARY OF DETECTED PARAMETERS IN SOIL
PHASE III-A HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-2*	*87-2*	*87-2*	*87-2*	*87-2*	*87-3*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-2*	*87-2*	*87-2*	*87-2*	*87-2*	*87-3*
Depth (feet bgs)	*Residential & Commercial I Drinking Water Protection Criteria* [1]	*Groundwater Surface Water Interface Protection Criteria* [1]	*Residential & Commercial I Groundwater Protection Criteria* [1]	*Residential & Commercial I Soil Volatilization to Indoor Air Criteria* [1]	*Residential & Commercial I Infinite Source Volatile Soil Inhalation Criteria* [1]	*Residential & Commercial I Particulate Soil Inhalation Criteria* [1]	*Direct Contact Criteria* [1]	*9.0 - 10.5*	*14.0 - 15.5*	*19.0 - 20.5*	*24.0 - 25.5*	*47.0 - 49.5*	*4.0 - 5.5*
Date Sampled								*1/14/1987*	*1/14/1987*	*1/14/1987*	*1/14/1987*	*1/14/1987*	*1/16/1987*
Date Analyzed								*1/14/1987*	*1/14/1987*	*1/14/1987*	*1/14/1987*	*1/14/1987*	*1/19/1987*
Units								*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*
Parameter (ug/kg)													
Volatile Organic Compounds													
Trichloroethylene	100	4,000	500,000	7,100	78,000	1.8E+09	500,000	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	ND (4.0)	16

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 6B

SUMMARY OF DETECTED PARAMETERS IN SOIL
PHASE III-A HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-3*	*87-3*	*87-3*	*87-4*	*87-4*	*87-4*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-3*	*87-3*	*87-3*	*87-4*	*87-4*	*87-4*
Depth (feet bgs)	*Residential & Commercial I*	*Groundwater Surface Water*	*Residential & Commercial I*	*Residential & Commercial I*	*Residential & Commercial I*	*Residential & Commercial I*	*Direct Contact*	*9.0 - 10.5*	*14.0 - 15.5*	*18.0 - 19.5*	*4.5 - 6.0*	*8.5 - 10.0*	*13.5 - 15.0*
Date Sampled	*Drinking Water Protection*	*Interface Protection*	*Groundwater Protection*	*Soil Volatilization to*	*Infinite Source Volatile Soil*	*Particulate Soil Inhalation*	*Criteria* [1]	*1/16/1987*	*1/16/1987*	*1/16/1987*	*1/19/1987*	*1/19/1987*	*1/19/1987*
Date Analyzed	*Criteria* [1]	*Criteria* [1]	*Criteria* [1]	*Indoor Air Criteria* [1]	*Inhalation Criteria* [1]	*Criteria* [1]		*1/19/1987*	*1/19/1987*	*1/19/1987*	*1/19/1987*	*1/19/1987*	*1/19/1987*
Units								*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*
Parameter (ug/kg)													
Volatile Organic Compounds													
Trichloroethylene	100	4,000	500,000	7,100	78,000	1.8E+09	500,000	65	**110**	**140**	ND (4.0)	ND (4.0)	5.5

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 6B

SUMMARY OF DETECTED PARAMETERS IN SOIL
PHASE III-A HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-4*	*87-4*	*87-4*	*87-5*	*87-5*	*87-5*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-4*	*87-4*	*87-4*	*87-5*	*87-5*	*87-5*
Depth (feet bgs)	*Residential & Commercial I*	*Groundwater Surface Water*	*Residential & Commercial I*	*Residential & Commercial I*	*Residential & Commercial I*	*Residential & Commercial I*	*Direct Contact*	*18.5 - 20.0*	*23.5 - 25.0*	*64.0 - 65.5*	*3.5 - 5.0*	*8.5 - 10.0*	*13.5 - 15.0*
Date Sampled	*Drinking Water*	*Interface*	*Groundwater*	*Soil*	*Infinite Source*	*Particulate Soil*	*Criteria* [1]	*1/19/1987*	*1/19/1987*	*1/20/1987*	*1/22/1987*	*1/22/1987*	*1/22/1987*
Date Analyzed	*Protection*	*Protection*	*Protection*	*Volatilization to*	*Volatile Soil*	*Inhalation*		*1/19/1987*	*1/19/1987*	*1/20/1987*	*1/22/1987*	*1/22/1987*	*1/22/1987*
Units	*Criteria* [1]	*Criteria* [1]	*Criteria* [1]	*Indoor Air Criteria* [1]	*Inhalation Criteria* [1]	*Criteria* [1]		*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*
Parameter (ug/kg)													
Volatile Organic Compounds													
Trichloroethylene	100	4,000	500,000	7,100	78,000	1.8E+09	500,000	ND (4.0)	12	ND (4.0)	ND (4.0)	ND (4.0)	20

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 6B

SUMMARY OF DETECTED PARAMETERS IN SOIL
PHASE III-A HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-5*	*87-5*	*87-5*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-5*	*87-5*	*87-5*
Depth (feet bgs)	*Residential & Commercial I*	*Groundwater Surface Water Interface*	*Residential & Commercial I*	*Residential & Commercial I*	*Residential & Commercial I*	*Residential & Commercial I*	*Direct Contact*	*18.5 - 20.0*	*23.5 - 25.0*	*62.0 - 64.0*
Date Sampled	*Drinking Water Protection*	*Protection*	*Groundwater Protection*	*Soil Volatilization to*	*Infinite Source Volatile Soil*	*Particulate Soil Inhalation*	*Criteria* [1]	*1/22/1987*	*1/22/1987*	*1/22/1987*
Date Analyzed								*1/22/1987*	*1/22/1987*	*1/22/1987*
Units	*Criteria* [1]	*Criteria* [1]	*Criteria* [1]	*ndoor Air Criteria* [1]	*Inhalation Criteria* [1]	*Criteria* [1]		*ug/kg*	*ug/kg*	*ug/kg*
Parameter (ug/kg)										
Volatile Organic Compounds										
Trichloroethylene	100	4,000	500,000	7,100	78,000	1.8E+09	500,000	19	17	ND (4.0)

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 6C

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE III-A HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-1*	*87-1*	*87-1*	*87-1*	*87-2*	*87-2*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-1*	*87-1*	*87-1*	*87-1*	*87-2*	*87-2*
Depth (feet bgs)	*Residential & Commercial I*	*Groundwater Surface Water Interface*	*Residential & Commercial I*	*Groundwater Contact*	*25.0 - 28.0*	*34.5 - 37.5*	*43.5 - 46.5*	*24.0 - 29.0*	*25.0 - 28.5*	*35.0 - 38.5*
Date Sampled	*Drinking Water*	*Criteria (1)*	*Groundwater Volatilization to Indoor Air Criteria (1)*	*Criteria (1)*	*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/14/1987*	*1/14/1987*	*1/14/1987*
Date Analyzed	*Criteria (1)*				*1/14/1987*	*1/14/1987*	*1/14/1987*	*1/14/1987*	*1/16/1987*	*1/16/1987*
Units					*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)										
Volatile Organic Compounds										
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	NA	NA	NA	NA	NA	NA
Tetrachloroethylene	5.0	45	25,000	12,000	NA	NA	NA	NA	NA	NA
Trichloroethylene	5.0	200	15,000	37,000	280	120	140	1,300	6.6	54
Chloroform	100	170	28,000	150,000	NA	NA	NA	NA	NA	NA
Semi-Volatile Organic Compounds										
Bis-(2ethyl hexyl)-phthalate	6.0	32	NLV	320	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	1,200	14	NLV	2,700	NA	NA	NA	NA	NA	NA
Fluoranthene	210	1.6	210	210	NA	NA	NA	NA	NA	NA
Phenanthrene	52	5.0	1,000	1,000	NA	NA	NA	NA	NA	NA
Pyrene	140	ID	140	140	NA	NA	NA	NA	NA	NA

Notes:
(1) Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 6C

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE III-A HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-2*	*87-2*	*87-4*	*87-4*	*87-4*	*87-4*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-2*	*87-2*	*87-4*	*87-4*	*87-4*	*87-4*
Depth (feet bgs)	*Residential &*	*Groundwater*	*Residential &*	*Groundwater*	*43.0 - 46.0*	*33.0 - 38.0*	*22.3 - 24.3*	*32.0 - 35.0*	*42.0 - 45.0*	*51.5 - 54.5*
Date Sampled	*Commercial I*	*Surface Water*	*Commercial I*	*Contact*	*1/14/1987*	*1/15/1987*	*1/19/1987*	*1/19/1987*	*1/19/1987*	*1/20/1987*
Date Analyzed	*Drinking Water*	*Interface*	*Groundwater*	*Criteria (1)*	*1/16/1987*	*1/16/1987*	*1/19/1987*	*1/19/1987*	*1/19/1987*	*1/20/1987*
Units	*Criteria (1)*	*Criteria (1)*	*Volatilization to Indoor Air Criteria (1)*		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)										
Volatile Organic Compounds										
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	NA	NA	NA	NA	NA	NA
Tetrachloroethylene	5.0	45	25,000	12,000	NA	NA	NA	NA	NA	NA
Trichloroethylene	5.0	200	15,000	37,000	9.5	45	220	8.3	1.3	4.9
Chloroform	100	170	28,000	150,000	NA	NA	NA	NA	NA	NA
Semi-Volatile Organic Compounds										
Bis-(2ethyl hexyl)-phthalate	6.0	32	NLV	320	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	1,200	14	NLV	2,700	NA	NA	NA	NA	NA	NA
Fluoranthene	210	1.6	210	210	NA	NA	NA	NA	NA	NA
Phenanthrene	52	5.0	1,000	1,000	NA	NA	NA	NA	NA	NA
Pyrene	140	ID	140	140	NA	NA	NA	NA	NA	NA

Notes:
(1) Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 6C

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE III-A HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-5*	*87-5*	*87-5*	*87-5*	*87-2*	*86-2*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-5*	*87-5*	*87-5*	*87-5*	*87-2*	*86-2*
Depth (feet bgs)	*Residential & Commercial I*	*Groundwater Surface Water Interface*	*Residential & Commercial I*	*Groundwater Contact*	*22.0 - 24.0*	*31.0 - 34.0*	*41.0 - 44.0*	*51.0 - 54.0*	*33.2 - 38.2*	*27.5 - 32.,5*
Date Sampled	*Drinking Water*	*Criteria (1)*	*Groundwater*	*Criteria (1)*	*1/22/1987*	*1/22/1987*	*1/22/1987*	*1/22/1987*	*1/23/1987*	*1/23/1987*
Date Analyzed	*Criteria (1)*		*Volatilization to*		*1/22/1987*	*1/22/1987*	*1/22/1987*	*1/22/1987*	*2/4/1987*	*1/26/1987*
Units			*Indoor Air Criteria (1)*		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)										
Volatile Organic Compounds										
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	NA	NA	NA	NA	12	ND (10)
Tetrachloroethylene	5.0	45	25,000	12,000	NA	NA	NA	NA	ND (2.0)	ND (10)
Trichloroethylene	5.0	200	15,000	37,000	**1,900**	**15**	**57**	**490**	**65**	**90,000**
Chloroform	100	170	28,000	150,000	NA	NA	NA	NA	ND (1.0)	ND (5.0)
Semi-Volatile Organic Compounds										
Bis-(2ethyl hexyl)-phthalate	6.0	32	NLV	320	NA	NA	NA	NA	9	**36**
Butyl benzyl phthalate	1,200	14	NLV	2,700	NA	NA	NA	NA	16	13
Fluoranthene	210	1.6	210	210	NA	NA	NA	NA	3	**3**
Phenanthrene	52	5.0	1,000	1,000	NA	NA	NA	NA	ND (1.0)	4
Pyrene	140	ID	140	140	NA	NA	NA	NA	2	2

Notes:
(1) Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 6C

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE III-A HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-1*	*87-4*	*87-5*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-1*	*87-4*	*87-5*
Depth (feet bgs)	*Residential & Commercial I*	*Groundwater Surface Water Interface*	*Residential & Commercial I*	*Groundwater Contact*	***24.0 - 29.0***	*24.0 - 27.0*	*39.5 - 50.5*
Date Sampled	*Drinking Water*	*Criteria (1)*	*Groundwater*	*Criteria (1)*	*1/23/1987*	*1/23/1987*	*1/30/1987*
Date Analyzed	*Criteria (1)*		*Volatilization to*		*1/26/1987*	*1/26/1987*	*1/30/1987*
Units			*Indoor Air Criteria (1)*		*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)							
Volatile Organic Compounds							
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	16	ND (2.0)	ND (2.0)
Tetrachloroethylene	5.0	45	25,000	12,000	ND (10)	ND (2.0)	ND (2.0)
Trichloroethylene	5.0	200	15,000	37,000	1,200	87	70
Chloroform	100	170	28,000	150,000	ND (5.0)	ND (1.0)	3
Semi-Volatile Organic Compounds							
Bis-(2ethyl hexyl)-phthalate	6.0	32	NLV	320	ND (2.0)	29	ND (2.0)
Butyl benzyl phthalate	1,200	14	NLV	2,700	ND (3.0)	ND (3.0)	ND (3.0)
Fluoranthene	210	1.6	210	210	ND (1.0)	2	ND (1.0)
Phenanthrene	52	5.0	1,000	1,000	3	ND (1.0)	ND (1.0)
Pyrene	140	ID	140	140	ND (1.0)	2	ND (1.0)

Notes:
(1) Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 7A

SUMMARY OF SOIL VAPOR STUDY
PHASE III-B HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Sample Depth (feet)*	*Parts Per Million (ppm)*	*Mg/m^3*
30	6.0	0.52	2.8
31	6.0	0.23	1.2
32	6.0	0.15	0.80
	6.0(DS)	2.3	12
33	6.0	0.33	0.41
	6.0(DS)	1.8	2.2
34	6.0	0.2	1.1
	6.0(DS)	0.16	0.85
35	6.0	0.89	4.7
	6.0(DS)	0.23	1.2

Notes:
(DS) Duplicate Sample

TABLE 7B

SUMMARY OF DETECTED PARAMETERS IN SURFACE WATER SAMPLES
PHASE III-B HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*C-1*	*C-2*	*C-3*	*C-4*	*Pond Inlet*	*Pond Outlet*	*Upstream*
Sample ID	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Depth (feet bgs)	--	--	--	--	--	--	--
Date Sampled	*1/7/1987*	*1/7/1987*	*1/7/1987*	*1/7/1987*	*6/15/1987*	*6/15/1987*	*6/15/1987*
Date Analyzed	*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/13/1987*	*6/16/1987*	*6/16/1987*	*6/16/1987*
Units	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)							
Volatile Organic Compounds							
Trichloroethylene	4.4	3.6	4.8	2.7	2.0	2.0	4.0
Tetrachloroethylene	NA	NA	NA	NA	ND (1.0)	ND (1.0)	11
Bromodichloromethane	NA	NA	NA	NA	3.0	ND (1.0)	ND (1.0)
Chloroform	NA	NA	NA	NA	5.0	3.0	ND (1.0)
1,1,1-trichloroethane	NA	NA	NA	NA	8.0	4.0	ND (1.0)

Notes:
(1) Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 7C

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE III-B HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-9*	*87-9*	*87-9*	*87-9*	*87-9*	*87-9*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-9*	*87-9*	*87-9*	*87-9*	*87-9*	*87-9*
Depth (feet bgs)	*Residential &*	*Groundwater*	*Residential &*	*Groundwater*	*22.0 - 25.0*	*32.0 - 35.0*	*41.0 - 44.0*	*52.0 - 55.0*	*62.0 - 65.0*	*72.0 - 75.0*
Date Sampled	*Commercial I*	*Surface Water*	*Commercial I*	*Contact*	*1/14/1987*	*1/14/1987*	*1/14/1987*	*1/15/1987*	*1/15/1987*	*1/15/1987*
Date Analyzed	*Drinking Water*	*Interface*	*Groundwater*	*Criteria (1)*	*1/14/1987*	*1/14/1987*	*1/14/1987*	*1/15/1987*	*1/15/1987*	*1/15/1987*
Units	*Criteria (1)*	*Criteria (1)*	*Volatilization to Indoor Air Criteria (1)*		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)										
Volatile Organic Compounds										
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	NA	NA	NA	NA	NA	NA
Tetrachloroethylene	5.0	45	25,000	12,000	NA	NA	NA	NA	NA	NA
Trichloroethylene	5.0	200	15,000	37,000	**42**	**27**	**41**	**63**	**19.0**	2.9
Chloroform	100	170	28,000	150,000	NA	NA	NA	NA	NA	NA
1,1,1-trichloroethane	200	200	660,000	1,300,000	NA	NA	NA	NA	NA	NA
Semi-Volatile Organic Compounds										
Bis-(2ethyl hexyl)-phthalate	6.0	32	NLV	320	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	1,200	14	NLV	2,700	NA	NA	NA	NA	NA	NA

Notes:
(1) Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 7C

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE III-B HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-8*	*87-8*	*87-8*	*87-8*	*87-8*	*87-9*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-8*	*87-8*	*87-8*	*87-8*	*87-8*	*87-9*
Depth (feet bgs)	*Residential &*	*Groundwater*	*Residential &*	*Groundwater*	*18.7 - 19.7*	*28.0 - 31.0*	*38.0 - 41.0*	*48.0 - 51.0*	*58.0 - 61.0*	*16.0 - 17.5*
Date Sampled	*Commercial I*	*Surface Water*	*Commercial I*	*Contact*	*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/14/1987*
Date Analyzed	*Drinking Water*	*Interface*	*Groundwater*	*Criteria (1)*	*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/13/1987*	*1/14/1987*
Units	*Criteria (1)*	*Criteria (1)*	*Volatilization to Indoor Air Criteria (1)*		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)										
Volatile Organic Compounds										
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	NA	NA	NA	NA	NA	NA
Tetrachloroethylene	5.0	45	25,000	12,000	NA	NA	NA	NA	NA	NA
Trichloroethylene	5.0	200	15,000	37,000	**17**	**5.4**	ND (1.0)	ND (1.0)	**5.2**	**14**
Chloroform	100	170	28,000	150,000	NA	NA	NA	NA	NA	NA
1,1,1-trichloroethane	200	200	660,000	1,300,000	NA	NA	NA	NA	NA	NA
Semi-Volatile Organic Compounds										
Bis-(2ethyl hexyl)-phthalate	6.0	32	NLV	320	NA	NA	NA	NA	NA	NA
Butyl benzyl phthalate	1,200	14	NLV	2,700	NA	NA	NA	NA	NA	NA

Notes:
(1) Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 7C

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE III-B HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*85-7*	*86-3*	*87-8*	*87-9*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*85-7*	*86-3*	*87-8*	*87-9*
Depth (feet bgs)	*Residential &*	*Groundwater*	*Residential &*	*Groundwater*	*20.6 - 25.6*	*41.5 - 46.5*	*19.7 - 22.7*	*50.5 - 53.5*
Date Sampled	*Commercial I*	*Surface Water*	*Commercial I*	*Contact*	*1/21/1987*	*1/21/1987*	*1/21/1987*	*1/21/1987*
Date Analyzed	*Drinking Water*	*Interface*	*Groundwater*	*Criteria (1)*	*1/26/1987*	*1/26/1987*	*1/26/1987*	*1/26/1987*
Units	*Criteria (1)*	*Criteria (1)*	*Volatilization to Indoor Air Criteria (1)*		*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)								
Volatile Organic Compounds								
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	4.0	4.0	ND (2.0)	ND (2.0)
Tetrachloroethylene	5.0	45	25,000	12,000	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Trichloroethylene	5.0	200	15,000	37,000	**150**	**340**	**9**	**62**
Chloroform	100	170	28,000	150,000	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,1-trichloroethane	200	200	660,000	1,300,000	ND (2.0)	6.0	ND (2.0)	ND (2.0)
Semi-Volatile Organic Compounds								
Bis-(2ethyl hexyl)-phthalate	6.0	32	NLV	320	**68**	ND (2.0)	ND (2.0)	ND (2.0)
Butyl benzyl phthalate	1,200	14	NLV	2,700	ND (7.0)	**26**	ND (7.0)	ND (7.0)

Notes:
(1) Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 8A

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE IV-C HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-10*	*87-10*	*87-10*	*87-10*	*87-10*	*87-11*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-10*	*87-10*	*87-10*	*87-10*	*87-10*	*87-11*
Depth (feet bgs)	*Residential &*	*Groundwater*	*Residential &*	*Groundwater*	*19.5 - 22.5*	*29 - 32*	*38.5 - 41.5*	*48 - 51*	*58 - 61*	*18 - 21*
Date Sampled	*Commercial I*	*Surface Water*	*Commercial I*	*Contact*	*9/29/1987*	*9/29/1987*	*9/29/1987*	*9/29/1987*	*9/29/1987*	*OIC*
Date Analyzed	*Drinking Water*	*Interface*	*Groundwater*	*Criteria* [1]	*9/29/1987*	*9/29/1987*	*9/29/1987*	*9/29/1987*	*9/29/1987*	*9/30/1987*
Units	*Criteria* [1]	*Criteria* [1]	*Volatilization to Indoor Air Criteria* [1]		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)										
Volatile Organic Compounds										
1,1-dichloroethane	880	ID	1,000,000	2,400,000	NA	NA	NA	NA	NA	NA
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	3.0	8.0	ND (2.0)	ND (2.0)	ND (2.0)	17
Tetrachloroethylene	5.0	45	25,000	12,000	NA	NA	NA	NA	NA	NA
1,1,1-trichloroethane	200	200	660,000	1,300,000	NA	NA	NA	NA	NA	NA
Trichloroethylene	5.0	200	15,000	37,000	**81**	**91**	**37**	**24**	**32**	ND (1.0)
Chloroform	100	170	28,000	150,000	NA	NA	NA	NA	NA	NA
Vinyl Chloride	2.0	15	110	570	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 8A

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE IV-C HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-11*	*87-11*	*87-11*	*87-12*	*87-12*	*87-13*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-11*	*87-11*	*87-11*	*87-12*	*87-12*	*87-13*
Depth (feet bgs)	*Residential & Commercial I Drinking Water Criteria* [1]	*Groundwater Surface Water Interface Criteria* [1]	*Residential & Commercial I Groundwater Volatilization to Indoor Air Criteria* [1]	*Groundwater Contact Criteria* [1]	*28 - 31*	*36.4 - 39.4*	*48 - 51*	*19 - 22*	*29 - 32*	*20 - 23*
Date Sampled					*9/30/1987*	*10/1/1987*	*10/1/1987*	*10/5/1987*	*10/5/1987*	*10/6/1987*
Date Analyzed					*9/30/1987*	*10/2/1987*	*10/2/1987*	*10/5/1987*	*10/5/1987*	*10/6/1987*
Units					*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)										
Volatile Organic Compounds										
1,1-dichloroethane	880	ID	1,000,000	2,400,000	NA	NA	NA	NA	NA	NA
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	29	26	13	ND (2.0)	ND (2.0)	ND (2.0)
Tetrachloroethylene	5.0	45	25,000	12,000	NA	NA	NA	NA	NA	NA
1,1,1-trichloroethane	200	200	660,000	1,300,000	NA	NA	NA	NA	NA	NA
Trichloroethylene	5.0	200	15,000	37,000	**26**	**17**	**46**	ND (2.0)	ND (2.0)	**5.0**
Chloroform	100	170	28,000	150,000	NA	NA	NA	NA	NA	NA
Vinyl Chloride	2.0	15	110	570	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 8A

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE IV-C HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-13*	*87-13*	*88-1*	*88-1*	*88-1*	*88-2*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-13*	*87-13*	*88-1*	*88-1*	*88-1*	*88-2*
Depth (feet bgs)	*Residential &*	*Groundwater*	*Residential &*	*Groundwater*	*30 - 33*	*40 - 43*	*12 - 13*	*22 - 23*	*29 - 32*	*12 - 15*
Date Sampled	*Commercial I*	*Surface Water*	*Commercial I*	*Contact*	*10/6/1987*	*10/6/1987*	*3/30/1988*	*3/30/1988*	*3/30/1988*	*3/31/1988*
Date Analyzed	*Drinking Water*	*Interface*	*Groundwater*	*Criteria* [1]	*10/6/1987*	*10/6/1987*	*3/30/1988*	*3/30/1988*	*3/30/1988*	*3/31/1988*
Units	*Criteria* [1]	*Criteria* [1]	*Volatilization to Indoor Air Criteria* [1]		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)										
Volatile Organic Compounds										
1,1-dichloroethane	880	ID	1,000,000	2,400,000	NA	NA	NA	NA	NA	NA
Trans-1,2-dichloroethylene	100	ID	85,000	220,000	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Tetrachloroethylene	5.0	45	25,000	12,000	NA	NA	NA	NA	NA	NA
1,1,1-trichloroethane	200	200	660,000	1,300,000	NA	NA	NA	NA	NA	NA
Trichloroethylene	5.0	200	15,000	37,000	**5.0**	**7.0**	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Chloroform	100	170	28,000	150,000	NA	NA	NA	NA	NA	NA
Vinyl Chloride	2.0	15	110	570	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 8A

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE IV-C HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*88-2*	*88-2*	*88-3*	*88-3*	*88-3*	*88-4*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*88-2*	*88-2*	*88-3*	*88-3*	*88-3*	*88-4*
Depth (feet bgs)	*Residential &*	*Groundwater*	*Residential &*	*Groundwater*	*22 - 25*	*30 -31*	*12 - 15*	*22 - 25*	*30 - 31*	*9 - 12*
Date Sampled	*Commercial I*	*Surface Water*	*Commercial I*	*Contact*	*3/31/1988*	*3/31/1988*	*4/1/1988*	*4/1/1988*	*4/1/1988*	*4/4/1988*
Date Analyzed	*Drinking Water*	*Interface*	*Groundwater*	*Criteria* [1]	*3/31/1988*	*3/31/1988*	*4/1/1988*	*4/1/1988*	*4/1/1988*	*4/4/1988*
Units	*Criteria* [1]	*Criteria* [1]	*Volatilization to Indoor Air Criteria* [1]		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)										
Volatile Organic Compounds										
1,1-dichloroethane	880	ID	1,000,000	2,400,000	NA	NA	NA	NA	NA	NA
Trans-1,2-dichloroethyl	100	ID	85,000	220,000	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Tetrachloroethylene	5.0	45	25,000	12,000	NA	NA	NA	NA	NA	NA
1,1,1-trichloroethane	200	200	660,000	1,300,000	NA	NA	NA	NA	NA	NA
Trichloroethylene	5.0	200	15,000	37,000	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chloroform	100	170	28,000	150,000	NA	NA	NA	NA	NA	NA
Vinyl Chloride	2.0	15	110	570	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 8A

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE IV-C HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451 Part 201 Residential & Commercial I Drinking Water Criteria* [1]	*Michigan Act 451 Part 201 Groundwater Surface Water Interface Criteria* [1]	*Michigan Act 451 Part 201 Residential & Commercial I Groundwater Volatilization to Indoor Air Criteria* [1]	*Michigan Act 451 Part 201 Groundwater Contact Criteria* [1]	*88-4*	*86-3*	*87-8*	*87-9*	*87-10*	*87-11*
Sample ID					*88-4*	*86-3*	*87-8*	*87-9*	*87-10*	*87-11*
Depth (feet bgs)					*18 - 21*	*41.5 - 46.5*	*19.7 - 22.7*	*50.5-53.5*	*29 - 32*	*30 - 33*
Date Sampled					*4/4/1988*	*6/8/1988*	*6/8/1988*	*6/8/1988*	*6/8/1988*	*6/8/1988*
Date Analyzed					*4/4/1988*	*6/14/1988*	*6/14/1988*	*6/14/1988*	*6/14/1988*	*6/14/1988*
Units					*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)										
Volatile Organic Compounds										
1,1-dichloroethane	880	ID	1,000,000	2,400,000	NA	ND (2.0)	ND (2.0)	ND(2.0)	ND (2.0)	2.0
Trans-1,2-dichloroethyl	100	ID	85,000	220,000	ND (2.0)	10	ND (2.0)	ND(2.0)	8.0	76
Tetrachloroethylene	5.0	45	25,000	12,000	NA	ND (2.0)	ND (2.0)	ND(2.0)	ND (2.0)	ND (2.0)
1,1,1-trichloroethane	200	200	660,000	1,300,000	NA	ND (2.0)	ND (2.0)	ND(2.0)	ND(5.0)	ND(6.0)
Trichloroethylene	5.0	200	15,000	37,000	ND(2.0)	**170**	**6.0**	**21.0**	**46**	**320**
Chloroform	100	170	28,000	150,000	NA	ND (1.0)	ND (1.0)	ND(1.0)	3.0	ND(1.0)
Vinyl Chloride	2.0	15	110	570	ND (10)	ND (10)	ND (10)	ND(10)	ND (10)	ND (10)

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.

TABLE 8A

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PHASE IV-C HYDROGEOLOGICAL INVESTIGATION
GRAND RAPIDS METAL PLANT
WYOMING, MICHIGAN

Sample Location	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*Michigan Act 451*	*87-13*	*88-1*	*88-2*	*88-3*	*88-4*
Sample ID	*Part 201*	*Part 201*	*Part 201*	*Part 201*	*87-13*	*88-1*	*88-2*	*88-3*	*88-4*
Depth (feet bgs)	*Residential &*	*Groundwater*	*Residential &*	*Groundwater*	*40 - 43*	*27 - 30*	*26 - 29*	*27 - 30*	*18 - 21*
Date Sampled	*Commercial I*	*Surface Water*	*Commercial I*	*Contact*	*6/8/1988*	*4/5/1988*	*4/5/1988*	*4/5/1988*	*4/5/1988*
Date Analyzed	*Drinking Water*	*Interface*	*Groundwater*	*Criteria* [1]	*6/14/1988*	*4/8/1988*	*4/8/1988*	*4/8/1988*	*4/8/1988*
Units	*Criteria* [1]	*Criteria* [1]	*Volatilization to Indoor Air Criteria* [1]		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
Parameter (ug/L)									
Volatile Organic Compounds									
1,1-dichloroethane	880	ID	1,000,000	2,400,000	ND (2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Trans-1,2-dichloroethyl	100	ID	85,000	220,000	ND (2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Tetrachloroethylene	5.0	45	25,000	12,000	ND (2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
1,1,1-trichloroethane	200	200	660,000	1,300,000	ND(6.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Trichloroethylene	5.0	200	15,000	37,000	10	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chloroform	100	170	28,000	150,000	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Vinyl Chloride	2.0	15	110	570	ND (10)	ND(10)	ND(10)	ND(10)	ND(10)

Notes:
[1] Part 201 Generic Cleanup Criteria and Screening Levels, Groundwater: Residential and Industrial-Commercial, Michigan Department of Environmental Quality, June 7, 2000.
Boxed concentration indicates exceedance of one or more criteria.
NA - Parameter not analyzed.