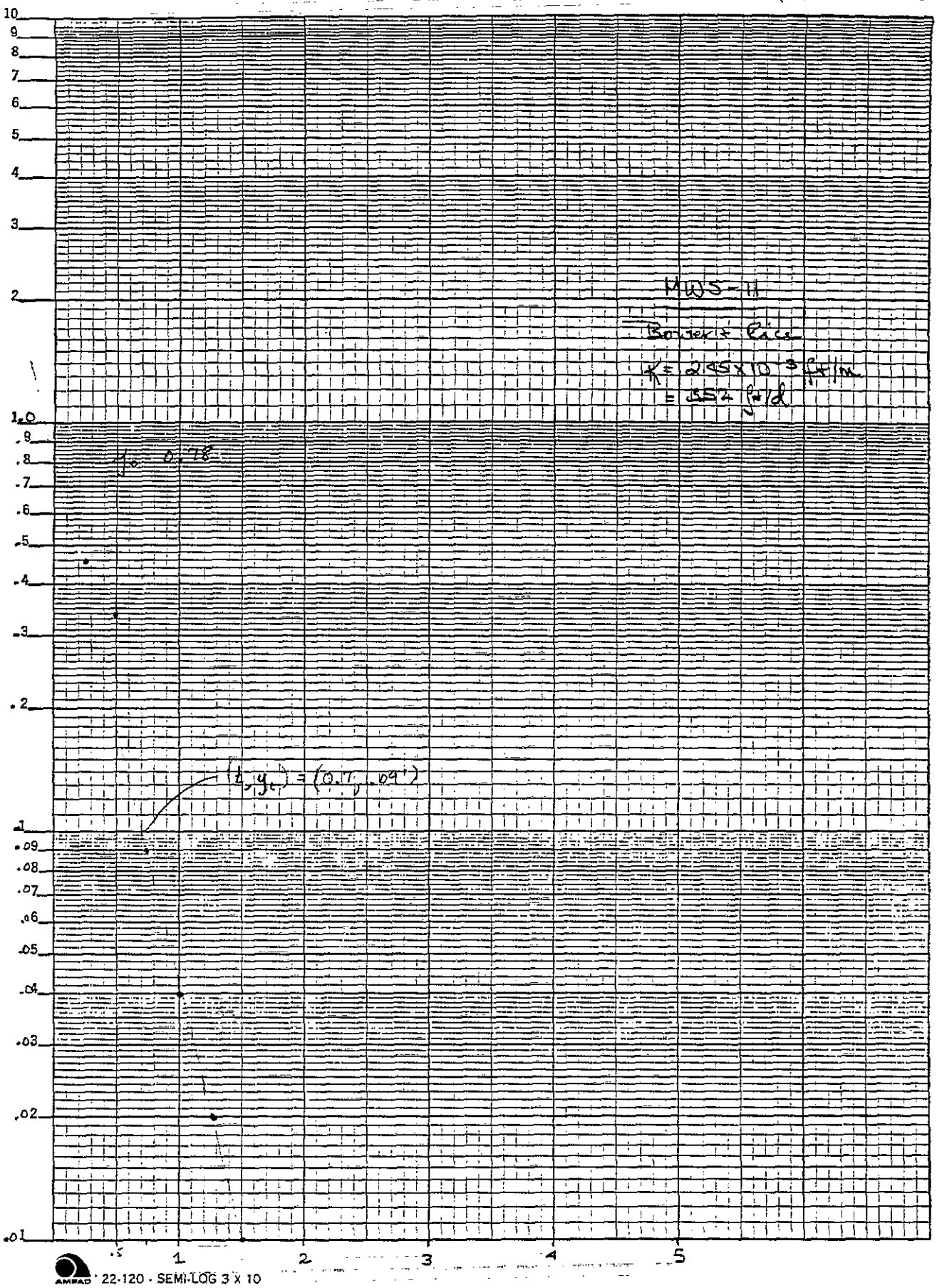
138016



AMPAD 22-120 · SEMI-LOG 3 X 10

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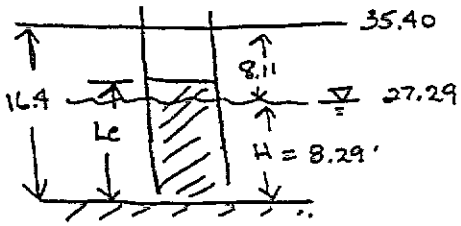
AR301799

ecology and environment

MWS-11

Bower + Rice



$r_c = 0.08'$ $\quad$ $L_e = 9.2'$

$r_w = 0.40'$ $\quad$ $H = 8.29'$

t	h	Δh
SWL	27.29	—
.25	27.75	.46
.50	27.63	.34
.75	27.38	.09
1.00	27.33	.04
1.25	27.31	.02
1.50	27.30	.01
1.75	27.29	0
2.0	↓	0
2.5		↓
3.0		
5.0	27.29 SWL.	

$$L_e/r_w = 9.2/0.4 = 23.0 \Longrightarrow C = 1.75$$

$$y_0 = 0.78$$

$$(t, y_t) = (0.7, .09)$$

$$\left[\ln\left(L_e/r_w\right)\right] = \left(\frac{1.1}{\ln(8.29/.4)} + \frac{1.75}{23}\right)^{-1} = 2.28$$

$$= (0.36 + 0.08)^{-1}$$

$$K = \underbrace{\frac{(.08)^2[2.28]}{2\cdot(9.2)}}_{7.93\times10^{-4}} \cdot \underbrace{\frac{1}{0.7}\ln\frac{0.78}{.09}}_{3.08} = \boxed{2.45\times10^{-3}\ ft/m}$$

$$K = 3.52\ ft/d$$

$$= 26.35\ gpd/ft^2$$

AR301800

Slug test data

Site : SSC Job No. : ZD3032 Well NO :MWS-11

Date:Oct.24,89 Static : 8.13 To.Dept: 9.35 top of pv

TOC Elev = 35.42'
Surf Elev = 35.40'
Static WL = 27.29'
(TOC - 8.13)

c

TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT FALGN. HEAD	WATER ELVATN	
1247	0.25	7.67	27.75	good
	0.5	7.79	27.63	
	0.75	8.04	27.38	
	1	8.09	27.33	
	1.25	8.11	27.31	
	1.5	~~8.38~~ 8.12	27.~~69~~30	
	1.75	8.13	27.29	
	2	8.13	27.29	
	2.5	8.13	27.29	
	3	8.13	27.29	
	3.5			
	4			
1252	5	8.13	27.29	
	6			
	7			
	8			
	10			
	12			
	14			
	16			
	18			
	20			
	25			
	30			
	35			
	40			
	53			
	50			
	55			
	60			
	70			
	80			
	90			

TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT RISIG N HEAD	WATER ELVATN	REMARKS
1253	0.25	8.5	26.92	Reference for
	0.5	8.29	27.13	level readings
	0.75	8.21	27.21	is the top
	1	8.19	27.23	of PVC casing
	1.25	8.18	27.24	
	1.5	8.14	27.28	
	1.75	8.13	27.29	
	2	8.13	27.29	
	2.5	8.13	27.29	
	3	8.13	27.29	
	3.5	8.13	27.29	
	4	8.13	27.29	
	5			
	6			
	7			
	8			
	10			
	12			
	14			
	16			
	18			
	20			
	25			
	30			
	35			
	40			
	45			
	50			
	55			
	60			
	70			
	80			
	90			

AR301801
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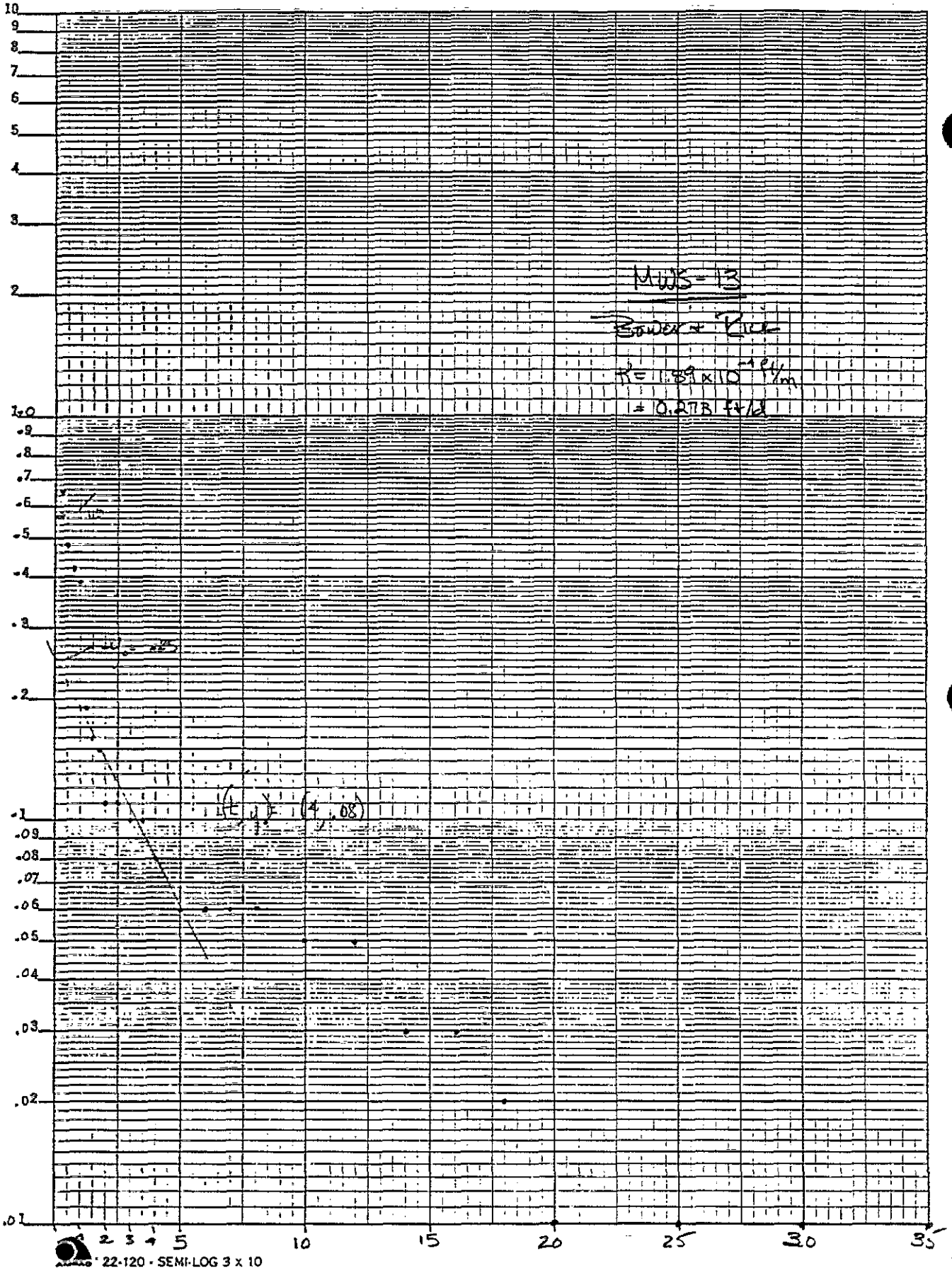
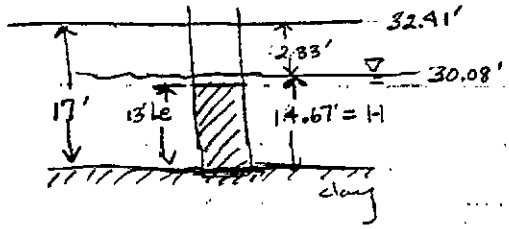

MWS-13
Bower + Rice
K = 1.89 x 10^-4 ft/m
= 0.273 ft/d
(t, y) = (4, .08)
22-120 · SEMI-LOG 3 x 10

AR301802

MWS-13

Bower + Rice



$r_c = .08'$ $L_e = 13'$

$r_w = .40'$ $H = 14.67$

t	h	Δh
–	30.08'	SWL
.25	30.73'	0.65'
.50	30.56	.48
.75	30.50	.42
1.00	30.47	.39
1.25	30.27	.19
1.50	30.24	.16
1.75	30.23	.15
2.0	30.19	.11
2.5	30.19	.11
3.0	30.18	.10
3.5	30.18	.10
4.0	30.16	.08
5	30.14	.06
6	30.14	.06
7	30.14	.06
8	30.14	.06
10	30.13	.05
12	30.13	.05
14	30.11	.03
16	30.11	.03
18	30.10	.02
20	30.09	.01
25	30.09	.01
30	30.09	.01
35	30.09	.01

$L_e/r_w = 13/.4 = 32.5 \Rightarrow C = 2.1$

$y_o = 0.25$

$(t, y_t) = (4, .08)$

$$\left[\ln\left(L_e/r_w\right)\right] = \left(\frac{1}{\ln(14.67/.4)} + \frac{2.1}{32.5}\right)^{-1}$$

$$= (0.31 + .06) = 2.70$$

$$K = \underbrace{\frac{(.08)^2[2.70]}{2 \cdot 13}}_{6.65 \times 10^{-4}} \cdot \underbrace{\frac{1}{4} \ln \frac{0.25}{.08}}_{0.28} = \boxed{1.89 \times 10^{-4}\ ft/m}$$

$K = 2.73 \times 10^{-1}$ ft/d

$= 2.04$ gpd/ft²

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AR301803

ecology and environment

Slug test data

Site : SSC Job No. : ZD3032 Well NO :MWS-13

Date:Oct.29,89 Static : 2.19 To.Dept: 14.04 top of pv

TOC Elev = 32.27' ?
Surf Elev = 32.41'
Static WL = 30.09'
(TOC - 2.19)

c

TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT FALGN. HEAD	WATER ELVATN	TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT RISIGN HEAD	WATER ELVATN	REMARKS
856	0.25	1.54	30.73 ✓good	1007	0.25	2.68	29.59	Reference for
	0.5	1.71	30.56		0.5	2.34	29.93	level readings
	0.75	1.77	30.5		0.75	2.34	29.93	is the top
	1	1.8	30.47		1			of PVC casing
	1.25	2	30.27		1.25	2.25	30.02	
	1.5	2.03	30.24		1.5	2.29	29.98	
	1.75	2.04	30.23		1.75	2.31	29.96	
	2	2.08	30.19		2	2.32	29.95	
	2.5	2.08	30.19		2.5	2.21	30.06	
	3	2.09	30.18		3	2.21	30.06	
	3.5	2.09	30.18		3.5	2.21	30.06	
	4	2.11	30.16		4	2.21	30.06	
901	5	2.13	30.14	1012	5	~~2.21~~ 2.19	30.06	
	6	2.13	30.14		6			
903	7	2.13	30.14		7			
	8	2.13	30.14		8			
906	10	2.14	30.13		10			
	12	2.14	30.13		12			
910	14	2.16	30.11		14			
	16	2.16	30.11		16			
914	18	2.17	30.1		18			
916	20	2.18	30.09		20			
921	25	2.18	30.09		25			
926	30	2.18	30.09		30			
	35				35			
936	40	2.18	30.09		40			
946	50	2.18	30.09		45			
956	60	2.18	30.09		50			
1006	70	2.18	30.09		55			
					60			
					70			
					80			
					90			

AR301804

Slug test data

Site : SSC Job No. : ZD3032 Well NO :0w-2

Date:Oct.23,89 Static : 6.3 To.Dept: 15.57 top of pv

TOC Elev = 44.08
Surf Elev. ?
Static WL = 37.78'
(TOC - 6.3)

c

TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT FALGN. HEAD	WATER ELVATN	TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT RISIG N HEAD	WATER ELVATN	REMARKS
	0.25			1103	0.25			Reference for
1405	0.5	6.25	37.83		0.5	7.25	36.83	level readings
	0.75				0.75			is the top
	1	6.29	37.79		1	6.42	37.66	of PVC casing
	1.25				1.25			
	1.5	6.29	37.79		1.5	6.31	37.77	
	1.75				1.75			
	2	6.29	37.79		2	6.3	37.78	
	2.5	6.3	37.78		2.5			
	3	6.3	37.78		3	6.3	37.78	
	3.5				3.5			
	4	6.3	37.78		4			
	5	6.3	37.78		5			
	6				6	6.3	37.78	
	7				7			
	8	6.3	37.78		8			
	10				10	6.3	37.78	
	12				12			
	14				14	6.3	37.78	
	16	6.3	37.78		16			
	18				18			
	20				20	6.3	37.78	
	25				25	6.3	37.78	
	30				30			

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RR301805

AR301806

DEEP WELLS

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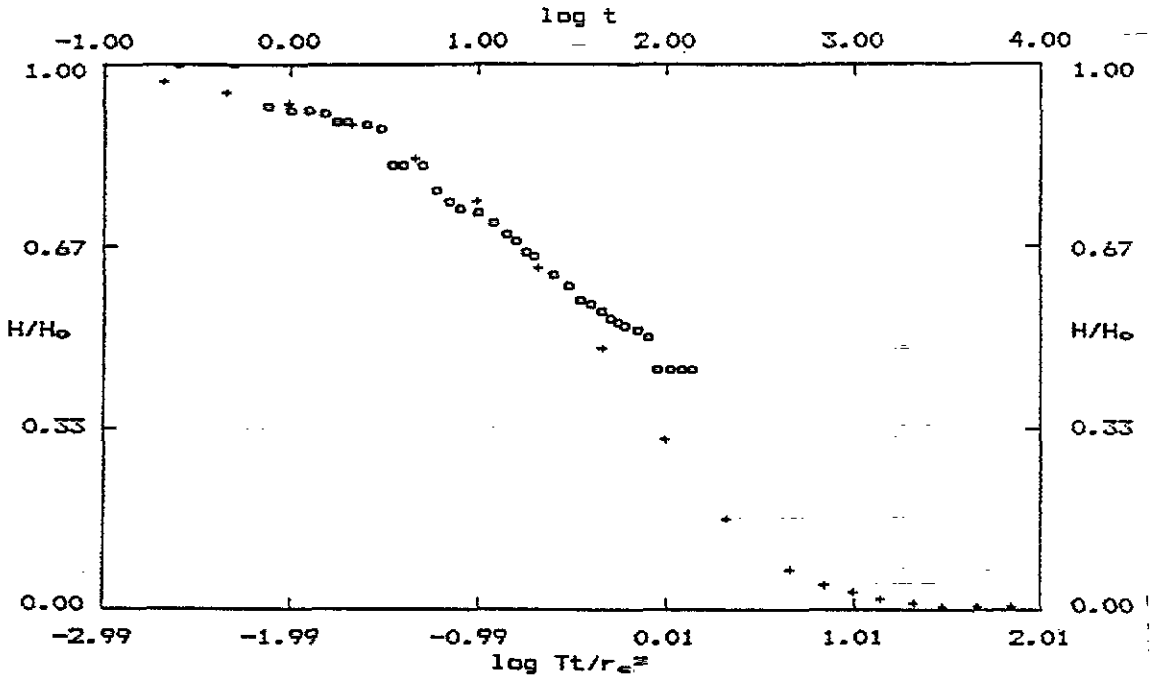
ecology and environment

AR301807

MWD-2: COOPER TECH. - Injection



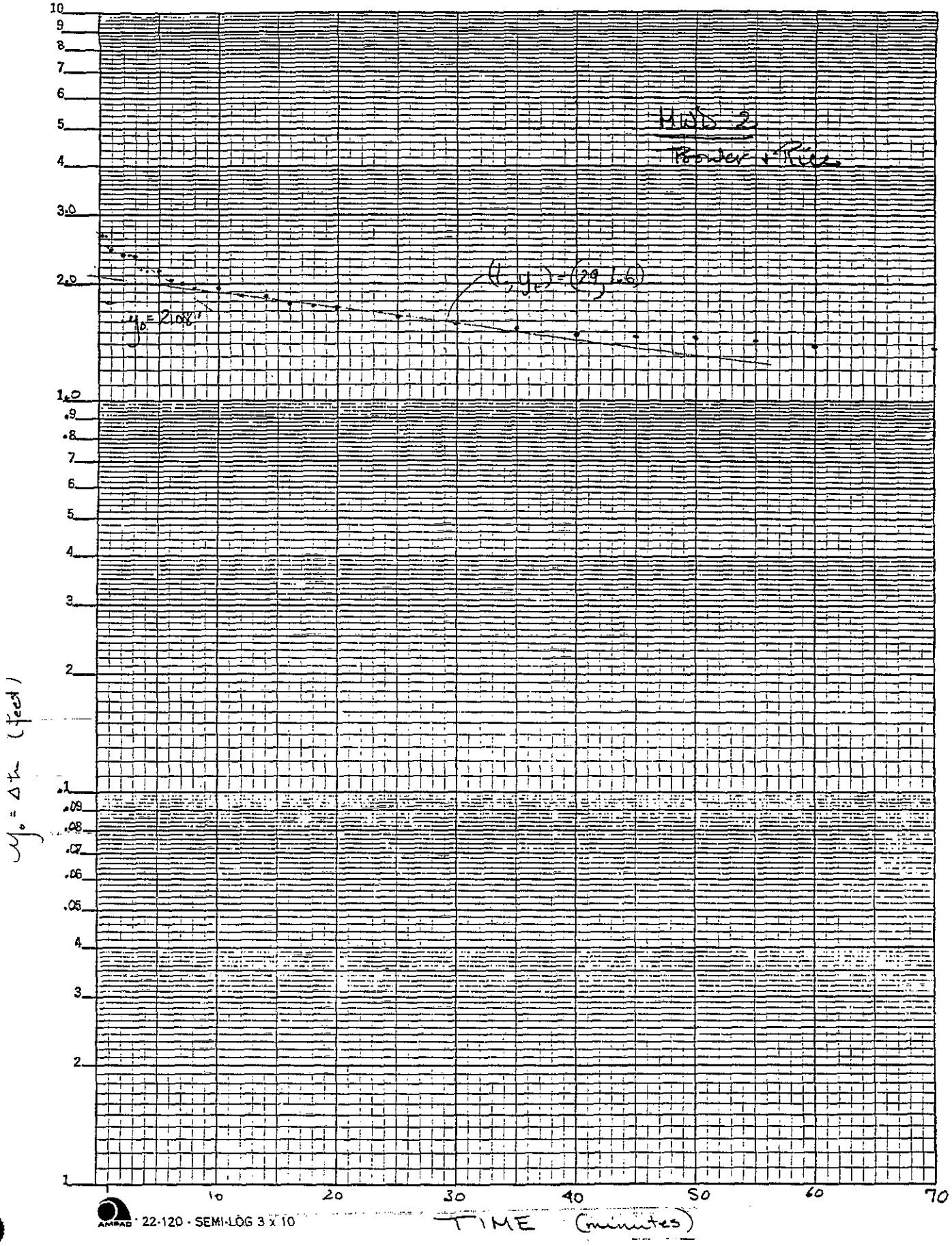
o - Data

+ - Type Curve
Slug Test: alpha = -1.0

SOLUTION

Transmissivity = 6.55E-005 sq ft/min
Aquifer Thick. = 1.00E+001 ft
Hydraulic Cond.= 6.55E-006 ft/min
Storativity = 4.00E-003

AR301808



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AR301809

ology and environment

Data for Slug Injection/Withdrawal Test

Well Name: MWD-2 Date of Test: 9/29/89
Aquifer Thickness (b): 10.000 feet
Change in Vol.of Water = 0.027 cu.ft.
Effective Radius of Well = 0.400 feet
Radius of Casing(rc) over Water Level Decline = 0.080 feet

Entry No.	Time(t) (min.)	Head (ft.)	H (ft.)	H/HO
1		35.920		
2	0.000	38.590	2.670	1.000
3	0.250	38.590	2.670	1.000
4	0.500	38.590	2.670	1.000
5	0.750	38.380	2.460	0.921
6	1.000	38.360	2.440	0.914
7	1.250	38.350	2.430	0.910
8	1.500	38.340	2.420	0.906
9	1.750	38.310	2.390	0.895
10	2.000	38.300	2.380	0.891
11	2.500	38.290	2.370	0.888
12	3.000	38.270	2.350	0.880
13	3.500	38.090	2.170	0.813
14	4.000	38.087	2.167	0.812
15	5.000	38.084	2.164	0.810
16	6.000	37.960	2.040	0.764
17	7.000	37.920	2.000	0.749
18	8.000	37.880	1.960	0.734
19	10.000	37.860	1.940	0.727
20	12.000	37.800	1.880	0.704
21	14.000	37.760	1.840	0.689
22	16.000	37.710	1.790	0.670
23	18.000	37.670	1.750	0.655
24	20.000	37.640	1.720	0.644
25	25.000	37.550	1.630	0.610
26	30.000	37.500	1.580	0.592
27	35.000	37.440	1.520	0.569
28	40.000	37.410	1.490	0.558
29	45.000	37.380	1.460	0.547
30	50.000	37.350	1.430	0.536
31	55.000	37.330	1.410	0.528
32	60.000	37.310	1.390	0.521
33	70.000	37.290	1.370	0.513
34	80.000	37.260	1.340	0.502
35	90.000	37.090	1.170	0.438
36	105.000	37.088	1.168	0.437
37	120.000	37.087	1.167	0.437
38	137.000	37.086	1.166	0.437

AR301810

TOC elev = 47.09'
Surf elev = 45.23'
Static WL = 35.92
(TOC - 11.17')

Slug test data

Site : SSC Job No. : ZD3032 Well NO :HWB(D)-2

Date:Oct.29,89 Static : 11.17 ✓ To.Dept: 37.77 Gr.srfce

TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT FALGN. HEAD	WATRE ELVATN.	TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT RISIGN HEAD	WATER ELVATN.	REMARKS
1239	0.25			1453	0.25	12.08	35.01	Reference for
	0.5	8.5	38.59		0.5	12.33	34.76	level readings
	0.75	8.71	38.38		0.75	12.36	34.73	is the top
	1	8.73	38.36		1	12.29	34.80	of PVC casing
	1.25				1.25	12.26	34.83	
	1.5	8.75	38.34		1.5	12.23	34.86	
	1.75	8.78	38.31		1.75	12.22	34.87	
	2	8.79	38.30		2	12.2	34.89	
	2.5	8.8	38.29		2.5	12.18	34.91	
	3	8.82	38.27		3	12.13	34.96	
	3.5	9	38.09		3.5	12.09	35.00	
	4	9.003	38.087		4	12.04	35.05	
1244	5	9.006	38.084		5	11.83	35.26	
	6	9.13	37.96		6	11.73	35.36	
	7	9.17	37.92		7	11.68	35.41	
	8	9.21	37.88	1506	8	11.62	35.47	
1249	10	9.23	37.86		10	11.51	35.58	
	12	9.29	37.80	1506	12	11.43	35.66	
	14	9.33	37.76		14	11.33	35.76	
1255	16	9.38	37.71		16	11.25	35.84	
	18	9.42	37.67		18	11.18	35.91	
	20	9.45	37.64		20	11.1	35.99	
1304	25	9.54	37.55	1523	25	10.79	36.30	
	30	9.59	37.50		30	10.63	36.46	
1314	35	9.65	37.44	1533	35	10.57	36.52	
	40	9.68	37.41		40			
	45	9.71	37.38		45			
1329	50	9.74	37.35		50			
	55	9.76	37.33		55			
1339	60	9.78	37.31		60			
1349	70	9.8	37.29		70			
	80	9.83	37.26		80			
1409	90	10	37.09		90			
1424	105	10.002	37.078		105			
1439	120	10.003	37.087		120			
1456	137	10.004	37.086		137			

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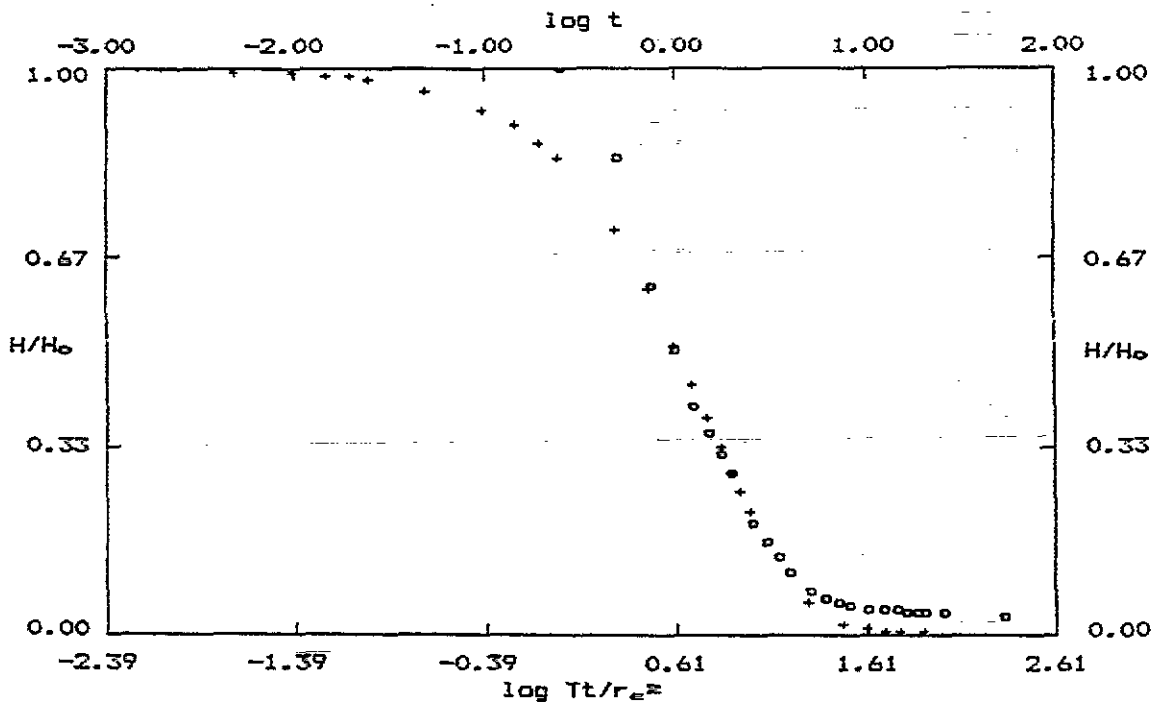
MWD-6: COOPER TECH. - Injection



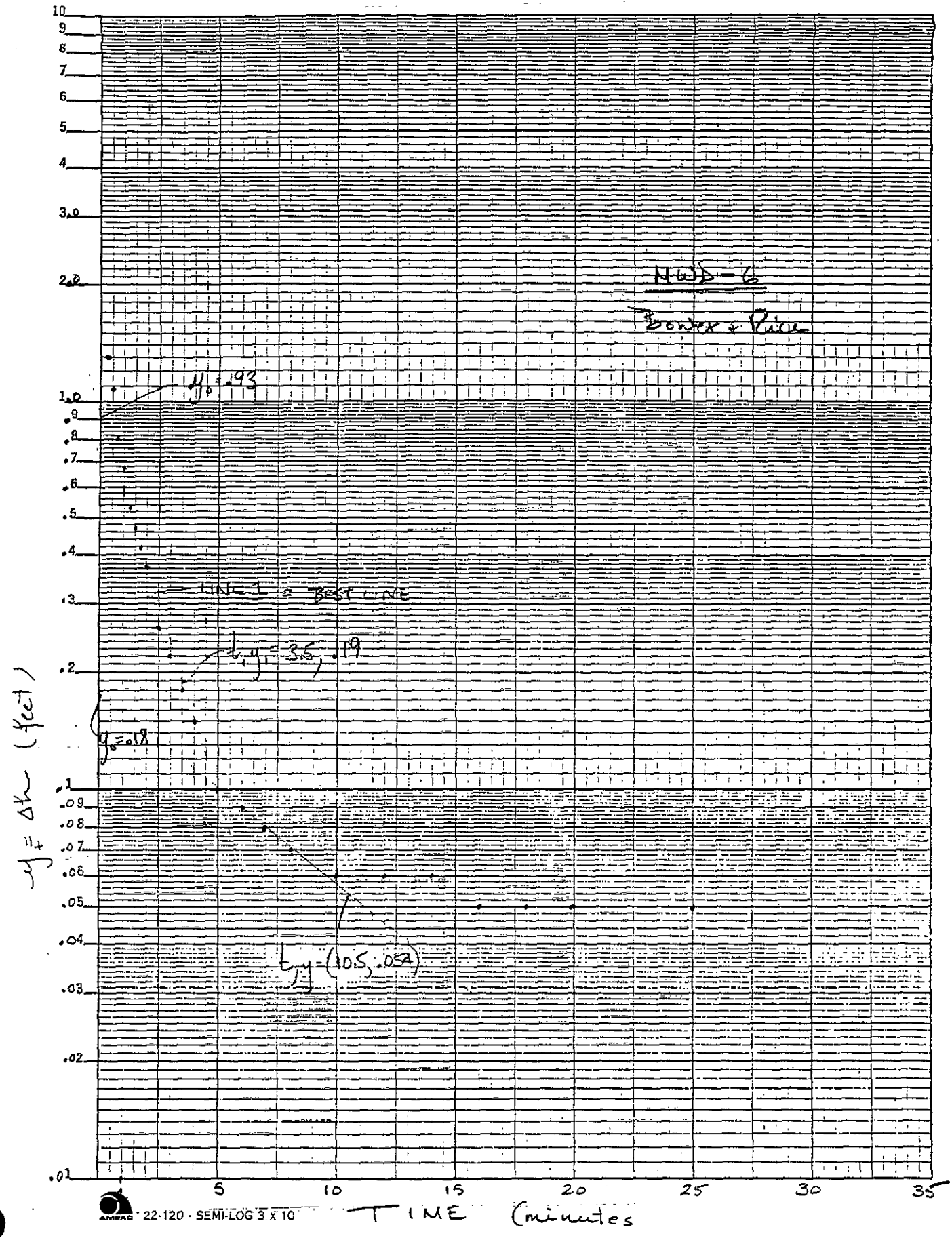
o - Data

+ - Type Curve
Slug Test: alpha =-10.0

SOLUTION

Transmissivity = 2.61E-002 sq ft/min
Aquifer Thick. = 1.00E+001 ft
Hydraulic Cond.= 2.61E-003 ft/min
Storativity = 4.00E-012

AR301812



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AR301813
ecology and environment

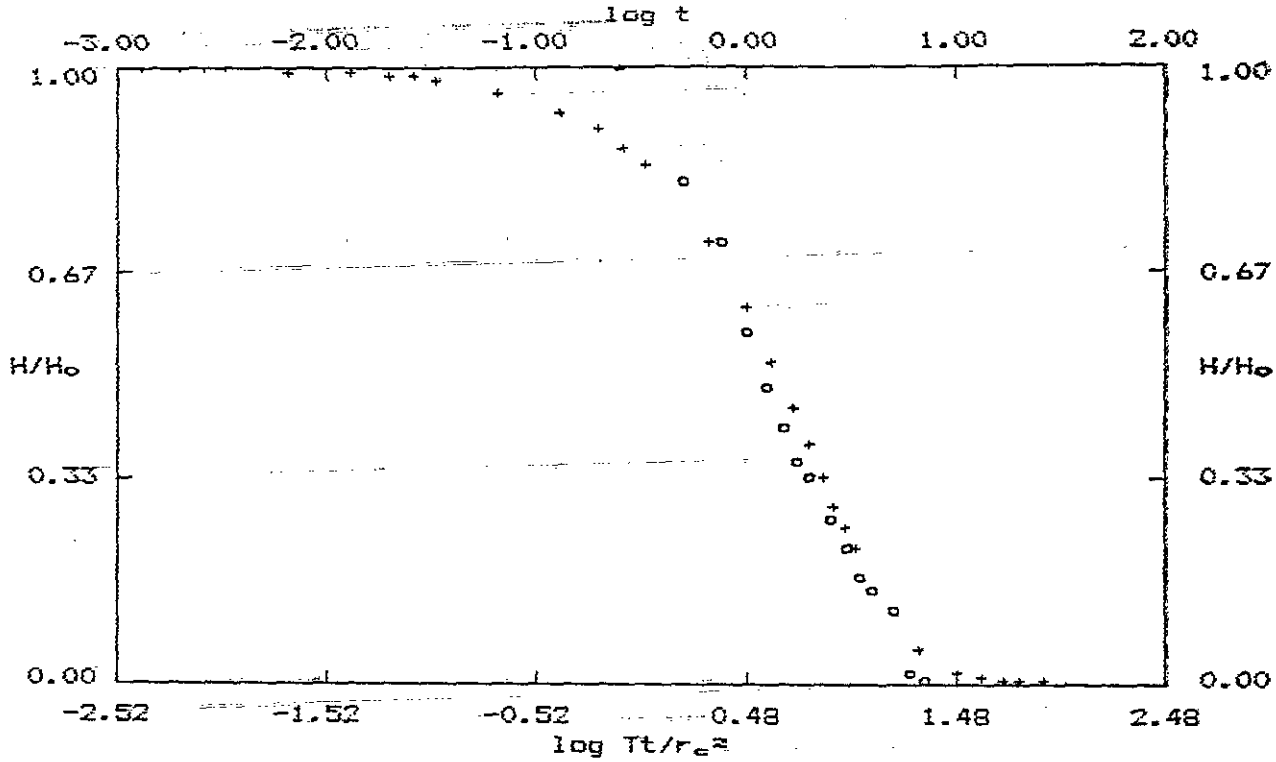
Data for Slug Injection/Withdrawal Test

Well Name: MWD-6 Date of Test: 9/29/89
Aquifer Thickness (b): 10.000 feet
Change in Vol.of Water = 0.027 cu.ft.
Effective Radius of Well = 0.400 feet
Radius of Casing(rc) over Water Level Decline = 0.080 feet

Entry No.	Time(t) (min.)	Head (ft.)	H (ft.)	H/HO
********	**********	**********	**********	**********
1		31.480		
2	0.000	32.780	1.300	1.000
3	0.250	32.780	1.300	1.000
4	0.500	32.570	1.090	0.838
5	0.750	32.280	0.800	0.615
6	1.000	32.150	0.670	0.515
7	1.250	32.010	0.530	0.408
8	1.500	31.950	0.470	0.362
9	1.750	31.900	0.420	0.323
10	2.000	31.850	0.370	0.285
11	2.500	31.740	0.260	0.200
12	3.000	31.700	0.220	0.169
13	3.500	31.660	0.180	0.138
14	4.000	31.630	0.150	0.115
15	5.000	31.580	0.100	0.077
16	6.000	31.570	0.090	0.069
17	7.000	31.560	0.080	0.062
18	8.000	31.550	0.070	0.054
19	10.000	31.540	0.060	0.046
20	12.000	31.540	0.060	0.046
21	14.000	31.540	0.060	0.046
22	16.000	31.530	0.050	0.038
23	18.000	31.530	0.050	0.038
24	20.000	31.530	0.050	0.038
25	25.000	31.530	0.050	0.038
26	53.000	31.520	0.040	0.031

AR301814

MWD-6: COOPER TECH.-Withdrawal



o - Data

+ - Type Curve
Slug Test: alpha =-10.0

SOLUTION

Transmissivity = 1.93E-002 sq ft/min
Aquifer Thick. = 1.00E+001 ft
Hydraulic Cond.= 1.93E-003 ft/min
Storativity = 4.00E-012

AR301815

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AR301815

ecology and environment

Data for Slug Injection/Withdrawal Test

Well Name: MWD-6W Date of Test: 9/26/89
Aquifer Thickness (b): 10.000 feet
Change in Vol.of Water = 0.027 cu.ft.
Effective Radius of Well = 0.400 feet
Radius of Casing(rc) over Water Level Decline = 0.080 feet

Entry No.	Time(t) (min.)	Head (ft.)	H (ft.)	H/HO
********	**********	**********	**********	**********
1		31.480		
2	0.000	29.740	1.740	1.000
3	0.250	29.740	1.740	1.000
4	0.500	30.070	1.410	0.810
5	0.750	30.240	1.240	0.713
6	1.000	30.490	0.990	0.569
7	1.250	30.650	0.830	0.477
8	1.500	30.760	0.720	0.414
9	1.750	30.850	0.630	0.362
10	2.000	30.900	0.580	0.333
11	2.500	31.020	0.460	0.264
12	3.000	31.100	0.380	0.218
13	3.500	31.180	0.300	0.172
14	4.000	31.210	0.270	0.155
15	5.000	31.270	0.210	0.121
16	6.000	31.450	0.030	0.017
17	7.000	31.470	0.010	0.006
18	8.000	31.480	0.000	0.000

AR301816

Slug test data

Site : SSC Job No. : ZD3032 Well NO : MWD-6

Date: Oct. 29, 89 Static : 8.8 To.Dept: 25.28 top of pv

TOC Elev = 40.28'
Surf Elev = 40.90'
Static WL = 31.48
(TOC - 8.8')

c

TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT FALGN. HEAD	WATER ELVATN (From GWD → Slug Test TOC)
1036	0.25	7.5	32.78
	0.5	7.71	32.57
	0.75	8.004	32.24
	1	8.13	32.15
	1.25	8.27	32.01
	1.5	8.33	31.95
	1.75	8.38	31.90
	2	8.43	31.85
	2.5	8.54	31.74
	3	8.58	31.70
	3.5	8.62	31.66
	4	8.65	31.63
1041	5	8.7	31.58
	6	8.71	31.57
	7	8.72	31.56
	8	8.73	31.55
1046	10	8.74	31.54
	12	8.74	31.54
1050	14	8.75	31.54
	16	8.75	31.53
	18	8.75	31.53
	20	8.75	31.53
1101	25	8.75	31.53
	30		
	35		
	40		
1129	53	8.76	32.14
	50		
	55		
	60		
	70		
	80		
	90		
	105		

TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT RISIGN HEAD	WATER ELVATN.
1130	0.25	10.54	29.74
	0.5	10.21	30.07
	0.75	10.04	30.24
	1	9.79	30.49
	1.25	9.63	30.65
	1.5	9.52	30.76
	1.75	9.43	30.85
	2	9.38	30.90
	2.5	9.26	31.02
	3	9.18	31.10
	3.5	9.1	31.18
	4	9.07	31.21
1135	5	9.01	31.27
	6	8.83	31.45
	7	8.81	31.47
	8	8.8	31.4
1225	10		
	12		
	14		
	16		
	18		
	20		
	25		
	30		
	35		
	40		
	45		
	50		
	55		
	60		
	70		
	80		
	90		
	105		

Reference for level readings is the top of PVC casing

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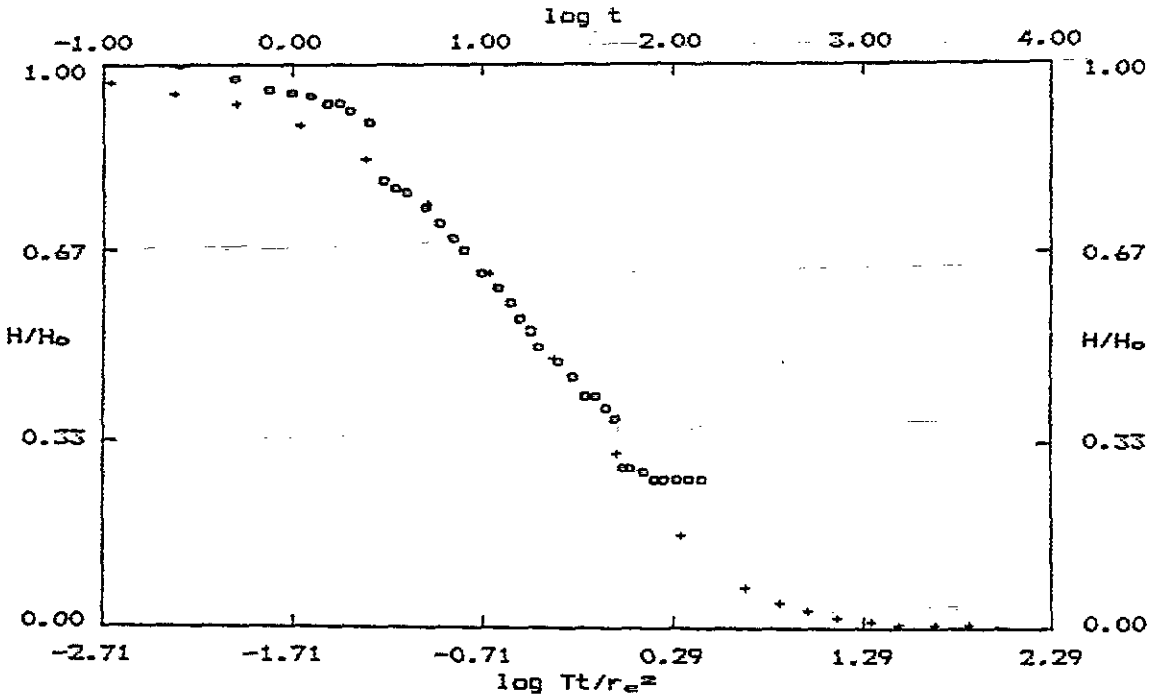
BB30/817

MWD-10: COOPER TECH. - Injection



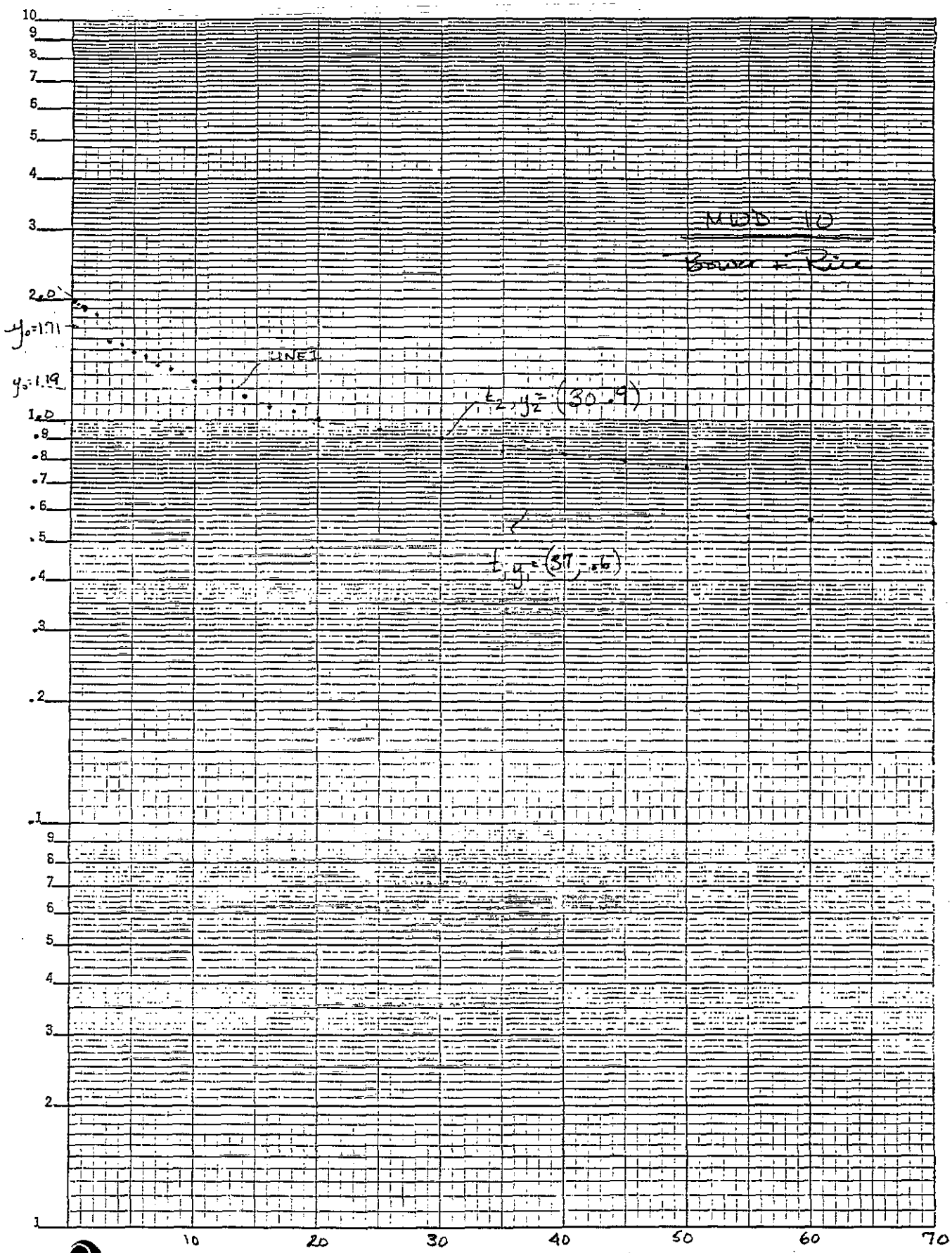
o - Data

+ - Type Curve
Slug Test: alpha = -1.0

SOLUTION

Transmissivity = 1.25E-004 sq ft/min
Aquifer Thick. = 1.00E+001 ft
Hydraulic Cond.= 1.25E-005 ft/min
Storativity = 4.00E-003

AR301818



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Data for Slug Injection/Withdrawal Test

Well Name: MWD-10 Date of Test: 9/28/89
Aquifer Thickness (b): 10.000 feet
Change in Vol.of Water = 0.027 cu.ft.
Effective Radius of Well = 0.400 feet
Radius of Casing(rc) over Water Level Decline = 0.080 feet

Entry No.	Time(t) (min.)	Head (ft.)	H (ft.)	H/H0
1		26.780		
2	0.000	28.780	2.000	1.000
3	0.250	28.780	2.000	1.000
4	0.500	28.730	1.950	0.975
5	0.750	28.690	1.910	0.955
6	1.000	28.680	1.900	0.950
7	1.250	28.660	1.880	0.940
8	1.500	28.640	1.860	0.930
9	1.750	28.630	1.850	0.925
10	2.000	28.600	1.820	0.910
11	2.500	28.570	1.790	0.895
12	3.000	28.360	1.580	0.790
13	3.500	28.330	1.550	0.775
14	4.000	28.320	1.540	0.770
15	5.000	28.260	1.480	0.740
16	6.000	28.210	1.430	0.715
17	7.000	28.160	1.380	0.690
18	8.000	28.120	1.340	0.670
19	10.000	28.030	1.250	0.625
20	12.000	27.980	1.200	0.600
21	14.000	27.930	1.150	0.575
22	16.000	27.870	1.090	0.545
23	18.000	27.830	1.050	0.525
24	20.000	27.780	1.000	0.500
25	25.000	27.730	0.950	0.475
26	30.000	27.680	0.900	0.450
27	35.000	27.610	0.830	0.415
28	40.000	27.600	0.820	0.410
29	45.000	27.570	0.790	0.395
30	50.000	27.530	0.750	0.375
31	55.000	27.360	0.580	0.290
32	60.000	27.350	0.570	0.285
33	70.000	27.340	0.560	0.280
34	80.000	27.320	0.540	0.270
35	90.000	27.320	0.540	0.270
36	105.000	27.310	0.530	0.265
37	120.000	27.310	0.530	0.265
38	140.000	27.310	0.530	0.265

AR301820

Slug test data

Site : SSC Job No. : ZD3032 Well NO :MWD-10

Date:Oct.28,89 Static : 10.58 To.Dept: 9.46 top of pv

TOC elev = 37.36'
Surf Elev = 37.64'
Static WL = 26.78
(TOC - 10.58')

TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT FALGN. HEAD	WATER ELVATN
1521	0.25	8.58	28.78
	0.5	8.63	28.73
	0.75	8.67	28.69
	1	8.68	28.68
	1.25	8.7	28.66
	1.5	8.72	28.64
	1.75	8.73	28.63
	2	8.76	28.6
	2.5	8.79	28.57
	3	9	28.36
	3.5	9.03	28.33
	4	9.04	28.32
	5	9.1	28.26
1529	6	9.15	28.21
	7	9.2	28.16
	8	9.24	28.12
	10	9.33	28.03
1533	12	9.38	27.98
	14	9.43	27.93
	16	9.49	27.87
1539	18	9.53	27.83
	20	9.58	27.78
1546	25	9.63	27.73
1551	30	9.68	27.68
	35	9.75	27.61
1601	40	9.76	27.6
1606	45	9.79	27.57
1611	50	9.83	27.53
	55	10	27.36
1621	60	10.01	27.35
1631	70	10.02	27.34
	80	10.04	27.32
1651	90	10.04	27.32
1706	105	10.05	27.31
1721	120	10.05	27.31
1741	140	10.05	27.31

TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT RISIGN HEAD	REMARKS
	0.25		Reference for level readings is the top of PVC casing
	0.5		
	0.75		
	1		
	1.25		
	1.5		
	1.75		
	2		
	2.5		
	3		
	3.5		
	4		
	5		
	6		
	7		
	8		
	10		
	12		
	14		
	16		
	18		
	20		
	25		
	30		
	35		
	40		
	45		
	50		
	55		
	60		
	70		
	80		
	90		
	105		
	120		
	137		

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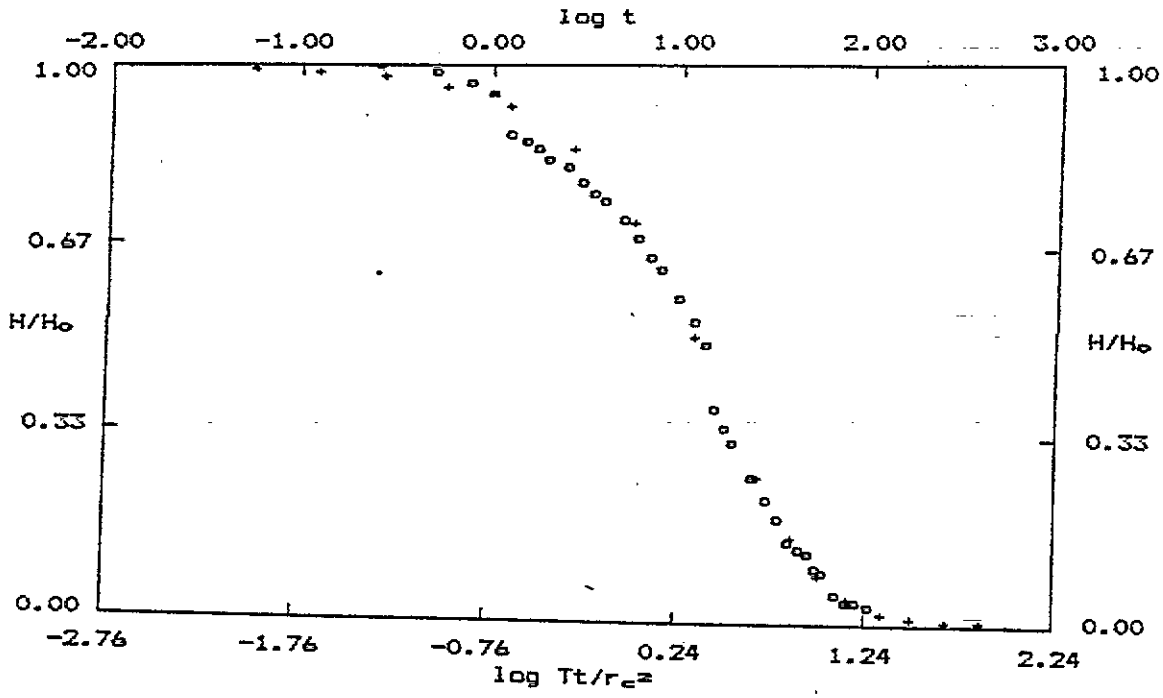
MWD-14: COOPER TECH. — Injection



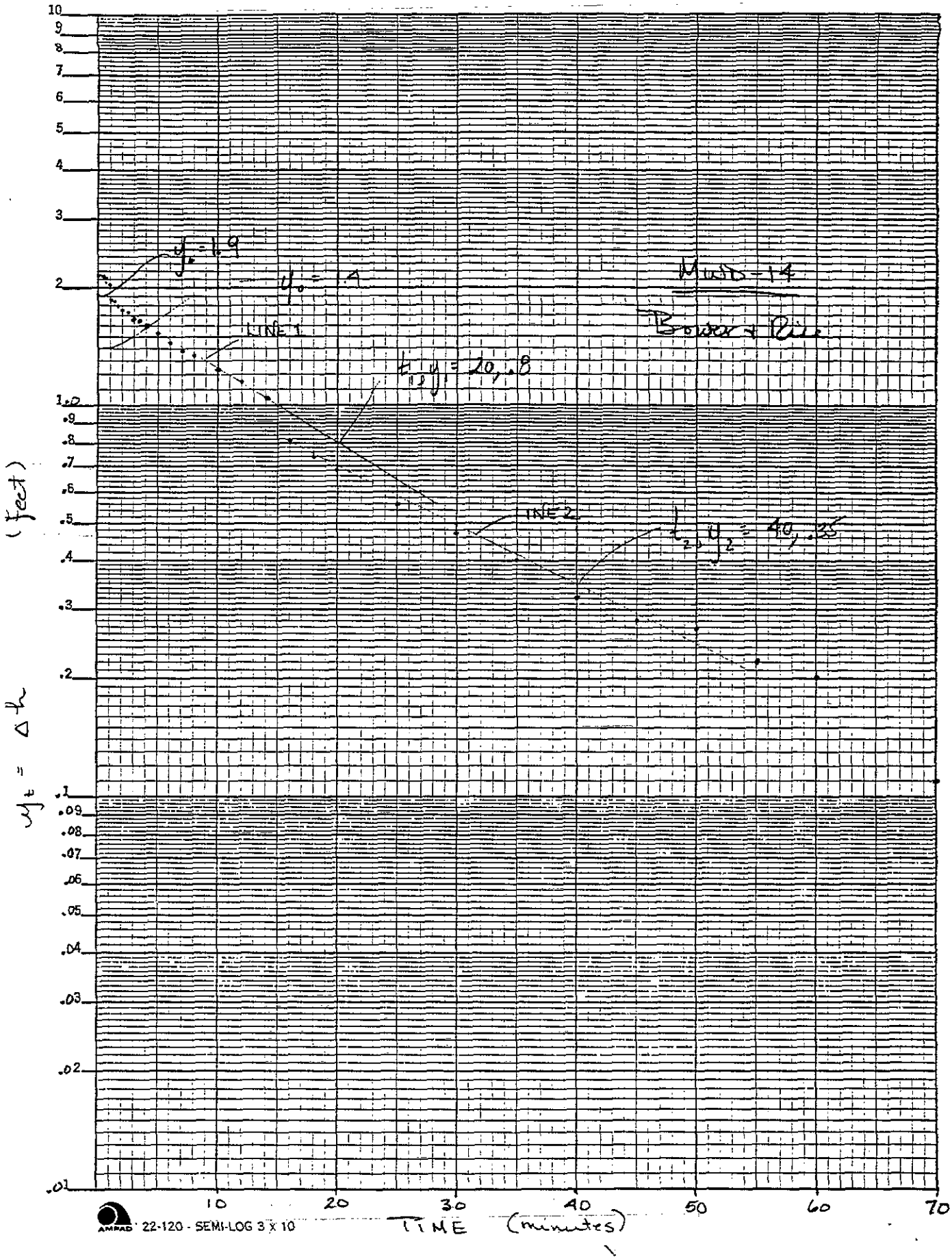
o - Data

+ - Type Curve
Slug Test: alpha = -5.0

SOLUTION

Transmissivity = 1.11E-003 sq ft/min
Aquifer Thick. = 1.00E+001 ft
Hydraulic Cond.= 1.11E-004 ft/min
Storativity = 4.00E-007

AR301822



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Data for Slug Injection/Withdrawal Test

Well Name: MWD-14 Date of Test: 9/29/89
Aquifer Thickness (b): 10.000 feet
Change in Vol.of Water = 0.027 cu.ft.
Effective Radius of Well = 0.400 feet
Radius of Casing(rc) over Water Level Decline = 0.080 feet

Entry No.	Time(t) (min.)	Head (ft.)	H (ft.)	H/H0
1		27.030		
2	0.000	29.170	2.140	1.000
3	0.250	29.170	2.140	1.000
4	0.500	29.140	2.110	0.986
5	0.750	29.100	2.070	0.967
6	1.000	29.060	2.030	0.949
7	1.250	28.880	1.850	0.864
8	1.500	28.860	1.830	0.855
9	1.750	28.830	1.800	0.841
10	2.000	28.790	1.760	0.822
11	2.500	28.750	1.720	0.804
12	3.000	28.700	1.670	0.780
13	3.500	28.660	1.630	0.762
14	4.000	28.630	1.600	0.748
15	5.000	28.550	1.520	0.710
16	6.000	28.480	1.450	0.678
17	7.000	28.420	1.390	0.650
18	8.000	28.370	1.340	0.626
19	10.000	28.250	1.220	0.570
20	12.000	28.170	1.140	0.533
21	14.000	28.080	1.050	0.491
22	16.000	27.840	0.810	0.379
23	18.000	27.770	0.740	0.346
24	20.000	27.710	0.680	0.318
25	25.000	27.590	0.560	0.262
26	30.000	27.500	0.470	0.220
27	35.000	27.430	0.400	0.187
28	40.000	27.350	0.320	0.150
29	45.000	27.310	0.280	0.131
30	50.000	27.300	0.270	0.126
31	55.000	27.250	0.220	0.103
32	60.000	27.230	0.200	0.093
33	70.000	27.140	0.110	0.051
34	80.000	27.120	0.090	0.042
35	90.000	27.110	0.080	0.037
36	105.000	27.100	0.070	0.033

AR301824

Slug test data

Site : SSC Job No. : ZD3032 Well NO :MWD-14

Date:Oct.29,89 Static : 4.79 To.Dept: 22.08 top of pv

TOC Elev = 31.88'
Surf Elev = 32.33'
Static WL = 27.03'
(TOC - 4.79)

notes say PVC = 1'6" ABOVE ground.

c

TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT FALGN. HEAD	WATER ELVATN	TIME	LAPS TIME IN MIN	DEPTH TO WATER IN FT RISIGN HEAD	WATER ELVATN	REMARKS
740	0.25	2.71	29.17 ✓	929	0.25	7.17	24.71	Reference for
	0.5	2.74	29.14		0.5	7.1	24.78	level readings
	0.75	2.78	29.1		0.75	7.04	24.84	is the top
	1	2.82	29.06		1	7	24.88	of PVC casing
	1.25	3	28.88		1.25	6.81	25.07	
	1.5	3.02	28.86		1.5	6.78	25.1	
	1.75	3.05	28.83		1.75	6.75	25.13	
	2	3.09	28.79		2	6.73	25.15	
	2.5	3.13	28.75		2.5	6.69	25.19	
	3	3.18	28.7		3	6.66	25.22	
	3.5	3.22	28.66		3.5	6.63	25.25	
	4	3.25	28.63		4	6.56	25.32	
745	5	3.33	28.55	934	5	6.48	25.4	
	6	3.4	28.48		6	6.39	25.49	
	7	3.46	28.42		7	6.33	25.55	
	8	3.51	28.37		8	6.26	25.62	
750	10	3.63	28.25	939	10	6.16	25.72	
	12	3.71	28.17		12	6.05	25.83	
1050	14	3.8	28.08		14	5.79	26.09	
	16	4.04	27.84	945	16	5.71	26.17	
	18	4.11	27.77		18	5.63	26.25	
800	20	4.17	27.71		20	5.58	26.3	
	25	4.29	27.59	954	25	5.43	26.45	
810	30	4.38	27.5		30	5.33	26.55	
	35	4.45	27.43	1004	35	5.25	26.63	
	40	4.53	27.35		40	5.18	26.7	
	45	4.57	27.31	1014	45	5.13	26.75	
830	50	4.58	27.3	1019	50	5.08	26.8	
	55	4.63	27.25	1024	55	4.81	27.07	
	60	4.65	27.23		60			
850	70	4.74	27.14		70			
	80	4.76	27.12		80			
910	90	4.77	27.11		90			
925	105	4.78	27.1		105			
	120				120			

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APPENDIX H

ANALYTICAL DATA

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      3.2.1 Inorganic Target Analyte List
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4. GUIDANCE AND REGULATORY LEVELS

5. ENGINEERING DATA

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AR301828

1. INTRODUCTION

Laboratory data packs are not included in this RI/FS report. Data packs have been sent to the EPA RPM as they have been released for distribution. This appendix includes computer output from the E & E Site Contaminant Data Base Management System (SCDBMS) used to generate the tables and graphs detailing the laboratory results in the report.

Section 2 includes the computer printout of the data in the SCDBMS. Samples that had levels above the instrument detection limits for the tested parameters were entered into the data base. Samples with levels below the instrument detection limits were not entered into the SCDBMS.

Section 3 lists the parameters inputted into the SCDBMS. The instrument detection limits (IDLs) required by the Contract Laboratory Program (CLP) for the Inorganic Target Analyte List (TAL) and Organic Target Compound List (TCL) are also included in Section 3.

Section 4 lists the regulations, guidance documents, or other standards which may apply to this site.

Section 5 lists the data not inputted into the SCDBMS, which is referenced in the text. These data are primarily engineering data not easily accommodated by the SCDBMS.

Section 6 includes the total cumulative frequency plots for arsenic, chromium (total) and copper soil data collected during the RI. These plots were used to derive reference background concentrations for the study area soils.

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AR301830

2. DATA

2.1 Computer Output

Following is a computer printout of the data in the SCDBMS. Only detected concentrations above the IDLs were entered into the SCDBMS. To determine which samples were submitted for which analyses see Section 2.2. If a sample was submitted for analysis but does not appear in the SCDBMS printout, then no levels above the IDL were detected for that analysis. IDLs for the TAL and TCL are in Section 3.

Sample data is listed in alphabetical order by sample identification. Sample identifications are indexed in Section 2.2 and shown on maps located in Section 2.3.

A summary of data validation qualifiers follows the computer printout.

The program does not use the data qualifiers to sort data. Therefore the qualifiers were not necessarily entered into the computer data base. To facilitate reader review of the data the qualifiers have been added to the printout. Data qualifiers listed between the non-dissolved and dissolved metal column relate to the dissolved (i.e., filtered) metal analysis. The qualifier in the column before the data entry/update column relate to the non-dissolved (i.e., total) metal analysis.

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
A - 1 - SS	METALS		Arsenic	MG/KG	22.4000	0.0000		05/12/90
			Chromium	MG/KG	57.2000	0.0000		05/12/90
			Copper	MG/KG	39.3000	0.0000		05/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	21.0000		J	08/21/90
	OTHER		Dioxin Furans	TOXEQ	0.3450			08/30/90
			Total Organic Carbon	UG/G	7915.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	93.8000			08/21/90
			Chromium VI	MG/KG	0.0549		J	05/22/90
			Percent Solids		97.5100			08/21/90
AD - 1 - SS	METALS		Arsenic	MG/KG	57.0000	0.0000		05/12/90
			Chromium	MG/KG	120.0000	0.0000		05/12/90
			Copper	MG/KG	65.5000	0.0000		05/12/90
	OTHER		Dioxin Furans	TOXEQ	0.5560			08/30/90
			Total Organic Carbon	UG/G	41760.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	151.0000			08/21/90
			Chromium VI	MG/KG	0.7887		J	05/22/90
			Percent Solids		91.9100			08/21/90
B - 1 - A	OTHER		Total Organic Carbon	UG/G	26286.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	166.0000			08/21/90
			Percent Solids		90.1900			08/21/90
B - 1 - B	METALS		Aluminum	MG/KG	6060.0000	0.0000	J	05/05/90
			Arsenic	MG/KG	2.6000	0.0000		05/05/90
			Barium	MG/KG	16.4000	0.0000		05/05/90
			Calcium	MG/KG	475.0000	0.0000		05/05/90
			Chromium	MG/KG	11.3000	0.0000		05/05/90
			Copper	MG/KG	6.7000	0.0000		05/05/90
			Iron	MG/KG	5880.0000	0.0000	J	05/05/90
			Lead	MG/KG	8.6000	0.0000	J	05/05/90
			Magnesium	MG/KG	272.0000	0.0000		05/05/90
			Manganese	MG/KG	16.8000	0.0000		05/05/90
			Potassium	MG/KG	153.0000	0.0000		05/05/90
			Vanadium	MG/KG	12.8000	0.0000		05/05/90
			Zinc	MG/KG	24.5000	0.0000	J	05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.0010			08/30/90
			Total Organic Carbon	UG/G	19720.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	135.0000			08/21/90
			Chromium VI	MG/KG	0.1160		J	05/22/90
			Percent Solids		87.9500			08/21/90
B - 1 - C	OTHER		Dioxin Furans	TOXEQ	0.0040			08/30/90
			Total Organic Carbon	UG/G	6271.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	110.0000			08/21/90
			Chromium VI	MG/KG	0.1786		J	05/22/90
			Percent Solids		85.6300			08/21/90
B - 1 - E	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	120.0000		B	08/21/90
			Butylbenzylphthalate	UG/KG	180.0000		B	05/25/90
			bis(2-Ethylhexyl)phthalate	UG/KG	570.0000		B	05/25/90
			Di-n-octylphthalate	UG/KG	600.0000			05/25/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	QI	Data Entry Date
B - 1 - E	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/KG	7.0000		B	05/25/90
			1,1,1-Trichloroethane	UG/KG	7.0000			05/25/90
B - 1 - ET	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/L	10.0000		B	05/25/90
B - 1 - F	OTHER		Total Organic Carbon	UG/G	11262.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	137.0000			08/21/90
			Chromium VI	MG/KG	0.1712		J	05/22/90
			Percent Solids		90.7600			08/21/90
B - 1 - SS	METALS		Arsenic	MG/KG	37.7000	0.0000		05/12/90
			Chromium	MG/KG	87.0000	0.0000		05/12/90
			Copper	MG/KG	119.0000	0.0000		05/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	1700.0000			05/05/90
	OTHER		Dioxin Furans	TOXEQ	2.4680			08/30/90
			Total Organic Carbon	UG/G	5912.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	87.8000			08/21/90
			Percent Solids		98.7500			08/21/90
B - 27 - A	OTHER		Dioxin Furans	TOXEQ	0.0400			08/30/90
B - 27 - B	OTHER		Dioxin Furans	TOXEQ	0.0270			08/30/90
B - 27 - C	OTHER		Dioxin Furans	TOXEQ	0.0530			08/30/90
B - 27 - D	OTHER		Dioxin Furans	TOXEQ	0.0280			08/30/90
BK - 1 - BS	OTHER		Dioxin Furans	TOXEQ	0.0190			08/30/90
BK - 1 - SS	METALS		Arsenic	MG/KG	3.1000	0.0000		05/12/90
			Chromium	MG/KG	7.4000	0.0000		05/12/90
			Copper	MG/KG	9.8000	0.0000		05/12/90
	OTHER		Dioxin Furans	TOXEQ	0.0100			08/30/90
			Total Organic Carbon	UG/G	8227.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	69.5000			08/21/90
			Chromium VI	MG/KG	0.0100		UJ	05/22/90
			Percent Solids		96.7000			05/22/90
BK - 2 - BS	OTHER		Dioxin Furans	TOXEQ	0.0180			08/30/90
BK - 2 - SS	OTHER		Dioxin Furans	TOXEQ	0.0150			08/30/90
BK - 3 - SS	METALS		Arsenic	MG/KG	2.3000	0.0000		05/12/90
			Chromium	MG/KG	3.2000	0.0000		05/12/90
			Copper	MG/KG	11.0000	0.0000		06/05/90
	OTHER		Dioxin Furans	TOXEQ	0.0120			08/30/90
BK - 4 - SS	METALS		Arsenic	MG/KG	2.3000	0.0000		05/12/90
			Chromium	MG/KG	4.0000	0.0000		05/12/90
			Copper	MG/KG	10.7000	0.0000		05/12/90
	OTHER		Dioxin Furans	TOXEQ	0.0050			08/30/90
			Chromium VI	MG/KG	0.0100		UJ	05/22/90
C - 1 - SS	METALS		Arsenic	MG/KG	9.8000	0.0000		05/12/90
			Chromium	MG/KG	12.4000	0.0000		05/12/90
			Copper	MG/KG	11.0000	0.0000	[]	06/05/90
	OTHER		Dioxin Furans	TOXEQ	0.5120			08/30/90
			Total Organic Carbon	UG/G	3339.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	154.0000			08/21/90
			Chromium VI	MG/KG	0.0209		J	05/22/90
			Percent Solids		99.9300			08/21/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
CB - 1 - A	METALS		Arsenic	MG/KG	8.0000	0.0000		05/17/90
			Chromium	MG/KG	28.4000	0.0000	K	05/17/90
			Copper	MG/KG	17.7000	0.0000	K	05/17/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	210000.0000			05/05/90
	OTHER		Chromium VI	MG/KG	0.6182		J	05/22/90
			Moisture Content	PERC.	10.4700			08/21/90
			pH		6.2100		J	08/21/90
			Alkalinity	MG/KG	140.0000		J	08/21/90
			Chlorine	PERC.	0.1000			05/24/90
			Sulfer	PERC.	0.1000			05/24/90
			Silica	PERC.	83.4800			09/05/90
			BTU Content	BTU1b	50.0000			05/24/90
			Ash Content	PERC.	97.7500			05/24/90
CB - 1 - B	METALS		Arsenic	MG/KG	3.0000	0.0000		07/12/90
			Chromium	MG/KG	8.6000	0.0000	K	07/12/90
			Copper	MG/KG	4.8000	0.0000	K	07/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	6300.0000		J	05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.1990			08/30/90
			Total Organic Carbon	UG/G	1476.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	38.2000			08/21/90
			Chromium VI	MG/KG	0.2801		J	08/21/90
CB - 1 - C	METALS		Arsenic	MG/KG	5.1000	0.0000	J	07/12/90
			Chromium	MG/KG	14.1000	0.0000	K	07/12/90
			Copper	MG/KG	4.8000	0.0000	K	07/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	4700.0000			05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.0990			08/30/90
			Total Organic Carbon	UG/G	635.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	31.7000			08/21/90
			Chromium VI	MG/KG	0.8562		J	05/22/90
CB - 1 - B	METALS		Aluminum	MG/KG	2730.0000	0.0000		05/12/90
			Arsenic	MG/KG	5.4000	0.0000	K	05/12/90
			Barium	MG/KG	12.0000	0.0000		05/12/90
			Calcium	MG/KG	285.0000	0.0000		05/12/90
			Chromium	MG/KG	9.4000	0.0000	J	05/12/90
			Copper	MG/KG	8.5000	0.0000	J	05/12/90
			Iron	MG/KG	2380.0000	0.0000		05/12/90
			Lead	MG/KG	4.3000	0.0000		05/12/90
			Magnesium	MG/KG	203.0000	0.0000		05/12/90
			Manganese	MG/KG	11.3000	0.0000		05/12/90
			Nickel	MG/KG	1.2000	0.0000		05/12/90
			Potassium	MG/KG	128.0000	0.0000		05/12/90
			Selenium	MG/KG	2.2000	0.0000	L	05/12/90
			Sodium	MG/KG	21.8000	0.0000		05/12/90
			Vanadium	MG/KG	5.1000	0.0000		05/12/90
			Zinc	MG/KG	5.3000	0.0000		05/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	5000.0000			06/05/90
			Phenanthrene	UG/KG	190.0000		J	06/05/90

Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Date Entry Date
CB - 1 - D	ORGANICS	BASE NEUTRALS	Di-n-octylphthalate	UG/KG	360.0000		B	06/05/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	27.0000			06/05/90
			Acetone	UG/KG	26.0000		B	06/05/90
CB - 1 - SS	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	160.0000		J	10/16/90
CB - 2 - A	METALS		Arsenic	MG/KG	6.4000	0.0000		07/12/90
			Chromium	MG/KG	9.7000	0.0000	K	07/12/90
			Copper	MG/KG	5.5000	0.0000	K	07/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	460.0000		J	05/05/90
	OTHER		Total Organic Carbon	UG/G	3082.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	43.6000			08/21/90
			Chromium VI	MG/KG	0.0603		B	05/22/90
			Moisture Content	PERC.	7.8400			08/21/90
			pH		7.5500		J	08/21/90
			Alkalinity	MG/KG	526.0000		J	08/21/90
			Chlorine	PERC.	0.1000			05/24/90
			Sulfer	PERC.	0.1000			05/24/90
			Silica	PERC.	90.1300			09/05/90
			BTU Content	BTU1b	50.0000			05/24/90
			Ash Content	PERC.	97.4200			05/24/90
			Percent Solids		93.3500			08/21/90
CB - 2 - B	METALS		Arsenic	MG/KG	4.3000	0.0000		07/12/90
			Chromium	MG/KG	5.4000	0.0000	K	07/12/90
	OTHER		Dioxin Furans	TOXEQ	0.2640			08/30/90
			Total Organic Carbon	UG/G	4031.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	70.5000			08/21/90
			Chromium VI	MG/KG	0.0347		B	05/22/90
			Percent Solids		88.5800			08/21/90
CB - 2 - C	METALS		Arsenic	MG/KG	3.9000	0.0000		05/22/90
			Chromium	MG/KG	9.3000	0.0000	K	05/22/90
	OTHER		Dioxin Furans	TOXEQ	0.1040			08/30/90
			Total Organic Carbon	UG/G	858.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	38.1000			08/21/90
			Chromium VI	MG/KG	0.3364		B	05/22/90
			Percent Solids		85.2100			08/21/90
CB - 2 - E	METALS		Aluminum	MG/KG	9450.0000	0.0000		05/05/90
			Arsenic	MG/KG	2.2000	0.0000		05/05/90
			Barium	MG/KG	18.7000	0.0000		05/05/90
			Beryllium	MG/KG	0.3400	0.0000	B	05/05/90
			Calcium	MG/KG	765.0000	0.0000		05/05/90
			Chromium	MG/KG	8.8000	0.0000		05/05/90
			Copper	MG/KG	3.0000	0.0000	B	05/05/90
			Iron	MG/KG	4460.0000	0.0000		05/05/90
			Lead	MG/KG	5.7000	0.0000		05/05/90
			Magnesium	MG/KG	386.0000	0.0000		05/05/90
			Manganese	MG/KG	7.3000	0.0000	L	05/05/90
			Potassium	MG/KG	298.0000	0.0000		05/05/90
			Sodium	MG/KG	52.3000	0.0000	B	05/05/90

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Listing of Sample Analysis Results
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* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
CB - 2 - E	METALS		Vanadium	MG/KG	17.2000	0.0000		05/05/90
			Zinc	MG/KG	5.2000	0.0000	B	05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	45.0000		B	07/16/90
			bis(2-Ethylhexyl)phthalate	UG/KG	19.0000		J	07/16/90
		PESTICIDES/PCB's	beta-BHC	UG/KG	170.0000		R	08/21/90
			delta-BHC	UG/KG	15.0000		J	07/20/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	17.0000		B	07/16/90
			Acetone	UG/KG	6.0000		B	07/16/90
CB - 4 - A	METALS		Arsenic	MG/KG	4.6000	0.0000		07/12/90
			Chromium	MG/KG	12.5000	0.0000	K	07/12/90
			Copper	MG/KG	4.3000	0.0000	K	07/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	2700.0000		J	05/05/90
	OTHER		Total Organic Carbon	UG/G	2163.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	32.3000			08/21/90
			Chromium VI	MG/KG	0.0757		B	05/22/90
			Moisture Content	PERC.	7.5700			08/21/90
			pH		6.4800		J	08/21/90
			Alkalinity	MG/KG	395.0000		J	08/21/90
			Chlorine	PERC.	0.1000			05/24/90
			Sulfer	PERC.	0.1000			05/24/90
			Silica	PERC.	97.2000			09/05/90
			BTU Content	BTU1b	50.0000			05/24/90
			Ash Content	PERC.	98.9400		[]	05/24/90
			Percent Solids		93.0100			08/21/90
CB - 4 - B	METALS		Chromium	MG/KG	6.9000	0.0000	K	05/22/90
	OTHER		Dioxin Furans	TOXEQ	9.0900			08/30/90
			Total Organic Carbon	UG/G	2376.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	4460.0000			08/21/90
			Chromium VI	MG/KG	1.5032		B	05/22/90
			2378-TCDD	ng/g	0.2700			08/30/90
			Percent Solids		88.0900			08/21/90
CB - 4 - E	METALS		Aluminum	MG/KG	1610.0000	0.0000		05/05/90
			Arsenic	MG/KG	1.8000	0.0000		05/05/90
			Barium	MG/KG	8.1000	0.0000		05/05/90
			Calcium	MG/KG	282.0000	0.0000		05/05/90
			Chromium	MG/KG	2.9000	0.0000		05/05/90
			Copper	MG/KG	4.6000	0.0000	B	05/05/90
			Iron	MG/KG	953.0000	0.0000		05/05/90
			Lead	MG/KG	3.8000	0.0000		05/05/90
			Magnesium	MG/KG	110.0000	0.0000		05/05/90
			Manganese	MG/KG	9.9000	0.0000	L	05/05/90
			Potassium	MG/KG	95.6000	0.0000		05/05/90
			Sodium	MG/KG	37.5000	0.0000	B	05/05/90
			Vanadium	MG/KG	2.9000	0.0000		05/05/90
			Zinc	MG/KG	3.6000	0.0000	B	05/05/90
	ORGANICS	BASE NEUTRALS	2-Methylnaphthalene	UG/KG	440.0000		J	07/16/90
			Acenaphthene	UG/KG	390.0000		J	07/16/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	QI	Date Entry Date
CB - 4 - E	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	44000.0000			07/16/90
			Phenanthrene	UG/KG	1100.0000		J	07/16/90
			Fluoranthene	UG/KG	250.0000		J	07/16/90
			Di-n-octylphthalate	UG/KG	140.0000		J	07/16/90
			Benzo(b)fluoranthene	UG/KG	290.0000		J	07/16/90
			Benzo(k)fluoranthene	UG/KG	330.0000		J	07/16/90
			Benzo(a)pyrene	UG/KG	330.0000		J	07/16/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	340.0000		B	07/16/90
			Acetone	UG/KG	70.0000		B	07/16/90
CB - 5 - A	METALS		Arsenic	MG/KG	5.7000	0.0000		07/12/90
			Chromium	MG/KG	6.1000	0.0000	E	07/12/90
			Copper	MG/KG	4.8000	0.0000	E	07/12/90
	OTHER		Total Organic Carbon	UG/G	4571.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	15.2000			08/21/90
			Chromium VI	MG/KG	0.0818		B	05/22/90
			Moisture Content	PERC.	6.1400			08/21/90
			pH		6.5000		J	08/21/90
			Alkalinity	MG/KG	133.0000		J	08/21/90
			Chlorine	PERC.	0.1000			05/24/90
			Sulfer	PERC.	0.1000			05/24/90
			Silica	PERC.	89.9000			09/05/90
			BTU Content	BTU1b	50.0000			05/24/90
			Ash Content	PERC.	99.0800			05/24/90
			Percent Solids		95.0400			08/21/90
CB - 5 - B	METALS		Arsenic	MG/KG	6.2000	0.0000		05/22/90
			Chromium	MG/KG	29.9000	0.0000	E	05/22/90
	OTHER		Dioxin Furans	TOXEQ	0.0020			08/30/90
			Total Organic Carbon	UG/G	1449.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	35.5000			08/21/90
			Chromium VI	MG/KG	0.9172		B	05/22/90
			Percent Solids		87.3000			08/21/90
CB - 5 - E	METALS		Aluminum	MG/KG	5840.0000	0.0000		05/05/90
			Arsenic	MG/KG	2.2000	0.0000		05/05/90
			Barium	MG/KG	25.4000	0.0000		05/05/90
			Beryllium	MG/KG	0.3600	0.0000	B	05/05/90
			Calcium	MG/KG	348.0000	0.0000		05/05/90
			Chromium	MG/KG	15.2000	0.0000		05/05/90
			Copper	MG/KG	2.9000	0.0000	B	05/05/90
			Iron	MG/KG	6090.0000	0.0000		05/05/90
			Lead	MG/KG	3.7000	0.0000		05/05/90
			Magnesium	MG/KG	245.0000	0.0000		05/05/90
			Manganese	MG/KG	11.8000	0.0000	L	05/05/90
			Potassium	MG/KG	234.0000	0.0000		05/05/90
			Sodium	MG/KG	58.6000	0.0000	B	05/05/90
			Vanadium	MG/KG	13.7000	0.0000		05/05/90
			Zinc	MG/KG	2.1000	0.0000	B	05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	36.0000		B	07/20/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
CB - 5 - X	ORGANICS	BASE NEUTRALS	bis(2-Ethylhexyl)phthalate	UG/KG	19.0000		J	07/20/90
		PESTICIDES/PCB's	beta-BHC	UG/KG	120.0000		R	07/20/90
			Endosulfan I	UG/KG	0.5600		J	07/20/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	130.0000		B	07/16/90
CB - 6 - A	METALS		Arsenic	MG/KG	1.7000	0.0000		07/12/90
			Chromium	MG/KG	10.7000	0.0000	K	07/12/90
			Copper	MG/KG	4.8000	0.0000	K	07/12/90
	OTHER		Total Organic Carbon	UG/G	1086.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	69.1000			08/21/90
			Chromium VI	MG/KG	0.1159		B	05/22/90
			Moisture Content	PERC.	6.9900			08/21/90
			pH		6.3100		J	08/21/90
			Alkalinity	MG/KG	113.0000		J	08/21/90
			Chlorine	PERC.	0.1000			05/24/90
			Sulfer	PERC.	0.1000			05/24/90
			Silica	PERC.	88.9600			09/05/90
			BTU Content	BTU/lb	50.0000			05/24/90
			Ash Content	PERC.	99.0700			05/24/90
			Percent Solids		93.3400			08/21/90
CB - 6 - B	METALS		Arsenic	MG/KG	3.2000	0.0000		05/22/90
			Chromium	MG/KG	11.4000	0.0000	K	05/22/90
	OTHER		Dioxin Furans	TOXEQ	0.0080			08/30/90
			Total Organic Carbon	UG/G	2116.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	93.9000			08/21/90
			Chromium VI	MG/KG	0.9040		B	05/22/90
			Percent Solids		89.9700			08/21/90
CB - 6 - X	METALS		Aluminum	MG/KG	6280.0000	0.0000		05/05/90
			Arsenic	MG/KG	1.4000	0.0000		05/05/90
			Barium	MG/KG	36.5000	0.0000		05/05/90
			Beryllium	MG/KG	0.3500	0.0000	B	05/05/90
			Calcium	MG/KG	507.0000	0.0000		05/05/90
			Chromium	MG/KG	9.6000	0.0000		05/05/90
			Copper	MG/KG	4.0000	0.0000	B	05/05/90
			Iron	MG/KG	5080.0000	0.0000		05/05/90
			Lead	MG/KG	3.3000	0.0000		05/05/90
			Magnesium	MG/KG	277.0000	0.0000		05/05/90
			Manganese	MG/KG	8.5000	0.0000	L	05/05/90
			Potassium	MG/KG	293.0000	0.0000		05/05/90
			Sodium	MG/KG	60.7000	60.0000	B	05/05/90
			Vanadium	MG/KG	15.3000	0.0000		05/05/90
			Zinc	MG/KG	7.1000	0.0000	B	05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	35.0000		B	07/20/90
			bis(2-Ethylhexyl)phthalate	UG/KG	36.0000		J	07/20/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	89.0000		B	07/16/90
CB - 1 - G	METALS		Aluminum	MG/KG	2730.0000	0.0000	J	05/05/90
			Arsenic	MG/KG	2.0000	0.0000		05/05/90
			Barium	MG/KG	9.0000	0.0000		05/05/90

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Listing of Sample Analysis Results

For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
CE - 1 - S	METALS		Calcium	MG/KG	5440.0000	0.0000		05/05/90
			Chromium	MG/KG	13.6000	0.0000		05/05/90
			Copper	MG/KG	7.1000	0.0000		05/05/90
			Iron	MG/KG	2810.0000	0.0000	J	05/05/90
			Lead	MG/KG	16.9000	0.0000	J	05/05/90
			Magnesium	MG/KG	331.0000	0.0000		05/05/90
			Manganese	MG/KG	22.5000	0.0000		05/05/90
			Potassium	MG/KG	303.0000	0.0000		05/05/90
			Sodium	MG/KG	469.0000	0.0000		05/05/90
			Vanadium	MG/KG	5.6000	0.0000		05/05/90
			Zinc	MG/KG	70.6000	0.0000	J	05/05/90
	ORGANICS	BASE NEUTRALS	Naphthalene	UG/KG	230.0000		J	05/23/90
			Fluoranthene	UG/KG	140.0000		J	05/24/90
			Pyrene	UG/KG	240.0000		J	05/24/90
			Benzo(a)anthracene	UG/KG	200.0000		J	05/24/90
			Chrysene	UG/KG	200.0000		J	05/24/90
			bis(2-Ethylhexyl)phthalate	UG/KG	220.0000		J	05/24/90
			Benzo(b)fluoranthene	UG/KG	290.0000		J	05/24/90
			Benzo(a)pyrene	UG/KG	150.0000		J	05/24/90
			Indeno(1,2,3-cd)pyrene	UG/KG	100.0000		J	05/24/90
			Benzo(g,h,i)perylene	UG/KG	130.0000		J	05/24/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	8.0000		B	05/23/90
			Acetone	UG/KG	25.0000		B	05/23/90
			2-Butanone	UG/KG	26.0000		B	05/23/90
			Ethylbenzene	UG/KG	10.0000		L	05/23/90
			Total Xylenes	UG/KG	7.0000		L	05/23/90
	OTHER		Dioxin Furans	TOXEQ	0.0090			08/30/90
			Total Organic Carbon	UG/G	2113.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	614.0000			08/21/90
			Chromium VI	MG/KG	0.0100		UJ	05/22/90
			Percent Solids		78.8200			08/21/90
CE - 1 - W	METALS		Aluminum	UG/L	1020.0000 [illegible] B	176.0000		05/31/90
			Arsenic	UG/L	3.1000 [illegible]	9.1000	[]	05/31/90
			Barium	UG/L	20.7000	0.0000	[]	06/01/90
			Beryllium	UG/L	2.0000	0.0000	B[illegible]	06/01/90
			Calcium	UG/L	13600.0000	13600.0000		05/31/90
			Copper	UG/L	38.8000	0.0000	B	06/01/90
			Iron	UG/L	1390.0000	361.0000		05/31/90
			Lead	UG/L	4.8000 [illegible]	1.4000	[]	05/31/90
			Magnesium	UG/L	1110.0000 [illegible]	1080.0000	[]	05/31/90
			Manganese	UG/L	27.5000 J	21.9000		05/31/90
			Mercury	UG/L	0.3600	0.4200		05/31/90
			Potassium	UG/L	5630.0000	5330.0000		05/31/90
			Selenium	UG/L	0.0000 [illegible] B	1.4000	B	05/31/90
			Sodium	UG/L	109000.0000	112000.0000		05/31/90
			Zinc	UG/L	63.5000 [illegible]	13.9000	J	05/31/90
	OTHER		Alkalinity	UG/L	264000.0000		J	08/18/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
CE - 1 - W	OTHER		Chemical Oxygen Demand	UG/L	20000.0000		J	08/18/90
			Hardness	UG/L	38000.0000			08/18/90
			Total Dissolved Solids	MG/L	10.0000		J	08/18/90
CE - 2 - S	METALS		Aluminum	MG/KG	679.0000	0.0000	J	05/05/90
			Arsenic	MG/KG	1.7000	0.0000		05/05/90
			Barium	MG/KG	18.5000	0.0000		05/05/90
			Calcium	MG/KG	1060.0000	0.0000		05/05/90
			Chromium	MG/KG	4.5000	0.0000		05/05/90
			Iron	MG/KG	1070.0000	0.0000	J	05/05/90
			Lead	MG/KG	9.7000	0.0000	J	05/05/90
			Magnesium	MG/KG	123.0000	0.0000		05/05/90
			Manganese	MG/KG	8.5000	0.0000		05/05/90
			Mercury	MG/KG	0.2600	0.2600		05/05/90
			Sodium	MG/KG	396.0000	0.0000		05/05/90
			Zinc	MG/KG	48.7000	0.0000	J	05/05/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/KG	60.0000		B	05/23/90
			Acetone	UG/KG	6.0000		B	05/23/90
			2-Butanone	UG/KG	24.0000		B	05/23/90
	OTHER		Total Organic Carbon	UG/G	575.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	326.0000			08/21/90
			Chromium VI	MG/KG	0.0100		UJ	05/22/90
			Percent Solids		79.7100			08/21/90
CE - 2 - W	METALS		Aluminum	UG/L	1300.0000	141.0000		05/31/90
			Arsenic	UG/L	8.5000	14.8000	[]	05/31/90
			Barium	UG/L	23.3000	0.0000	[]	06/01/90
			Beryllium	UG/L	2.0000	0.0000	[]	06/01/90
			Calcium	UG/L	16800.0000	17100.0000		05/31/90
			Copper	UG/L	36.6000	0.0000	B	06/01/90
			Iron	UG/L	1640.0000	283.0000		05/31/90
			Magnesium	UG/L	1280.0000	1260.0000	[]	05/31/90
			Manganese	UG/L	28.4000	18.6000		05/31/90
			Mercury	UG/L	0.9600	0.3100		05/31/90
			Potassium	UG/L	5580.0000	5430.0000		05/31/90
			Selenium	UG/L	1.5000	0.0000	B	08/22/90
			Sodium	UG/L	92600.0000	98100.0000		05/31/90
			Zinc	UG/L	56.7000	11.1000	B	05/31/90
	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	20.0000		B	05/25/90
	OTHER		Alkalinity	UG/L	237000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	25000.0000		J	08/18/90
			Hardness	UG/L	46000.0000			08/18/90
			Total Dissolved Solids	MG/L	16.0000		J	08/18/90
CE - 3 - S	METALS		Aluminum	MG/KG	1730.0000	0.0000	J	05/05/90
			Arsenic	MG/KG	2.4000	0.0000		05/05/90
			Barium	MG/KG	9.5000	0.0000		05/05/90
			Calcium	MG/KG	2130.0000	0.0000		05/05/90
			Chromium	MG/KG	7.8000	0.0000		05/05/90
			Iron	MG/KG	2070.0000	0.0000	J	05/05/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
CE - 3 - S	METALS		Lead	MG/KG	7.6000	0.0000	J	05/05/90
			Magnesium	MG/KG	122.0000	0.0000		05/05/90
			Manganese	MG/KG	13.3000	0.0000		05/05/90
			Mercury	MG/KG	0.2100	0.0000		05/05/90
			Nickel	MG/KG	39.1000	0.0000		05/05/90
			Sodium	MG/KG	359.0000	0.0000		05/05/90
			Zinc	MG/KG	45.1000	0.0000	J	05/05/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/KG	59.0000		B	05/23/90
			Acetone	UG/KG	7.0000		B	05/23/90
			2-Butanone	UG/KG	24.0000		B	05/23/90
	OTHER		Total Organic Carbon	UG/G	734.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	233.0000			08/21/90
			Chromium VI	MG/KG	0.0100		UJ	05/22/90
			Percent Solids		81.5600			08/21/90
CE - 3 - W	METALS		Aluminum	UG/L	514.0000 [ ]B	154.0000		05/31/90
			Arsenic	UG/L	8.5000	15.0000	[]	05/31/90
			Barium	UG/L	23.3000 [ ]	20.5000	[]	05/31/90
			Beryllium	UG/L	1.6000	0.0000	B[ ]	06/01/90
			Calcium	UG/L	38700.0000	40300.0000		05/31/90
			Copper	UG/L	30.8000	0.0000	B	06/01/90
			Iron	UG/L	821.0000	288.0000		05/31/90
			Lead	UG/L	4.3000	0.0000	[]	06/01/90
			Magnesium	UG/L	1830.0000 [ ]	1900.0000	[]	05/31/90
			Manganese	UG/L	18.5000 [ ]J	12.8000	B	05/31/90
			Mercury	UG/L	0.0000	0.2300		05/31/90
			Potassium	UG/L	4940.0000	5110.0000	[]	05/31/90
			Selenium	UG/L	1.9000	0.0000	B[ ]	08/22/90
			Sodium	UG/L	69800.0000	74300.0000		05/31/90
			Zinc	UG/L	32.3000 [ ]	10.0000	B	05/31/90
	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	20.0000		B	08/21/90
	OTHER		Alkalinity	UG/L	224000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	25000.0000		J	08/18/90
			Hardness	UG/L	100000.0000			08/18/90
			Total Dissolved Solids	MG/L	8.0000		J	08/18/90
CK - 1 - S	METALS		Aluminum	MG/KG	1420.0000	0.0000		05/05/90
			Arsenic	MG/KG	1.6000	0.0000		05/05/90
			Barium	MG/KG	13.3000	0.0000	J	05/05/90
			Calcium	MG/KG	606.0000	0.0000	J	05/05/90
			Chromium	MG/KG	4.0000	0.0000		05/05/90
			Copper	MG/KG	3.4000	0.0000		05/05/90
			Iron	MG/KG	3950.0000	0.0000		05/05/90
			Lead	MG/KG	7.8000	0.0000		05/05/90
			Magnesium	MG/KG	200.0000	0.0000	J	05/05/90
			Manganese	MG/KG	15.8000	0.0000	J	05/05/90
			Potassium	MG/KG	190.0000	0.0000		05/05/90
			Sodium	MG/KG	43.6000	0.0000	J	05/05/90
			Vanadium	MG/KG	4.7000	0.0000	J	05/05/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
CK - 1 - S	METALS		Zinc	MG/KG	13.8000	0.0000	J	05/05/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/KG	25.0000		B	08/21/90
			Acetone	UG/KG	17.0000		B	08/21/90
			2-Butanone	UG/KG	29.0000		B	08/21/90
	OTHER		Dioxin Furans	TOXEQ	0.0020			08/30/90
			Total Organic Carbon	UG/G	1580.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	366.0000			08/21/90
			Chromium VI	MG/KG	0.0100		UJ	05/22/90
			Percent Solids		73.9800			08/21/90
CK - 1 - W	METALS		Aluminum	UG/L	70.7000	0.0000	BL	05/31/90
			Barium	UG/L	65.9000	L 61.4000	L	05/26/90
			Calcium	UG/L	12700.0000	13300.0000		05/26/90
			Copper	UG/L	42.4000	0.0000	B	05/31/90
			Iron	UG/L	1640.0000	165.0000		05/26/90
			Lead	UG/L	1.8000	0.0000	[	05/31/90
			Magnesium	UG/L	3140.0000	L 3400.0000	[	05/31/90
			Manganese	UG/L	59.5000	0.0000		05/26/90
			Potassium	UG/L	2140.0000	L 2180.0000	L	05/26/90
			Sodium	UG/L	4790.0000	L 4730.0000	L	05/26/90
			Zinc	UG/L	23.3000	0.0000	B	05/31/90
	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	4.0000		B	08/21/90
	OTHER		Alkalinity	UG/L	30000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	45000.0000		J	08/18/90
			Hardness	UG/L	38000.0000			08/18/90
			Total Dissolved Solids	MG/L	16.0000		J	08/18/90
CK - 2 - S	METALS		Aluminum	MG/KG	12400.0000	0.0000		05/05/90
			Arsenic	MG/KG	18.0000	0.0000		05/05/90
			Barium	MG/KG	60.0000	0.0000	J	05/05/90
			Calcium	MG/KG	4660.0000	0.0000	J	05/05/90
			Chromium	MG/KG	19.7000	0.0000		05/05/90
			Cobalt	MG/KG	7.4000	0.0000		05/05/90
			Copper	MG/KG	14.5000	0.0000		05/05/90
			Iron	MG/KG	17600.0000	0.0000		05/05/90
			Lead	MG/KG	31.1000	0.0000		05/05/90
			Magnesium	MG/KG	2440.0000	0.0000	J	05/05/90
			Manganese	MG/KG	207.0000	0.0000	J	05/05/90
			Nickel	MG/KG	8.3000	0.0000		05/05/90
			Potassium	MG/KG	1160.0000	0.0000		05/05/90
			Sodium	MG/KG	1260.0000	0.0000	J	05/05/90
			Vanadium	MG/KG	34.7000	0.0000	J	05/05/90
			Zinc	MG/KG	74.2000	0.0000	J	05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-octylphthalate	UG/KG	480.0000		B	06/05/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	14.0000		B	06/05/90
			Acetone	UG/KG	95.0000		B	06/05/90
	OTHER		Total Organic Carbon	UG/G	40300.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	139.0000			08/21/90
			Chromium VI	MG/KG	0.0100		UJ	05/22/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
CK - 2 - S	OTHER		Percent Solids		44.3200			08/21/90
CK - 2 - W	METALS		Aluminum	UG/L	201.0000 [ ]B	23.4000		05/26/90
			Arsenic	UG/L	0.0000 [ ]	5.0000		05/26/90
			Barium	UG/L	58.9000 [ ]	54.8000 [ ]		05/26/90
			Beryllium	UG/L	1.2000	0.0000	B[ ]	05/31/90
			Calcium	UG/L	19000.0000	19400.0000		05/31/90
			Copper	UG/L	41.4000	0.0000	B	05/31/90
			Iron	UG/L	1500.0000	379.0000		05/26/90
			Lead	UG/L	1.8000	0.0000	[]	05/31/90
			Magnesium	UG/L	7820.0000	8600.0000		05/26/90
			Manganese	UG/L	69.4000 J	46.6000		05/26/90
			Mercury	UG/L	0.8100	0.0000		08/22/90
			Potassium	UG/L	3660.0000 [ ]	3960.0000		05/26/90
			Selenium	UG/L	1.8000	0.0000	B	05/31/90
			Silver	UG/L	0.0000 [ ]B	6.3000	B	05/26/90
			Sodium	UG/L	39400.0000	44900.0000		05/26/90
			Zinc	UG/L	20.4000	0.0000	B	05/31/90
	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	8.0000		B	05/26/90
	OTHER		Alkalinity	UG/L	127000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	85000.0000		J	08/18/90
			Hardness	UG/L	230000.0000			08/18/90
			Total Dissolved Solids	MG/L	28.0000		J	08/18/90
CK - 3 - S	METALS		Aluminum	MG/KG	12400.0000	0.0000		05/05/90
			Arsenic	MG/KG	72.0000	0.0000		05/05/90
			Barium	MG/KG	41.2000	0.0000	J	05/05/90
			Beryllium	MG/KG	0.6500	0.0000		05/05/90
			Calcium	MG/KG	52900.0000	0.0000	J	05/05/90
			Chromium	MG/KG	39.0000	0.0000		05/05/90
			Cobalt	MG/KG	4.1000	0.0000		05/05/90
			Copper	MG/KG	5.6000	0.0000		05/05/90
			Iron	MG/KG	42700.0000	0.0000		05/05/90
			Lead	MG/KG	14.0000	0.0000		05/05/90
			Magnesium	MG/KG	1910.0000	0.0000	J	05/05/90
			Manganese	MG/KG	628.0000	0.0000	J	05/05/90
			Nickel	MG/KG	7.7000	0.0000		05/05/90
			Potassium	MG/KG	967.0000	0.0000		05/05/90
			Sodium	MG/KG	1120.0000	0.0000	J	05/05/90
			Vanadium	MG/KG	60.0000	0.0000	J	05/05/90
			Zinc	MG/KG	29.0000	0.0000	J	05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-octylphthalate	UG/KG	97.0000		B	06/05/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	7.0000		B	06/05/90
	OTHER		Total Organic Carbon	UG/G	5232.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	52.2000			08/21/90
			Chromium VI	MG/KG	0.0214		J	05/22/90
			Percent Solids		69.5000			08/21/90
CK - 3 - W	METALS		Aluminum	UG/L	558.0000 [ ]B	24.9000		05/26/90
			Arsenic	UG/L	6.7000	23.0000	[]	05/26/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
CK - 3 - W	METALS		Barium	UG/L	47.8000	[ ] 40.4000	[]	05/26/90
			Beryllium	UG/L	1.6000	[ ]B 1.4000	B[]	05/26/90
			Cadmium	UG/L	0.0000	R 34.3000		05/31/90
			Calcium	UG/L	69500.0000	69600.0000		05/31/90
			Copper	UG/L	36.2000	[ ]B 5.7000	B	05/31/90
			Iron	UG/L	1080.0000	0.0000		06/01/90
			Lead	UG/L	1.9000	0.0000	[]	06/01/90
			Magnesium	UG/L	89700.0000	91300.0000		05/31/90
			Manganese	UG/L	176.0000	J 95.1000	J	05/31/90
			Potassium	UG/L	35300.0000	34800.0000		05/31/90
			Silver	UG/L	0.0000	B 13.5000	B	05/31/90
			Sodium	UG/L	744000.0000	722000.0000		05/31/90
			Zinc	UG/L	21.0000	0.0000	B	06/01/90
	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	7.0000		B	05/26/90
	OTHER		Alkalinity	UG/L	135000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	115000.0000		J	08/18/90
			Hardness	UG/L	396000.0000			08/18/90
			Total Dissolved Solids	MG/L	18.0000		J	08/18/90
B - 1 - SS	METALS		Arsenic	MG/KG	31.7000	0.0000		05/12/90
			Chromium	MG/KG	36.6000	0.0000		05/12/90
			Copper	MG/KG	34.1000	0.0000		05/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	560.0000		J	05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.9100			08/30/90
			Total Organic Carbon	UG/G	17352.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	139.0000			08/21/90
			Chromium VI	MG/KG	0.0931		J	05/22/90
			Percent Solids		94.7200			08/21/90
E - 1 - SS	METALS		Arsenic	MG/KG	28.4000	0.0000		05/12/90
			Chromium	MG/KG	48.3000	0.0000		05/12/90
			Copper	MG/KG	27.8000	0.0000		05/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	5100.0000		K	05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.9440			08/30/90
			Total Organic Carbon	UG/G	2445.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	178.0000			08/21/90
			Chromium VI	MG/KG	1.0386		J	05/22/90
			Percent Solids		99.8900			08/21/90
F - 1 - SS	METALS		Arsenic	MG/KG	266.0000	0.0000		05/12/90
			Chromium	MG/KG	252.0000	0.0000		05/12/90
			Copper	MG/KG	158.0000	0.0000		05/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	2600.0000			05/05/90
	OTHER		Dioxin Furans	TOXEQ	3.2490			08/30/90
			Total Organic Carbon	UG/G	8033.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	172.0000			08/21/90
			Chromium VI	MG/KG	0.0972		J	05/22/90
			Percent Solids		99.4500			08/21/90
G - 1 - SS	METALS		Arsenic	MG/KG	32.1000	0.0000		05/12/90
			Chromium	MG/KG	57.3000	0.0000		05/12/90

Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
G - 1 - SS	METALS		Copper	MG/KG	32.9000	0.0000		05/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	1600.0000			05/05/90
	OTHER		Dioxin Furans	TOXEQ	2.1050			08/30/90
			Total Organic Carbon	UG/G	12540.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	93.7000			08/21/90
			Chromium VI	MG/KG	0.3525		J	05/22/90
			Percent Solids		99.5300			08/21/90
GW - 1 - R	METALS		Calcium	UG/L	23.1000	B[ ] 30.5000	B[ ]	09/12/90
			Copper	UG/L	4.0000	B[ ] 5.5000	B[ ]	09/12/90
			Iron	UG/L	20.5000	0.0000	B[ ]	09/12/90
			Magnesium	UG/L	0.0000	B[ ] 16.6000	B	09/12/90
			Sodium	UG/L	206.0000	B[ ] 202.0000	[ ]	09/12/90
			Vanadium	UG/L	0.0000	B[ ] 2.1000	B	09/12/90
			Zinc	UG/L	6.8000	B[ ] 12.0000	B[ ]	09/12/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/L	1.0000		B	06/02/90
GW - 1 - S	METALS		Aluminum	MG/KG	1770.0000	0.0000	J	05/05/90
			Arsenic	MG/KG	1.9000	0.0000		05/05/90
			Barium	MG/KG	9.0000	0.0000		05/05/90
			Calcium	MG/KG	1320.0000	0.0000		05/05/90
			Chromium	MG/KG	7.7000	0.0000		05/05/90
			Copper	MG/KG	6.4000	0.0000		05/05/90
			Iron	MG/KG	1650.0000	0.0000	J	05/05/90
			Lead	MG/KG	14.1000	0.0000	J	05/05/90
			Magnesium	MG/KG	151.0000	0.0000		05/05/90
			Manganese	MG/KG	11.0000	0.0000		05/05/90
			Nickel	MG/KG	5.0000	0.0000		05/05/90
			Sodium	MG/KG	346.0000	0.0000		05/05/90
			Vanadium	MG/KG	3.4000	0.0000		05/05/90
			Zinc	MG/KG	19.6000	0.0000	J	05/05/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/KG	10.0000		B	08/21/90
			Acetone	UG/KG	29.0000		B	08/21/90
			2-Butanone	UG/KG	31.0000		B	08/21/90
			Toluene	UG/KG	13.0000		L	05/23/90
	OTHER		Dioxin Furans	TOXEQ	0.0040			08/30/90
			Total Organic Carbon	UG/G	19084.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	488.0000			08/21/90
			Percent Solids		78.3700			08/21/90
GW - 1 - SD	METALS		Aluminum	MG/KG	1730.0000	0.0000	J	05/05/90
			Arsenic	MG/KG	1.3000	0.0000		05/05/90
			Barium	MG/KG	10.1000	0.0000		05/05/90
			Calcium	MG/KG	1180.0000	0.0000		05/05/90
			Chromium	MG/KG	6.8000	0.0000		05/05/90
			Copper	MG/KG	5.7000	0.0000		05/05/90
			Iron	MG/KG	1890.0000	0.0000	J	05/05/90
			Lead	MG/KG	9.5000	0.0000	J	05/05/90
			Magnesium	MG/KG	160.0000	0.0000		05/05/90
			Manganese	MG/KG	13.9000	0.0000		05/05/90

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AR301845

Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
GW - 1 - SD	METALS		Nickel	MG/KG	4.1000	0.0000		05/05/90
			Potassium	MG/KG	298.0000	0.0000		05/05/90
			Sodium	MG/KG	349.0000	0.0000		05/05/90
			Vanadium	MG/KG	3.4000	0.0000		05/05/90
			Zinc	MG/KG	21.3000	0.0000	J	05/05/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/KG	8.0000		B	08/21/90
			Acetone	UG/KG	29.0000		B	08/21/90
			2-Butanone	UG/KG	20.0000		B	08/21/90
			Toluene	UG/KG	11.0000		L	05/23/90
	OTHER		Total Organic Carbon	UG/G	3028.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	670.0000			08/21/90
			Chromium VI	MG/KG	0.0160		J	05/22/90
			Percent Solids		85.9500			08/21/90
GW - 1 - W	METALS		Aluminum	UG/L	170.0000	0.0000	B[]	05/31/90
			Barium	UG/L	71.5000 []	66.5000		05/26/90
			Calcium	UG/L	12000.0000	12600.0000		05/26/90
			Copper	UG/L	48.9000 []	B 8.0000	B	05/26/90
			Iron	UG/L	1840.0000	496.0000		05/26/90
			Lead	UG/L	1.6000	0.0000	[]	05/31/90
			Magnesium	UG/L	3180.0000 []	3340.0000	[]	05/26/90
			Manganese	UG/L	114.0000 J	35.4000	J	05/26/90
			Potassium	UG/L	2240.0000 []	2340.0000	[]	05/26/90
			Sodium	UG/L	4700.0000	4720.0000	[]	05/26/90
			Zinc	UG/L	31.2000 []	16.8000	B	05/26/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/L	2.0000		B	05/26/90
			Acetone	UG/L	3.0000		B	05/26/90
	OTHER		Alkalinity	UG/L	31000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	35000.0000		J	08/18/90
			Hardness	UG/L	46000.0000			08/18/90
			Total Dissolved Solids	MG/L	4.0000		J	08/18/90
GW - 1 - WD	METALS		Aluminum	UG/L	150.0000	0.0000	B[]	06/01/90
			Barium	UG/L	67.1000 []	67.3000	[]	05/26/90
			Beryllium	UG/L	1.5000	0.0000	B[]	06/01/90
			Calcium	UG/L	11800.0000 []	12200.0000		05/26/90
			Copper	UG/L	30.5000	0.0000	B	06/01/90
			Iron	UG/L	1540.0000	502.0000		05/26/90
			Magnesium	UG/L	3160.0000 []	3310.0000 []		05/26/90
			Manganese	UG/L	72.5000 J	27.6000	J	05/26/90
			Potassium	UG/L	2160.0000 []	2230.0000 []		05/26/90
			Sodium	UG/L	4680.0000 []	4650.0000 []		05/26/90
			Zinc	UG/L	23.1000 []	8.9000 B		05/26/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/L	1.0000		B	05/26/90
			Acetone	UG/L	5.0000		B	05/26/90
	OTHER		Alkalinity	UG/L	31000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	45000.0000		J	08/18/90
			Hardness	UG/L	42000.0000			08/18/90
			Total Dissolved Solids	MG/L	12.0000		J	09/05/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
GW - 2 - S	METALS		Aluminum	MG/KG	17200.0000	0.0000		05/05/90
			Arsenic	MG/KG	4.6000	0.0000		05/05/90
			Barium	MG/KG	143.0000	0.0000	J	05/05/90
			Calcium	MG/KG	3430.0000	0.0000	J	05/05/90
			Chromium	MG/KG	15.2000	0.0000		05/05/90
			Copper	MG/KG	9.3000	0.0000		05/05/90
			Iron	MG/KG	9130.0000	0.0000		05/05/90
			Lead	MG/KG	36.7000	0.0000		05/05/90
			Magnesium	MG/KG	1270.0000	0.0000	J	05/05/90
			Manganese	MG/KG	62.1000	0.0000	J	05/05/90
			Nickel	MG/KG	9.6000	0.0000		05/05/90
			Potassium	MG/KG	863.0000	0.0000		05/05/90
			Sodium	MG/KG	162.0000	0.0000	J	05/05/90
			Vanadium	MG/KG	27.1000	0.0000	J	05/05/90
			Zinc	MG/KG	63.8000	0.0000	J	05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-octylphthalate	UG/KG	560.0000		B	06/05/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	15.0000		B	06/05/90
			Acetone	UG/KG	210.0000			06/05/90
			2-Butanone	UG/KG	41.0000			06/05/90
			Toluene	UG/KG	5.0000			06/05/90
	OTHER		Dioxin Furans	TOXEQ	0.0050			08/30/90
			Total Organic Carbon	UG/G	103733.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	26.0000			08/21/90
GW - 2 - W	METALS		Aluminum	UG/L	41.4000 []	B 24.6000	[]B	06/01/90
			Barium	UG/L	65.0000 []	60.2000	L[]	06/01/90
			Calcium	UG/L	11500.0000	10300.0000		06/01/90
			Iron	UG/L	1220.0000 J	536.0000		06/01/90
			Magnesium	UG/L	2850.0000 []	2710.0000	[]	06/01/90
			Manganese	UG/L	41.7000 []	9.6000		06/01/90
			Potassium	UG/L	1930.0000 []	B 483.0000	[]	06/01/90
			Sodium	UG/L	4910.0000 []	4810.0000	[]	06/01/90
			Zinc	UG/L	0.0000 []	6.7000	[]	06/01/90
	ORGANICS	BASE NEUTRALS	Pyrene	UG/L	2.0000		J	05/26/90
		VOLATILE ORGANICS	Acetone	UG/L	16.0000		B	08/21/90
	OTHER		Alkalinity	UG/L	11000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	30000.0000		J	08/18/90
			Hardness	UG/L	20000.0000			08/18/90
			Total Dissolved Solids	MG/L	36.0000		J	08/18/90
GW - 3 - S	METALS		Aluminum	MG/KG	4280.0000	0.0000		05/05/90
			Arsenic	MG/KG	1.8000	0.0000		05/05/90
			Barium	MG/KG	38.6000	0.0000	J	05/05/90
			Calcium	MG/KG	1690.0000	0.0000	J	05/05/90
			Chromium	MG/KG	4.2000	0.0000		05/05/90
			Copper	MG/KG	5.1000	0.0000		05/05/90
			Iron	MG/KG	2610.0000	0.0000		05/05/90
			Lead	MG/KG	9.0000	0.0000		05/05/90
			Magnesium	MG/KG	373.0000	0.0000	J	05/05/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Q1	Data Entry Date
GW - 3 - S	METALS		Manganese	MG/KG	17.5000	0.0000	J	05/05/90
			Potassium	MG/KG	240.0000	0.0000		05/05/90
			Sodium	MG/KG	105.0000	0.0000	J	05/05/90
			Vanadium	MG/KG	6.3000	0.0000	J	05/05/90
			Zinc	MG/KG	18.1000	0.0000	J	05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-octylphthalate	UG/KG	190.0000		B	06/05/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	13.0000		B	06/05/90
			Acetone	UG/KG	120.0000			06/05/90
			Total Xylenes	UG/KG	5.0000			06/05/90
	OTHER		Total Organic Carbon	UG/G	19751.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	23.3000			08/21/90
GW - 3 - W	METALS		Aluminum	UG/L	60.1000	0.0000	B []	06/02/90
			Barium	UG/L	64.2000 []	58.6000	[] L	06/02/90
			Calcium	UG/L	11000.0000	10900.0000		06/02/90
			Iron	UG/L	1390.0000	346.0000		06/02/90
			Magnesium	UG/L	2710.0000 []	2880.0000	[]	06/02/90
			Manganese	UG/L	80.0000 []	3.3000		06/02/90
			Potassium	UG/L	1290.0000 []	1720.0000	[]	06/02/90
			Sodium	UG/L	4780.0000 []	4730.0000	[]	06/02/90
			Zinc	UG/L	5.9000	0.0000	[]	06/02/90
	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	19.0000		B	05/26/90
	OTHER		Alkalinity	UG/L	31000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	40000.0000		J	08/18/90
			Hardness	UG/L	40000.0000			08/18/90
			Total Dissolved Solids	MG/L	12.0000		J	08/18/90
GW - 4 - S	METALS		Aluminum	MG/KG	8700.0000	0.0000		05/05/90
			Arsenic	MG/KG	2.2000	0.0000		05/05/90
			Barium	MG/KG	35.3000	0.0000	J	05/05/90
			Calcium	MG/KG	461.0000	0.0000	J	05/05/90
			Chromium	MG/KG	11.5000	0.0000		05/05/90
			Copper	MG/KG	6.3000	0.0000		05/05/90
			Iron	MG/KG	5060.0000	0.0000		05/05/90
			Lead	MG/KG	24.2000	0.0000		05/05/90
			Magnesium	MG/KG	690.0000	0.0000	J	05/05/90
			Manganese	MG/KG	17.0000	0.0000	J	05/05/90
			Potassium	MG/KG	695.0000	0.0000		05/05/90
			Sodium	MG/KG	313.0000	0.0000	J	05/05/90
			Vanadium	MG/KG	13.7000	0.0000	J	05/05/90
			Zinc	MG/KG	18.3000	0.0000	J	05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-octylphthalate	UG/KG	320.0000		B	06/05/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	13.0000		B	06/05/90
			Acetone	UG/KG	100.0000			06/05/90
			2-Butanone	UG/KG	10.0000			06/05/90
	OTHER		Total Organic Carbon	UG/G	88367.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	8.6200			08/21/90
			Chromium VI	MG/KG	0.1070		J	05/22/90
GW - 4 - W	METALS		Aluminum	UG/L	199.0000 [] B	45.3000	[]	06/02/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
GW - 4 - W	METALS		Barium	UG/L	73.7000	[] 66.6000	L[]	06/02/90
			Calcium	UG/L	6250.0000	5990.0000		06/02/90
			Chromium	UG/L	2.4000	0.0000	[]	06/02/90
			Iron	UG/L	1950.0000	J 333.0000		06/02/90
			Lead	UG/L	2.9000	0.0000	[]	06/02/90
			Magnesium	UG/L	2560.0000	[] 2340.0000	[]	06/02/90
			Manganese	UG/L	53.8000	30.4000		06/02/90
			Potassium	UG/L	2010.0000	[] 1760.0000	[]	06/02/90
			Sodium	UG/L	8880.0000	8850.0000		06/02/90
			Zinc	UG/L	8.2000	[] 9.4000	[]	06/02/90
	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	18.0000		B	05/26/90
	OTHER		Alkalinity	UG/L	18000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	30000.0000		J	08/18/90
			Hardness	UG/L	34200.0000			08/18/90
			Total Dissolved Solids	MG/L	4.0000		J	08/18/90
GW - 5 - S	ORGANICS	BASE NEUTRALS	bis(2-Ethylhexyl)phthalate	UG/KG	140.0000		J	06/05/90
			Di-n-octylphthalate	UG/KG	370.0000		B	06/05/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	10.0000		B	06/05/90
			Acetone	UG/KG	130.0000			06/05/90
			2-Butanone	UG/KG	25.0000			06/05/90
	OTHER		Total Organic Carbon	UG/G	54217.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	87.0000			08/21/90
			Chromium VI	MG/KG	0.0349		J	05/22/90
			Percent Solids		31.9200			08/21/90
GW - 5 - W	METALS		Aluminum	UG/L	57.7000	0.0000	B[]	05/31/90
			Barium	UG/L	65.9000	[] 68.1000	[]	05/26/90
			Calcium	UG/L	11500.0000	11800.0000		05/26/90
			Copper	UG/L	46.0000	0.0000	B	05/31/90
			Iron	UG/L	1350.0000	566.0000		05/26/90
			Magnesium	UG/L	3100.0000	[] 3230.0000	[]	05/26/90
			Manganese	UG/L	64.5000	J 55.7000		05/26/90
			Mercury	UG/L	0.2100	0.0000		05/31/90
			Potassium	UG/L	2200.0000	[] 2090.0000		05/26/90
			Sodium	UG/L	4580.0000	[] 4560.0000		05/26/90
			Zinc	UG/L	19.4000	0.0000	B[]	05/31/90
	OTHER		Alkalinity	UG/L	30000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	40000.0000		J	08/18/90
			Hardness	UG/L	46200.0000			08/18/90
			Total Dissolved Solids	MG/L	4.0000		J	08/18/90
GW - 6 - S	METALS		Aluminum	MG/KG	4230.0000	0.0000		05/05/90
			Arsenic	MG/KG	3.0000	0.0000		05/05/90
			Barium	MG/KG	38.0000	0.0000	J	05/05/90
			Calcium	MG/KG	922.0000	0.0000	J	05/05/90
			Chromium	MG/KG	5.1000	0.0000		05/05/90
			Copper	MG/KG	5.7000	0.0000		05/05/90
			Iron	MG/KG	5540.0000	0.0000		05/05/90
			Lead	MG/KG	27.2000	0.0000		05/05/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
GX - 6 - S	METALS		Magnesium	MG/KG	264.0000	0.0000	J	05/05/90
			Manganese	MG/KG	21.6000	0.0000	J	05/05/90
			Potassium	MG/KG	252.0000	0.0000		05/05/90
			Sodium	MG/KG	46.5000	0.0000	J	05/05/90
			Vanadium	MG/KG	10.1000	0.0000	J	05/05/90
			Zinc	MG/KG	16.6000	0.0000	J	05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-octylphthalate	UG/KG	990.0000		B	06/05/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	18.0000		B	06/05/90
			Acetone	UG/KG	67.0000		B	06/05/90
	OTHER		Total Organic Carbon	UG/G	42708.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	31.5000			08/21/90
			Chromium VI	MG/KG	0.1404		J	05/22/90
GX - 6 - W	METALS		Aluminum	UG/L	79.8000	0.0000	B []	06/02/90
			Barium	UG/L	67.4000	[] 63.0000	L []	06/02/90
			Calcium	UG/L	10800.0000	11200.0000		06/02/90
			Iron	UG/L	1700.0000	J 533.0000		06/02/90
			Magnesium	UG/L	2830.0000	[] 2970.0000	[]	06/02/90
			Manganese	UG/L	84.4000	33.3000		06/02/90
			Potassium	UG/L	943.0000	[] B 1610.0000	B []	06/02/90
			Sodium	UG/L	4730.0000	[] 4840.0000	[]	06/02/90
			Zinc	UG/L	3.2000	[] 5.7000	[]	06/02/90
	ORGANICS	BASE NEUTRALS	Butylbenzylphthalate	UG/L	4.0000		J	05/26/90
		VOLATILE ORGANICS	Acetone	UG/L	12.0000		B	05/26/90
	OTHER		Alkalinity	UG/L	30000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	100000.0000		J	08/18/90
			Hardness	UG/L	49800.0000			08/18/90
			Total Dissolved Solids	MG/L	16.0000		J	08/18/90
H - 1 - SS	METALS		Arsenic	MG/KG	3.8000	0.0000		05/12/90
			Chromium	MG/KG	7.1000	0.0000		05/12/90
			Copper	MG/KG	9.4000	0.0000		05/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	3100.0000			05/05/90
	OTHER		Dioxin Furans	TOXEQ	1.2940			08/30/90
			Total Organic Carbon	UG/G	15266.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	170.0000			08/21/90
			Chromium VI	MG/KG	0.0155		J	05/22/90
			Percent Solids		98.3900			08/21/90
I - 1 - SS	METALS		Arsenic	MG/KG	3.8000	0.0000		05/12/90
			Chromium	MG/KG	7.0000	0.0000		05/12/90
			Copper	MG/KG	7.8000	0.0000		05/12/90
	OTHER		Dioxin Furans	TOXEQ	0.4130			08/30/90
			Total Organic Carbon	UG/G	11302.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	64.9000			08/21/90
			Chromium VI	MG/KG	0.1177		J	05/22/90
			Percent Solids		92.0200			08/21/90
IS - 1 - S	METALS		Aluminum	MG/KG	4470.0000	0.0000	J	05/05/90
			Antimony	MG/KG	9.5000	0.0000	[]	05/05/90
			Arsenic	MG/KG	7.1000	0.0000		05/05/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Q1	Data Entry Date
IS - 1 - S	METALS		Barium	MG/KG	32.1000	0.0000		05/05/90
			Calcium	MG/KG	1130.0000	0.0000		05/05/90
			Chromium	MG/KG	16.7000	0.0000		05/05/90
			Cobalt	MG/KG	2.6000	0.0000		05/05/90
			Copper	MG/KG	17.1000	0.0000		05/05/90
			Iron	MG/KG	5090.0000	0.0000	J	05/05/90
			Lead	MG/KG	15.5000	0.0000	J	05/05/90
			Magnesium	MG/KG	1060.0000	0.0000		05/05/90
			Manganese	MG/KG	68.1000	0.0000		05/05/90
			Nickel	MG/KG	7.6000	0.0000		05/05/90
			Potassium	MG/KG	1140.0000	0.0000		05/05/90
			Sodium	MG/KG	429.0000	0.0000		05/05/90
			Vanadium	MG/KG	13.3000	0.0000		05/05/90
			Zinc	MG/KG	43.9000	0.0000	J	05/05/90
	ORGANICS	BASE NEUTRALS	Phenanthrene	UG/KG	300.0000		J	05/24/90
			Di-n-butylphthalate	UG/KG	280.0000		J	05/24/90
			Fluoranthene	UG/KG	340.0000		J	05/24/90
			Benzo(a)anthracene	UG/KG	180.0000		J	05/24/90
			Chrysene	UG/KG	210.0000		J	05/24/90
			bis(2-Ethylhexyl)phthalate	UG/KG	150.0000		J	05/24/90
			Benzo(b)fluoranthene	UG/KG	260.0000		J	05/24/90
			Benzo(a)pyrene	UG/KG	160.0000		J	05/24/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	66.0000		B	05/23/90
			Acetone	UG/KG	17.0000		B	05/23/90
			2-Butanone	UG/KG	30.0000		B	05/23/90
	OTHER		Dioxin Furans	TOXEQ	0.0040			08/30/90
			Total Organic Carbon	UG/G	10351.0000		J	09/12/90
			Total Petroleum Hydrocarbons	MG/KG	363.0000			09/12/90
			Percent Solids		81.0400			09/12/90
IS - 1 - W	METALS		Aluminum	UG/L	1070.0000	[ ] B 71.3000		05/31/90
			Arsenic	UG/L	6.8000	[ ] 6.5000	[]	05/31/90
			Barium	UG/L	60.1000	[ ] 52.6000	[]	05/31/90
			Beryllium	UG/L	2.1000	0.0000	B	06/01/90
			Calcium	UG/L	16300.0000	16000.0000		05/31/90
			Copper	UG/L	38.4000	0.0000	B	06/01/90
			Iron	UG/L	2150.0000	502.0000		05/31/90
			Lead	UG/L	3.9000	0.0000		06/01/90
			Magnesium	UG/L	2690.0000	[ ] 2510.0000	[]	05/31/90
			Manganese	UG/L	93.3000	J 74.5000		05/31/90
			Mercury	UG/L	0.4000	0.2300		05/31/90
			Potassium	UG/L	4230.0000	[ ] 4030.0000	[]	05/31/90
			Selenium	UG/L	0.0000	[ ] B 1.5000	B	05/31/90
			Sodium	UG/L	6480.0000	6720.0000		05/31/90
			Zinc	UG/L	50.5000	[ ] 11.7000	B	05/31/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/L	1.0000		B	05/26/90
			Acetone	UG/L	4.0000		B	05/26/90
	OTHER		Alkalinity	UG/L	29000.0000		J	08/18/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
IS - 1 - W	OTHER		Chemical Oxygen Demand	UG/L	20000.0000		J	08/18/90
			Hardness	UG/L	60000.0000			08/18/90
			Total Dissolved Solids	MG/L	32.0000		J	08/18/90
IS - 2 - S	METALS		Aluminum	MG/KG	400.0000	0.0000	J	05/05/90
			Barium	MG/KG	10.1000	0.0000		05/05/90
			Calcium	MG/KG	313.0000	0.0000		05/05/90
			Chromium	MG/KG	2.8000	0.0000		05/05/90
			Iron	MG/KG	819.0000	0.0000	J	05/05/90
			Lead	MG/KG	8.0000	0.0000	J	05/05/90
			Manganese	MG/KG	4.5000	0.0000		05/05/90
			Sodium	MG/KG	365.0000	0.0000		05/05/90
			Zinc	MG/KG	45.6000	0.0000	J	05/05/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/KG	22.0000		B	08/21/90
			Acetone	UG/KG	19.0000		B	08/21/90
	OTHER		Dioxin Furans	TOXEQ	0.0010			08/30/90
			Total Organic Carbon	UG/G	514.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	165.0000			08/21/90
			Chromium VI	MG/KG	0.0969		J	05/22/90
			Percent Solids		81.0200			08/21/90
IS - 2 - W	METALS		Aluminum	UG/L	335.0000 [ ]	B101.0000		05/31/90
			Arsenic	UG/L	0.0000 [ ]	4.4000	[]	05/31/90
			Barium	UG/L	62.5000 [ ]	61.2000	[]	05/31/90
			Beryllium	UG/L	1.8000	0.0000	B[ ]	06/01/90
			Calcium	UG/L	29400.0000	29400.0000		05/31/90
			Copper	UG/L	28.5000	0.0000	B	06/01/90
			Iron	UG/L	907.0000	323.0000		05/31/90
			Lead	UG/L	3.0000	0.0000	[]	06/01/90
			Magnesium	UG/L	4240.0000 [ ]	4450.0000	[]	05/31/90
			Manganese	UG/L	90.5000 J	88.2000		05/31/90
			Potassium	UG/L	4550.0000 [ ]	4490.0000	[]	05/31/90
			Selenium	UG/L	1.8000	0.0000	B[ ]	06/01/90
			Sodium	UG/L	9440.0000	9820.0000		05/31/90
			Zinc	UG/L	94.4000	70.3000	J	05/31/90
	OTHER		Alkalinity	UG/L	39000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	35000.0000		J	08/18/90
			Hardness	UG/L	98200.0000			08/18/90
			Total Dissolved Solids	MG/L	6.0000		J	09/05/90
IS - 3 - S	METALS		Aluminum	MG/KG	1720.0000	0.0000	J	05/05/90
			Calcium	MG/KG	242.0000	0.0000		05/05/90
			Chromium	MG/KG	4.8000	0.0000		05/05/90
			Iron	MG/KG	4770.0000	0.0000	J	05/05/90
			Lead	MG/KG	10.3000	0.0000	J	05/05/90
			Manganese	MG/KG	7.2000	0.0000		05/05/90
			Sodium	MG/KG	302.0000	0.0000		05/05/90
			Vanadium	MG/KG	9.9000	0.0000		05/05/90
			Zinc	MG/KG	32.5000	0.0000	J	05/05/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/KG	7.0000		B	08/21/90

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Listing of Sample Analysis Results
For All Data

Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	QI	Data Entry Date
IS - 3 - S	ORGANICS	VOLATILE ORGANICS	Acetone	UG/KG	11.0000		B	08/21/90
			2-Butanone	UG/KG	18.0000		B	08/21/90
	OTHER		Total Organic Carbon	UG/G	398.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	339.0000			08/21/90
			Chromium VI	MG/KG	0.0252		J	05/22/90
			Percent Solids		82.3800			08/21/90
IS - 3 - W	METALS		Aluminum	UG/L	548.0000 [ ]	72.2000		05/31/90
			Arsenic	UG/L	0.0000 [ ]	5.0000		05/31/90
			Barium	UG/L	60.7000 [ ]	56.4000	[]	05/31/90
			Beryllium	UG/L	2.0000	0.0000	B[ ]	06/01/90
			Calcium	UG/L	2860.0000	28700.0000		05/31/90
			Copper	UG/L	28.1000	0.0000	B	06/01/90
			Iron	UG/L	1260.0000	325.0000		05/31/90
			Lead	UG/L	5.0000 [ ]	1.8000	[]	05/31/90
			Magnesium	UG/L	4230.0000 [ ]	4300.0000	[]	05/31/90
			Manganese	UG/L	96.1000 J	90.6000		05/31/90
			Mercury	UG/L	0.0000	0.2400		05/31/90
			Potassium	UG/L	4410.0000 [ ]	4390.0000	[]	05/31/90
			Selenium	UG/L	0.0000 B[ ]	3.2000	B	05/31/90
			Sodium	UG/L	9100.0000	9440.0000		05/31/90
			Zinc	UG/L	89.6000	58.5000	J	05/31/90
			Cyanide	UG/L	26.4000	0.0000		06/01/90
	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	5.0000		B	05/26/90
	OTHER		Alkalinity	UG/L	39000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	30000.0000		J	08/18/90
			Hardness	UG/L	106000.0000			08/18/90
			Total Dissolved Solids	MG/L	32.0000		J	08/18/90
J - 1 - SS	METALS		Arsenic	MG/KG	2.2000	0.0000		05/12/90
			Chromium	MG/KG	4.0000	0.0000		05/12/90
			Copper	MG/KG	7.7000	0.0000		05/12/90
	OTHER		Dioxin Furans	TOXEQ	0.2330			08/30/90
			Total Organic Carbon	UG/G	4992.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	572.0000			08/22/90
			Chromium VI	MG/KG	0.0896		J	05/22/90
			Percent Solids		95.3700			08/21/90
K - 1 - SS	METALS		Arsenic	MG/KG	14.5000	0.0000		05/12/90
			Chromium	MG/KG	21.6000	0.0000		05/12/90
			Copper	MG/KG	17.1000	0.0000		05/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	67.0000		J	05/05/90
	OTHER		Dioxin Furans	TOXEQ	1.1640			08/30/90
			Total Organic Carbon	UG/G	12409.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	113.0000			08/21/90
			Chromium VI	MG/KG	0.0145		J	05/22/90
			Percent Solids		90.3800			08/21/90
KF - 1 - A	METALS		Aluminum	MG/KG	7070.0000	0.0000		05/05/90
			Arsenic	MG/KG	2.0000	0.0000		05/05/90
			Barium	MG/KG	24.8000	0.0000		05/05/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Q1	Data Entry Date
XY - 1 - A	METALS		Calcium	MG/KG	661.0000	0.0000		05/05/90
			Chromium	MG/KG	6.5000	0.0000		05/05/90
			Copper	MG/KG	2.0000	0.0000		05/05/90
			Iron	MG/KG	3250.0000	0.0000		05/05/90
			Lead	MG/KG	5.8000	0.0000	J	05/05/90
			Magnesium	MG/KG	236.0000	0.0000		05/05/90
			Manganese	MG/KG	18.4000	0.0000		05/05/90
			Potassium	MG/KG	247.0000	0.0000		05/05/90
			Sodium	MG/KG	34.6000	0.0000		05/05/90
			Vanadium	MG/KG	11.3000	0.0000		05/05/90
			Zinc	MG/KG	25.6000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	45.0000		B	07/16/90
			bis(2-Ethylhexyl)phthalate	UG/KG	26.0000		J	07/16/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	120.0000		B	07/16/90
			Acetone	UG/KG	4.0000		B	07/16/90
	OTHER		Dioxin Furans	TOXEQ	0.0210			08/30/90
			Total Organic Carbon	UG/G	1216.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	59.7000			08/21/90
			Chromium VI	MG/KG	0.0676		J	05/22/90
			Percent Solids		84.9800			08/21/90
XY - 2 - A	METALS		Aluminum	MG/KG	7230.0000	0.0000		05/05/90
			Arsenic	MG/KG	2.3000	0.0000		05/05/90
			Barium	MG/KG	13.0000	0.0000		05/05/90
			Calcium	MG/KG	143.0000	0.0000		05/05/90
			Chromium	MG/KG	7.3000	0.0000		05/05/90
			Copper	MG/KG	2.1000	0.0000		05/05/90
			Iron	MG/KG	4180.0000	0.0000		05/05/90
			Lead	MG/KG	4.1000	0.0000	J	05/05/90
			Magnesium	MG/KG	219.0000	0.0000		05/05/90
			Manganese	MG/KG	9.6000	0.0000		05/05/90
			Potassium	MG/KG	223.0000	0.0000		05/05/90
			Sodium	MG/KG	30.4000	0.0000		05/05/90
			Vanadium	MG/KG	51.1000	0.0000		05/05/90
			Zinc	MG/KG	4.6000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	66.0000		B	07/16/90
			Di-n-octylphthalate	UG/KG	75.0000		J	07/16/90
		PESTICIDES/PCB's	Gamma-Chlordane	UG/KG	15.0000		J	08/21/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	95.0000		B	07/16/90
	OTHER		Dioxin Furans	TOXEQ	0.0390			08/30/90
			Total Organic Carbon	UG/G	1371.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	52.9000			08/21/90
			Chromium VI	MG/KG	0.2437		J	05/22/90
			Percent Solids		91.5500			08/21/90
XY - 3 - A	METALS		Aluminum	MG/KG	7850.0000	0.0000		05/05/90
			Arsenic	MG/KG	1.5000	0.0000		05/05/90
			Barium	MG/KG	14.0000	0.0000		05/05/90
			Calcium	MG/KG	497.0000	0.0000		05/05/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
KF - 3 - A	METALS		Chromium	MG/KG	6.9000	0.0000		05/05/90
			Copper	MG/KG	0.9300	0.0000		05/05/90
			Iron	MG/KG	3900.0000	0.0000		05/05/90
			Lead	MG/KG	5.1000	0.0000	J	05/05/90
			Magnesium	MG/KG	233.0000	0.0000		05/05/90
			Manganese	MG/KG	6.0000	0.0000		05/05/90
			Potassium	MG/KG	226.0000	0.0000		05/05/90
			Sodium	MG/KG	29.4000	0.0000		05/05/90
			Vanadium	MG/KG	12.8000	0.0000		05/05/90
			Zinc	MG/KG	3.9000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	bis(2-Ethylhexyl)phthalate	UG/KG	17.0000		J	07/12/90
		PESTICIDES/PCB's	Alpha-Chlordane	UG/KG	3.0000		B	07/12/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	6.0000		B	07/12/90
	OTHER		Dioxin Furans	TOXEQ	0.0240			08/30/90
			Total Organic Carbon	UG/G	2185.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	59.4000			08/21/90
			Chromium VI	MG/KG	0.1321		J	05/22/90
			Percent Solids		90.0200			08/21/90
KF - 3 - AD	OTHER		Dioxin Furans	TOXEQ	0.0070			08/30/90
KF - 4 - A	METALS		Aluminum	MG/KG	5490.0000	0.0000		05/05/90
			Arsenic	MG/KG	1.4000	0.0000		05/05/90
			Barium	MG/KG	15.9000	0.0000		05/05/90
			Calcium	MG/KG	397.0000	0.0000		05/05/90
			Chromium	MG/KG	4.4000	0.0000		05/05/90
			Copper	MG/KG	1.6000	0.0000		05/05/90
			Iron	MG/KG	4460.0000	0.0000		05/05/90
			Lead	MG/KG	3.5000	0.0000	J	05/05/90
			Magnesium	MG/KG	220.0000	0.0000		05/05/90
			Manganese	MG/KG	12.5000	0.0000		05/05/90
			Potassium	MG/KG	212.0000	0.0000		05/05/90
			Sodium	MG/KG	27.6000	0.0000		05/05/90
			Vanadium	MG/KG	10.8000	0.0000		05/05/90
			Zinc	MG/KG	3.9000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	50.0000		B	07/16/90
			bis(2-Ethylhexyl)phthalate	UG/KG	25.0000		J	07/16/90
			Di-n-octylphthalate	UG/KG	14.0000		J	07/16/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	92.0000		B	07/16/90
	OTHER		Dioxin Furans	TOXEQ	0.0020			08/30/90
			Total Organic Carbon	UG/G	938.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	51.7000			08/21/90
			Chromium VI	MG/KG	0.1291		J	05/22/90
			Percent Solids		90.9000			08/21/90
KF - 5 - A	METALS		Aluminum	MG/KG	2490.0000	0.0000	J	05/05/90
			Arsenic	MG/KG	2.8000	0.0000		05/05/90
			Barium	MG/KG	6.1000	0.0000		05/05/90
			Calcium	MG/KG	232.0000	0.0000		05/05/90
			Chromium	MG/KG	6.3000	0.0000		05/05/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
XY - 5 - A	METALS		Iron	MG/KG	1730.0000	0.0000	J	05/05/90
			Lead	MG/KG	5.6000	0.0000	J	05/05/90
			Magnesium	MG/KG	108.0000	0.0000	[]	05/05/90
			Manganese	MG/KG	9.0000	0.0000		05/05/90
			Sodium	MG/KG	256.0000	0.0000		05/05/90
			Vanadium	MG/KG	5.8000	0.0000		05/05/90
			Zinc	MG/KG	9.2000	0.0000	J	05/05/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/KG	16.0000		B	05/23/90
			2-Butanone	UG/KG	21.0000		B	05/23/90
	OTHER		Dioxin Furans	TOXEQ	0.0010			08/30/90
			Total Organic Carbon	UG/G	308.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	113.0000			08/21/90
			Chromium VI	MG/KG	0.9350		J	05/22/90
			Percent Solids		94.6500			08/21/90
XY - 5 - AD	METALS		Aluminum	MG/KG	3710.0000	0.0000	J	05/05/90
			Arsenic	MG/KG	2.1000	0.0000	K	05/05/90
			Barium	MG/KG	9.5000	0.0000		05/05/90
			Calcium	MG/KG	281.0000	0.0000		05/05/90
			Chromium	MG/KG	8.8000	0.0000		05/05/90
			Copper	MG/KG	10.9000	0.0000		05/05/90
			Iron	MG/KG	2820.0000	0.0000	J	05/05/90
			Lead	MG/KG	4.8000	0.0000	J	05/05/90
			Magnesium	MG/KG	162.0000	0.0000		05/05/90
			Manganese	MG/KG	12.9000	0.0000		05/05/90
			Nickel	MG/KG	5.0000	0.0000		05/05/90
			Sodium	MG/KG	232.0000	0.0000		05/05/90
			Vanadium	MG/KG	7.6000	0.0000		05/05/90
			Zinc	MG/KG	12.2000	0.0000	J	05/05/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/KG	29.0000		B	05/23/90
			Acetone	UG/KG	6.0000		B	05/23/90
			2-Butanone	UG/KG	35.0000		B	05/23/90
	OTHER		Total Organic Carbon	UG/G	329.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	317.0000			08/21/90
			Chromium VI	MG/KG	0.6200		J	05/22/90
			Percent Solids		94.9100			08/21/90
XI - 1 - X	METALS		Calcium	UG/L	13700.0000	13500.0000		08/22/90
			Copper	UG/L	9.2000	0.0000	[] B	08/22/90
			Lead	UG/L	3.1000	[] B 1.8000	B[]	08/22/90
			Magnesium	UG/L	1880.0000	[] B 1830.0000	J[]	08/22/90
			Manganese	UG/L	9.8000	[] B 10.0000	B	08/22/90
			Potassium	UG/L	5640.0000	5090.0000		08/22/90
			Sodium	UG/L	27500.0000	27800.0000		08/22/90
			Zinc	UG/L	22.5000	16.7000	B	08/22/90
	OTHER		Total Dissolved Solids	MG/L	167.0000	[] B		05/22/90
L - 1 - SS	METALS		Arsenic	MG/KG	3.5000	0.0000		05/12/90
			Chromium	MG/KG	5.0000	0.0000		05/12/90
			Copper	MG/KG	5.8000	0.0000		05/12/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	QI	Date Entry Date
L - 1 - SS	OTHER		Dioxin Furans	TOXEQ	0.0770			08/30/90
			Total Organic Carbon	UG/G	19124.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	112.0000			08/21/90
			Chromium VI	MG/KG	0.0233		J	05/22/90
			Percent Solids		89.8600			08/21/90
M - 1 - SS	METALS		Arsenic	MG/KG	2.0000	0.0000		05/12/90
			Chromium	MG/KG	2.1000	0.0000		05/12/90
			Copper	MG/KG	3.8000	0.0000		05/12/90
	OTHER		Dioxin Furans	TOXEQ	0.0140			08/30/90
			Total Organic Carbon	UG/G	6535.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	106.0000			08/21/90
			Percent Solids		93.9100			08/21/90
MW - 1 - S	METALS		Aluminum	UG/L	50600.0000	0.0000		08/22/90
			Arsenic	UG/L	8.9000	0.0000	L	08/22/90
			Barium	UG/L	177.0000 [J]	42.6000		07/26/90
			Calcium	UG/L	48800.0000 J	38200.0000	J	07/26/90
			Chromium	UG/L	55.2000	0.0000		08/22/90
			Copper	UG/L	20.5000	0.0000	[]	08/22/90
			Iron	UG/L	33400.0000 [J]	35.6000		07/26/90
			Lead	UG/L	51.2000	0.0000		08/22/90
			Magnesium	UG/L	6290.0000 [J]	4240.0000		07/26/90
			Manganese	UG/L	104.0000	24.6000		07/26/90
			Mercury	UG/L	0.3700	0.0000	L	08/22/90
			Potassium	UG/L	9980.0000 B[J]	6660.0000		07/26/90
			Silver	UG/L	0.0000	4.3000	B	07/26/90
			Sodium	UG/L	13900.0000	13100.0000		07/26/90
			Thallium	UG/L	1.4000	0.0000	[]	08/22/90
			Vanadium	UG/L	91.7000	0.0000	[]	08/22/90
			Zinc	UG/L	169.0000	35.3000		07/26/90
			Cyanide	UG/L	19.4000	0.0000	L	08/22/90
MW - 2 - D	METALS		Aluminum	UG/L	957.0000	256.0000		07/26/90
			Arsenic	UG/L	6.1000 L[J]	4.0000	L[J]	07/26/90
			Barium	UG/L	41.9000	0.0000	[]	08/22/90
			Calcium	UG/L	29300.0000 J	9010.0000	J	07/26/90
			Iron	UG/L	1410.0000 [J]	31.2000		07/26/90
			Lead	UG/L	1.3000	0.0000	[]	08/22/90
			Magnesium	UG/L	1440.0000 [J]	768.0000	[]	07/26/90
			Manganese	UG/L	13.7000	0.0000	[]	08/22/90
			Potassium	UG/L	24900.0000	21800.0000		07/26/90
			Selenium	UG/L	2.9000	0.0000	B	08/22/90
			Sodium	UG/L	40300.0000	35600.0000		07/26/90
			Zinc	UG/L	151.0000	30.4000		07/26/90
			Cyanide	UG/L	16.7000	0.0000	L	08/22/90
	ORGANICS	BASE NEUTRALS	Phenol	UG/L	3.0000		J	05/25/90
			bis(2-Ethylhexyl)phthalate	UG/L	2.0000		J	05/25/90
		VOLATILE ORGANICS	Acetone	UG/L	8.0000		J	05/25/90
	OTHER		Total Dissolved Solids	MG/L	316.0000			05/22/90

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* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Date Entry Date
MW - 3 - S	METALS		Aluminum	UG/L	91400.0000	0.0000		07/24/90
			Antimony	UG/L	58.0000	[ ]B 21.0000	B[ ]	07/24/90
			Arsenic	UG/L	3.3000	0.0000	L[ ]	07/24/90
			Barium	UG/L	186.0000	[ ]B 13.4000	[ ]	07/24/90
			Beryllium	UG/L	1.4000	0.0000	B[ ]	07/24/90
			Cadmium	UG/L	3.6000	0.0000	B[ ]	07/24/90
			Calcium	UG/L	28000.0000	19400.0000		07/24/90
			Chromium	UG/L	83.2000	0.0000		07/24/90
			Cobalt	UG/L	9.6100	0.0000	[]	07/24/90
			Copper	UG/L	212.0000	0.0000		07/24/90
			Iron	UG/L	30300.0000	0.0000		07/24/90
			Lead	UG/L	55.0000	0.0000	L	07/24/90
			Magnesium	UG/L	3920.0000	[ ] 942.0000	[ ]	07/24/90
			Manganese	UG/L	79.6000	[ ]B 9.1000		07/24/90
			Nickel	UG/L	20.0000	0.0000	B[ ]	07/24/90
			Potassium	UG/L	4990.0000	[ ] 1180.0000	[]	07/24/90
			Silver	UG/L	9.1000	0.0000	L[ ]	07/24/90
			Sodium	UG/L	7450.0000	7080.0000		07/24/90
			Vanadium	UG/L	130.0000	0.0000		07/24/90
			Zinc	UG/L	110.0000	[ ]B 18.0000		07/24/90
	ORGANICS	BASE NEUTRALS	bis(2-Ethylhexyl)phthalate	UG/L	1.0000		B	08/21/90
	OTHER		Total Dissolved Solids	MG/L	471.0000			05/22/90
MW - 4 - II	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/L	19000.0000		J	10/16/90
MW - 4 - X	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/L	17000.0000		J	10/16/90
MW - 4 - S	METALS		Aluminum	UG/L	53500.0000	1180.0000		07/21/90
			Antimony	UG/L	20.0000	0.0000	B[ ]	07/21/90
			Arsenic	UG/L	22.0000	[ ] 5.2000	L	07/21/90
			Barium	UG/L	234.0000	[ ] 55.7000		07/21/90
			Cadmium	UG/L	3.4000	0.0000	B[ ]	07/21/90
			Calcium	UG/L	26200.0000	21600.0000		07/21/90
			Chromium	UG/L	151.0000	27.8000		07/21/90
			Cobalt	UG/L	14.5000	0.0000	[ ]	07/21/90
			Copper	UG/L	246.0000	[ ] 11.2000		07/21/90
			Iron	UG/L	66500.0000	8580.0000		07/21/90
			Lead	UG/L	100.0000	[ ] 1.1000	L	07/21/90
			Magnesium	UG/L	3820.0000	[ ] 1240.0000	[ ]	07/21/90
			Manganese	UG/L	683.0000	515.0000		07/21/90
			Nickel	UG/L	27.1000	0.0000	B[ ]	07/21/90
			Potassium	UG/L	9060.0000	5730.0000		07/21/90
			Sodium	UG/L	11800.0000	11900.0000		07/21/90
			Vanadium	UG/L	120.0000	0.0000		07/21/90
			Zinc	UG/L	404.0000	268.0000		07/21/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/L	15000.0000		L	06/07/90
			Phenanthrene	UG/L	5.0000		J	06/07/90
		VOLATILE ORGANICS	Toluene	UG/L	6.0000			06/07/90
			Ethylbenzene	UG/L	5.0000		J	06/07/90
			Total Xylenes	UG/L	49.0000			06/07/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
MW - 4 - S	OTHER		Total Dissolved Solids	MG/L	667.0000			05/22/90
MW - 5 - S	METALS		Aluminum	UG/L	93600.0000	[ ] 75.7000		07/26/90
			Arsenic	UG/L	9.6000	0.0000	[] L	08/22/90
			Barium	UG/L	384.0000	0.0000		08/22/90
			Beryllium	UG/L	3.3000	0.0000	[]	08/22/90
			Cadmium	UG/L	13.1000	0.0000		08/22/90
			Calcium	UG/L	71500.0000	J 45600.0000	J	07/26/90
			Chromium	UG/L	136.0000	0.0000		08/22/90
			Copper	UG/L	62.6000	0.0000		08/22/90
			Iron	UG/L	38200.0000	0.0000		08/22/90
			Lead	UG/L	192.0000	0.0000		08/22/90
			Magnesium	UG/L	5740.0000	[ ] 2340.0000		07/26/90
			Manganese	UG/L	184.0000	[ ] 12.2000		07/26/90
			Mercury	UG/L	0.5400	0.0000	L	08/22/90
			Potassium	UG/L	10900.0000	5940.0000		07/26/90
			Sodium	UG/L	20900.0000	21000.0000		07/26/90
			Vanadium	UG/L	232.0000	0.0000		08/22/90
			Zinc	UG/L	282.0000	[ ] 14.4000		07/26/90
	OTHER		Total Dissolved Solids	MG/L	987.0000			05/22/90
MW - 6 - CL	METALS		Arsenic	MG/KG	2.5000	0.0000	K	05/12/90
			Chromium	MG/KG	10.2000	0.0000	J	05/12/90
			Copper	MG/KG	11.2000	0.0000	J	05/12/90
MW - 6 - D	METALS		Aluminum	UG/L	3970.0000	0.0000		08/22/90
			Arsenic	UG/L	9.6000	0.0000	L[ ]	08/22/90
			Barium	UG/L	81.9000	[ ] 39.8000	[]	07/26/90
			Calcium	UG/L	107000.0000	J 54200.0000	J	07/26/90
			Chromium	UG/L	20.1000	0.0000		08/22/90
			Copper	UG/L	25.5000	0.0000		08/22/90
			Iron	UG/L	29000.0000	0.0000		08/22/90
			Lead	UG/L	8.6000	0.0000		08/22/90
			Magnesium	UG/L	14300.0000	[ ] 3170.0000		07/26/90
			Manganese	UG/L	410.0000	231.0000		07/26/90
			Potassium	UG/L	8060.0000	10400.0000		07/26/90
			Selenium	UG/L	2.0000	0.0000	B [ ]	08/22/90
			Silver	UG/L	4.7000	B [ ] 5.2000	B [ ]	07/26/90
			Sodium	UG/L	12900.0000	12300.0000		07/26/90
			Zinc	UG/L	375.0000	53.5000		07/26/90
	OTHER		Total Dissolved Solids	MG/L	353.0000			05/22/90
MW - 7 - ID	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/L	28.0000			10/16/90
MW - 7 - II	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/L	25.0000			10/16/90
MW - 7 - S	METALS		Aluminum	UG/L	26500.0000	0.0000		07/21/90
			Arsenic	UG/L	82.0000	49.0000	L	07/21/90
			Barium	UG/L	188.0000	69.1000	[]	07/21/90
			Calcium	UG/L	37300.0000	33700.0000		07/21/90
			Chromium	UG/L	238.0000	17.8000		07/21/90
			Copper	UG/L	15.9000	0.0000	[]	07/21/90
			Iron	UG/L	210.0000	[ ] B 26.3000		07/21/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Q1	Data Entry Date
MW - 7 - S	METALS		Lead	UG/L	17.0000	0.0000	L	07/21/90
			Magnesium	UG/L	5140.0000	3930.0000		07/21/90
			Manganese	UG/L	90.2000	50.0000		07/21/90
			Nickel	UG/L	9.6000	0.0000	B	07/21/90
			Potassium	UG/L	8180.0000	6650.0000		07/21/90
			Sodium	UG/L	4810.0000	4510.0000		07/21/90
			Vanadium	UG/L	54.0000	0.0000		07/21/90
			Zinc	UG/L	81.6000	34.9000		07/21/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/L	10.0000		J	06/07/90
			Di-n-octylphthalate	UG/L	1.0000		J	06/07/90
	OTHER		Chromium VI	UG/L	12.0000			06/07/90
			Total Dissolved Solids	MG/L	464.0000			08/21/90
MW - 8 - CL	METALS		Arsenic	MG/KG	21.0000	0.0000	K	05/12/90
			Chromium	MG/KG	11.9000	0.0000	J	05/12/90
			Copper	MG/KG	4.6000	0.0000	J	05/12/90
MW - 8 - D	METALS		Aluminum	UG/L	3740.0000	0.0000		07/21/90
			Antimony	UG/L	15.0000	0.0000	B	07/21/90
			Arsenic	UG/L	11.0000	0.0000	L	07/21/90
			Barium	UG/L	93.7000	66.9000		07/21/90
			Calcium	UG/L	87300.0000	67700.0000		07/21/90
			Chromium	UG/L	15.5000	0.0000		07/21/90
			Copper	UG/L	169.0000	0.0000		07/21/90
			Iron	UG/L	39600.0000	713.0000		07/21/90
			Lead	UG/L	74.0000	0.0000	L	07/21/90
			Magnesium	UG/L	8660.0000	5040.0000		07/21/90
			Manganese	UG/L	621.0000	350.0000		07/21/90
			Nickel	UG/L	10.7000	0.0000	B	07/21/90
			Potassium	UG/L	12500.0000	13100.0000		07/21/90
			Sodium	UG/L	11000.0000	10900.0000		07/21/90
			Vanadium	UG/L	14.0000	5.1000		07/21/90
			Zinc	UG/L	229.0000	63.1000		07/21/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/L	160.0000			06/07/90
			bis(2-Ethylhexyl)phthalate	UG/L	2.0000		B	06/07/90
			Di-n-octylphthalate	UG/L	1.0000		J	06/07/90
	OTHER		Total Dissolved Solids	MG/L	413.0000			05/22/90
MW - 8 - II	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/L	11.0000		J	10/15/90
MW - 9 - S	METALS		Aluminum	UG/L	34800.0000	0.0000		08/22/90
			Arsenic	UG/L	4.7000	0.0000	L	08/22/90
			Barium	UG/L	99.9000	0.0000		08/22/90
			Beryllium	UG/L	0.8400	0.0000		08/22/90
			Calcium	UG/L	24800.0000	13200.0000	J	07/26/90
			Chromium	UG/L	143.0000	7.7000		07/26/90
			Copper	UG/L	170.0000	0.0000		08/22/90
			Iron	UG/L	54400.0000	0.0000		08/22/90
			Lead	UG/L	116.0000	2.1000		07/26/90
			Magnesium	UG/L	3270.0000	1430.0000		07/26/90
			Manganese	UG/L	1830.0000	51.4000		07/26/90

Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Q1	Data Entry Date
MW - 9 - S	METALS		Potassium	UG/L	4780.0000	2130.0000	[]	07/26/90
			Sodium	UG/L	5580.0000	5840.0000		07/26/90
			Vanadium	UG/L	21.8000	0.0000	[]	08/22/90
			Zinc	UG/L	123.0000	22.0000		07/26/90
	OTHER		Total Dissolved Solids	MG/L	195.0000			05/12/90
MW - 9 - SD	METALS		Aluminum	UG/L	36200.0000	0.0000		08/22/90
			Arsenic	UG/L	3.8000	0.0000	L	08/22/90
			Barium	UG/L	117.0000	0.0000	[]	08/22/90
			Beryllium	UG/L	1.1000	0.0000	[]	08/22/90
			Calcium	UG/L	25500.0000	13100.0000	J	07/28/90
			Chromium	UG/L	154.0000	9.2000		07/28/90
			Copper	UG/L	75.1000	0.0000		08/22/90
			Iron	UG/L	47600.0000	0.0000		08/22/90
			Lead	UG/L	102.0000	2.8000		07/28/90
			Magnesium	UG/L	3210.0000	1320.0000	[]	07/28/90
			Manganese	UG/L	1520.0000	49.2000		07/28/90
			Potassium	UG/L	4920.0000	2760.0000	[]	07/28/90
			Sodium	UG/L	6150.0000	5850.0000		07/28/90
			Zinc	UG/L	119.0000	24.9000		07/28/90
	ORGANICS	BASE NEUTRALS	bis(2-Ethylhexyl)phthalate	UG/L	2.0000		J	05/25/90
MW - 10 - CD	METALS		Arsenic	MG/KG	16.3000	0.0000	K	05/12/90
			Chromium	MG/KG	17.7000	0.0000	J	05/12/90
MW - 10 - CL	METALS		Arsenic	MG/KG	14.3000	0.0000	K	05/12/90
			Chromium	MG/KG	17.8000	0.0000	J	05/12/90
MW - 10 - D	METALS		Aluminum	UG/L	13700.0000	0.0000		08/22/90
			Arsenic	UG/L	13.8000	0.0000	L	08/22/90
			Barium	UG/L	89.4000	31.5000	[]	07/28/90
			Beryllium	UG/L	0.7600	0.0000	[]	08/22/90
			Cadmium	UG/L	29.5000	0.0000		08/22/90
			Calcium	UG/L	367000.0000	48500.0000	J	07/28/90
			Chromium	UG/L	61.9000	0.0000		08/22/90
			Copper	UG/L	453.0000	0.0000		08/22/90
			Iron	UG/L	47900.0000	0.0000		08/22/90
			Lead	UG/L	318.0000	6.5000		07/28/90
			Magnesium	UG/L	49100.0000	2680.0000		07/28/90
			Manganese	UG/L	754.0000	80.5000		07/28/90
			Potassium	UG/L	12200.0000	8610.0000		07/28/90
			Sodium	UG/L	22000.0000	18000.0000		07/28/90
			Vanadium	UG/L	22.2000	0.0000	[]	08/22/90
			Zinc	UG/L	741.0000	13.0000		07/28/90
	ORGANICS	BASE NEUTRALS	bis(2-Ethylhexyl)phthalate	UG/L	3.0000		J	05/25/90
MW - 11 - S	METALS		Aluminum	UG/L	11600.0000	0.0000		08/22/90
			Arsenic	UG/L	28.3000	0.0000	L	08/22/90
			Barium	UG/L	59.5000	30.3000	[]	07/28/90
			Beryllium	UG/L	3.4000	0.0000	[]	08/22/90
			Cadmium	UG/L	5.3000	0.0000		08/22/90
			Calcium	UG/L	28200.0000	11400.0000	J	07/28/90

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* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
MW - 11 - S	METALS		Chromium	UG/L	27.9000	0.0000		08/22/90
			Copper	UG/L	493.0000	0.0000		08/22/90
			Iron	UG/L	46600.0000	0.0000		08/22/90
			Lead	UG/L	282.0000	0.0000		08/22/90
			Magnesium	UG/L	3580.0000	[] 1250.0000	[]	07/28/90
			Manganese	UG/L	451.0000	171.0000		07/28/90
			Potassium	UG/L	4010.0000	[] 3480.0000	[]	07/28/90
			Sodium	UG/L	9270.0000	0.0000		08/22/90
			Vanadium	UG/L	37.5000	0.0000	[]	08/22/90
			Zinc	UG/L	322.0000	72.5000		07/28/90
	ORGANICS	BASE NEUTRALS	bis(2-Ethylhexyl)phthalate	UG/L	5.0000		J	05/25/90
	OTHER		Total Dissolved Solids	MG/L	460.0000			05/22/90
MW - 12 - CL	METALS		Arsenic	MG/KG	8.1000	0.0000	K	05/12/90
			Chromium	MG/KG	18.4000	0.0000	J	05/12/90
			Copper	MG/KG	2.3000	0.0000	J	05/12/90
MW - 12 - B	METALS		Aluminum	UG/L	4180.0000	0.0000		08/22/90
			Arsenic	UG/L	7.7000	0.0000	L[]	08/22/90
			Barium	UG/L	57.7000	[] 27.6000	[]	07/28/90
			Calcium	UG/L	152000.0000	58700.0000	J	07/28/90
			Chromium	UG/L	12.5000	0.0000		08/22/90
			Copper	UG/L	214.0000	0.0000		08/22/90
			Iron	UG/L	26100.0000	0.0000		08/22/90
			Lead	UG/L	53.2000	0.0000		08/22/90
			Magnesium	UG/L	19700.0000	[] 3400.0000		07/28/90
			Manganese	UG/L	443.0000	239.0000		07/28/90
			Potassium	UG/L	4460.0000	2560.0000	[]	07/28/90
			Sodium	UG/L	7200.0000	6670.0000		07/28/90
			Zinc	UG/L	168.0000	33.1000		07/28/90
	ORGANICS	BASE NEUTRALS	bis(2-Ethylhexyl)phthalate	UG/L	3.0000		J	05/25/90
	OTHER		Total Dissolved Solids	MG/L	516.0000			05/22/90
MW - 13 - S	METALS		Aluminum	UG/L	48500.0000	0.0000		08/22/90
			Arsenic	UG/L	29.3000	0.0000	L	08/22/90
			Barium	UG/L	339.0000	[] 76.4000		07/28/90
			Beryllium	UG/L	13.4000	0.0000		08/22/90
			Cadmium	UG/L	8.6000	0.0000		08/22/90
			Calcium	UG/L	322000.0000	153000.0000	J	07/28/90
			Chromium	UG/L	108.0000	0.0000		08/22/90
			Copper	UG/L	120.0000	0.0000		08/22/90
			Iron	UG/L	119000.0000	5090.0000		07/28/90
			Lead	UG/L	244.0000	0.0000		08/22/90
			Magnesium	UG/L	31400.0000	6370.0000		07/28/90
			Manganese	UG/L	1460.0000	841.0000		07/28/90
			Mercury	UG/L	1.5000	0.0000	L	08/22/90
			Potassium	UG/L	17200.0000	11700.0000		07/28/90
			Sodium	UG/L	12300.0000	10900.0000		07/28/90
			Vanadium	UG/L	101.0000	0.0000		08/22/90
			Zinc	UG/L	480.0000	0.0000		08/22/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
MW - 13 - S	OTHER		Total Dissolved Solids	MG/L	666.0000			05/22/90
MW - 14 - CL	METALS		Arsenic	MG/KG	6.3000	0.0000	K	05/12/90
			Chromium	MG/KG	10.4000	0.0000	J	05/12/90
MW - 14 - D	METALS		Aluminum	UG/L	13500.0000	0.0000		07/28/90
			Arsenic	UG/L	5.8000	[ ] 3.2000	[]	07/28/90
			Barium	UG/L	93.7000	[ ] 47.8000	[]	07/28/90
			Beryllium	UG/L	0.8200	0.0000	B[ ]	07/28/90
			Calcium	UG/L	216000.0000	72800.0000		07/28/90
			Chromium	UG/L	19.0000	0.0000	L	07/28/90
			Copper	UG/L	328.0000	8.8000		07/28/90
			Iron	UG/L	21400.0000	0.0000	J	07/28/90
			Lead	UG/L	98.0000	[ ] B 1.2000		07/28/90
			Magnesium	UG/L	24400.0000	J 5040.0000	J	07/28/90
			Manganese	UG/L	609.0000	J 329.0000	J	07/28/90
			Potassium	UG/L	29000.0000	27400.0000		07/28/90
			Selenium	UG/L	0.0000	[ ] B 2.3000	B	08/22/90
			Sodium	UG/L	42500.0000	38500.0000		07/28/90
			Zinc	UG/L	208.0000	B 63.7000		07/28/90
	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	5.0000		J	05/25/90
	OTHER		Total Dissolved Solids	MG/L	428.0000			05/22/90
MW - 15 - II	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/L	240.0000		J	10/16/90
MW - 16 - II	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/L	4100.0000		J	10/16/90
MW - 19 - DS	OTHER		Percent Organic Matter	PERC.	1.9000			10/16/90
MW - 19 - II	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/L	1.0000		J	10/16/90
	OTHER		Total Petroleum Hydrocarbons	MG/L	1.4000			10/16/90
N - 1 - SS	METALS		Arsenic	MG/KG	0.9300	0.0000		05/12/90
			Chromium	MG/KG	1.4000	0.0000		05/12/90
			Copper	MG/KG	1.8000	0.0000		05/12/90
	OTHER		Dioxin Furans	TOXEQ	0.0110			08/30/90
			Total Organic Carbon	UG/G	4050.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	81.0000			08/21/90
			Percent Solids		96.5600			08/21/90
OR - 1 - II	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/L	300.0000		J	05/21/91
OW - 1 - RW	METALS		Aluminum	UG/L	157.0000	0.0000	[]	07/24/90
			Antimony	UG/L	18.0000	[ ] B 17.0000	B[ ]	07/24/90
			Barium	UG/L	42.9000	[ ] 41.2000	[]	07/24/90
			Calcium	UG/L	25100.0000	25900.0000		07/24/90
			Iron	UG/L	5080.0000	[ ] B 5.4000		07/24/90
			Magnesium	UG/L	2490.0000	[ ] 2530.0000	[]	07/24/90
			Manganese	UG/L	304.0000	301.0000		07/24/90
			Mercury	UG/L	0.1700	0.0000	[]	07/24/90
			Potassium	UG/L	2240.0000	[ ] 1860.0000	[]	07/24/90
			Silver	UG/L	9.2500	0.0000	L[ ]	07/24/90
			Sodium	UG/L	5100.0000	[ ] 4900.0000		07/24/90
			Zinc	UG/L	25.0000	20.1000	B	07/24/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/L	95.0000			08/21/90
			bis(2-Ethylhexyl)phthalate	UG/L	2.0000		B	08/21/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
OW - 1 - RN	OTHER		Total Dissolved Solids	MG/L	225.0000			08/21/90
OW - 1 - W	METALS		Aluminum	UG/L	3960.0000	[ ] 45.9000	J	08/21/90
			Arsenic	UG/L	4.0000	0.0000	[]	08/21/90
			Barium	UG/L	71.9000	[ ] 39.6000	[]	08/21/90
			Calcium	UG/L	42000.0000	38800.0000		08/21/90
			Chromium	UG/L	11.3000	[ ] B 7.1000	B	08/21/90
			Cobalt	UG/L	2.4000	0.0000	B[ ]	08/21/90
			Copper	UG/L	30.3000	B 7.8000	J	08/21/90
			Iron	UG/L	14800.0000	5070.0000		08/21/90
			Lead	UG/L	21.6000	0.0000		08/21/90
			Magnesium	UG/L	3330.0000	[ ] J 3080.0000	J[ ]	08/21/90
			Manganese	UG/L	388.0000	342.0000		08/21/90
			Potassium	UG/L	7550.0000	7200.0000		08/21/90
			Silver	UG/L	2.4000	[ ] B 2.6000	B[ ]	08/21/90
			Sodium	UG/L	10900.0000	10500.0000		08/21/90
			Vanadium	UG/L	9.0000	[ ] B 5.3000	B[ ]	08/21/90
			Zinc	UG/L	74.3000	B 23.9000		08/21/90
			Cyanide	UG/L	143.0000	0.0000		08/21/90
	ORGANICS	BASE NEUTRALS	Naphthalene	UG/L	3.0000		J	06/02/90
			2-Methylnaphthalene	UG/L	2.0000		J	06/02/90
			Acenaphthene	UG/L	3.0000		J	06/02/90
			bis(2-Ethylhexyl)phthalate	UG/L	5.0000		B	06/02/90
		VOLATILE ORGANICS	Methylene Chloride	UG/L	1.0000		B	06/02/90
	OTHER		Total Dissolved Solids	MG/L	281.0000			05/22/90
OW - 2 - W	METALS		Aluminum	UG/L	18200.0000	[ ] 87.7000	J	08/21/90
			Arsenic	UG/L	14.0000	0.0000		08/21/90
			Barium	UG/L	67.4000	[ ] B 17.5000	[]	08/21/90
			Beryllium	UG/L	2.3000	0.0000	[]	08/21/90
			Calcium	UG/L	17900.0000	15100.0000		08/21/90
			Chromium	UG/L	29.5000	[ ] B 7.5000	B	08/21/90
			Cobalt	UG/L	3.2000	0.0000	B[ ]	08/21/90
			Copper	UG/L	11.1000	[ ] B 6.6000	B[ ]	08/21/90
			Iron	UG/L	15200.0000	[ ] B 39.9000		08/21/90
			Lead	UG/L	13.4000	0.0000		08/21/90
			Magnesium	UG/L	2090.0000	[ ] J 1180.0000	J[ ]	08/21/90
			Manganese	UG/L	33.2000	[ ] 8.6000		08/21/90
			Nickel	UG/L	5.4000	0.0000	B[ ]	08/21/90
			Potassium	UG/L	6420.0000	[ ] 4630.0000		08/21/90
			Silver	UG/L	0.0000	[ ] B 2.8000	B	08/21/90
			Sodium	UG/L	20700.0000	16900.0000		08/21/90
			Vanadium	UG/L	58.4000	[ ] B 11.4000		08/21/90
			Zinc	UG/L	135.0000	B 25.6000		08/21/90
			Cyanide	UG/L	6.0000	0.0000	[]	08/21/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/L	3.0000		B	06/02/90
	OTHER		Total Dissolved Solids	MG/L	474.0000		[]	05/22/90
OW - 2 - WD	METALS		Aluminum	UG/L	5870.0000	[ ] B 28.5000	J	08/21/90
			Arsenic	UG/L	9.0000	3.0000	[]	08/21/90

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* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	QI	Data Entry Date
OW - 2 - WD	METALS		Barium	UG/L	33.8000	15.1000		08/21/90
			Calcium	UG/L	17300.0000	15500.0000		08/21/90
			Chromium	UG/L	9.8000	0.0000	B	08/21/90
			Copper	UG/L	31.2000	5.0000	J	08/21/90
			Iron	UG/L	5660.0000	28.9000		08/21/90
			Lead	UG/L	7.1000	0.0000		08/21/90
			Magnesium	UG/L	1520.0000	1260.0000	J	08/21/90
			Manganese	UG/L	21.0000	12.3000		08/21/90
			Potassium	UG/L	5900.0000	5060.0000		08/21/90
			Sodium	UG/L	21700.0000	20100.0000		08/21/90
			Vanadium	UG/L	29.0000	11.5000		08/21/90
			Zinc	UG/L	89.4000	41.7000		08/21/90
			Cyanide	UG/L	5.0000	0.0000		08/21/90
	ORGANICS	BASE NEUTRALS	bis(2-Ethylhexyl)phthalate	UG/L	1.0000		B	06/02/90
		VOLATILE ORGANICS	Methylene Chloride	UG/L	6.0000		B	06/02/90
	OTHER		Total Dissolved Solids	MG/L	348.0000			05/22/90
OW - 3 - W	METALS		Aluminum	UG/L	4730.0000	31.6000	J	08/21/90
			Arsenic	UG/L	2.0000	0.0000		08/21/90
			Barium	UG/L	34.2000	23.8000		08/21/90
			Calcium	UG/L	24400.0000	25100.0000		08/21/90
			Chromium	UG/L	15.6000	10.6000	B	08/21/90
			Cobalt	UG/L	3.4000	0.0000	B	08/21/90
			Copper	UG/L	120.0000	7.2000	J	08/21/90
			Iron	UG/L	3780.0000	25.2000		08/21/90
			Lead	UG/L	80.9000	0.0000		08/21/90
			Magnesium	UG/L	1310.0000	1120.0000	J	08/21/90
			Manganese	UG/L	159.0000	133.0000		08/21/90
			Nickel	UG/L	6.5000	0.0000	B	08/21/90
			Potassium	UG/L	2890.0000	2500.0000		08/21/90
			Silver	UG/L	2.5000	2.9000	B	08/21/90
			Sodium	UG/L	27900.0000	28000.0000		08/21/90
			Vanadium	UG/L	8.2000	4.1000	B	08/21/90
			Zinc	UG/L	102.0000	47.2000		08/21/90
			Cyanide	UG/L	6.0000	0.0000		08/21/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/L	6.0000		B	06/02/90
	OTHER		Total Dissolved Solids	MG/L	349.0000			05/22/90
OW - 4 - W	METALS		Aluminum	UG/L	13800.0000	47.9000	J	08/21/90
			Arsenic	UG/L	20.0000	3.0000		08/21/90
			Barium	UG/L	61.1000	25.8000		08/21/90
			Calcium	UG/L	116000.0000	110000.0000		08/21/90
			Chromium	UG/L	31.0000	19.2000	B	08/21/90
			Cobalt	UG/L	5.6000	0.0000	B	08/21/90
			Copper	UG/L	21.1000	8.5000	B	08/21/90
			Iron	UG/L	14900.0000	19.9000		08/21/90
			Lead	UG/L	21.9000	0.0000		08/21/90
			Magnesium	UG/L	4510.0000	3830.0000	J	08/21/90
			Manganese	UG/L	430.0000	342.0000		08/21/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION *						Level/			Data
						Non-Dissolved	Dissolved		Entry
Location - Sample# - Type	Test	Group	Parameter	Units		Metals	Metals	Ql	Date
OW - 4 - W	METALS		Nickel	UG/L		7.6000	3.4000	B	08/21/90
			Potassium	UG/L		6380.0000	5210.0000		08/21/90
			Silver	UG/L		5.1000	6.1000	B	08/21/90
			Sodium	UG/L		6670.0000	6140.0000		08/21/90
			Vanadium	UG/L		36.2000	4.9000		08/21/90
			Zinc	UG/L		89.6000	14.1000		08/21/90
			Cyanide	UG/L		155.0000	0.0000		08/21/90
	ORGANICS	BASE NEUTRALS	Isophorone	UG/L		1.0000		J	06/02/90
			Acenaphthene	UG/L		4.0000		J	06/02/90
			bis(2-Ethylhexyl)phthalate	UG/L		1.0000		B	06/02/90
		VOLATILE ORGANICS	Methylene Chloride	UG/L		1.0000		B	06/02/90
	OTHER		Total Dissolved Solids	MG/L		727.0000			05/22/90
PA - 1 - A	METALS		Arsenic	MG/KG		2.2000	0.0000	K	05/12/90
			Chromium	MG/KG		1.9000	0.0000	J	05/12/90
			Copper	MG/KG		10.3000	0.0000	J	05/12/90
	OTHER		Dioxin Furans	TOXEQ		0.2010			08/30/90
			Total Organic Carbon	UG/G		1049.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG		50.6000			08/21/90
			Chromium VI	MG/KG		0.3242		J	05/22/90
			Percent Solids			92.8800			08/21/90
PA - 1 - B	OTHER		Dioxin Furans	TOXEQ		0.0030			08/30/90
			Total Organic Carbon	UG/G		752.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG		22.0000			08/21/90
			Chromium VI	MG/KG		0.2478		J	05/22/90
			Percent Solids			85.3700			08/21/90
PA - 1 - D	METALS		Aluminum	MG/KG		6200.0000	0.0000		05/05/90
			Arsenic	MG/KG		2.0000	0.0000		05/05/90
			Barium	MG/KG		10.9000	0.0000	J	05/05/90
			Calcium	MG/KG		517.0000	0.0000	J	05/05/90
			Chromium	MG/KG		5.9000	0.0000		05/05/90
			Copper	MG/KG		4.7000	0.0000		05/05/90
			Iron	MG/KG		4990.0000	0.0000		05/05/90
			Lead	MG/KG		4.8000	0.0000		05/05/90
			Magnesium	MG/KG		268.0000	0.0000	J	05/05/90
			Manganese	MG/KG		7.5000	0.0000	J	05/05/90
			Potassium	MG/KG		204.0000	0.0000		05/05/90
			Sodium	MG/KG		270.0000	0.0000	J	05/05/90
			Vanadium	MG/KG		13.4000	0.0000	J	05/05/90
			Zinc	MG/KG		8.2000	0.0000	J	05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-octylphthalate	UG/KG		130.0000		B	08/21/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG		30.0000		B	08/21/90
			Acetone	UG/KG		11.0000		B	08/21/90
			2-Butanone	UG/KG		35.0000		B	08/21/90
PA - 2 - A	OTHER		Dioxin Furans	TOXEQ		0.3070			08/30/90
			Total Organic Carbon	UG/G		1571.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG		25.1000			08/21/90
			Chromium VI	MG/KG		0.0516		J	05/22/90

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
PA - 2 - A	OTHER		Percent Solids		94.9100			08/21/90
PA - 2 - AD	OTHER		Dioxin Furans	TOXEQ	0.4770			08/30/90
			Total Organic Carbon	UG/G	2486.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	36.1000			08/21/90
PA - 2 - B	OTHER		Percent Solids		94.9600			08/21/90
			Dioxin Furans	TOXEQ	0.1660			08/30/90
			Total Organic Carbon	UG/G	863.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	22.9000			08/21/90
			Chromium VI	MG/KG	0.2827		J	05/22/90
PA - 2 - C	OTHER		Percent Solids		88.4300			08/21/90
			Dioxin Furans	TOXEQ	0.0610			08/30/90
			Total Organic Carbon	UG/G	644.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	54.3000			08/21/90
			Chromium VI	MG/KG	0.0575		J	05/22/90
PA - 2 - D	METALS		Percent Solids		85.7400			08/21/90
			Aluminum	MG/KG	2090.0000	0.0000		05/05/90
			Arsenic	MG/KG	0.9700	0.0000		05/05/90
			Barium	MG/KG	9.3000	0.0000	J	05/05/90
			Calcium	MG/KG	423.0000	0.0000	J	05/05/90
			Chromium	MG/KG	3.6000	0.0000		05/05/90
			Copper	MG/KG	1.8000	0.0000		05/05/90
			Iron	MG/KG	2740.0000	0.0000		05/05/90
			Lead	MG/KG	2.9000	0.0000		05/05/90
			Magnesium	MG/KG	431.0000	0.0000	J	05/05/90
			Manganese	MG/KG	27.2000	0.0000	J	05/05/90
			Nickel	MG/KG	2.2000	0.0000		05/05/90
			Potassium	MG/KG	373.0000	0.0000		05/05/90
			Sodium	MG/KG	32.2000	0.0000	J	05/05/90
			Vanadium	MG/KG	5.0000	0.0000	J	05/05/90
			Zinc	MG/KG	5.5000	0.0000	J	05/05/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	200.0000		J	06/05/90
			Di-n-octylphthalate	UG/KG	120.0000		B	06/05/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	13.0000		B	08/21/90
			Acetone	UG/KG	180.0000		B	08/21/90
			2-Butanone	UG/KG	19.0000		B	08/21/90
PA - 3 - A	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	5300.0000		J	05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.9290			08/30/90
			Total Organic Carbon	UG/G	2430.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	108.0000			08/21/90
			Chromium VI	MG/KG	0.1073		J	05/22/90
PA - 3 - B	ORGANICS	BASE NEUTRALS	Percent Solids		95.4300			08/21/90
	OTHER		Pentachlorophenol	UG/KG	480.0000		J	05/05/90
			Dioxin Furans	TOXEQ	0.0940			08/30/90
			Total Organic Carbon	UG/G	953.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	26.4000			08/21/90
			Chromium VI	MG/KG	0.0382		J	05/22/90
			Percent Solids		94.4000			08/21/90

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* SAMPLE IDENTIFICATION *								
Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
PA - 3 - C	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	110.0000		J	05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.0370			08/30/90
			Total Organic Carbon	UG/G	755.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	28.9000			08/21/90
			Chromium VI	MG/KG	0.0654		J	05/22/90
			Percent Solids		86.1600			08/21/90
PA - 3 - CD	OTHER		Dioxin Furans	TOXEQ	0.0630			08/30/90
PA - 3 - D	METALS		Aluminum	MG/KG	3970.0000	0.0000		05/05/90
			Arsenic	MG/KG	1.4000	0.0000		05/05/90
			Barium	MG/KG	11.5000	11.5000	J	05/05/90
			Calcium	MG/KG	563.0000	0.0000	J	05/05/90
			Chromium	MG/KG	4.7000	0.0000		05/05/90
			Copper	MG/KG	1.7000	0.0000		05/05/90
			Iron	MG/KG	4270.0000	0.0000		05/05/90
			Lead	MG/KG	4.5000	0.0000		05/05/90
			Magnesium	MG/KG	256.0000	0.0000	J	05/05/90
			Manganese	MG/KG	15.2000	0.0000	J	05/05/90
			Potassium	MG/KG	245.0000	0.0000		05/05/90
			Sodium	MG/KG	31.7000	0.0000	J	05/05/90
			Vanadium	MG/KG	9.7000	0.0000	J	05/05/90
			Zinc	MG/KG	4.0000	0.0000	J	05/05/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	340.0000		J	06/05/90
			Di-n-octylphthalate	UG/KG	130.0000		B	06/05/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	22.0000		B	08/21/90
			Acetone	UG/KG	30.0000		B	08/21/90
			2-Butanone	UG/KG	31.0000		B	08/21/90
PA - 3 - R	METALS		Calcium	UG/L	219.0000	0.0000	[]	05/05/90
			Copper	UG/L	3.5000	0.0000	[]	05/05/90
			Iron	UG/L	174.0000	0.0000	J	05/05/90
			Magnesium	UG/L	36.2000	0.0000	[]	05/05/90
			Manganese	UG/L	5.2000	0.0000	[]	05/05/90
			Sodium	UG/L	282.0000	0.0000	B	05/05/90
			Zinc	UG/L	100.0000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-octylphthalate	UG/L	15.0000		B	06/05/90
		VOLATILE ORGANICS	Methylene Chloride	UG/L	7.0000		B	05/23/90
			Acetone	UG/L	350.0000			05/23/90
	OTHER		Total Organic Carbon	MG/L	1.0620		J	08/21/90
PS - 1 - B	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/KG	20.0000			06/05/90
PS - 1 - S	METALS		Aluminum	MG/KG	2680.0000	0.0000		05/05/90
			Arsenic	MG/KG	3.5000	0.0000		05/05/90
			Barium	MG/KG	13.1000	0.0000		05/05/90
			Calcium	MG/KG	854.0000	0.0000		05/05/90
			Chromium	MG/KG	4.7000	0.0000		05/05/90
			Copper	MG/KG	3.9000	0.0000		05/05/90
			Iron	MG/KG	2330.0000	0.0000		05/05/90
			Lead	MG/KG	9.4000	0.0000	J	05/05/90
			Magnesium	MG/KG	183.0000	0.0000		05/05/90

Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
PS - 1 - S	METALS		Manganese	MG/KG	18.5000	0.0000		05/05/90
			Potassium	MG/KG	172.0000	0.0000		05/05/90
			Sodium	MG/KG	44.5000	0.0000		05/05/90
			Vanadium	MG/KG	4.9000	0.0000		05/05/90
			Zinc	MG/KG	25.5000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	4-Methylphenol	UG/KG	110.0000		J	07/16/90
			Pentachlorophenol	UG/KG	1200.0000		J	07/16/90
			Di-n-butylphthalate	UG/KG	81.0000		B	07/16/90
			bis(2-Ethylhexyl)phthalate	UG/KG	39.0000		J	07/16/90
		PESTICIDES/PCB's	beta-BHC	UG/KG	8700.0000		R	07/20/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	8.0000		B	07/16/90
			Acetone	UG/KG	13.0000		B	07/16/90
			Carbon Disulfide	UG/KG	5.0000		J	07/16/90
			Toluene	UG/KG	60.0000		L	07/16/90
			Styrene	UG/KG	5.0000		L	07/16/90
			Total Xylenes	UG/KG	5.0000		L	07/16/90
	OTHER		Dioxin Furans	TOXEQ	0.9060			08/30/90
			Total Organic Carbon	UG/G	13406.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	38.0000			08/21/90
			Chromium VI	MG/KG	0.0509		J	05/21/91
			Percent Solids		74.4200			08/21/90
PS - 2 - S	METALS		Aluminum	MG/KG	5150.0000	0.0000		05/05/90
			Arsenic	MG/KG	2.4000	0.0000		05/05/90
			Barium	MG/KG	11.5000	0.0000		05/05/90
			Calcium	MG/KG	742.0000	0.0000		05/05/90
			Chromium	MG/KG	6.6000	0.0000		05/05/90
			Copper	MG/KG	3.6000	0.0000		05/05/90
			Iron	MG/KG	4760.0000	0.0000		05/05/90
			Lead	MG/KG	31.7000	0.0000	J	05/05/90
			Magnesium	MG/KG	119.0000	0.0000		05/05/90
			Manganese	MG/KG	9.7000	0.0000		05/05/90
			Potassium	MG/KG	139.0000	0.0000		05/05/90
			Sodium	MG/KG	29.1000	0.0000		05/05/90
			Vanadium	MG/KG	13.0000	0.0000		05/05/90
			Zinc	MG/KG	35.0000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	7700.0000			07/16/90
			bis(2-Ethylhexyl)phthalate	UG/KG	110.0000		J	07/16/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	10.0000		B	07/16/90
			Toluene	UG/KG	6.0000		L	07/16/90
	OTHER		Dioxin Furans	TOXEQ	15.3050			08/30/90
			Total Organic Carbon	UG/G	2286.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	60.6000			08/21/90
			Chromium VI	MG/KG	0.0236		J	05/22/90
			2378-TCDD	pg/g	0.5700			08/30/90
			Percent Solids		74.1800			08/21/90
PS - 3 - S	METALS		Aluminum	MG/KG	6740.0000	0.0000		05/05/90
			Arsenic	MG/KG	1.9000	0.0000		05/05/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Q1	Data Entry Date
PS - 3 - S	METALS		Barium	MG/KG	21.7000	0.0000		05/05/90
			Calcium	MG/KG	1220.0000	0.0000		05/05/90
			Chromium	MG/KG	8.4000	0.0000		05/05/90
			Copper	MG/KG	5.0000	0.0000		05/05/90
			Iron	MG/KG	3770.0000	0.0000		05/05/90
			Lead	MG/KG	12.0000	0.0000	J	05/05/90
			Magnesium	MG/KG	197.0000	0.0000		05/05/90
			Manganese	MG/KG	12.0000	0.0000		05/05/90
			Potassium	MG/KG	251.0000	0.0000		05/05/90
			Sodium	MG/KG	45.3000	0.0000		05/05/90
			Vanadium	MG/KG	14.0000	0.0000		05/05/90
			Zinc	MG/KG	76.7000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	4800.0000		J	07/16/90
			bis(2-Ethylhexyl)phthalate	UG/KG	150.0000		J	07/16/90
		PESTICIDES/PCB's	beta-BHC	UG/KG	100.0000		R	07/20/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	5.0000		B	07/16/90
			Acetone	UG/KG	10.0000		B	07/16/90
	OTHER		Dioxin Furans	TOXEQ	11.0230			08/30/90
			Total Organic Carbon	UG/G	22975.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	45.5000			08/21/90
			Chromium VI	MG/KG	0.0123		J	05/22/90
			Percent Solids		72.5100			08/21/90
PW - 1 - S	ORGANICS	BASE NEUTRALS	Naphthalene	UG/KG	5300.0000			07/16/90
			2-Methylnaphthalene	UG/KG	12000.0000			07/16/90
			Dibenzofuran	UG/KG	710.0000		J	07/16/90
			Fluorene	UG/KG	2600.0000			07/16/90
			Pentachlorophenol	UG/KG	230000.0000			07/16/90
			Phenanthrene	UG/KG	5700.0000			07/16/90
			bis(2-Ethylhexyl)phthalate	UG/KG	620.0000		J	07/16/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	40.0000		B	07/16/90
			Acetone	UG/KG	82.0000		B	07/16/90
			Toluene	UG/KG	43.0000		L	07/16/90
			Ethylbenzene	UG/KG	140.0000		L	07/16/90
			Total Xylenes	UG/KG	290.0000		L	07/16/90
PW - 1 - W	METALS		Aluminum	UG/L	1000.0000	[ ] B 41.5000	B	05/31/90
			Arsenic	UG/L	17.5000	10.3000		05/31/90
			Barium	UG/L	71.3000	0.0000	[]	06/01/90
			Beryllium	UG/L	1.4000	[ ] B 1.3000	B[ ]	05/31/90
			Calcium	UG/L	38100.0000	36500.0000		05/31/90
			Copper	UG/L	40.2000	0.0000	B	06/01/90
			Iron	UG/L	3480.0000	354.0000		05/31/90
			Lead	UG/L	6.0000	0.0000		06/01/90
			Magnesium	UG/L	2830.0000	[ ] 1710.0000	[]	05/31/90
			Manganese	UG/L	240.0000	J 94.2000	J	05/31/90
			Potassium	UG/L	5290.0000	[ ] 3070.0000		05/31/90
			Sodium	UG/L	5660.0000	5450.0000		05/31/90
			Zinc	UG/L	64.5000	0.0000	J	06/01/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Q1	Data Entry Date
PW - 1 - W	ORGANICS	BASE NEUTRALS	4-Methylphenol	UG/L	10.0000			05/26/90
		VOLATILE ORGANICS	Acetone	UG/L	23.0000		B	05/26/90
	OTHER		Alkalinity	UG/L	85000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	195000.0000		J	08/18/90
			Hardness	UG/L	72500.0000			08/18/90
			Total Dissolved Solids	MG/L	74.0000		J	08/18/90
PW - 1 - WD	METALS		Aluminum	UG/L	841.0000 [ ] B	30.7000		05/31/90
			Arsenic	UG/L	16.1000	11.4000		05/31/90
			Barium	UG/L	66.7000 [ ]	22.5000	[]	05/31/90
			Beryllium	UG/L	1.3000	0.0000	B	06/01/90
			Calcium	UG/L	37200.0000	36800.0000		05/31/90
			Copper	UG/L	38.4000	0.0000	B	06/01/90
			Iron	UG/L	2900.0000	363.0000		05/31/90
			Lead	UG/L	4.7000	0.0000	[]	06/01/90
			Magnesium	UG/L	1900.0000 [ ]	1730.0000	[]	05/31/90
			Manganese	UG/L	196.0000 J	107.0000	J	05/31/90
			Mercury	UG/L	0.0000	0.5100		05/31/90
			Potassium	UG/L	4120.0000 [ ]	3050.0000	[]	05/31/90
			Sodium	UG/L	5520.0000	5650.0000		05/31/90
			Zinc	UG/L	52.3000	0.0000	B	06/01/90
	ORGANICS	BASE NEUTRALS	4-Methylphenol	UG/L	5.0000		J	05/26/90
		VOLATILE ORGANICS	Acetone	UG/L	21.0000		B	05/26/90
			Toluene	UG/L	4.0000		J	05/26/90
	OTHER		Alkalinity	UG/L	85000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	110000.0000		J	08/18/90
			Hardness	UG/L	95000.0000			08/18/90
			Total Dissolved Solids	MG/L	60.0000		J	08/18/90
R - 1 -	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/KG	16.0000		B	09/12/90
			Acetone	UG/KG	60.0000		B	09/12/90
R - 27 - A	ORGANICS	PESTICIDES/PCB's	beta-BHC	UG/L	0.4000		R	07/12/90
	OTHER		Total Organic Carbon	MG/L	0.9200		J	08/21/90
			Chromium VI	MG/KG	0.0840		B	05/22/90
R - 27 - AA	OTHER		Total Organic Carbon	MG/L	1.1400		J	08/21/90
R - 27 - B	OTHER		Total Organic Carbon	MG/L	0.9240		J	08/21/90
			Chromium VI	MG/KG	0.0469		B	05/22/90
R - 27 - BB	OTHER		Total Organic Carbon	MG/L	1.1300		J	08/21/90
R - 27 - E	METALS		Beryllium	MG/KG	1.1000	0.0000	B	05/05/90
			Calcium	MG/KG	50.4000	0.0000	B	05/05/90
			Copper	MG/KG	6.3000	0.0000	B	05/05/90
			Iron	MG/KG	70.6000	0.0000	B	05/05/90
			Sodium	MG/KG	405.0000	0.0000	B	05/05/90
RW - 1 - S	METALS		Aluminum	MG/KG	793.0000	0.0000	J	05/05/90
			Arsenic	MG/KG	3.0000	0.0000		05/05/90
			Barium	MG/KG	14.4000	0.0000		05/05/90
			Calcium	MG/KG	10100.0000	0.0000		05/05/90
			Chromium	MG/KG	5.1000	0.0000		05/05/90
			Copper	MG/KG	6.3000	0.0000		05/05/90

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Listing of Sample Analysis Results
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* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Q!	Data Entry Date
RW - 1 - S	METALS		Iron	MG/KG	2150.0000	0.0000	J	05/05/90
			Lead	MG/KG	56.2000	0.0000	J	05/05/90
			Magnesium	MG/KG	384.0000	0.0000		05/05/90
			Manganese	MG/KG	30.5000	0.0000		05/05/90
			Nickel	MG/KG	10.4000	0.0000		05/05/90
			Sodium	MG/KG	384.0000	0.0000		05/05/90
			Vanadium	MG/KG	3.3000	0.0000		05/05/90
			Zinc	MG/KG	101.0000	0.0000	J	05/05/90
	ORGANICS	BASE NEUTRALS	bis(2-Ethylhexyl)phthalate	UG/KG	410.0000			05/24/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	84.0000		B	05/23/90
			Acetone	UG/KG	7.0000		B	05/23/90
			2-Butanone	UG/KG	21.0000		B	05/23/90
	OTHER		Dioxin Furans	TOXEQ	0.0030			08/30/90
			Total Organic Carbon	UG/G	359.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	797.0000			08/21/90
			Chromium VI	MG/KG	0.3060		J	05/22/90
			Percent Solids		79.8000			08/21/90
RW - 1 - W	METALS		Aluminum	UG/L	16600.0000 [ ]B	56.6000		05/31/90
			Arsenic	UG/L	128.0000	54.7000		05/31/90
			Barium	UG/L	194.0000 [ ]	21.9000	[]	05/31/90
			Beryllium	UG/L	2.5000	0.0000	B	06/01/90
			Cadmium	UG/L	3.4000	0.0000	B	06/01/90
			Calcium	UG/L	37100.0000	28900.0000		05/31/90
			Chromium	UG/L	135.0000	0.0000		06/01/90
			Copper	UG/L	181.0000 [ ]B	15.3000		05/31/90
			Iron	UG/L	18300.0000	0.0000		06/01/90
			Lead	UG/L	247.0000	0.0000		06/01/90
			Magnesium	UG/L	5820.0000 [ ]	1220.0000		05/31/90
			Manganese	UG/L	433.0000 [ ]J	13.1000		05/31/90
			Mercury	UG/L	0.5300	0.0000		06/01/90
			Potassium	UG/L	11200.0000	5440.0000		05/31/90
			Selenium	UG/L	1.6000 [ ]B	2.6000	B	05/31/90
			Sodium	UG/L	8360.0000	6710.0000		05/31/90
			Vanadium	UG/L	37.9000	0.0000	[]	06/01/90
			Zinc	UG/L	1310.0000	53.1000	J	05/31/90
	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	20.0000		B	05/26/90
	OTHER		Dioxin Furans	TOXEQ	7.0030			08/30/90
			Alkalinity	UG/L	74500.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	25000.0000		J	08/18/90
			Hardness	UG/L	88000.0000			08/18/90
			Total Dissolved Solids	MG/L	302.0000		J	08/18/90
RW - 2 - S	METALS		Aluminum	MG/KG	641.0000	0.0000	J	05/05/90
			Arsenic	MG/KG	2.7000	0.0000		05/05/90
			Barium	MG/KG	39.8000	0.0000		05/05/90
			Calcium	MG/KG	10200.0000	0.0000		05/05/90
			Chromium	MG/KG	5.0000	0.0000		05/05/90
			Iron	MG/KG	1750.0000	0.0000	J	05/05/90

Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
RW - 2 - S	METALS		Lead	MG/KG	14.1000	0.0000	J	05/05/90
			Magnesium	MG/KG	385.0000	0.0000		05/05/90
			Manganese	MG/KG	31.8000	0.0000		05/05/90
			Mercury	MG/KG	0.2500	0.0000		05/05/90
			Potassium	MG/KG	354.0000	0.0000		05/05/90
			Sodium	MG/KG	377.0000	0.0000		05/05/90
			Zinc	MG/KG	187.0000	0.0000	J	05/05/90
	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/KG	57.0000		B	05/23/90
			Acetone	UG/KG	5.0000		B	05/23/90
			2-Butanone	UG/KG	30.0000		B	05/23/90
	OTHER		Dioxin Furans	TOXEQ	0.0930			08/30/90
			Total Organic Carbon	UG/G	640.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	531.0000			08/21/90
			Chromium VI	MG/KG	0.3701		J	05/22/90
			Percent Solids		85.3100			08/21/90
RW - 2 - W	METALS		Aluminum	UG/L	1730.0000 [ ]B	46.9000		05/31/90
			Arsenic	UG/L	142.0000	55.9000		05/31/90
			Barium	UG/L	287.0000 [ ]	30.3000		05/31/90
			Beryllium	UG/L	3.5000	0.0000	B	06/01/90
			Cadmium	UG/L	4.0000	0.0000	B	06/01/90
			Calcium	UG/L	49300.0000	39000.0000		05/31/90
			Chromium	UG/L	153.0000 [ ]	9.5000		05/31/90
			Copper	UG/L	207.0000 [ ]B	18.0000		05/31/90
			Iron	UG/L	21800.0000	0.0000		06/01/90
			Lead	UG/L	403.0000 [ ]	2.1000	[]	05/31/90
			Magnesium	UG/L	7490.0000 [ ]	1530.0000		05/31/90
			Manganese	UG/L	566.0000 J	44.9000		05/31/90
			Mercury	UG/L	0.4900	0.2100		05/31/90
			Potassium	UG/L	13900.0000	6720.0000		05/31/90
			Selenium	UG/L	1.8000 [ ]B	2.1000	[]	05/31/90
			Sodium	UG/L	8410.0000	6430.0000		05/31/90
			Vanadium	UG/L	43.1000	0.0000	[]	06/01/90
			Zinc	UG/L	1690.0000	88.3000	J	05/31/90
	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	21.0000		B	05/26/90
	OTHER		Dioxin Furans	TOXEQ	5.8510			08/30/90
			Alkalinity	UG/L	102000.0000		J	08/18/90
			Chemical Oxygen Demand	UG/L	25000.0000		J	08/18/90
			Hardness	UG/L	124000.0000			08/18/90
			Total Dissolved Solids	MG/L	454.0000		J	08/18/90
SS - 1 - R	OTHER		Total Organic Carbon	MG/L	1.2380		J	08/21/90
ST - 1 - A	METALS		Arsenic	MG/KG	4.0000	0.0000	J	05/17/90
			Chromium	MG/KG	9.5000	0.0000	K	05/17/90
			Copper	MG/KG	5.8000	0.0000	K	05/17/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	330000.0000		L	05/05/90
	OTHER		Dioxin Furans	TOXEQ	7.6910			08/30/90
			Total Organic Carbon	UG/G	1852.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	2840.0000			08/21/90

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Listing of Sample Analysis Results
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* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
ST - 1 - A	OTHER		Chromium VI	MG/KG	0.0273		J	05/22/90
			Moisture Content	PERC.	5.4500			08/21/90
			pH		5.5500		J	08/21/90
			Alkalinity	MG/KG	132.0000		J	08/21/90
			Chlorine	PERC.	0.1000			05/24/90
			Sulfer	PERC.	0.1000			05/24/90
			Silica	PERC.	98.1700			09/05/90
			BTU Content	BTU1b	99.0000			05/24/90
			Ash Content	PERC.	98.1700			05/24/90
ST - 1 - AB	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	250000.0000		L	05/05/90
	OTHER		Dioxin Furans	TOXEQ	4.2520			08/30/90
			Total Organic Carbon	UG/G	5849.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	3240.0000			08/21/90
			Chromium VI	MG/KG	0.0663		J	05/22/90
ST - 1 - B	METALS		Arsenic	MG/KG	3.5000	0.0000		07/12/90
			Chromium	MG/KG	10.4000	0.0000	K	07/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	13000.0000			05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.5510			08/30/90
			Total Organic Carbon	UG/G	789.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	512.0000			08/21/90
			Chromium VI	MG/KG	0.1719		J	05/22/90
ST - 1 - C	METALS		Arsenic	MG/KG	1.8000	0.0000		07/12/90
			Chromium	MG/KG	9.3000	0.0000	K	07/12/90
			Copper	MG/KG	5.0000	0.0000	K	07/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	3300.0000		J	05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.1500			08/30/90
			Total Organic Carbon	UG/G	549.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	100.0000			08/21/90
			Chromium VI	MG/KG	0.3234		J	05/22/90
ST - 1 - E	METALS		Aluminum	MG/KG	4760.0000	0.0000		05/12/90
			Arsenic	MG/KG	0.7100	0.0000		05/12/90
			Barium	MG/KG	10.1000	0.0000		05/12/90
			Calcium	MG/KG	341.0000	0.0000		05/12/90
			Chromium	MG/KG	4.7000	0.0000	B	05/12/90
			Copper	MG/KG	2.2000	0.0000	B	05/12/90
			Iron	MG/KG	4190.0000	0.0000		05/12/90
			Lead	MG/KG	2.9000	0.0000		05/12/90
			Magnesium	MG/KG	140.0000	0.0000		05/12/90
			Manganese	MG/KG	6.5000	0.0000		05/12/90
			Potassium	MG/KG	173.0000	0.0000		05/12/90
			Sodium	MG/KG	36.2000	0.0000		05/12/90
			Vanadium	MG/KG	11.2000	0.0000		05/12/90
			Zinc	MG/KG	2.4000	0.0000		05/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	28000.0000			05/24/90
			Pyrene	UG/KG	210.0000		J	05/24/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	67.0000		B	08/21/90
			Acetone	UG/KG	1900.0000		J	08/21/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
ST - 1 - E	ORGANICS	VOLATILE ORGANICS	2-Butanone	UG/KG	81.0000		B	08/21/90
ST - 1 - SS	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	600.0000		J	10/16/90
ST - 2 - A	METALS		Arsenic	MG/KG	5.3000	0.0000		05/22/90
			Chromium	MG/KG	12.2000	0.0000	K	05/22/90
			Copper	MG/KG	6.8000	0.0000	K	05/22/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	520.0000			05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.6990			08/30/90
			Total Organic Carbon	UG/G	1159.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	19.9000			08/21/90
			Chromium VI	MG/KG	0.0534		J	05/22/90
			Moisture Content	PERC.	4.7100			08/21/90
			pH		5.1400		J	08/21/90
			Alkalinity	MG/KG	36.7000		J	08/21/90
			Chlorine	PERC.	0.1000			05/24/90
			Sulfer	PERC.	0.1000			05/24/90
			Silica	PERC.	66.1700			09/05/90
			BTU Content	BTU1b	50.0000		[!	05/24/90
			Ash Content	PERC.	98.9300			05/24/90
ST - 2 - B	METALS		Arsenic	MG/KG	4.4000	0.0000	J	07/12/90
			Chromium	MG/KG	12.2000	0.0000	K	07/12/90
			Copper	MG/KG	4.9000	0.0000	K	07/12/90
	OTHER		Dioxin Furans	TOXEQ	0.0050			08/30/90
			Total Organic Carbon	UG/G	1920.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	16.7000			08/21/90
			Chromium VI	MG/KG	0.1595		J	05/22/90
ST - 2 - C	METALS		Arsenic	MG/KG	1.5000	0.0000		07/12/90
			Chromium	MG/KG	13.9000	0.0000	K	07/12/90
	OTHER		Total Organic Carbon	UG/G	479.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	19.0000			08/21/90
			Chromium VI	MG/KG	0.3205		J	05/22/90
ST - 2 - E	METALS		Aluminum	MG/KG	780.0000	0.0000		05/05/90
			Arsenic	MG/KG	2.7000	0.0000		05/05/90
			Barium	MG/KG	18.5000	0.0000		05/05/90
			Beryllium	MG/KG	0.2400	0.0000	B	05/05/90
			Calcium	MG/KG	418.0000	0.0000		05/05/90
			Chromium	MG/KG	7.2000	0.0000		05/05/90
			Cobalt	MG/KG	1.7000	0.0000		05/05/90
			Copper	MG/KG	4.4000	0.0000	B	05/05/90
			Iron	MG/KG	8040.0000	0.0000		05/05/90
			Lead	MG/KG	4.2000	0.0000		05/05/90
			Magnesium	MG/KG	347.0000	0.0000		05/05/90
			Manganese	MG/KG	15.5000	0.0000	L	05/05/90
			Nickel	MG/KG	2.5000	0.0000		05/05/90
			Potassium	MG/KG	302.0000	0.0000		05/05/90
			Sodium	MG/KG	58.2000	0.0000	B	05/05/90
			Vanadium	MG/KG	15.7000	0.0000		05/05/90
			Zinc	MG/KG	4.8000	0.0000	B	05/05/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
ST - 2 - E	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	95.0000		B	07/12/90
			bis(2-Ethylhexyl)phthalate	UG/KG	68.0000		J	07/12/90
		PESTICIDES/PCB's	Endosulfan II	UG/KG	8.4000		J	07/12/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	110.0000			07/12/90
ST - 3 - A	METALS		Arsenic	MG/KG	5.0000	0.0000		05/17/90
			Chromium	MG/KG	10.9000	0.0000	K	05/17/90
			Copper	MG/KG	9.8000	0.0000	K	05/17/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	810.0000		J	05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.6270			08/30/90
			Total Organic Carbon	UG/G	1148.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	54.9000			08/21/90
			Chromium VI	MG/KG	0.4310		J	05/22/90
			Moisture Content	PERC.	4.2800			08/21/90
			pH		5.3400		J	08/21/90
			Alkalinity	MG/KG	104.0000		J	08/21/90
			Chlorine	PERC.	0.1000			05/24/90
			Sulfer	PERC.	0.1000			05/24/90
			Silica	PERC.	80.0600			09/05/90
			BTU Content	BTU1b	50.0000			05/24/90
			Ash Content	PERC.	98.8700			05/24/90
			Percent Solids		96.0300			08/21/90
ST - 3 - B	METALS		Arsenic	MG/KG	4.0000	0.0000		07/12/90
			Chromium	MG/KG	11.7000	0.0000	K	07/12/90
			Copper	MG/KG	6.1000	0.0000	K	07/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	460.0000		J	05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.4290			08/30/90
			Total Organic Carbon	UG/G	2889.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	43.5000			08/21/90
			Chromium VI	MG/KG	1.0794		J	05/22/90
			Percent Solids		91.4400			08/21/90
ST - 3 - E	METALS		Aluminum	MG/KG	4920.0000	0.0000		05/12/90
			Arsenic	MG/KG	1.5000	0.0000		05/12/90
			Barium	MG/KG	15.4000	0.0000		05/12/90
			Calcium	MG/KG	621.0000	0.0000		05/12/90
			Chromium	MG/KG	6.7000	0.0000	B	05/12/90
			Cobalt	MG/KG	1.2000	0.0000		05/12/90
			Copper	MG/KG	4.4000	0.0000		05/12/90
			Iron	MG/KG	6070.0000	0.0000		05/12/90
			Lead	MG/KG	4.0000	0.0000		05/12/90
			Magnesium	MG/KG	351.0000	0.0000		05/12/90
			Manganese	MG/KG	25.7000	0.0000		05/12/90
			Nickel	MG/KG	2.7000	0.0000		05/12/90
			Potassium	MG/KG	384.0000	0.0000		05/12/90
			Sodium	MG/KG	45.9000	0.0000		05/12/90
			Vanadium	MG/KG	12.0000	0.0000		05/12/90
			Zinc	MG/KG	5.7000	0.0000		05/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	500.0000		J	05/24/90

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Listing of Sample Analysis Results
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* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
ST - 3 - E	ORGANICS	BASE NEUTRALS	bis(2-Ethylhexyl)phthalate	UG/KG	150.0000		J	05/24/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	27.0000		B	05/23/90
			Acetone	UG/KG	37.0000		B	05/23/90
			2-Butanone	UG/KG	26.0000		B	05/23/90
TB - 10 - BK	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	23.0000		B	05/21/91
TB - 18 - S	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/L	26.0000		B	05/23/90
			Acetone	UG/L	8.0000		B	05/23/90
TB - 20 - S	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	4.0000		J	06/05/90
TB - 21 - S	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/L	8.0000		B	05/23/90
TB - 21 - W	ORGANICS	VOLATILE ORGANICS	Acetone	UG/L	6.0000		B	05/26/90
TB - 27 -	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/L	5.0000		B	07/12/90
TB - 33 - T	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/L	1.0000		B	06/02/90
TP - 1 - BK	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/L	22.0000		B	05/23/90
			Acetone	UG/L	9.0000		B	05/23/90
TP - 2 - BK	ORGANICS	VOLATILE ORGANICS	Methylene Chloride	UG/L	18.0000		B	05/23/90
			Acetone	UG/L	10.0000		B	05/23/90
WP - 1 - A	OTHER		Total Organic Carbon	UG/G	5620.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	67.7000			08/21/90
			Chromium VI	MG/KG	0.0320		J	05/22/90
			Percent Solids		91.9900			08/21/90
WP - 1 - B	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	1900000.0000		L	05/05/90
	OTHER		Dioxin Furans	TOXEQ	20.5690			08/30/90
			Total Organic Carbon	UG/G	40467.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	6290.0000			08/21/90
			Chromium VI	MG/KG	0.0192		J	05/22/90
			Percent Solids		82.6800			08/21/90
WP - 1 - BP	OTHER		Dioxin Furans	TOXEQ	0.0170			08/30/90
WP - 1 - C	METALS		Aluminum	MG/KG	2350.0000	0.0000		05/05/90
			Arsenic	MG/KG	1.1000	0.0000		05/05/90
			Barium	MG/KG	11.7000	0.0000		05/05/90
			Calcium	MG/KG	154.0000	0.0000		05/05/90
			Chromium	MG/KG	1.7000	0.0000		05/05/90
			Copper	MG/KG	1.5000	0.0000		05/05/90
			Iron	MG/KG	1410.0000	0.0000		05/05/90
			Lead	MG/KG	3.4000	0.0000	J	05/05/90
			Magnesium	MG/KG	110.0000	0.0000		05/05/90
			Manganese	MG/KG	5.1000	0.0000		05/05/90
			Potassium	MG/KG	87.6000	0.0000		05/05/90
			Sodium	MG/KG	29.4000	0.0000		05/05/90
			Vanadium	MG/KG	4.4000	0.0000		05/05/90
			Zinc	MG/KG	23.9000	0.0000		05/05/90
	OTHER		Dioxin Furans	TOXEQ	7.8780			08/30/90
			Total Organic Carbon	UG/G	4326.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	2560.0000			08/21/90
			Chromium VI	MG/KG	0.0355		J	05/22/90
			Percent Solids		85.3100			08/21/90
WP - 2 - A	OTHER		Dioxin Furans	TOXEQ	0.0790			08/30/90

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Listing of Sample Analysis Results
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* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
WP - 2 - A	OTHER		Total Organic Carbon	UG/G	5652.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	68.7000			08/21/90
			Chromium VI	MG/KG	0.0372		J	05/22/90
			Percent Solids		95.4200			08/21/90
WP - 2 - AD	OTHER		Dioxin Furans	TOXEQ	0.0970			08/30/90
			Total Organic Carbon	UG/G	8266.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	54.4000			08/21/90
			Chromium VI	MG/KG	0.0651		J	05/22/90
			Percent Solids		96.0100			08/21/90
WP - 2 - B	OTHER		Dioxin Furans	TOXEQ	0.0320			08/30/90
			Total Organic Carbon	UG/G	2431.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	66.6000			08/21/90
			Chromium VI	MG/KG	0.0459		J	05/22/90
			Percent Solids		93.4800			08/21/90
WP - 2 - C	METALS		Aluminum	MG/KG	1590.0000	0.0000		05/05/90
			Arsenic	MG/KG	0.9600	0.0000		05/05/90
			Barium	MG/KG	9.0000	0.0000		05/05/90
			Calcium	MG/KG	213.0000	0.0000		05/05/90
			Iron	MG/KG	846.0000	0.0000		05/05/90
			Lead	MG/KG	3.3000	0.0000	J	05/05/90
			Magnesium	MG/KG	64.9000	0.0000		05/05/90
			Manganese	MG/KG	6.0000	0.0000		05/05/90
			Potassium	MG/KG	68.1000	0.0000		05/05/90
			Sodium	MG/KG	21.3000	0.0000		05/05/90
			Vanadium	MG/KG	3.0000	0.0000		05/05/90
			Zinc	MG/KG	4.7000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	46.0000		B	07/16/90
			bis(2-Ethylhexyl)phthalate	UG/KG	27.0000		J	07/16/90
		PESTICIDES/PCB's	Heptachlor	UG/KG	5.5000			08/21/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	91.0000		B	07/16/90
	OTHER		Total Organic Carbon	UG/G	3772.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	58.9000			08/21/90
			Chromium VI	MG/KG	0.1282		J	05/22/90
			Percent Solids		93.0100			08/21/90
WP - 2 - CD	METALS		Aluminum	MG/KG	1350.0000	0.0000		05/05/90
			Arsenic	MG/KG	0.9700	0.0000		05/05/90
			Barium	MG/KG	7.7000	0.0000		05/05/90
			Calcium	MG/KG	137.0000	0.0000		05/05/90
			Chromium	MG/KG	0.9700	0.0000		05/05/90
			Copper	MG/KG	1.3000	0.0000		05/05/90
			Iron	MG/KG	827.0000	0.0000		05/05/90
			Lead	MG/KG	2.7000	0.0000	J	05/05/90
			Magnesium	MG/KG	59.0000	0.0000		05/05/90
			Manganese	MG/KG	6.2000	0.0000		05/05/90
			Potassium	MG/KG	61.5000	0.0000		05/05/90
			Sodium	MG/KG	11.5000	0.0000		05/05/90
			Vanadium	MG/KG	2.4000	0.0000		05/05/90

Listing of Sample Analysis Results
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* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
WP - 2 - CD	METALS		Zinc	MG/KG	2.8000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	45.0000		B	07/16/90
			bis(2-Ethylhexyl)phthalate	UG/KG	27.0000		J	07/16/90
		PESTICIDES/PCB's	Heptachlor	UG/KG	4.0000			07/20/90
			Gamma-Chlordane	UG/KG	3.2000		J	07/20/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	98.0000		B	07/16/90
WP - 4 - A	OTHER		Dioxin Furans	TOXEQ	0.3770			08/30/90
			Total Organic Carbon	UG/G	5382.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	72.8000			08/21/90
			Chromium VI	MG/KG	0.0751		J	05/22/90
			Percent Solids		94.5100			08/21/90
WP - 4 - B	OTHER		Dioxin Furans	TOXEQ	0.0740			08/30/90
			Total Organic Carbon	UG/G	1020.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	76.5000			08/21/90
			Chromium VI	MG/KG	0.0682		J	05/22/90
			Percent Solids		94.7600			08/21/90
WP - 4 - C	METALS		Aluminum	MG/KG	326.0000	0.0000		05/05/90
			Arsenic	MG/KG	0.7600	0.0000		05/05/90
			Barium	MG/KG	1.3000	0.0000		05/05/90
			Calcium	MG/KG	34.7000	0.0000		08/21/90
			Iron	MG/KG	217.0000	0.0000		05/05/90
			Lead	MG/KG	1.5000	0.0000	J	05/05/90
			Manganese	MG/KG	0.9300	0.0000		08/21/90
			Sodium	MG/KG	18.3000	0.0000		05/05/90
			Vanadium	MG/KG	1.3000	0.0000		05/05/90
			Zinc	MG/KG	1.2000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	98.0000		B	07/16/90
			bis(2-Ethylhexyl)phthalate	UG/KG	32.0000		J	07/16/90
		PESTICIDES/PCB's	Alpha-Chlordane	UG/KG	8.5000		J	07/20/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	110.0000		B	07/16/90
			Acetone	UG/KG	7.0000		B	07/16/90
	OTHER		Total Organic Carbon	UG/G	374.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	36.2000			08/21/90
			Chromium VI	MG/KG	0.1749		J	05/22/90
			Percent Solids		87.7000			08/21/90
WP - 5 - A	OTHER		Total Petroleum Hydrocarbons	MG/KG	8.5000			10/16/90
WP - 5 - B	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	45.0000		J	10/16/90
	OTHER		Total Petroleum Hydrocarbons	MG/KG	23.0000			10/16/90
WP - 5 - C	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	51000.0000		L	10/16/90
	OTHER		Total Petroleum Hydrocarbons	MG/KG	6200.0000			10/16/90
WP - 6 - A	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	300000.0000		J	10/16/90
	OTHER		Total Petroleum Hydrocarbons	MG/KG	940.0000			10/16/90
WP - 6 - B	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	370000.0000		L	10/16/90
	OTHER		Total Petroleum Hydrocarbons	MG/KG	20000.0000			10/16/90
WP - 6 - C	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	15000.0000		L	10/16/90
	OTHER		Total Petroleum Hydrocarbons	MG/KG	2500.0000			10/16/90
WP - 7 - B	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	110.0000		J	10/16/90

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* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
WP - 7 - B	OTHER		Total Petroleum Hydrocarbons	MG/KG	9.4000			10/16/90
WP - 7 - C	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	2400.0000		L	10/16/90
	OTHER		Total Petroleum Hydrocarbons	MG/KG	56.0000			10/16/90
WP - 7 - D	OTHER		Total Petroleum Hydrocarbons	MG/KG	47.0000			10/16/90
WP - 7 - B1	OTHER		Percent Organic Matter	PERC.	7.9000			05/21/91
WS - 1 - A	METALS		Arsenic	MG/KG	11.9000	0.0000	J	05/22/90
			Chromium	MG/KG	32.7000	0.0000	B	05/22/90
			Copper	MG/KG	17.3000	0.0000	B	05/22/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	8900.0000		J	05/05/90
	OTHER		Total Organic Carbon	UG/G	4811.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	98.3000			08/21/90
			Chromium VI	MG/KG	0.1197		J	05/22/90
			Percent Solids		95.0900			08/21/90
WS - 1 - B	METALS		Aluminum	MG/KG	4310.0000	0.0000		05/05/90
			Arsenic	MG/KG	1.5000	0.0000		05/05/90
			Barium	MG/KG	7.7000	0.0000		05/05/90
			Calcium	MG/KG	2570.0000	0.0000		05/05/90
			Chromium	MG/KG	5.2000	0.0000		05/05/90
			Copper	MG/KG	1.5000	0.0000		05/05/90
			Iron	MG/KG	4440.0000	0.0000		05/05/90
			Lead	MG/KG	3.8000	0.0000	J	05/05/90
			Magnesium	MG/KG	201.0000	0.0000		05/05/90
			Manganese	MG/KG	16.2000	0.0000		05/05/90
			Potassium	MG/KG	185.0000	0.0000		05/05/90
			Sodium	MG/KG	37.1000	0.0000		05/05/90
			Vanadium	MG/KG	9.0000	0.0000		05/05/90
			Zinc	MG/KG	4.1000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	bis(2-Ethylhexyl)phthalate	UG/KG	37.0000		L	07/16/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	110.0000		B	07/16/90
	OTHER		Dioxin Furans	TOXEQ	0.0650			08/30/90
			Total Organic Carbon	UG/G	886.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	52.0000			08/21/90
			Chromium VI	MG/KG	0.0250		J	05/22/90
			Percent Solids		88.4000			08/21/90
WS - 2 - A	METALS		Arsenic	MG/KG	7.1000	0.0000	J B	05/22/90
			Chromium	MG/KG	18.6000	0.0000	J B	05/22/90
			Copper	MG/KG	10.3000	0.0000	B	05/22/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	1300.0000		J	05/05/90
	OTHER		Total Organic Carbon	UG/G	1755.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	65.9000			08/21/90
			Chromium VI	MG/KG	0.0539		J	05/22/90
			Percent Solids		93.3200			08/21/90
WS - 2 - B	METALS		Aluminum	MG/KG	1940.0000	0.0000		08/21/90
			Arsenic	MG/KG	1.7000	0.0000		05/05/90
			Barium	MG/KG	6.6000	0.0000		05/05/90
			Calcium	MG/KG	156.0000	0.0000		05/05/90
			Chromium	MG/KG	3.5000	0.0000		05/05/90

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* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
WS - 2 - B	METALS		Copper	MG/KG	1.6000	0.0000		05/05/90
			Iron	MG/KG	2050.0000	0.0000		05/05/90
			Lead	MG/KG	2.5000	0.0000	J	05/05/90
			Magnesium	MG/KG	71.4000	0.0000		05/05/90
			Manganese	MG/KG	6.0000	0.0000		05/05/90
			Potassium	MG/KG	68.1000	0.0000		05/05/90
			Sodium	MG/KG	16.4000	0.0000		05/05/90
			Vanadium	MG/KG	4.5000	0.0000		05/05/90
			Zinc	MG/KG	1.7000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	51.0000		B	07/16/90
			bis(2-Ethylhexyl)phthalate	UG/KG	60.0000		J	07/16/90
		PESTICIDES/PCB's	beta-BHC	UG/KG	84.0000-		R	07/20/90
			Heptachlor	UG/KG	6.3000		B	07/20/90
			Endrin	UG/KG	0.9300		J	07/20/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	9.0000		B	08/21/90
			Acetone	UG/KG	78.0000		[]	06/05/90
	OTHER		Dioxin Furans	TOXEQ	0.0030			08/30/90
			Total Organic Carbon	UG/G	412.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	28.8000			08/21/90
			Chromium VI	MG/KG	0.4556		J	05/22/90
			Percent Solids		85.3400			08/21/90
WS - 3 - A	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	110.0000		J	05/05/90
	OTHER		Total Organic Carbon	UG/G	32553.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	143.0000			08/21/90
			Chromium VI	MG/KG	0.0386		J	05/22/90
			Percent Solids		87.7500			08/21/90
WS - 3 - B	METALS		Aluminum	MG/KG	4490.0000	0.0000		05/05/90
			Arsenic	MG/KG	1.5000	0.0000		05/05/90
			Barium	MG/KG	12.3000	0.0000		05/05/90
			Calcium	MG/KG	490.0000	0.0000		05/05/90
			Chromium	MG/KG	4.4000	0.0000		05/05/90
			Copper	MG/KG	1.2000	0.0000		05/05/90
			Iron	MG/KG	1410.0000	0.0000		05/05/90
			Lead	MG/KG	4.9000	0.0000		05/05/90
			Magnesium	MG/KG	158.0000	0.0000	J	05/05/90
			Manganese	MG/KG	12.6000	0.0000		05/05/90
			Potassium	MG/KG	141.0000	0.0000		05/05/90
			Sodium	MG/KG	125.3000	0.0000		05/05/90
			Vanadium	MG/KG	6.2000	0.0000		05/05/90
			Zinc	MG/KG	8.5000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	bis(2-Ethylhexyl)phthalate	UG/KG	39.0000		L	07/16/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	120.0000		B	07/16/90
	OTHER		Dioxin Furans	TOXEQ	0.0240			08/30/90
			Total Organic Carbon	UG/G	2280.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	46.4000			08/21/90
			Chromium VI	MG/KG	0.0461		J	05/22/90
			Percent Solids		86.7900			08/21/90

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Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
WS - 4 - A	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	12000.0000		J	05/05/90
	OTHER		Total Organic Carbon	UG/G	3223.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	170.0000			08/21/90
			Chromium VI	MG/KG	0.0317		J	05/22/90
WS - 4 - AD	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	16000.0000			05/05/90
	OTHER		Total Organic Carbon	UG/G	852.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	181.0000			08/21/90
WS - 4 - B	METALS		Aluminum	MG/KG	2890.0000	0.0000		05/05/90
			Arsenic	MG/KG	1.6000	0.0000		05/05/90
			Barium	MG/KG	11.2000	0.0000		05/05/90
			Calcium	MG/KG	254.0000	0.0000		05/05/90
			Chromium	MG/KG	5.4000	0.0000		05/05/90
			Copper	MG/KG	1.4000	0.0000		05/05/90
			Iron	MG/KG	4070.0000	0.0000		05/05/90
			Lead	MG/KG	2.6000	0.0000		05/05/90
			Magnesium	MG/KG	112.0000	0.0000	J	05/05/90
			Manganese	MG/KG	9.0000	0.0000		05/05/90
			Potassium	MG/KG	116.0000	0.0000		05/05/90
			Sodium	MG/KG	31.3000	0.0000		05/05/90
			Vanadium	MG/KG	8.1000	0.0000		05/05/90
			Zinc	MG/KG	1.4000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	32.0000		B	07/16/90
			bis(2-Ethylhexyl)phthalate	UG/KG	60.0000		J	07/16/90
		PESTICIDES/PCB's	beta-BHC	UG/KG	85.0000		R	07/20/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	52.0000		B	07/16/90
	OTHER		Dioxin Furans	TOXEQ	0.1210			08/30/90
			Total Organic Carbon	UG/G	6790.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	28.9000			08/21/90
			Chromium VI	MG/KG	1.1326		J	05/22/90
			Percent Solids		91.6200			08/21/90
WS - 4 - BD	METALS		Aluminum	MG/KG	3120.0000	0.0000		05/05/90
			Arsenic	MG/KG	1.5000	0.0000		05/05/90
			Barium	MG/KG	10.2000	0.0000		05/05/90
			Calcium	MG/KG	254.0000	0.0000		05/05/90
			Chromium	MG/KG	3.6000	0.0000		05/05/90
			Iron	MG/KG	3230.0000	0.0000		05/05/90
			Lead	MG/KG	3.2000	0.0000	J	05/05/90
			Magnesium	MG/KG	123.0000	0.0000		05/05/90
			Manganese	MG/KG	12.6000	0.0000		05/05/90
			Potassium	MG/KG	121.0000	0.0000		05/05/90
			Sodium	MG/KG	17.9000	0.0000		05/05/90
			Vanadium	MG/KG	7.0000	0.0000		05/05/90
			Zinc	MG/KG	0.5000	0.0000		05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	53.0000		B	07/16/90
			bis(2-Ethylhexyl)phthalate	UG/KG	84.0000		J	07/16/90
		PESTICIDES/PCB's	beta-BHC	UG/KG	180.0000		R	07/20/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	10.0000		B	07/16/90

Listing of Sample Analysis Results
For All Data

* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Q1	Data Entry Date
WS - 4 - SS	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	100.0000		J	10/16/90
WS - 5 - A	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	3400.0000			05/05/90
	OTHER		Total Organic Carbon	UG/G	4918.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	880.0000			08/21/90
			Chromium VI	MG/KG	0.0215		J	05/22/90
			Percent Solids		88.5900			08/21/90
WS - 5 - B	METALS		Aluminum	MG/KG	3010.0000	0.0000	J	05/05/90
			Arsenic	MG/KG	3.0000	0.0000		05/05/90
			Barium	MG/KG	14.1000	0.0000		05/05/90
			Calcium	MG/KG	633.0000	0.0000		05/05/90
			Chromium	MG/KG	6.8000	0.0000		05/05/90
			Copper	MG/KG	5.8000	0.0000		05/05/90
			Iron	MG/KG	2040.0000	0.0000	J	05/05/90
			Lead	MG/KG	13.3000	0.0000	J	05/05/90
			Magnesium	MG/KG	161.0000	0.0000		05/05/90
			Manganese	MG/KG	20.4000	0.0000		05/05/90
			Mercury	MG/KG	0.1300	0.0000		05/05/90
			Nickel	MG/KG	4.8000	0.0000		05/05/90
			Sodium	MG/KG	294.0000	0.0000		05/05/90
			Vanadium	MG/KG	5.0000	0.0000		05/05/90
			Zinc	MG/KG	24.6000	0.0000	J	05/05/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	160.0000		J	05/24/90
			bis(2-Ethylhexyl)phthalate	UG/KG	120.0000		J	05/24/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	29.0000		B	05/23/90
			Acetone	UG/KG	25.0000		B	05/23/90
			2-Butanone	UG/KG	32.0000		B	05/23/90
	OTHER		Dioxin Furans	TOXEQ	0.7740			08/30/90
			Total Organic Carbon	UG/G	29995.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	259.0000			08/21/90
			Chromium VI	MG/KG	0.0616		J	05/22/90
			Percent Solids		88.1800			08/21/90
WS - 5 - R	METALS		Aluminum	UG/L	35.8000	0.0000	[]	05/05/90
			Arsenic	UG/L	1.2000	0.0000	B	05/05/90
			Calcium	UG/L	38.7000	0.0000	[]	05/05/90
			Iron	UG/L	101.0000	0.0000	J	05/05/90
			Lead	UG/L	1.5000	0.0000	[]	05/05/90
			Manganese	UG/L	4.4000	0.0000	[]	05/05/90
			Sodium	UG/L	76.5000	0.0000	B	05/05/90
			Zinc	UG/L	16.0000	0.0000	B	05/05/90
	ORGANICS	BASE NEUTRALS	Di-n-octylphthalate	UG/L	44.0000		B	06/05/90
WT - 1 - A	METALS		Arsenic	MG/KG	20.0000	0.0000		05/22/90
			Chromium	MG/KG	47.5000	0.0000	K	05/22/90
			Copper	MG/KG	32.9000	0.0000	K	05/22/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	270000.0000		L	05/05/90
	OTHER		Dioxin Furans	TOXEQ	11.9390			08/30/90
			Total Organic Carbon	UG/G	3056.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	2070.0000			08/21/90

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Listing of Sample Analysis Results
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* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Q1	Data Entry Date
WT - 1 - A	OTHER		Chromium VI	MG/KG	0.0632		J	05/22/90
			Percent Solids		96.4000			08/21/90
WT - 1 - AB	OTHER		Dioxin Furans	TOXEQ	9.3270			08/30/90
WT - 1 - B	METALS		Chromium	MG/KG	7.1000	0.0000	K	07/12/90
	OTHER		Dioxin Furans	TOXEQ	0.0040			08/30/90
			Total Organic Carbon	UG/G	1126.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	42.0000			08/21/90
			Chromium VI	MG/KG	0.0601		J	05/22/90
			Percent Solids		93.9300			08/21/90
WT - 1 - C	METALS		Arsenic	MG/KG	3.9000	0.0000		07/12/90
			Chromium	MG/KG	11.5000	0.0000	K	07/12/90
	ORGANICS	BASE NEUTRALS	Di-n-butylphthalate	UG/KG	110.0000		B	07/12/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	85.0000			07/12/90
			Acetone	UG/KG	5.0000		B	07/12/90
	OTHER		Dioxin Furans	TOXEQ	0.0070			08/30/90
			Total Organic Carbon	UG/G	547.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	2.5000			08/21/90
			Chromium VI	MG/KG	0.1761		J	05/22/90
			Percent Solids		86.2400			08/21/90
WT - 1 - D	METALS		Aluminum	MG/KG	3500.0000	0.0000		05/05/90
			Arsenic	MG/KG	2.0000	0.0000		05/05/90
			Barium	MG/KG	16.1000	0.0000		05/05/90
			Beryllium	MG/KG	0.1200	0.0000	B	05/05/90
			Calcium	MG/KG	340.0000	0.0000		05/05/90
			Chromium	MG/KG	2.9000	0.0000		05/05/90
			Copper	MG/KG	24.9000	0.0000	J	05/05/90
			Iron	MG/KG	3760.0000	0.0000		05/05/90
			Lead	MG/KG	3.8000	0.0000		05/05/90
			Magnesium	MG/KG	229.0000	0.0000		05/05/90
			Manganese	MG/KG	21.0000	0.0000	L	05/05/90
			Potassium	MG/KG	129.0000	0.0000		05/05/90
			Sodium	MG/KG	35.2000	0.0000	B	05/05/90
			Vanadium	MG/KG	7.0000	0.0000		05/05/90
			Zinc	MG/KG	3.6000	0.0000	B	05/05/90
WT - 2 - A	METALS		Arsenic	MG/KG	9.0000	0.0000		05/17/90
			Chromium	MG/KG	16.9000	0.0000	K	05/17/90
			Copper	MG/KG	10.9000	0.0000	K	05/17/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	58000.0000		J	05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.5820			08/30/90
			Total Organic Carbon	UG/G	6792.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	1100.0000			08/21/90
			Chromium VI	MG/KG	1.3252		J	05/22/90
WT - 2 - AB	METALS		Arsenic	MG/KG	11.0000	0.0000		05/17/90
			Chromium	MG/KG	24.2000	0.0000	K	05/17/90
			Copper	MG/KG	15.7000	0.0000	K	05/17/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	61000.0000		J	05/05/90
	OTHER		Total Organic Carbon	UG/G	4091.0000		J	08/21/90

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Listing of Sample Analysis Results
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* SAMPLE IDENTIFICATION * Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
WT - 2 - AD	OTHER		Total Petroleum Hydrocarbons	MG/KG	1340.0000			08/21/90
			Chromium VI	MG/KG	2.9100		J	05/22/90
WT - 2 - B	METALS		Arsenic	MG/KG	4.4000	0.0000		07/12/90
			Chromium	MG/KG	7.5000	0.0000	K	07/12/90
			Copper	MG/KG	4.4000	0.0000	K	07/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	4900.0000			05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.0070			08/30/90
			Total Organic Carbon	UG/G	705.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	8.8500			08/21/90
			Chromium VI	MG/KG	0.0849		J	05/22/90
WT - 2 - C	METALS		Arsenic	MG/KG	2.4000	0.0000		07/12/90
			Chromium	MG/KG	13.8000	0.0000	K	07/12/90
			Copper	MG/KG	4.5000	0.0000	K	07/12/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	7800.0000		[]	05/05/90
	OTHER		Dioxin Furans	TOXEQ	0.0160			08/30/90
			Total Organic Carbon	UG/G	750.0000		J	08/21/90
			Total Petroleum Hydrocarbons	MG/KG	66.2000			08/21/90
			Chromium VI	MG/KG	0.9456		J	05/22/90
WT - 2 - D	METALS		Aluminum	MG/KG	6870.0000	0.0000		05/12/90
			Arsenic	MG/KG	1.6000	0.0000		05/12/90
			Barium	MG/KG	20.1000	0.0000		05/12/90
			Calcium	MG/KG	521.0000	0.0000	[]	05/12/90
			Chromium	MG/KG	8.2000	0.0000	B	05/12/90
			Cobalt	MG/KG	1.4000	0.0000		05/12/90
			Copper	MG/KG	6.6000	0.0000		05/12/90
			Iron	MG/KG	6710.0000	0.0000		05/12/90
			Lead	MG/KG	3.7000	0.0000		05/12/90
			Magnesium	MG/KG	312.0000	0.0000		05/12/90
			Manganese	MG/KG	15.1000	0.0000		05/12/90
			Nickel	MG/KG	2.5000	0.0000		05/12/90
			Potassium	MG/KG	245.0000	0.0000		05/12/90
			Sodium	MG/KG	52.4000	0.0000	[]	05/12/90
			Vanadium	MG/KG	14.3000	0.0000		06/05/90
			Zinc	MG/KG	7.1000	0.0000		06/05/90
	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	2500.0000			06/05/90
			Di-n-octylphthalate	UG/KG	210.0000		B	06/05/90
		VOLATILE ORGANICS	Methylene Chloride	UG/KG	20.0000			08/21/90
			Acetone	UG/KG	78.0000			08/21/90
	OTHER		Dioxin Furans	TOXEQ	0.8500			09/12/90
WT - 2 - SS	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	270.0000		J	10/16/90
WT - 3 - A	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	290.0000		J	10/16/90
	OTHER		Total Petroleum Hydrocarbons	MG/KG	600.0000			10/16/90
WT - 3 - AD	OTHER		Total Petroleum Hydrocarbons	MG/KG	510.0000			10/16/90
WT - 3 - B	OTHER		Total Petroleum Hydrocarbons	MG/KG	14000.0000			10/16/90
WT - 3 - C	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	85000.0000		J	10/16/90
	OTHER		Total Petroleum Hydrocarbons	MG/KG	14000.0000			10/16/90
WT - 3 - SS	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	1900.0000		L	10/16/90

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Listing of Sample Analysis Results
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* SAMPLE IDENTIFICATION *									
Location - Sample# - Type	Test	Group	Parameter	Units	Level/ Non-Dissolved Metals	Dissolved Metals	Ql	Data Entry Date
WT - 4 - SB	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	44.0000		J	10/16/90
WT - 4 - SS	ORGANICS	BASE NEUTRALS	Pentachlorophenol	UG/KG	44.0000		J	10/16/90
WT - 5 - D	OTHER		Percent Organic Matter	PERC.	3.1000			10/16/90
WT - 5 - R1	OTHER		Total Petroleum Hydrocarbons	MG/L	1.1000		J	10/16/90

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2.2 Index to Sample Names

The following chart lists the sample designator, sample location and analyses for which sample was submitted (with an x in the column of the analysis). Samples are grouped into Phase I and Phase II sampling events, with similar sample types grouped together. Data not inputted into the SCDBMS is shown on a separate page. Refer to Volume 1 of the Remedial Investigation Report, Figures 3-5, 3-6, 3-7, 3-8 and 3-9 for sample locations.

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SURFACE SOIL CHARACTERESTIC TESTING

SAMPLE CODE	SAMPLE DESCRIPTION	Sieve Size	Dioxin-Furans	As Cr Cu	Cr VI	PCP	TOC	TPH	% Solids
A-1-SS	AREA A COMPOSITE	X	X	X	X	X	X	X	X
AD-1-SS	" A " DUPLICATE	X	X	X	X	X	X	X	X
B-1-SS	" B "	X	X	X	X	X	X	X	X
C-1-SS	" C "	X	X	X	X	X	X	X	X
D-1-SS	" D "	X	X	X	X	X	X	X	X
E-1-SS	" E "	X	X	X	X	X	X	X	X
F-1-SS	" F "	X	X	X	X	X	X	X	X
G-1-SS	" G "	X	X	X	X	X	X	X	X
H-1-SS	" H "	X	X	X	X	X	X	X	X
I-1-SS	" I "	X	X	X	X	X	X	X	X
J-1-SS	" J "	X	X	X	X	X	X	X	X
K-1-SS	" K "	X	X	X	X	X	X	X	X
L-1-SS	" L "	X	X	X	X	X	X	X	X
M-1-SS	" M "	X	X	X	X	X	X	X	X
N-1-SS	" N "	X	X	X	X	X	X	X	X
BK-1-SS	Background 0-1" Depth at MW-2-D	X	X	X	X	X	X	X	X
BK-2-SS	" " " " " Dupli.		X						
BK-3-SS	" 0-1' " " "	X	X	X	X	X			
BK-4-SS	" " " " " Dupli.	X	X	X	X	X			
WP-1-BP	Waste Water Pond - Burn Pit 0"-6" DEPTH		X			X			
BK-1-B5	Background		X						
BK-2-B5	" "		X						
M-1-SD	Duplicate of M-1-SS	X							

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SOIL BORING CHARACTERESTIC TESTING

SAMPLE CODE	SAMPLE DESCRIPTION	TCL	TAL	Dioxin-furans	As, Cr, Cu	Cr VI	TOC	PCP	TPH	Na Salinity
CONICAL BURN PIT										
CB-1-A	STA #1 0'-2' DEPTH				X	X		X		
CB-1-B	" 2'-4' "			X	X	X	X	X	X	
CB-1-C	" 4'-6' "			X	X	X	X	X	X	
CB-1-D	" 2'-GW " COMPOSITE	X	X							
CB-2-A	STA #2 0'-2' "				X	X	X	X	X	X
CB-2-B	" 2'-4' "			X	X	X	X	X	X	X
CB-2-C	" 4-6' "			X	X	X	X	X	X	X
CB-2-E	" 2'-GW " COMPOSITE	X	X							
CB-4-A	STA #4 0'-2' "				X	X	X	X	X	X
CB-4-B	" 2'-4' "			X	X	X	X	X	X	X
CB-4-E	" 2'-GW " COMPOSITE	X	X							
CB-5-A	STA #5 0'-2' "				X	X	X	X	X	X
CB-5-B	" 2'-4' "			X	X	X	X	X	X	X
CB-5-E	" 2'-GW " COMPOSITE	X	X							
CB-6-A	STA #6 0'-2' "				X	X	X	X	X	X
CB-6-B	" 2'-4' "			X	X	X	X	X	X	X
CB-6-E	" 2'-GW " COMPOSITE	X	X							
KELLY FIELD										
KF-1-A	STA #1 1'-GW " COMPOSITE	X	X	X		X	X	X	X	
KF-2-A	STA #2 " " "	X	X	X		X	X	X	X	
KF-3-A	STA #3 " " "	X	X	X		X	X	X	X	
KF-4-A	STA #4 " " "	X	X	X		X	X	X	X	
KF-5-A	STA #5 " " "	X	X	X		X	X	X	X	

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SAMPLE CODE	SAMPLE DESCRIPTION		TCL	TAL	Dioxin-Furans	As Cr Cu	CrVI	TOC	PCP	TPH	% Solids
KF-5-AD	STA #5	1'-GW DEPTH. DUPLICATE	X	X		X	X		X	X	
PLANT ACCESS ROAD											
PA-1-A	STA #1	0'-1' "		X	X	X		X			
PA-1-B	"	1'-3' "		X		X	X		X	X	
PA-1-D	"	1'-GW " COMPOSITE	X	X							
PA-2-A	STA #2	0'-1' "		X		X	X	X	X	X	
PA-2-B	"	1'-3' "		X		X	X	X	X	X	
PA-2-C	"	3'-6' "		X		X	X	X	X	X	
PA-2-D	"	1'-GW " COMPOSITE	X	X							
PA-3-A	STA #3	0'-1' "		X		X	X	X	X	X	
PA-3-B	"	1'-3' "		X		X	X	X	X	X	
PA-3-C	"	3'-6' "		X		X	X	X	X	X	
PA-3-D	"	1'-GW " COMPOSITE	X	X							
SEPARATION TANKS											
ST-1-A	STA #1	0'-2' "		X	X	X	X	X	X		
ST-1-AD	"	0'-2' " DUPLICATE		X		X	X	X	X		
ST-1-B	"	2'-4' "		X	X	X	X	X	X		
ST-1-C	"	4'-6' "		X		X	X	X	X		
ST-1-E	"	2'-GW " COMPOSITE	X	X							
ST-2-A	STA #2	0'-2' "		X	X	X	X	X	X		
ST-2-B	"	2'-4' "		X	X	X	X	X	X		
ST-2-C	"	4'-6' "			X	X	X	X	X		
ST-2-E	"	2'-GW " COMPOSITE	X	X							
ST-3-A	STA #3	0'-2' "		X	X	X	X	X	X	X	

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SAMPLE CODE	SAMPLE DESCRIPTION		TCL	TAL	Dioxin-furans	As & Cu	Cr VI	TOC	PCP	TPH	Na Sol'l
ST-3-B	STA #3	2'-4' DEPTH			X	X	X	X	X	X	X
ST-3-E	"	2'-GW " COMPOSITE	X	X							
WASTEWATER POND											
WP-1-A	STA #1	0'-2' "				X	X	X	X	X	
WP-1-B	"	2'-4' "			X	X	X	X	X	X	
WP-1-C	"	2'-GW " COMPOSITE		X	X	X	X		X	X	
WP-2-A	STA #2	0'-2' "			X	X	X	X	X	X	
WP-2-AO	"	0'-2' " DUPLICATE			X	X	X	X	X	X	
WP-2-B	"	2'-4' "			X	X	X	X	X	X	
WP-2-C	"	2'-GW " COMPOSITE	X	X		X	X		X	X	
WP-2-CO	"	2'-GW " DUP. COMP.		X							
WP-4-A	STA #4	0'-2' "			X	X	X	X	X	X	
WP-4-B	"	2'-4' "			X	X	X	X	X	X	
WP-4-C	"	2'-GW " COMPOSITE	X	X		X	X		X	X	
WOOD STORAGE											
WS-1-A	STA #1	0'-1' "			X	X	X	X	X	X	
WS-1-B	"	1'-GW " COMPOSITE	X	X	X	X	X		X	X	
WS-2-A	STA #2	0'-1' "			X	X	X	X	X	X	
WS-2-B	"	1'-GW " COMPOSITE	X	X	X	X	X		X	X	
WS-3-A	STA #3	0'-1' "				X	X	X	X	X	
WS-3-B	"	1'-GW " COMPOSITE	X	X	X	X	X		X	X	
WS-4-A	STA #4	0'-1' "				X	X	X	X		
WS-4-AO	"	0'-1' " DUPLICATE					X	X	X		
WS-4-B	"	1'-GW " COMPOSITE	X	X	X	X	X		X	X	

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SAMPLE CODE	SAMPLE DESCRIPTION			TCL	TAL	Dioxin-furans	As Cr Cu	Cr VI	TOC	PCP	TPH	% Solids
WS-4-BD	Sta #4	1'-GW	DEPTH OUP. COMP.	X	X							
WOOD TREATING												
WT-1-A	Sta #1	0'-2'	"			X	X	X	X	X	X	X
WT-1-B	"	2'-4'	"			X	X	X	X	X	X	X
WT-1-C	"	4'-6'	"			X	X	X	X	X	X	X
WT-1-D	"	2'-GW	" COMPOSITE		X							
WT-2-A	Sta #2	0'-2'	"			X	X	X	X	X	X	
WT-2-AD	"	0'-2'	" DUPLICATE				X	X	X	X	X	
WT-2-B	"	2'-4'	"			X	X	X	X	X	X	
WT-2-C	"	4'-6'	"			X	X	X	X	X	X	
WT-2-D	"	2'-GW	" COMPOSITE	X	X		X					
BACKGROUND												
B-1-A	MW-2-D	0'-2'	"					X	X	X	X	X
B-1-B	"	2'-4'	"		X	X		X	X	X	X	X
B-1-C	"	4'-6'	"			X		X	X	X	X	X
B-1-E	"	2'-GW	" COMPOSITE	X								
B-1-F	"	0'-2'	" DUPLICATE					X	X	X	X	X
WS-5-A	Sta #5	0'-2'	"					X	X	X	X	X
WS-5-B	"	2'-GW	" COMPOSITE	X	X	X		X	X	X	X	
PA-2-AD	Sta #2	0'-1'	" DUPLICATE			X			X	X	X	X
KF-3-AD	Sta #3	0-1'	" "			X						
PA-3-CD	Sta #3	3-6'	" "			X						

SAMPLE CODE	SAMPLE DESCRIPTION	TCL	TAL	Dioxin-Furans	AsCrCu	CrVI	TOC	PCP	TPH	Dr Solids
ST-3-ED	Sta#3 - 2'-GW Composite Duplicate									
WT-1-AD	Sta#1 - 0'-2' Depth Duplicate		x							
B-27-A	Background		x							
B-27-B	"		x							
B-27-C	"		x							
B-27-D	"		x							

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SEDIMENT CHARACTERESTIC TESTING

SAMPLE CODE	SAMPLE DESCRIPTION	GRAIN SIZE	PH	MOISTURE CONT	Eh	TCL	TAL	TOC	C.T.	ODOR	COLOR	TPH	BIOASSAY	DIOXIN FURANS	% SOIL
CEDAR CREEK															
CE-1-S	STA# 1					X	X	X	X			X		X	X
CE-2-S	STA# 2					X	X	X	X			X			X
CE-3-S	STA# 3					X	X	X	X			X			X
CHUCKATUCK CREEK															
CK-1-S	STA# 1					X	X	X	X			X	X	X	X
CK-2-S	STA# 2					X	X	X	X			X			X
CK-3-S	STA# 3					X	X	X	X			X			X
GODWINS MILL POND															
GW-1-S	STA# 1	X				X	X	X	X			X	X	X	X
GW-1-SD	" DUPLICATE	X				X	X	X	X			X			X
GW-2-S	STA# 2					X	X	X	X			X		X	
GW-3-S	STA# 3					X	X	X	X			X			
GW-4-S	STA# 4					X	X	X	X			X	X		
GW-5-S	STA# 5					X		X	X			X			X
GW-6-S	STA# 6					X	X	X	X			X			
INTERMITTENT STREAM															
IS-1-S	STA# 1					X	X	X	X			X		X	X
IS-2-S	STA# 2					X	X	X	X			X		X	X
IS-3-S	STA# 3					X	X	X	X			X	X		X
WASTEWATER POND															
PS-1-S						X	X	X	X			X		X	X
PS-2-S						X	X	X	X			X		X	X
PS-3-S						X	X	X	X			X		X	X

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SED-

SAMPLE CODE	SAMPLE DESCRIPTION	Grain Size	pH	Moisture Cont.	EL	TCC	TAL	TOC	CrVI	ODOR	CRDR	TPH	BIOASSAY	Dioxin Furans	% Solids			
PW-1-S						X												
RUNOFF WATER																		
RW-1-S						X	X	X	X			X		X	X			
RW-2-S						X	X	X	X			X		X	X			

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SURFACE WATER CHARACTERISTIC TESTING

SAMPLE CODE	SAMPLE DESCRIPTION	TCL	TAL	TAL FILTERED	TSS	ALK	CND	DO	Cr VI	Hardness	pH	Spec. Cond.	Temp	Dilution Factor
CEDAR CREEK														
CE-1-W	STA #1	X	X	X	X	X	X		X	X				
CE-2-W	STA #2	X	X	X	X	X	X		X	X				
CE-3-W	STA #3	X	X	X	X	X	X		X	X				
CHUCKATUCK CREEK														
CK-1-W	STA #1	X	X	X	X	X	X		X	X				
CK-2-W	STA #2	X	X	X	X	X	X		X	X				
CK-3-W	STA #3	X	X	X	X	X	X		X	X				
GODWINS MILLPOND														
GW-1-W	STA #1	X	X	X	X	X	X		X	X				
GW-1-WD	STA #1 DUPLICATE	X	X	X	X	X	X		X	X				
GW-2-W	STA #2	X	X	X	X	X	X		X	X				
GW-3-W	STA #3	X	X	X	X	X	X		X	X				
GW-4-W	STA #4	X	X	X	X	X	X		X	X				
GW-5-W	STA #5	X	X	X	X	X	X		X	X				
GW-6-W	STA #6	X	X	X	X	X	X		X	X				
INTERMITTENT STREAM														
IS-1-W	STA #1	X	X	X	X	X	X		X	X				
IS-2-W	STA #2	X	X	X	X	X	X		X	X				
IS-3-W	STA #3	X	X	X	X	X	X		X	X				
WASTEWATER POND														
PW-1-W	STA #1	X	X	X	X	X	X		X	X			X	
PW-1-WD	STA #1 DUPLICATE	X	X	X	X	X	X		X	X				

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SW-

SAMPLE CODE	SAMPLE DESCRIPTION	TCL	TAL	TAL FILTERED	TSS	ALK	COD	DO	CATI	Hardness	PH	Spec. Cond	Temp.	DIOXIN Trans
RUNOFF WATER														
RW-1-W	STA #1	X	X	X	X	X	X		X	X			X	
RW-2-W	STA #2	X	X	X	X	X	X		X	X			X	

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GROUND WATER CHARACTERESTIC TESTING

GW-

SAMPLE CODE	SAMPLE DESCRIPTION	TCL	TAL	TAL FILTERED	DISSOLVED GASES	TDS	Cr VI	TPH	pH	Spec Cond.	TEMP
KELLY PRIVATE WELL											
K1-1-W	KELLY'S IRRIGATION WELL	X	X	X		X	X	X			
MONITORING WELLS											
MW-1-S	BACKGROUND SHALLOW DEPTH	X	X	X	X	X	X	X			
MW-2-D	" DEEP "	X	X	X		X	X	X			
MW-3-S	SEPERATION TANK SHALLOW "	X	X	X		X	X	X			
MW-4-S	WOOD TREATING " "	X	X	X		X	X	X			
MW-5-S	WOOD STORAGE " "	X	X	X		X	X	X			
MW-6-D	" " DEEP "	X	X	X		X	X	X			
MW-7-S	COMMON BURNER PIT Shallow "	X	X	X	X	X	X	X			
MW-8-D	" " " DEEP "	X	X	X		X	X	X			
MW-9-S	KELLY FIELD SHALLOW "	X	X	X		X	X	X			
MW-9-SD	" " " " Dup.	X	X	X		X	X	X			
MW-10-D	" " DEEP "	X	X	X		X	X	X			
MW-11-S	" " SHALLOW "	X	X	X		X	X	X			
MW-12-D	" " DEEP "	X	X	X		X	X	X			
MW-13-S	" " SHALLOW "	X	X	X		X	X	X			
MW-14-D	" " DEEP "	X	X	X		X	X	X			
OWNER'S WELLS											
OW-1-RW	OWNER'S RECOVERY WELL	X	X	X		X	X	X			
OW-1-W	WASTEWATER POND DOWN GRADIENT	X	X	X		X	X	X			
OW-2-W	" " UP "	X	X	X		X	X	X			
OW-2-WD	" " " " Dup.	X	X	X		X	X	X			
OW-3-W	WOODSTORAGE EAST	X	X	X		X	X	X			
OW-4-W	" SOUTH	X	X	X		X	X	X			

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CONFINING LAYER CHARACTERISTIC TESTING

CL-1

SAMPLE CODE	SAMPLE DESCRIPTION	PCP	As Cr Cu
MW-6-CL		X	X
MW-8-CL		X	X
MW-10-CL		X	X
MW-10-CD		X	X
MW-12-CL		X	X
MW-14-CL		X	X

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QA/QC SAMPLES

QA/QC

SAMPLE CODE	SAMPLE DESCRIPTION	VOC ORG	Diesel-Fuel	TPH	TCL	TOC	CLTCL	PCP	TPH	TDS
B-1-ET	Background Boring Trip Blank	x								
GW-1-R	Codeline Millpond Sediment Rinsate		x	x		x		x	x	
PA-3-R	Plant Access Sys #3 Soil Rinsate	x	x	x	x					
R-27-A	Soil Rinsates			x	x	x				
R-27-B	" "				x	x				
R-27-E	" "		x							
SS-1-R	Surface Soil Rinsate		x		x		x			
TB-18-S	Trip Blank	x								
TB-20-S	" "	x								
TB-21-W	" "	x								
TB-27-	" "	x								
TB-33-T	" "	x								
TP-1-BK	" "	x								
TP-2-BK	" "	x								
WS-5-R	Soil Rinsate	x		x	x		X			
TB-19-S	Trip Blank	x								
R-1-	Rinsate	x								
R-20-S	"			X				X		
TB-26-	Trip Blank	x								
TB-34-T	" " Monitoring Wells	x								
TB-35-T	" " " "	x								
DR-1	Rinsate		X							
R-27-AA	Rinsates				x					
R-27-BB	"				x					
-30-T	"	x								
TB-32-T	"	x								

AR301900

ENG

ENGINEERING CHARACTERESTIC TESTING

SAMPLE CODE	SAMPLE DESCRIPTION		Grain Size	Atterberg Limit	Bulk Density	Permeability	Total Chlorine	Total Sulfur	Total Silica	Alk	BTU Coal	ASH Coal	Moisture Coal	PH
CB-1-A	Conical Burn Pit	0'-2' Depth Sta#1	X			X	X	X	X	X	X	X	X	
CB-2-A	" "	" " Sta#2	X			X	X	X	X	X	X	X	X	
CB-4-A	" "	" " Sta#4	X			X	X	X	X	X	X	X	X	
CB-5-A	" "	" " Sta#5	X	X		X	X	X	X	X	X	X	X	
CB-6-A	" "	" " Sta#6	X		X	X	X	X	X	X	X	X	X	
ST-1-A	Separation Tank	" " Sta#1	X			X	X	X	X	X	X	X	X	
ST-2-A	" "	" " Sta#2	X			X	X	X	X	X	X	X	X	
ST-3-A	" "	" " Sta#3	X			X	X	X	X	X	X	X	X	
PA-2-B	Plant Access	2'-4' " Sta#2		X	X	X						X		
CK-1-S	Chuckstuck Creek	Sta#1 Sediment		X								X		
GW-6-S	Godwin Millpond	Sta#6 "		X								X		
ST-1-C	Separation Tank	2'-6' Sta#1		X	X	X						X		
WS-3-A	Wood Storage	0'-2' Sta#3		X								X		
WS-3-B	" "	2'-4' "		X								X		
ST-1-B	Separation Tank	2'-4' Sta#1		X								X		
KF-1-A	Kelley Field	1'-GW Comp "	X	X								X		
KF-1-AD	"	" Comp "	X	X										
IS-2-S	Intermittent St.	Sediment Sta#2		X								X		
MW-12-CL	Clay Confining Layer at MW-12-D			X	X	X						X		
MW-6-CL	" " " " MW-6-D			X	X	X						X		
MW-10-CL	" " " " MW-10-D			X	X	X						X		
MW-14-CL	" " " " MW-14-D			X	X	X						X		
MW-8-CL	" " " " MW-8-D			X	X	X						X		

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SAMPLE CODE	SAMPLE DESCRIPTION	PCP	TPH	ORGANIC MATTER
CB-1-SS	0-6"	X		
ST-1-SS	0-6"	X		
WP-5-A	0-2	X	X	
WP-5-B	2-4	X	X	
WP-5-C	4-6	X	X	
WP-6-A	0-2	X	X	
WP-6-B	2-4	X	X	
WP-7-A	0-2	X	X	
WP-7-B	2-4	X	X	
WP-7-C	4-6	X	X	
WP-7-D	8-10 Clay Layer	X	X	X
WS-4-SS	0-6"	X		
WT-1-SS	0-6"	X		
WT-2-SS	0-6"	X		
WT-3-A	0-2	X	X	
WT-3-AD	0-2	X	X	
WT-3-B	2-4	X	X	
WT-3-C	4-6	X	X	
WT-3-SS	0-6"	X		
WP-6-C	4-6	X	X	
MW-19-DS	20-22 Yorktown			X
WT-4-A	0-2	X	X	
WT-4-B	2-4	X	X	
WT-4-C	4-6	X	X	
WT-4-SD	0-6	X	X	
WT-4-SS	0-6"	X	X	

HR301902

SAMPLE CODE	SAMPLE DESCRIPTION	PCP	TPH	ORGANIC MATTER
WT - 5 - A	0 - 2	X	X	
WT - 5 - C	4 - 6	X	X	
WT - 5 - SS	0 - 6"	X	X	
WT - 5 - R	RINSATE	X	X	
WT - 5 - R1	RINSATE	X	X	
WT - 5 - D	10 - 11 Clay Layer			X

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AR301903

SAMPLE CODE	SAMPLE DESCRIPTION	PLP	TPH
WP-1-1L	LEACHATE	X	
WP-1-2L	"	X	
WP-1-3L	"	X	
WP-1-4L	"	X	
WP-1-5L	"	X	
WP-1-LB	"	X	
WT-2-1L	"	X	
WT-2-2L	"	X	
WT-2-3L	"	X	
WT-2-4L	"	X	
WT-2-5L	"	X	
WT-2-LB	"	X	
WP-1-PL	"	X	
WT-2-PL	"	X	

AR301904

SAMPLE CODE	SAMPLE DESCRIPTION	PCP
SPCP-1	TREATABILITY STUDY	X
SPCP-2	"	X
SPCP-3	"	X
SPCP-4	"	X
SPCP-5	"	X

AR301905

SAMPLE CODE	SAMPLE DESCRIPTION	PCP	TPH
MW-4-11	WATER	X	X
MW-4-N	"	X	
MW-7-11	"	X	X
MW-7-10	"	X	X
MW-8-11	"	X	X
MW-15-11	"	X	X
MW-16-11	"	X	X
MW-19-11	"	X	X
MW-19-D	"	X	
OR-1-11	"	X	

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3. PARAMETERS

3.1 Computer Output

A listing of the parameters input into the SCDBMS follows.

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AR301907

Listing of Test Parameters

Test	Group	*PARAMETER* Code	Description	Soil	Water
METALS		001	Aluminum	MG/KG	UG/L
		002	Antimony	MG/KG	UG/L
		003	Arsenic	MG/KG	UG/L
		004	Barium	MG/KG	UG/L
		005	Beryllium	MG/KG	UG/L
		006	Cadmium	MG/KG	UG/L
		007	Calcium	MG/KG	UG/L
		008	Chromium	MG/KG	UG/L
		009	Cobalt	MG/KG	UG/L
		010	Copper	MG/KG	UG/L
		011	Iron	MG/KG	UG/L
		012	Lead	MG/KG	UG/L
		013	Magnesium	MG/KG	UG/L
		014	Manganese	MG/KG	UG/L
		015	Mercury	MG/KG	UG/L
		016	Nickel	MG/KG	UG/L
		017	Potassium	MG/KG	UG/L
		018	Selenium	MG/KG	UG/L
		019	Silver	MG/KG	UG/L
		020	Sodium	MG/KG	UG/L
		021	Thallium	MG/KG	UG/L
		022	Vanadium	MG/KG	UG/L
		023	Zinc	MG/KG	UG/L
		024	Cyanide	MG/KG	UG/L
ORGANICS	BASE NEUTRALS	001	Phenol	UG/KG	UG/L
		002	bis(2-Chloroethyl)ether	UG/KG	UG/L
		003	2-Chlorophenol	UG/KG	UG/L
		004	1,3-Dichlorobenzene	UG/KG	UG/L
		005	Benzyl	UG/KG	UG/L
		006	1,2-Dichlorobenzene	UG/KG	UG/L
		007	2-Methylphenol	UG/KG	UG/L
		008	bis(2-Chloroisopropyl)ether	UG/KG	UG/L
		009	4-Methylphenol	UG/KG	UG/L
		010	N-Nitroso-di-n-propylamine	UG/KG	UG/L
		011	Hexachloroethane	UG/KG	UG/L
		012	Nitrobenzene	UG/KG	UG/L
		013	Isophorone	UG/KG	UG/L
		014	2-Nitrophenol	UG/KG	UG/L
		015	2,4-Dimethylphenol	UG/KG	UG/L
		016	Benzoic Acid	UG/KG	UG/L
		017	bis(2-Chloroethoxy)methane	UG/KG	UG/L
		018	2,4-Dichlorophenol	UG/KG	UG/L
		019	1,2,4-Trichlorobenzene	UG/KG	UG/L
		020	Naphthalene	UG/KG	UG/L
		021	4-Chloroaniline	UG/KG	UG/L
		022	Hexachlorobutadiene	UG/KG	UG/L
		023	4-Chloro-3-methylphenol	UG/KG	UG/L
		024	2-Methylnaphthalene	UG/KG	UG/L
		025	Hexachlorocyclopentadiene	UG/KG	UG/L
		026	2,4,6-Trichlorophenol	UG/KG	UG/L
		027	2,4,5-Trichlorophenol	UG/KG	UG/L
		028	2-Chloronaphthalene	UG/KG	UG/L

Listing of Test Parameters

Test	Group	*PARAMETER* Code	Description	Soil	Water
ORGANICS	BASE NEUTRALS	029	2-Nitroaniline	UG/KG	UG/L
		030	Dimethylphthalate	UG/KG	UG/L
		031	Acenaphthylene	UG/KG	UG/L
		032	2,6-Dinitrotoluene	UG/KG	UG/L
		033	3-Nitroaniline	UG/KG	UG/L
		034	Acenaphthene	UG/KG	UG/L
		035	2,4-Dinitrophenol	UG/KG	UG/L
		036	4-Nitrophenol	UG/KG	UG/L
		037	Dibenzofuran	UG/KG	UG/L
		038	2,4-Dinitrotoluene	UG/KG	UG/L
		039	Diethylphthalate	UG/KG	UG/L
		040	4-Chlrorphenyl-phenylether	UG/KG	UG/L
		041	Fluorene	UG/KG	UG/L
		042	4-nitroaniline	UG/KG	UG/L
		043	4,6-Dinitro-2-methylphenol	UG/KG	UG/L
		044	N-Nitrosodiphenylamine	UG/KG	UG/L
		045	4-Bromophenyl-phenylether	UG/KG	UG/L
		046	Hexachlorobenzene	UG/KG	UG/L
		047	Pentachlorophenol	UG/KG	UG/L
		048	Phenanthrene	UG/KG	UG/L
		049	Anthracene	UG/KG	UG/L
		050	Di-n-butylphthalate	UG/KG	UG/L
		051	Fluoranthene	UG/KG	UG/L
		052	Pyrene	UG/KG	UG/L
		053	Butylbenzylphthalate	UG/KG	UG/L
		054	3,3-Dichlorobenzidine	UG/KG	UG/L
		055	Benzo(a)anthracene	UG/KG	UG/L
		056	Chrysene	UG/KG	UG/L
		057	bis(2-Ethylhexyl)phthalate	UG/KG	UG/L
		058	Di-n-octylphthalate	UG/KG	UG/L
		059	Benzo(b)fluoranthene	UG/KG	UG/L
		060	Benzo(k)fluoranthene	UG/KG	UG/L
		061	Benzo(a)pyrene	UG/KG	UG/L
		062	Indeno(1,2,3-cd)pyrene	UG/KG	UG/L
		063	Dibenz(a,h)anthracene	UG/KG	UG/L
		064	Benzo(g,h,i)perylene	UG/KG	UG/L
	PESTICIDES/PCB's	001	alpha-BHC	UG/KG	UG/L
		002	beta-BHC	UG/KG	UG/L
		003	delta-BHC	UG/KG	UG/L
		004	Gamma-BHC (Lindane)	UG/KG	UG/L
		005	Heptachlor	UG/KG	UG/L
		006	Aldrin	UG/KG	UG/L
		007	Heptachlor Epoxide	UG/KG	UG/L
		008	Endosulfan I	UG/KG	UG/L
		009	Dieldrin	UG/KG	UG/L
		010	4,4'-DDE	UG/KG	UG/L
		011	Endrin	UG/KG	UG/L
		012	Endosulfan II	UG/KG	UG/L
		013	4,4'-DDD	UG/KG	UG/L
		014	Endosulfan Sulfate	UG/KG	UG/L
		015	4,4'-DDT	UG/KG	UG/L
		016	Methoxychlor	UG/KG	UG/L

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Listing of Test Parameters

Test	Group	*PARAMETER* Code	Description	Soil	Water
ORGANICS	PESTICIDES/PCB's	017	Endrin Ketone	UG/KG	UG/L
		018	Alpha-Chlordane	UG/KG	UG/L
		019	Gamma-Chlordane	UG/KG	UG/L
		020	Toxaphene	UG/KG	UG/L
		021	Aroclor-1016	UG/KG	UG/L
		022	Aroclor-1221	UG/KG	UG/L
		023	Aroclor-1232	UG/KG	UG/L
		024	Aroclor-1242	UG/KG	UG/L
		025	Aroclor-1248	UG/KG	UG/L
		026	Aroclor-1254	UG/KG	UG/L
		027	Aroclor-1260	UG/KG	UG/L
	VOLATILE ORGANICS	001	Chloromethane	UG/KG	UG/L
		002	Bromomethane	UG/KG	UG/L
		003	Vinyl Chloride	UG/KG	UG/L
		004	Chloroethane	UG/KG	UG/L
		005	Methylene Chloride	UG/KG	UG/L
		006	Acetone	UG/KG	UG/L
		007	Carbon Disulfide	UG/KG	UG/L
		008	1,1-Dichloroethene	UG/KG	UG/L
		009	1,1-Dichloroethane	UG/KG	UG/L
		010	Total-1,2-Dichloroethene	UG/KG	UG/L
		011	Chloroform	UG/KG	UG/L
		012	1,2-Dichloroethane	UG/KG	UG/L
		013	2-Butanone	UG/KG	UG/L
		014	1,1,1-Trichloroethane	UG/KG	UG/L
		015	Carbon Tetrachloride	UG/KG	UG/L
		016	Vinyl Acetate	UG/KG	UG/L
		017	Bromodichloromethane	UG/KG	UG/L
		018	1,2-Dichloropropane	UG/KG	UG/L
		019	Cis-1,3-Dichloropropene	UG/KG	UG/L
		020	Trichloroethene	UG/KG	UG/L
		021	Dibromochloromethane	UG/KG	UG/L
		022	1,1,2-Trichloroethane	UG/KG	UG/L
		023	Benzene	UG/KG	UG/L
		024	Trans-1,3-Dichloropropene	UG/KG	UG/L
		025	[illegible]	UG/KG	UG/L
		026	4-Methyl-2-pentanone	UG/KG	UG/L
		027	2-Hexanone	UG/KG	UG/L
		028	Tetrachloroethene	UG/KG	UG/L
		029	1,1,2,2-Tetrachloroethene	UG/KG	UG/L
		030	Toluene	UG/KG	UG/L
		031	Chlorobenzene	UG/KG	UG/L
		032	Ethylbenzene	UG/KG	UG/L
		033	Styrene	UG/KG	UG/L
		034	Total Xylenes	UG/KG	UG/L
OTHER		001	Dioxin Furans	TOXEQ	TOXEQ
		002	Pentachlorophenol	UG/KG	UG/KG
		003	Total Organic Carbon	UG/G	MG/L
		004	Total Petroleum Hydrocarbons	MG/KG	MG/L
		005	Total Chromium	MG/KG	UG/L
		006	Total Arsenic	MG/KG	UG/L
		007	Total Copper	MG/KG	UG/L

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3.2 Contract Laboratory Program

3.2.1 Inorganic Target Analyte List

Inorganic TAL parameter list and corresponding IDLs required by CLP follows. Lists were obtained from EPA CLP Statement of Work (EPA 1986).

INORGANIC TARGET ANALYTE LIST (TAL)

Analyte	Contract Required Detection Limit (1,2) (ug/L)
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium	10
Cobalt	50
Copper	25
Iron	100
Lead	3
Magnesium	5000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Vanadium	50
Zinc	20
Cyanide	10

(1) Subject to the restrictions specified in the first page of Part G, Section IV of Exhibit D (Alternate Methods - Catastrophic Failure) any analytical method specified in SOW Exhibit D may be utilized as long as the documented instrument or method detection limits meet the Contract Required Detection Limit (CRDL) requirements. Higher detection limits may only be used in the following circumstance:

If the sample concentration exceeds five times the detection limit of the instrument or method in use, the value may be reported even though the instrument or method detection limit may not equal the Contract Required Detection Limit. This is illustrated in the example below:

For lead:

Method in use - ICP
Instrument Detection Limit (IDL) - 40
Sample concentration - 220
Contract Required Detection Limit (CRDL) - 3

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The value of 220 may be reported even though instrument detection limit is greater than CRDL. The instrument or method detection limit must be documented as described in Exhibit E.

(2) The CRDL are the instrument detection limits obtained in pure water that must be met using the procedure in Exhibit E. The detection limits for samples may be considerably higher depending on the sample matrix.

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3.2.2 Organic Target Compound List

Organic TCL parameter list and corresponding IDLs required by CLP follows. Lists were obtained from EPA CLP Statement of Work (EPA 1986).

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Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL)*

Volatiles	CAS Number	Quantitation Limits** Water ug/L	Low Soil/Sediment[a] ug/Kg
1. Chloromethane	74-87-3	10	10
2. Bromomethane	74-83-9	10	10
3. Vinyl Chloride	75-01-4	10	10
4. Chloroethane	75-00-3	10	10
5. Methylene Chloride	75-09-2	5	5
6. Acetone	67-64-1	10	10
7. Carbon Disulfide	75-15-0	5	5
8. 1,1-Dichloroethene	75-35-4	5	5
9. 1,1-Dichloroethane	75-34-3	5	5
10. 1,2-Dichloroethene (total)	540-59-0	5	5
11. Chloroform	67-66-3	5	5
12. 1,2-Dichloroethane	107-06-2	5	5
13. 2-Butanone	78-93-3	10	10
14. 1,1,1-Trichloroethane	71-55-6	5	5
15. Carbon Tetrachloride	56-23-5	5	5
16. Vinyl Acetate	108-05-4	10	10
17. Bromodichloromethane	75-27-4	5	5
18. 1,2-Dichloropropane	78-87-5	5	5
19. cis-1,3-Dichloropropene	10061-01-5	5	5
20. Trichloroethene	79-01-6	5	5
21. Dibromochloromethane	124-48-1	5	5
22. 1,1,2-Trichloroethane	79-00-5	5	5
23. Benzene	71-43-2	5	5
24. trans-1,3-Dichloropropene	10061-02-6	5	5
25. Bromoform	75-25-2	5	5
26. 4-Methyl-2-pentanone	108-10-1	10	10
27. 2-Hexanone	591-78-6	10	10
28. Tetrachloroethene	127-18-4	5	5
29. Toluene	108-88-3	5	5
30. 1,1,2,2-Tetrachloroethane	79-34-5	5	5

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Volatiles	CAS Number	Quantitation Limits** Water ug/L	Low Soil/Sediment[a] ug/Kg
31. Chlorobenzene	108-90-7	5	5
32. Ethyl Benzene	100-41-4	5	5
33. Styrene	100-42-5	5	5
34. Xylenes (Total)	1330-20-7	5	5

[a] Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Volatile TCL Compounds are 125 times the individual Low Soil/Sediment CRQL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

AR301916

Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL)*

Semivolatiles	CAS Number	Quantitation Limits** Water ug/L	Low Soil/Sediment[b] ug/Kg
35. Phenol	108-95-2	10	330
36. bis(2-Chloroethyl) ether	111-44-4	10	330
37. 2-Chlorophenol	95-57-8	10	330
38. 1,3-Dichlorobenzene	541-73-1	10	330
39. 1,4-Dichlorobenzene	106-46-7	10	330
40. Benzyl alcohol	100-51-6	10	330
41. 1,2-Dichlorobenzene	95-50-1	10	330
42. 2-Methylphenol	95-48-7	10	330
43. bis(2-Chloroisopropyl) ether	108-60-1	10	330
44. 4-Methylphenol	106-44-5	10	330
45. N-Nitroso-di-n-dipropylamine	621-64-7	10	330
46. Hexachloroethane	67-72-1	10	330
47. Nitrobenzene	98-95-3	10	330
48. Isophorone	78-59-1	10	330
49. 2-Nitrophenol	88-75-5	10	330
50. 2,4-Dimethylphenol	105-67-9	10	330
51. Benzoic acid	65-85-0	50	1600
52. bis(2-Chloroethoxy) methane	111-91-1	10	330
53 2,4-Dichlorophenol	120-83-2	10	330
54. 1,2,4-Trichlorobenzene	120-82-1	10	330
55. Naphthalene	91-20-3	10	330
56. 4-Chloroaniline	106-47-8	10	330
57. Hexachlorobutadiene	87-68-3	10	330
58. 4-Chloro-3-methylphenol (para-chloro-meta-cresol)	59-50-7	10	330
59. 2-Methylnaphthalene	91-57-6	10	330
60. Hexachlorocyclopentadiene	77-47-4	10	330
61. 2,4,6-Trichlorophenol	88-06-2	10	330
62. 2,4,5-Trichlorophenol	95-95-4	50	1600
63. 2-Chloronaphthalene	91-58-7	10	330
64. 2-Nitroaniline	88-74-4	50	1600
65. Dimethylphthalate	131-11-3	10	330
66. Acenaphthylene	208-96-8	10	330
67. 2,6-Dinitrotoluene	606-20-2	10	330
68. 3-Nitroaniline	99-09-2	50	1600
69. Acenaphthene	83-32-9	10	330

(continued)

Semivolatiles	CAS Number	Quantitation Limits** Water ug/L	Low Soil/Sediment[b] ug/Kg
70. 2,4-Dinitrophenol	51-28-5	50	1600
71. 4-Nitrophenol	100-02-7	50	1600
72. Dibenzofuran	132-64-9	10	330
73. 2,4-Dinitrotoluene	121-14-2	10	330
74. Diethylphthalate	84-66-2	10	330
75. 4-Chlorophenyl-phenyl ether	7005-72-3	10	330
76. Fluorene	86-73-7	10	330
77. 4-Nitroaniline	100-01-6	50	1600
78. 4,6-Dinitro-2-methylphenol	534-52-1	50	1600
79. N-nitrosodiphenylamine	86-30-6	10	330
80. 4-Bromophenyl-phenylether	101-55-3	10	330
81. Hexachlorobenzene	118-74-1	10	330
82. Pentachlorophenol	87-86-5	50	1600
83. Phenanthrene	85-01-8	10	330
84. Anthracene	120-12-7	10	330
85. Di-n-butylphthalate	84-74-2	10	330
86. Fluoranthene	206-44-0	10	330
87. Pyrene	129-00-0	10	330
88. Butylbenzylphthalate	85-68-7	10	330
89. 3,3'-Dichlorobenzidine	91-94-1	20	660
90. Benzo(a)anthracene	56-55-3	10	330
91. Chrysene	218-01-9	10	330
92. bis(2-Ethylhexyl)phthalate	117-81-7	10	330
93. Di-n-octylphthalate	117-84-0	10	330
94. Benzo(b)fluoranthene	205-99-2	10	330
95. Benzo(k)fluoranthene	207-08-9	10	330
96. Benzo(a)pyrene	50-32-8	10	330
97. Indeno(1,2,3-cd)pyrene	193-39-5	10	330
98. Dibenz(a,h)anthracene	53-70-3	10	330
99. Benzo(g,h,i)perylene	191-24-2	10	330

[b] Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for SemiVolatile TCL Compounds are 60 times the individual Low Soil/Sediment CRQL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

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Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL)*

Pesticides/PCBs	CAS Number	Quantitation Limits** Water ug/L	Low Soil/Sediment[c] ug/Kg
100. alpha-BHC	319-84-6	0.05	8.0
101. beta-BHC	319-85-7	0.05	8.0
102. delta-BHC	319-86-8	0.05	8.0
103. gamma-BHC (Lindane)	58-89-9	0.05	8.0
104. Heptachlor	76-44-8	0.05	8.0
105. Aldrin	309-00-2	0.05	8.0
106. Heptachlor epoxide	1024-57-3	0.05	8.0
107. Endosulfan I	959-98-8	0.05	8.0
108. Dieldrin	60-57-1	0.10	16.0
109. 4,4'-DDE	72-55-9	0.10	16.0
110. Endrin	72-20-8	0.10	16.0
111. Endosulfan II	33213-65-9	0.10	16.0
112. 4,4'-DDD	72-54-8	0.10	16.0
113. Endosulfan sulfate	1031-07-8	0.10	16.0
114. 4,4'-DDT	50-29-3	0.10	16.0
115. Methoxychlor	72-43-5	0.5	80.0
116. Endrin ketone	53494-70-5	0.10	16.0
117. alpha-Chlordane	5103-71-9	0.5	80.0
118. gamma-Chlordane	5103-74-2	0.5	80.0
119. Toxaphene	8001-35-2	1.0	160.0
120. Aroclor-1016	12674-11-2	0.5	80.0
121. Aroclor-1221	11104-28-2	0.5	80.0
122. Aroclor-1232	11141-16-5	0.5	80.0
123. Aroclor-1242	53469-21-9	0.5	80.0
124. Aroclor-1248	12672-29-6	0.5	80.0
125. Aroclor-1254	11097-69-1	1.0	160.0
126. Aroclor-1260	11096-82-5	1.0	160.0

[c] Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Pesticide/PCB TCL compounds are 15 times the individual Low Soil/Sediment CRQL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation limits listed for soil/sediment are based on wet weight. The quantitation Limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

Listing of Test Parameters

Test	Group	'PARAMETER' Code	Description	Soil	Water
OTHER		008	Chromium VI	MG/KG	UG/L
		009	Filtered Chromium		UG/L
		010	Filtered Arsenic		UG/L
		011	Filtered Copper		UG/L
		012	Filtered Chromium VI		UG/L
		013	Grain Size Distribution		
		014	Atterburg Limits		
		015	Bulk Density		
		016	Permeability		
		017	Moisture Content	PERC.	
		018	Eh		
		019	pH		
		020	Specific Conductance		UMHOS
		021	Temperature		F
		022	Total Suspended Soils		MG/L
		023	Alkalinity	MG/KG	UG/L
		024	Chemical Oxygen Demand		UG/L
		025	Dissolved Oxygen		MG/L
		026	Hardness		UG/L
		027	Total Dissolved Solids		MG/L
		028	Chlorine	PERC.	
		029	Sulfer	PERC.	
		030	Silica	PERC.	
		031	BTU Content	BTU1b	
		032	Ash Content	PERC.	
		033	2378-TCDD	ng/g	ng/g
		034	Percent Solids		
		035	Percent Organic Matter	PERC.	

AR301920

4. GUIDANCE AND REGULATORY LEVELS

Regulations, guidance documents, or other standards which have been reviewed during the RI include:

Computer Code	Source
CCPAL	Chronic Criteria for Protection of Aquatic Life State of Virginia Water Quality Standards
CWAALA	Water Quality Criteria for Protection of Aquatic Life Freshwater Acute Clean Water Act
CWAALC	Water Quality Criteria for Protection of Aquatic Life Freshwater Chronic Clean Water Act
CWAFCO	Water Quality Criteria for Protection of Human Health Fish Ingestion Only Clean Water Act
CWAWFI	Water Quality Criteria for Protection of Human Health Water and Fish Ingestion Clean Water Act
MCL	Maximum Contaminant Levels Safe Drinking Water Act
MCLG	Maximum Contaminant Levels Guidelines Safe Drinking Water Act
MXD	Calculated Expected Soil Metal Concentrations E & E 1990
VACPGW	Groundwater Criteria for the Coastal Plain Virginia Water Quality Standards
VAGWS	Groundwater Standards Applicable Throughout Virginia Virginia Water Quality Standards
VAHE	Health Effects of the Constituents of Concern in F033 Code of Federal Register
VAWQS	Surface Water Standards for Surface Public Water Supplies Virginia Water Quality Standards
ES	Elements in Soils Shacklette and Boerngen 1984

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COMMONWEALTH of VIRGINIA

DEPARTMENT OF WASTE MANAGEMENT
11th Floor, Monroe Building
101 N. 14th Street
Richmond, VA 23219
(804) 225-2667

April 13, 1990

Via - Federal Express

Andrew Palestini
Remedial Project Manager (3HW24)
U.S. EPA Region III
841 Chestnut Building
Philadelphia, PA 19107

Ref: Saunders Supply Company NPL Site

Dear Andy:

I have identified some preliminary State ARARs for the referenced site. As we discussed on the phone, the Virginia Surface Water Quality Criteria (which will be adopted as standards in the near future) and the Virginia Groundwater Standards are not always strictly enforced by the State Water Control Board. We can propose cleanup levels to the SWCB based on risk assessment calculations. If the SCWB agrees that those levels are protective of aquatic life and human health, then those cleanup levels can be used at the site.

The following sections discuss the ARARs for each medium.

Air

If a release to air is planned, the emissions will be addressed using Virginia's standards which established Significant Ambient Air Concentrations (SAACs). For example, values have been established for copper (0.01667 mg/m^3), Chromium III (0.000005, H_2O insoluble), and Chromium VI (0.00033, H_2O soluble). In the case of these inorganics, the SAAC is much lower than the Federal Threshold Limit Values/Time Weighted Average (TLV-TWA), established by the American Conference of Environmental Industrial Hygienists. SAAC and TLV-TWA values for some volatiles and semi-volatiles are also available. Let me know if you want me to pursue air ARARs with the State Air Pollution Control Board.

Soil

Cleanup levels for soil should be calculated using risk assessment, as disucussed above. However, RCRA considerations may enter into this also. According to the Virginia Hazardous Waste Management Regulations (VHWMR), VR 672-10-1, discarded unused formulations containing pentachlorophenol is a hazardous waste with EPA hazardous waste number F027. Residues resulting from the incineration or thermal treatment of soil contaminated with F027 waste are F028. Also, bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenal is K001. Normally, since these wastes are mixed, you should choose the hazardous waste number that requires the most stringent measures in the transport and disposal of the waste and use that number on your manifests.

However, these listings will soon be changed. According to a Proposed Rule in the December 30, 1988 Federal Register, pentachlorophenol will be listed as F032 retroactively. Chromated copper arsenate will be listed as F035. This means that you will have to list both hazardous waste numbers on your manifests.

It is not clear when this change will be effective. The F032 listing will be effective when the rule is promulgated, which will be either November or June, depending on the outcome of a lawsuit against EPA. The F035 listing will be effective when the State Hazardous Waste Regulations pick it up, which will probably be the following January from the time it is promulgated. I will keep you updated on the time schedule.

Until CCA becomes a listed waste, soil and water contaminated with chromium and arsenic may still be a characteristic hazardous waste. Until September 29 of this year, this determination is made by EP Toxicity. After that date, the method which should be used is TCLP. The maximum value for arsenic is 5.0 mg/l. Should this number be exceeded, the hazardous waste number is D004. The maximum value for chromium is also 5.0 mg/l, and the hazardous waste number is D007.

Surface Water and Groundwater

I have attached the pages from the State Water Control Board Regulations, Water Quality Standards (VR 680-21-00) which deal with surface public water supplies (to be applied at Godwins Millpond), surface water quality criteria, and groundwater standards. Note that the groundwater standards section has values which are region-specific. The site is located in the Coastal Plain physiographic region.

In the December 30, 1988 Federal Register, a health-based water concentration limit for pentachlorophenol is listed. I have attached this page for your information.

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Should you have any comments or questions about this information, please let me know. As this list is tentative, I'm sure that we will discuss it further.

Sincerely,

Nora M. Okusu
Environmental Engineer Consultant

Attachments

cc: Dr. Greg Boardman, VPI

AR301924

VR680-21-02.3 Surface Water Standards for Surface Public Water Supplies

In addition to other standards established for the protection of public or municipal water supplies, the following standards apply at the water intake; the standards also apply to any upstream or downstream reach specified in the appropriate river basin table. The standards apply to both the water supply main stream and its tributaries within the designated distance.

CONSTITUENT	CONCENTRATION (MG/L)
Arsenic	0.05
Barium	1.0
Cadmium*	0.01
Chloride	250
Chromium (Total)	0.05
Copper*	1.0
Foaming agents (measured as methylene blue active substances)	0.5
Iron (soluble)	0.3
Lead	0.05
Manganese (soluble)	0.05
Mercury*	0.002
Nitrate (as N)	10
Phenols	0.001
Selenium*	0.01
Silver*	0.05
Sulfate	250
Total dissolved solids	500
Zinc*	5.0
Chlorinated Hydrocarbon Insecticides:	
Endrin*	0.0002
Lindane*	0.004
Methoxychlor*	0.1
Toxaphene*	0.005
Chlorophenoxy Herbicides:	
2,4-D	0.1
Silvex	0.01

* The numeric standards for the constituents above are designed to protect public water supplies for human consumption. The limits established for those chemicals marked with an asterisk (*) may not protect aquatic life. Therefore, when a request to classify a

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stream as a public water supply is received, an evaluation shall be made to determine whether more stringent limits are needed for those chemicals in order to ensure protection of aquatic life.

VR680-21-03 WATER QUALITY CRITERIA FOR SURFACE WATER

VR680-21-03.1 General Requirements

Section VR680-21-03.2 below establishes water quality criteria for certain substances in surface waters. Groundwater criteria are found in VR680-21-04.4. One basic distinction differentiates water quality criteria from water quality standards found in VR680-21-01 and VR680-21-04 of these regulations. The standards are always mandatory while the criteria are not. Criteria shall be utilized as mandatory requirements when in the judgement of the Board they are necessary to ensure the protection of the beneficial uses of the water body. The agency will employ the criteria values or any others it deems appropriate in establishing effluent limitations or other limitations necessary to protect the beneficial uses. The Board may consider modifications to these criteria, on a case-by-case basis, dependent upon a site-specific determination performed by the permittee which demonstrates that alternate criteria are sufficient to ensure protection of water quality.

Chronic Criteria for Protection of Aquatic Life ug/l

Substance*	Value	Applicability
Aldrin	0.03 0.003	Freshwater Saltwater
Ammonia	SEE TABLE ATTACHED	Freshwater
Arsenic-trivalent, inorganic, total recoverable	190 36	Freshwater Saltwater
Cadmium	$e^{0.7852(\ln(\text{hardness}))-3.490}$	Freshwater
total recoverable	9.3	saltwater
Chlordane	0.0043 0.004	Freshwater Saltwater
Chromium-hexavalent, total recoverable	11 50	Freshwater Saltwater
trivalent, total recoverable	$e^{0.819(\ln(\text{hardness}))+1.561}$ No saltwater Value	Freshwater
Copper, total recoverable	$e^{0.8545(\ln(\text{hardness}))-1.465}$ 2.9	Freshwater Saltwater
Cyanide, total	5.2 1.0	Freshwater Saltwater
DDT	0.001	All Waters
Demeton	0.1	All Waters
Dieldrin	0.0019	All Waters
Endosulfan	0.056 0.0087	Freshwater Saltwater
Endrin	0.0023	All Waters
Guthion	0.01	All Waters
Heptachlor	0.0038 0.0036	Freshwater Saltwater
Hydrogen Sulfide	2.0	All Waters
Iron	1,000 No Saltwater value	Freshwater

*Total unless otherwise indicated

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Chronic Criteria for Protection of Aquatic Life ug/l

Substance*	Value	Applicability
Kepone	Zero	All Waters
Lead, total recoverable	$e^{1.266(\ln(\text{hardness}))-4.661}$	Freshwater
	5.6	Saltwater
Lindane	0.080	Freshwater
	0.0016	Saltwater
Malathion	0.1	All Waters
Manganese	100	Saltwater
Mercury	0.10	Saltwater
Methoxychlor	0.03	All Waters
Mirex	Zero	All Waters
Nickel total recoverable	$e^{0.76(\ln(\text{hardness}))+1.06}$	Freshwater
	7.1	Saltwater
Parathion	0.04	All Waters
Phenol	1.0	All Waters
Phthalate Esters	3.0	All Waters
Polychlorinated Biphenyls	0.014	Freshwater
	0.03	Saltwater
Selenium, total inorganic	35	Freshwater
	54	Saltwater
Silver, total recoverable	$e^{1.72(\ln(\text{hardness}))-6.52} \times 0.01$	Freshwater
	0.023	Saltwater
Toxaphene	0.013	Freshwater
	0.0007	Saltwater
Zinc, total recoverable	47	Freshwater
	58	Saltwater

*Total unless otherwise indicated

Ammonia Criteria

pH	0 C	5 C	10 C	15 C	20 C	25C	30C

A. Salmonids or Other Sensitive Coldwater Species Present

Un-ionized Ammonia (mg/liter NH_3)

6.50	0.0007	0.0009	0.0013	0.0019	0.0019	0.0019	0.0019
6.75	0.0012	0.0017	0.0023	0.0033	0.0033	0.0033	0.0033
7.00	0.0021	0.0029	0.0042	0.0059	0.0059	0.0059	0.0059
7.25	0.0037	0.0052	0.0074	0.0105	0.0105	0.0105	0.0105
7.50	0.0066	0.0093	0.0132	0.0186	0.0186	0.0186	0.0186
7.75	0.0109	0.0153	0.022	0.031	0.031	0.031	0.031
8.00	0.0126	0.0177	0.025	0.035	0.035	0.035	0.035
8.25	0.0126	0.0177	0.025	0.035	0.035	0.035	0.035
8.50	0.0126	0.0177	0.025	0.035	0.035	0.035	0.035
8.75	0.0126	0.0177	0.025	0.035	0.035	0.035	0.035
9.00	0.0126	0.0177	0.025	0.035	0.035	0.035	0.035

Total Ammonia (mg/liter NH_3)

6.50	2.5	2.4	2.2	2.2	1.49	1.04	0.73
6.75	2.5	2.4	2.2	2.2	1.49	1.04	0.73
7.00	2.5	2.4	2.2	2.2	1.49	1.04	0.74
7.25	2.5	2.4	2.2	2.2	1.50	1.04	0.74
7.50	2.5	2.4	2.2	2.2	1.50	1.05	0.74
7.75	2.3	2.2	2.1	2.0	1.40	0.99	0.71
8.00	1.53	1.44	1.37	1.33	0.93	0.66	0.47
8.25	0.87	0.82	0.78	0.76	0.54	0.39	0.28
8.50	0.49	0.47	0.45	0.44	0.32	0.23	0.17
8.75	0.28	0.27	0.26	0.27	0.19	0.15	0.11
9.00	0.16	0.16	0.16	0.16	0.13	0.10	0.08

B. Salmonids and Other Sensitive Coldwater Species Absent

Un-ionized Ammonia (mg/liter NH_3)

6.50	0.0007	0.0009	0.0013	0.0019	0.0026	0.0026	0.0026
6.75	0.0012	0.0017	0.0023	0.0033	0.0047	0.0047	0.0047
7.00	0.0021	0.0029	0.0042	0.0059	0.0083	0.0083	0.0083
7.25	0.0037	0.0052	0.0074	0.0105	0.0148	0.0148	0.0148
7.50	0.0066	0.0093	0.0132	0.0186	0.026	0.026	0.026
7.75	0.0109	0.0153	0.022	0.031	0.043	0.043	0.043
8.00	0.0126	0.0177	0.025	0.035	0.050	0.050	0.050
8.25	0.0126	0.0177	0.025	0.035	0.050	0.050	0.050
8.50	0.0126	0.0177	0.025	0.035	0.050	0.050	0.050
8.75	0.0126	0.0177	0.025	0.035	0.050	0.050	0.050
9.00	0.0126	0.0177	0.025	0.035	0.050	0.050	0.050

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B. Salmonids and Other Sensitive Coldwater Species Absent (cont.)

Total Ammonia (mg/liter NH_3)

pH	0C	5C	10C	15C	20C	25C	30C
6.50	2.5	2.4	2.2	2.2	2.1	1.46	1.03
6.75	2.5	2.4	2.2	2.2	2.1	1.47	1.04
7.00	2.5	2.4	2.2	2.2	2.1	1.47	1.04
7.25	2.5	2.4	2.2	2.2	2.1	1.48	1.05
7.50	2.5	2.4	2.2	2.2	2.1	1.49	1.06
7.75	2.3	2.2	2.1	2.0	1.98	1.39	1.00
8.00	1.53	1.44	1.37	1.33	1.31	0.93	0.67
8.25	0.87	0.82	0.78	0.76	0.76	0.54	0.40
8.50	0.49	0.47	0.45	0.44	0.45	0.33	0.25
8.75	0.28	0.27	0.26	0.27	0.27	0.21	0.16
9.00	0.16	0.16	0.16	0.16	0.17	0.14	0.11

Site-specific criteria development is strongly suggested at temperatures above 20°C because of the limited data available to generate the criteria recommendation, and at temperatures below 20°C because of the limited data and because small changes in the criteria may have significant impact on the level of treatment required in meeting the recommended criteria.

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VR680-21-04 GROUNDWATER STANDARDS

VR680-21-04.1 General Requirements

Except where otherwise specified, groundwater quality standards shall apply statewide and shall apply to all groundwater occurring at and below the uppermost seasonal limits of the water table. In order to prevent the entry of pollutants into groundwater occurring in any aquifer, a soil zone or alternate protective measure or device sufficient to preserve and protect present and anticipated uses of groundwater shall be maintained at all times. Zones for mixing wastes with groundwater may be allowed, upon request, but shall be determined on a case-by-case basis and shall be kept as small as possible. It is recognized that natural groundwater quality varies from area to area. Virginia is divided into four Physiographic Provinces, namely the Coastal Plain, Piedmont and Blue Ridge, Valley and Ridge, and Cumberland Plateau. See Figure 1. Accordingly, the Board has established certain groundwater standards specific to each individual Physiographic Province.

VR680-21-04.2 - Anti-degradation Policy for Groundwater

If the concentration of any constituent in groundwater is less than the limit set forth by groundwater standards, the natural quality for the constituent shall be maintained; natural quality shall also be maintained for all constituents, including temperature, not set forth in groundwater standards. If the concentration of any constituent in groundwater exceeds the limit in the standard for that constituent, no addition of that constituent to the naturally occurring concentration shall be made. Variance to this policy shall not be made unless it has been affirmatively demonstrated that a change is justifiable to provide necessary economic or social development, that the degree of waste treatment necessary to preserve the existing quality cannot be economically or socially justified, and that the present and anticipated uses of such water will be preserved and protected.

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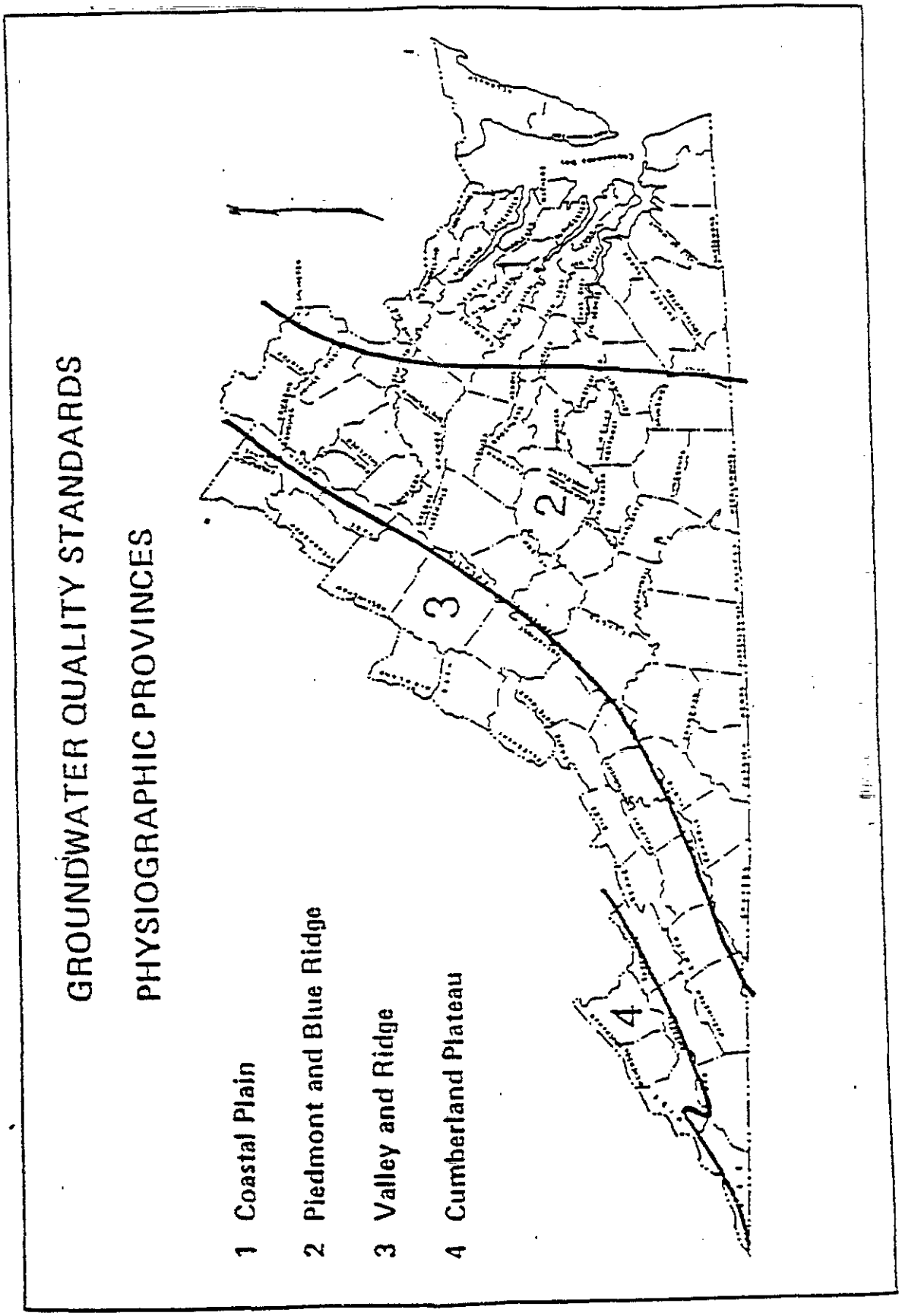

FIGURE 1

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VR680-21-04.3 Groundwater Standards Applicable Statewide

CONSTITUENT	CONCENTRATION	
Sodium	270	mg/l
Foaming Agents as methylene blue active substances	0.05	mg/l
Petroleum hydrocarbons	1	mg/l
Arsenic	0.05	mg/l
Barium	1.0	mg/l
Cadmium	0.0004	mg/l
Chromium	0.05	mg/l
Copper	1.0	mg/l
Cyanide	0.005	mg/l
Lead	0.05	mg/l
Mercury	0.00005	mg/l
Phenols	0.001	mg/l
Selenium	0.01	mg/l
Silver	None	
Zinc	0.05	mg/l
Chlorinated Hydrocarbon Insecticides		
Aldrin/Dieldrin	0.003	ug/l
Chlordane	0.01	ug/l
DDT	0.001	ug/l
Endrin	0.004	ug/l
Heptachlor	0.001	ug/l
Heptachlor Epoxide	0.001	ug/l
Kepone	None	
Lindane	0.01	ug/l
Methoxychlor	0.03	ug/l
Mirex	None	
Toxaphene	None	
Chlorophenoxy Herbicides		
2,4-D	0.1	mg/l
Silvex	0.01	mg/l
Radioactivity		
Total Radium (Ra-226 & Ra-228)	5	pCi/l
Radium 226	3	pCi/l

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Gross Beta Activity*	50	pCi/l
Gross Alpha Activity (excluding Radon & Uranium)	15	pCi/l
Tritium	20,000	pCi/l
Strontium-90	8	pCi/l
Manmade Radioactivity - Total Dose Equiv.**	4	mrem/yr

pCi/l = picocurie per liter
mrem/yr = millirems per year

*The gross beta value shall be used as a screening value only. If exceeded the water must be analyzed to determine the presence and quanity of radionuclids to determine compliance with the tritium, strontium, and manmade radioactivity standards.

**Combination of all sources should not exceed total dose equivalent of 4 mrem/year.

VR680-21-04.4 Groundwater Standards Applicable by Physiographic Province

CONSTITUENT	CONCENTRATION			
	Coastal Plain	Piedmont& Blue Ridge	Valley& Ridge	Cumberland Plateau
pH	6.5-9	5.5-8.5	6-9	5-8.5
Ammonia Nitrogen	0.025 mg/l	0.025 mg/l	0.025 mg/l	0.025 mg/l
Nitrite Nitrogen	0.025 mg/l	0.025 mg/l	0.025 mg/l	0.025 mg/l
Nitrate Nitrogen	5 mg/l	5 mg/l	5 mg/l	0.5 mg/l

AR301936

VR680-21-05 WATER QUALITY CRITERIA FOR GROUNDWATER

VR680-21-05.1 General Requirements

These groundwater quality criteria apply primarily to groundwater constituents that occur naturally. Since natural groundwater quality can vary greatly from area to area for these constituents, enforceable standards were not adopted. These criteria are intended to provide guidance in preventing groundwater pollution. Groundwater criteria carry the same regulatory limitation as surface water criteria: they are not mandatory.

VR680-21-05.2 Groundwater Criteria

CONSTITUENT (mg/l)	GROUNDWATER CRITERIA BY PHYSIOGRAPHIC PROVINCE***			
	Coastal Plain	Piedmont & Blue Ridge	Valley & Ridge	Cumberland Plateau
Alkalinity	30-500	10-200	30-500	30-200
Total Diss. Solids	1000	250	500	500
Chloride	50*	25	25	25
Sulfate	50	25	100	150
Total Organic Carbon	10	10	10	10
Color units	15	15	15	15
Iron	0.3	0.3	0.3	0.01-10
Manganese	0.05	0.05	0.05	0.01-0.5
Sodium	100*	25	25	100
Fluoride	1.4**	1.4	1.4	1.4
Hardness	120	120	300	180

* It is recognized that naturally occurring concentrations will exceed this limit in the eastern part of the Coastal Plain, especially toward the shoreline and with increased depth.

** Except within the cretaceous aquifer: concentration up to 5 mg/l and higher.

*** See Figure 1, for delineation of physiographic provinces.

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COMMONWEALTH of VIRGINIA

DEPARTMENT OF WASTE MANAGEMENT
11th Floor, Monroe Building
101 N. 14th Street
Richmond, VA 23219
(804) 225-2667

June 6, 1990

Andrew Palestini (3HW24)
Remedial Project Manager
U.S. EPA Region III
841 Chestnut Building
Philadelphia, PA 19107

Ref: Saunders Supply NPL Site

Dear Andy:

This letter is a follow-up to my letter to you dated April 13, 1990, on the subject of identifying Applicable or Relevant and Appropriate Requirements (ARARs) for this site. That letter was a preliminary identification of those statutes, regulations, and Executive Orders which may need to be addressed. This letter contains four additional potential ARARs and modifies one of the items in the April 13 letter.

1. Virginia Erosion and Sediment Control Law, Code of Virginia Sections 10.1-560 et seq. and the Virginia Erosion and Sediment Control Handbook.

No "land-disturbing" activity, as that term is defined in the statute, may take place until an erosion and sediment control plan for the activity has been submitted to and approved by the proper authority.

2. Virginia Board of Game and Inland Fisheries, Code of Virginia Sections 29.1-100 et seq.; Virginia Endangered Species Act, Code of Virginia Sections 29.1-563 et seq., and the Federal Endangered Species Act, 16 U.S.C. 1531.

Certain species of fish and wildlife are identified as being threatened with extinction and are entitled to special preservation and protection measures under these statutes.

3. Virginia Wetlands Act, Code of Virginia Sections 62.1-13.1 et seq., and Executive Order 11990 related to Wetlands Management.

Any activity to take place in a wetland or impact on a wetland must comply with the provisions of the Act and the Executive Order.

4. Executive Order 11988 related to Floodplain Management. Any activity located in a floodplain must comply with the provisions of this Executive Order. According to the Virginia Division of Soil and Water Conservation, a floodplain exists in the Godwins Millpond area about 200 feet north of the intersection of Routes 10/32 and 125.

As we discussed on the telephone, soil that is contaminated with <u>used</u> formulations of PCP is not presently a hazardous waste under the Virginia Hazardous Waste Management Regulations; only <u>unused</u> formulations fall under the F027 designation.

According to the RI/FS work plan, the oil/water separators and cooling pond were used to treat wastewater from the wood preservation process. The sludge from the separators was land-applied to control dust and weeds from 1966 to 1981. Should the soil contaminated with this sludge be excavated, it will be a K001 hazardous waste.

Should you have any comments about these additional ARARs, please give me a call.

Sincerely,

Nora M. Okusu

Nora M. Okusu
Environmental Engineer Consultant

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TABLE 12

BASIS FOR LISTING: HEALTH EFFECTS OF THE CONSTITUENTS OF CONCERN IN F033

HAZARDOUS CONSTITUENT	AVERAGE WASTE CONC. DETECTED[1] (ppm)	HEALTH-BASED WATER CONCENTRATION LIMITS (ppm)	BASIS[2]	ESTIMATED DRINKING WELL CONCENTRATIONS[3] (ppm)			CALCULATED CONCENTRATION TO HEALTH-BASED LIMIT RATIOS[4]		
				DA 100	DA 1,000	DA 10,000	DA 100	DA 1,000	DA 10,000
Pentachlorophenol[5]	20,000	1	RfD	200	20	2	200	20	2
2,4,6-Trichlorophenol	3	1.8×10^{-3}	RSD (Class B2)	0.03	0.003	3×10^{-4}	20	2	0.2
2,3,4,6-Tetrachlorophenol	3,000	1	RfD	30	3	0.3	30	3	0.3
DIBENZO-P-DIOXINS[6]									
TCDDs	2×10^{-2}	2.3×10^{-8}	RSD (Class B_2)	2×10^{-4}	2×10^{-5}	2×10^{-6}	8,700	870	87
PeCDDs	0.3	4.5×10^{-10}	RSD (Class B_2)	0.003	3×10^{-4}	3×10^{-5}	6,700,000	670,000	67,000
HxCDDs	3	5.6×10^{-9}	RSD (Class B_2)	0.03	0.003	3×10^{-4}	5,400,000	540,000	54,000
HpCDDs	20	2.3×10^{-7}	RSD (Class B_2)	0.2	0.02	0.002	870,000	87,000	8,700
DIBENZOFURANS[6]									
TCDFs	1	2.3×10^{-9}	RSD (Class B_2)	0.01	0.001	1×10^{-4}	4,300,000	430,000	43,000
PeCDFs	3	2.3×10^{-9}	RSD (Class B_2)	0.03	0.003	3×10^{-4}	4,300,000	430,000	43,000
HxCDFs	6	2.3×10^{-8}	RSD (Class B_2)	0.06	0.006	6×10^{-4}	2,600,000	260,000	26,000
HpCDFs	3	2.3×10^{-7}	RSD (Class B_2)	0.03	0.003	3×10^{-4}	130,000	13,000	1,300

Average concentrations based on process sludge or process residual data.

Reference Dose (RfD), Risk Specific Dose (RSD), and Maximum Contaminant Level (MCL) are explained later in the preamble, as are the classes of RSDs. Class B carcinogens are based on exposure limits at a 10^{-6} risk level.

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d/ For water that is to be used for drinking, the MCLs set under the SDWA are generally the applicable or relevant and appropriate standard. A standard for drinking water more stringent than an MCL may be needed in special circumstances, such as where multiple contaminants in ground water or multiple pathways of exposure present extraordinary risks. In setting a level more stringent than the MCL in such cases, a site-specific determination should be made by considering MCLGs, the Agency's policy on the use of appropriate risk ranges for carcinogens (10-4 to 10-7 individual lifetime risk), levels of quantification, and other pertinent guidelines. Prior consultation with Headquarters is encouraged in such cases.

* Lowest Observed Effect Level.

+ Hardness dependent criteria (100 mg/l used); refer to specific criteria documents for equations to calculate criteria based on other water hardness values.

Sources: U.S. EPA, Superfund Public Health Evaluation Manual, EPA 540/1-86/060 (OSWER Directive 9285.4-1) October 1986 and U.S. EPA, Quality Criteria for Water 1986, EPA 440/5-86-001, May 1986 (51 Federal Register 43665).

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acetone
alpha BHC
Benzo(a) fluoranthene
Butylbenzyl phthalate
2-butanone
Di-n-octyl phthalate
Methylene Chloride
4-Methyl phenol
Naphthalene
Pyrene

3/2/90

EXHIBIT 1-1 (continued)

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Chemical Name	Potential ARARs b/		
	CWA Water Quality Criteria for Protection of Human Health		CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/
	Water and Fish Ingestion (mg/l)	Fish Consumption Only (mg/l)	Freshwater Acute/Chronic (mg/l)
Acenapthene			1.7*/0.5*
Acenaphthylene			
Acrolein	3.2x10-01	7.8x10-01	6.8x10-02*/2.1x10-02*
Acrylonitrile	5.8x10-05	6.5x10-04	7.5*/2.6*
Aldrin	7.4x10-08	7.9x10-08	3.0x10-03
Anthracene			
Antimony and Compounds	1.5x10-01	45	9.0/1.6
Arsenic and Compounds	2.2x10-06	1.8x10-05	
Arsenic (V) and Compounds			0.5*/4.8x10-02*
Arsenic (III) and Compounds			0.3/0.1
Asbestos			
Barium and Compounds	1		
Benz(a)anthracene			
Benz(c)acridine			
Benzene	6.6x10-04	4.0x10-02	5.3*
Benzidine	1.2x10-04	5.3x10-04	2.5*
Benzo(a)pyrene			
Benzo(b)fluoranthene			
Benzo(ghi)perylene			
Benzo(k)fluoranthene			
Beryllium and Compounds	6.8x10-06	1.2x10-04	0.1*/5.3x10-03*
Bis(2-chloroethyl)ether			
Bis(2-chloroisopropyl)ether			
Bis(chloromethyl)ether			

EXHIBIT 1-1 (continued)

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Chemical Name	Potential ARARs b/		
	CWA Water Quality Criteria for Protection of Human Health		CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/
	Water and Fish Ingestion (mg/l)	Fish Consumption Only (mg/l)	Freshwater Acute/Chronic (mg/l)
Cadmium and Compounds	1.0x10-02		3.9x10-03+/1.1x10-03+
Carbon Tetrachloride	4.0x10-04	6.9x10-03	3.5x10+01
Chlordane	4.6x10-07	4.8x10-07	2.4x10-03/4.3x10-06
Chlorinated Benzenes			2.5x10-01*/5.0x10-02*
Chlorinated Naphthalenes			1.6*
Chloroalkyl Ethers			2.3x10+02*
Chlorobenzene (Mono)			
Chlorodibromomethane			
Chloroform			
2-Chlorophenol	1.9x10-04	1.8x10-02	2.8x10+01*/1.2*
Chromium III and Compounds	170	3433	4.3*/2.0*
Chromium VI and Compounds	5.0x10-02		1.7+/0.2+
Copper and Compounds			1.6x10-02/1.1x10-02
Cyanides	2x10-01		1.8x10-02+/1.2x10-02+
DDT	2.4x10-08	2.4x10-08	2.2x10-02/5.2x10-03
Dibutyl Phthalate	35	154	1.1x10-03/1.0x10-06
Dichlorobenzenes	4x10-01	2.6	1.1*/7.6x10-01*
1,2-Dichlorobenzene			
1,3-Dichlorobenzene			
1,4-Dichlorobenzene			
3,3'-Dichlorobenzidine	1x10-04	2x10-05	
1,2-Dichloroethane (EDC)	9.4x10-04	2.4x10-01	1.1x10+02*/2.0x10+01*
Dichloroethylenes	3.3x10-05	1.9x10-03	1.1x10+01*

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EXHIBIT 1-1 (continued)

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Chemical Name	Potential ARARs b/		
	CWA Water Quality Criteria for Protection of Human Health		CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/
	Water and Fish Ingestion (mg/l)	Fish Consumption Only (mg/l)	Freshwater Acute/Chronic (mg/l)
1,1-Dichloroethylene	3.1		1.1x10+01*
2,4-Dichlorophenol			2.0*/0.3*
2,6-Dichlorophenol			
3,4-Dichlorophenol			
2,3-Dichlorophenol			
2,5-Dichlorophenol			
2,4-Dichlorophenoxyacetic Acid (2,4-D)			
1,3-Dichloropropene	8.7x10-02	14.1	6.0*/0.2*
Dieldrin	7.1x10-08	7.6x10-08	2.5x10-03/1.9x10-06
Diethylphthalate	350	1800	
Bis(2-ethylhexyl)phthalate (DEHP)			
Diethylnitrosamine			
7,12-Dimethylbenz(a)anthracene			
Dimethylnitrosamine			
2,4-Dimethylphenol			2.1*
Dimethylphthalate	313	2900	
4,6-Dinitro-o-cresol			
2,4-Dinitrophenol			
1,2-Diphenylhydrazine			
Endosulfan	7.4x10-02	1.6x10-01	2.2x10-04/5.6x10-05
Endrin	1x10-03		1.8x10-04/2.3x10-06
Ethylbenzene	1.4	3.3	3.2x10+01
Fluoranthene	4.2x10-02	5.4x10-02	3.9*
Fluorides		4.0	

* * * AUGUST 8, 1988 DRAFT * * *

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EXHIBIT 1-1 (continued)

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Chemical Name	Potential ARARs b/		
	CWA Water Quality Criteria for Protection of Human Health		CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/
	Water and Fish Ingestion (mg/l)	Fish Consumption Only (mg/l)	Freshwater Acute/Chronic (mg/l)
Heptachlor	2.8x10-07	2.9x10-07	5.2x10-04/3.8x10-06
Hexachlorobenzene	7.2x10-07	7.4x10-07	
Hexacalorobutadiene	4.5x10-04	5x10-02	9.0x10-02/9.3x10-03*
alpha-Hexachlorocyclohexane (HCCH)	9.2x10-06	3.1x10-05	
gamma-HCCH (Lindane)			
Technical-HCCH	1.2x10-05	4.1x10-05	
Hexachlorocyclopentadiene	2.1x10-01		7.0x10-03*/5.2x10-03*
Hexachloroethane	1.9x10-03	8.74x10-03	9.8x10-01*/5.4x10-01*
Iodomethane			
Isophorone			1.17x10+02*
Lead and Compounds (Inorganic)	5x10-02		8.0x10-02/3.2x10-03+
Mercury and Compounds (Alkyl)			2.4x10-03/1.2x10-05
Mercury and Compounds (Inorganic)	1.4x10-04	1.5x10-04	2.4x10-03/1.2x10-05
Methoxychlor	1x10-01		0.3x10-04*
Methyl Chloride			
2-Methyl-4-chlorophenol			
3-Methyl-4-chlorophenol			
3-Methyl-6-chlorophenol			
3-Monochlorophenol			
4-Monochlorophenol			
Nickel and Compounds	1.3x10-10	1x10-01	1.4+/1.6x10-01+
Nitrate (as N)	10		
Nitrobenzene	20		2.7x10+01*
Nitrophenols			2.3x10-01*/1.5x10-01*

* * * AUGUST 8, 1988 DRAFT * * *

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EXHIBIT 1-1 (continued)

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

Chemical Name	Potential ARARs b/		
	CWA Water Quality Criteria for Protection of Human Health		CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/
	Water and Fish Ingestion (mg/l)	Fish Consumption Only (mg/l)	Freshwater Acute/Chronic (mg/l)
Nitrosamines			5.8*
n-Nitrosodiphenylamine	4.9x10-03	1.6x10-02	
N-Nitrosopyrrolidine	1.6x10-05	9.2x10-02	
Para Dichorobenzene			
Pentachlorinated Ethanes			7.2*/1.1*
Pentachlorobenzene	7.4x10-02	8.5x10-02	
Pentachlorophenol	1		2.0x10-02/1.3x10-02
Phenanthrene			
Phenol	3.5		1.0x10+01/2.5
Phthalate Esters			9.4x10-01*/3.0x10-03*
Polychlorinated Biphenyls (PCBs)	7.9x10-08	7.9x10-08	2.0x10-03/1.4x10-05
Radionuclides, Gross alpha activity		15 pCi/l	
Radium 226 and 228		5 pCi/l	
Selenium and Compounds	1.0x10-02	1.0x10-02	2.6x10-01/3.5x10-02
Silver and Compounds	5.0x10-02	5.0x10-02	4.1x10-03+/1.2x10-04
Strontium-90		8 pCi/l	
2,3,7,8-TCDD (Dioxin)			<1.0x10-05*/<1.0x10-08
Tetrachlorinated Ethanes			9.3*
1,2,4,5-Tetrachlorobenzene	3.8x10-02	4.8x10-02	
1,1,2,2-Tetrachloroethane	1.7x10-04	1.1x10-02	2.4*
Tetrachloroethenes			9.3*
Tetrachloroethylene	8x10-04	8.9x10-03	5.2*/8.4x10-01*
2,3,4,6-Tetrachlorophenol			
Thallium and Compounds	1.3x10-02	4.8x10-02	1.4*/4.0x10-02*

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EXHIBIT 1-1 (continued)

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a

Chemical Name	Potential ARARs b/		
	CWA Water Quality Criteria for Protection of Human Health		CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/
	Water and Fish Ingestion (mg/l)	Fish Consumption Only (mg/l)	Freshwater Acute/Chronic (mg/l)
Toluene	14	420	1.7x10+01*
Toxaphene	7.1x10-07	7.3x10-07	7.3x10-04/2.0x10-07
Tribromomethane (Bromoform)			
Trichlorinated Ethanes			
1,1,1-Trichloroethane	18	1000	1.8x10+01*
1,1,2-Trichloroethane	6x10-04	4.2x10-02	9.4*
Trichloroethylene	2.7x10-03	8.1x10-02	4.5x10+01*/2.1x10+01*
Trichlorofluoromethane			
2,4,5-Trichlorophenol	2.8		
2,4,6-Trichlorophenol	1.2x10-03	3.6x10-03	9.7x10-01*
2,4,5-Trichlorophenoxypropionic Acid			
Trihalomethanes (Total) b			
Tritium			
Vinyl Chloride	2x10-03	5.3x10-01	
Zinc and Compounds			1.3x10-01/1.1x10-01

a/ Additional chemical-specific requirements will be added (e.g. National Ambient Air Quality Criteria) after analysis of additional statutes.

b/ When two or more values conflict, the lower value generally should be used.

c/ Federal water quality criteria (FWQC) are not legally enforceable standards, but are potentially relevant and appropriate to CERCLA actions. CERCLA §121(d)(2)(B)(i) requires consideration of four factors when determining whether FWQC are relevant and appropriate: 1) the designated or potential use of the surface or groundwater, 2) the environmental media affected, 3) the purposes for which such criteria were developed, and 4) the latest information available.

* * * AUGUST 8, 1988 DRAFT * * *

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Appendix H

SAFE DRINKING WATER ACT

	Maximum Contaminant Level (mg/L)	Maximum Contaminant Level Guidelines (mg/L)	Secondary Drinking Water Standard
Aluminum	--	--	0.05 - 0.200****
Arsenic	0.050	0.050	--
Barium	5.000 (p)*	5.000 (p)*	--
Cadmium	0.010 (f) 0.005 (p)	0.005 (p)	--
Chromium	0.050 0.100 (p)**	0.100 (p)**	--
Copper	1.300 (p)*	1.300 (p)*	1.0
Iron	--	--	0.300
Lead	0.050 (f) 0.050 (p)*	-- 0 (p)*	-- --
Manganese	--	--	0.050
Zinc	--	--	5.0
Benzo(a)pyrene	0.0002 (p)***	0 (p)***	--
Bis(2-ethylhexyl)phthalate	0.004 (p)***	0 (p)***	--
Ethylbenzene	0.7 (p)**	0.7 (p)*	--
Methylene chloride	0.005 (p)***	0 (p)***	--
PCDDs/PCDFs	5×10^{-8} (p)***	0 (p)**	--
Pentachlorophenol	0.001 (p)****	--	--
Toluene	2.0 (p)**	2.0 (p)**	--
Xylene	10.0 (p)**	10.0 (p)**	--

02[UZ]ZD3081:D3123/4288/19

(p) = Proposed

*EPA (1988) 53 FR 31516 - August 18, 1988
**EPA (1989) 54 FR 22064 - May 22, 1989
***EPA (1990) 55 FR 30370 - July 25, 1990
****EPA (1991) 56 FR 3526-3613 - January 30, 1991

AR301948

5. ENGINEERING DATA

The following data summaries detail the engineering/treatability analyses performed as part of the RI.

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AR301949

MEMORANDUM

TO: Stevie Wilding, USEPA Region III Quality Assurance Officer

FROM: Joanne McMullan, E & E Senior Chemist

THROUGH: Fred J. McKosky, E & E Site Manger

DATE: October 27, 1989

SUBJECT: Data Validation for SAS 4743-Task 4,
Saunders Supply Company Site
WA #85-03-3LP6

CC: A. Palestini (EPA), J. Pearson (E & E), M. Meredith (E & E)

Overview:

Eight soil samples were analyzed for ash, BTU, chlorine and sulfur by ATEC Associates, Inc. (ATEC), according to ASTM Methods D-2974-87, D-2015-78, D-808-63, and D-124-64, respectively.

Summary:

All samples were analyzed successfully for ash, BTU, chlorine, and sulfur.

Notes:

- o Laboratory replicate analysis on sample 33 gave the results listed below with calculated relative percent difference (RPD) values, indicating good precision:

Parameter	Original Analysis	Replicate Analysis	% RPD
Ash, %	91.80	91.63	0.19
BTU/lb.	<54	<54	--
Chlorine, %	< 0.1	< 0.1	--
Sulfur, %	< 0.1	< 0.1	--

- o Laboratory standard analyses gave the following percent recoveries, indicating good accuracy:

Parameter	Expected Result*	Analytical Result*	% ~~RPD~~ Recovery
Ash, %	4.40	4.34	98.6
BTU/lb.	14446	14270	98.6
Sulfur, %	1.17	1.11	105

*Results as calculated on a dry sample basis.

- o Revision of the report to reflect a BTU detection limit of 50 BTU/lb., not 500 BTU/lb. as initially reported, was requested and obtained from the laboratory. Other minor corrections/clarifications were also requested and obtained. (See phone logs in Appendix D.)

Data for the soil samples in SAS 4743C-Task 4 were reviewed in accordance with the ASTM Methods as listed above and any additional SAS request requirements.

Attachments:

Appendix A - Glossary of Data Qualifiers

Appendix B - Data Summary

Appendix C - Results as Reported by Laboratory

Appendix D - Support Documentation

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DATA SUMMARY FORM: Ash, BTU, Chlorine, Sulfur Results

Site Name: Saunders Supply Company

SAS #: 4743C-Task 4 Sampling Date(s): 7/20 - 7/27/84

SOIL SAMPLES
(Results expressed on dry wt. basis)
(Units as given)

	Sample No.	4743C-TK4-1	4743C-TK4-2	4743C-TK4-3	4743C-TK4-30	4743C-TK4-31	4743C-TK4-32	4743C-TK4-33	4743C-TK4-34
	% Moisture ~~Dilution Factor~~	10.77	5.20	4.11	5.25	8.92	6.20	7.21	6.64
	Location	CB-1A	ST-1A	ST-3A	ST-2A	CB-2A	CB-5A	CB-4A	CB-6A
D.L.	PARAMETER								
0.01	Ash, %	97.75	98.17	98.87	98.43	97.42	99.08	98.99	97.07
50	BTU/lb	<50	99	<50	<50	<50	<50	<50	<50
0.1	Chlorine, %	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
0.1	Sulfur, %	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

DL = Detection Limit

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MEMORANDUM

TO: Stevie Wilding, USEPA Region III Quality Assurance Officer

FROM: Joanne McMullan, E & E Senior Chemist

THROUGH: Fred J. McKosky, E & E Site Manger

DATE: October 27, 1989

SUBJECT: Data Validation for SAS 4743-Task 3,
Saunders Supply Company Site
WA #85-03-3LP6

CC: A. Palestini (EPA), J. Pearson (E & E), M. Meredith (E & E)

Overview:

Eight soil samples were analyzed for silica by Huffman Laboratories, Inc. (Huffman), according to Method 64 from "Methods of Soil Analysis", American Society of Agronomy, 1965.

Summary:

All eight samples were successfully analyzed for silica.

Notes:

- o Laboratory replicate analysis on sample 4734C-Task 3-8 resulted in 88.96% and 93.93% silica. The calculated relative percent difference (RPD) is 5.4%, indicating good precision.
- o Analysis of NBS 1633A standard resulted in 95.1% recovery. Spike recovery on sample 4734C-Task 3-6 was 82.1%. Both recovery values are within quality control limits, indicating good accuracy.
- o Blank analysis indicated a value of 0.03% silica. Sample results are greater than two thousand fold higher than the blank, obviating the need for any blank correction.

Silica data for the soil samples in SAS 4734C-Task 3 were reviewed in accordance with Method 64 from "Methods of Soil Analysis," American Society of Agronomy, 1965 and any additional SAS request requirements.

DATA SUMMARY FORM: Silica Results

Site Name: Saunders Supply Company

SAS #: 4743C-Task 3 Sampling Date(s): 7/20-7/27/89

SOIL SAMPLES
(Results expressed as %)

	Sample No.	4743C-Tk3-1	4743C-Tk3-2	4743C-Tk3-3	4743C-Tk3-4	4743C-Tk3-5	4743C-Tk3-6	4743C-Tk3-7	4743C-Tk3-8
	~~Dilution Factor~~								
	Location	CB-1A	ST-1A	ST-3A	ST-2A	CB-2A	CB-5A	CB-4A	CB-6A
DL	PARAMETER								
*	Silica, %	89.48	81.70	80.06	66.17	90.13	89.40	97.20	88.96

DL Detection Limit; For silica, it is 0.03 ppm or 0.000003%.

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MEMORANDUM

TO: Stevie Wilding, EPA Region III Quality Assurance Officer

FROM: Joanne McMullan, E & E Senior Chemist

DATE: March 28, 1990

THROUGH: Fred J. McKosky, E & E Site Manager

SUBJECT: Data Validation for SAS 4724C-Task 5, Saunders Supply Company Site

CC: A. Palestini (EPA), J. Pearson (E & E), M. Meredith (E & E)

OVERVIEW:

Thirty-two (32) soil samples were analyzed for grain size distribution, eleven (11) samples for liquid and plastic limits, eight (8) samples were analyzed for permeability, and eight (8) samples for bulk density. The methods used were ASTM D422-63 and D421 for grain size, ASTM D-4318-84 for liquid and plastic limits, SW 846 Method 9100 for permeability, and MSA 13.2.2.1 for bulk density.

SUMMARY:

All samples were analyzed successfully for the requested parameters.

NOTES:

- Sieve calibrations were within specified tolerances, as noted in Tables 1 and 2 which summarize the results using caliper and glass bead methods.
- The hydrometer was calibrated and found to be within specified tolerances. The device for measuring liquid limit was calibrated and required an adjustment. The thermometer was calibrated and found to require a correction of +0.1°C at 0°C and at 140°C. The pressure transducer was calibrated satisfactorily.
- Station Location Comp A1 was as identified by the laboratory is actually Comp AD, according to the chain-of-custody record. This change was made in reporting the results in Appendix B.

- o Field duplicate results for grain size distribution, as presented in Table 3, indicated good precision and thus, good field sampling technique. The RPDs for GW-1 and GW-1D results are high for the 100 and 200 sieve and the hydrometer values, but comparison of the curves indicate good correlation.

- o Laboratory replicate results for the other parameters as presented in Table 4, indicate good precision for laboratory analyses.

All data in SAS 4724C-Task 5 were reviewed in accordance with the methods given above. The text of this report addresses only those problems affecting data usability.

Attachments:

Table 1 - Sieve Calibration - Caliper Method
Table 2 - Sieve Calibration - Glass Bead Method
Table 3 - Field Duplicate Results - Grain Size Distribution
Table 4 - Laboratory Replicate Results - Other Parameters
Appendix A - Glossary of Data Qualifiers
Appendix B - Data Summary
Appendix C - Results as Reported by the Laboratory
Appendix D - Support Documentation

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TABLE 1

Sieve Calibrations
Caliper Method

Sieve Size	Tolerance (in.)	Actual Difference (in.)
3 inch	±0.087	-0.007, -0.018
3 inch	±0.087	-0.007, -0.039
1 1/2 inch	±0.043	+0.011, -0.016
1 1/2 inch	±0.043	-0.008, +0.033
1 1/2 inch	±0.043	+0.005, +0.036
1 1/2 inch	±0.043	-0.010, -0.029
1 1/2 inch	±0.043	+0.017, +0.001
3/4 inch	±0.024	-0.015, -0.013
3/4 inch	±0.024	-0.010, -0.012
3/4 inch	±0.024	-0.013, -0.015
3/4 inch	±0.024	-0.015, -0.011
3/4 inch	±0.024	-0.016, -0.008
3/8 inch	±0.012	-0.007, +0.004
3/8 inch	±0.012	+0.001, -0.008
3/8 inch	±0.013	+0.004, +0.011
3/8 inch	±0.013	-0.011, +0.003
3/8 inch	±0.013	-0.005, +0.002
#4	±0.006	+0.003, -0.003
#4	±0.006	+0.003, 0.000
#4	±0.006	+0.001, -0.001
#4	±0.006	+0.003, -0.002
#4	±0.006	0.000, +0.001

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TABLE 2

Sieve Calibration

Glass Bead Method

Sieve Number	ASTM Specification (μm)	Sieve Opening (μm)	Difference
10	2.000 ± 0.07 mm	2.056 mm	+0.056 mm
20	850 ± 35	833.7	-16.3
40	425 ± 19	421.2	-3.8
60	250 ± 12	250.6	+0.6
100	150 ± 8	150.9	+0.9
200	75 ± 5	70.3	-4.7

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TABLE 3

Field Duplicate Results
Grain Size Distribution

Sieve Number	Comp A % Passing	Comp AD % Passing	RPD	Comp M % Passing	Comp MD % Passing	RPD	GW-1 % Passing	GW-1D % Passing	RPD
3/4	100.0	100.0	0.0	—	—	—	—	—	—
3/8	95.8	99.1	3.4	—	—	—	100.0	—	—
4	90.9	93.2	2.5	—	—	—	99.8	100.0	0.2
10	80.8	85.6	5.8	100.0	100.0	0.0	98.8	98.8	0.0
20	73.3	76.6	4.4	99.0	99.0	0.0	93.7	94.8	1.2
40	63.5	65.1	2.5	88.9	89.3	0.5	76.2	76.3	0.1
60	47.2	45.4	3.9	58.5	57.7	1.4	38.1	37.3	2.1
100	30.6	26.4	15	26.9	26.5	1.5	11.7	10.4	12
200	19.6	17.2	13	15.3	15.3	0.0	4.5	3.0	40

Hydrometer Elapsed Time	Comp A % Total	Comp AD % Total	RPD	Comp M % Total	Comp MD % Total	RPD	GW-1 % Total	GW-1D % Total	RPD
2	14.5	13.6	6.4	15.4	14.9	3.3	3.7	3.1	18
5	11.3	11.4	0.9	12.8	13.6	6.1	3.3	2.7	20
15	8.1	8.5	4.8	11.1	10.1	9.4	2.8	2.4	15
30	6.3	6.4	1.6	8.5	8.8	3.5	2.3	2.0	14
60	5.4	5.1	5.7	7.7	7.5	2.6	1.9	1.6	17
120	4.5	4.2	6.9	6.0	5.3	12	1.4	1.2	15
250	3.6	3.4	5.7	3.8	3.5	8.2	0.9	0.8	12
1440	2.7	3.0	11	2.1	2.2	4.7	0.9	1.6	56

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TABLE 4

Field Duplicate Results
Other Parameters

Parameter	MWD6 202	MWD6 202 QC	RPD
Bulk density (pcf)	91.6	85.3	7.1
Permeability (cm/sec)	1.05E-08	1.13E-08	7.3
Liquid Limits	27	30	11
Plastic Limits	13	14	7.4
Plasticity Index	14	16	13
Moisture (%)	29.5	30.3	2.7

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AR301960

DATA SUMMARY FORM: Soil Samples - Physical Parameters (Units as given)

ıB: Saunders Supply

4724e-Task 5 Sampling Date(s): 7/11-7/27/89

Sample No.	1	2	3	4	5	6	7	8	9
Dilution Factor	1	1	1	1	1	1	1	1	1
Location	Comp A	Comp B	Comp C	Comp D	Comp E	Comp F	Comp G	Comp H	Comp (BF
meter									
ain Size (%):									
Fine Gravel ≥4	9.1	4.0	10.2	6.7	15.6	13.0	4.9	0.8	9.
Coarse Sand	10.1	4.4	12.4	5.1	12.6	11.1	8.7	1.8	6.
Medium Sand	17.3	17.3	17.9	17.5	15.8	20.5	22.1	10.2	10.
Fine Sand	43.9	58.4	47.9	56.3	43.6	44.9	52.7	74.3	56.
Silt or Clay	19.6	15.9	11.6	14.4	12.4	10.5	11.6	12.9	17.
isture (%)									
stic Index									

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DATA SUMMARY FORM: Soil Samples - Physical Parameters (Units as Given)

me: Saunders Supply

4724C- Task 5 Sampling Date(s): 7/11 - 7/27/89

Sample No.	10	11	12	13	14	15	16	17	1
Dilution Factor	1	1	1	1	1	1	1	1	1
Location	Comp AD	Comp I	Comp J	Comp K	Comp L	Comp M	Comp N	Comp 3 (Bkgrd)	IS
meter									
ain Size(%):									
Fine Gravel	6.8		1.0	0.2	1.6			3.2	
Coarse Sand	7.6		3.3	0.4	1.1		0.3	1.6	
Medium Sand	20.5	6.5	16.3	9.8	14.6	11.1	8.2	11.4	
Fine Sand	47.9	61.1	68.3	70.4	63.9	73.6	77.7	61.1	
Silt or Clay	17.2	32.4	11.1	19.2	18.8	15.3	13.8	22.7	
sture(%)									2
tic Index									N.

N.P. = Non-plastic

AR301962

DATA SUMMARY FORM: Soil Samples - Physical Parameters (Units as given)

:me: Saunders Supply

4724C-Task 5 Sampling Date(s): 7/11-7/27/89

Sample No.	19	20	21	22	23	24	25	26	2
Dilution Factor	1	1	1	1	1	1	1	1	1
Location	PA-2-B	CK-1-S	GW-1	GW-1D	Comp4 (BKgrd)	CompMD	CB-1-A	ST-1-A	GW
:meter									
:n Size (%):									
Fine Gravel			0.2		3.1		6.8	8.8	
Coarse Sand			1.0	1.2	2.3		4.3	3.7	
Medium Sand			22.6	22.5	11.8	10.7	14.1	9.2	
Fine Sand			71.7	73.3	64.2	74.0	59.6	62.0	
Silt or Clay			4.5	3.0	16.6	15.3	15.2	16.3	
sture (%)	14.4	25.0							73.
stic Index	N.P	N.P.							N.

N.P. = Non-plastic

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DATA SUMMARY FORM: Soil Samples - Physical Parameters (Units as given)

ime: Saunders Supply

4724C- Task5 Sampling Date(s): 7/11-7/27/89

Sample No.	28	29	30	31	32	33	34	35	3
Dilution Factor	1	1	1	1	1	1	1	1	1
Location	ST-1-C	ST-3-A	ST-2-A	WS-3-A	WS-3-B	ST-1-B	KF-1-A	KF-1-A D	CB
meter									
ain Size (%):									
Fine Gravel		6.4	6.9						0.
Coarse Sand		2.8	1.0						1.
Medium Sand		10.2	6.1				6.6	5.9	10.
Fine Sand		64.3	67.1				65.7	66.8	72.
Silt or Clay		16.3	18.9				27.7	27.3	15.
isture (%)	19.9			14.7	18.8	13.3	17.1		
stic Index	N.P.			N.P.	N.P.	N.P.	N.P.	N.P.	

N.P. = Non-plastic

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DATA SUMMARY FORM: Soil Samples - Physical Parameters (Units as given)

:me: Saunders Supply

4724C-Task 5 Sampling Date(s): 7/11-7/27/89

Sample No.	37	38	39	40
Dilution Factor	1	1	1	1
Location	CB-5-A	CB-5-A*	CB-4-A	CB-6-A
ameter				
Grain Size (%):				
Fine Gravel				
Coarse Sand				
Medium Sand	10.1	8.4	8.2	8.5
Fine Sand	74.4	67.1	78.1	73.6
Silt or Clay	15.5	14.9	13.7	17.9
isture (%)		7.0		
stic Index	N.P.	N.P.		

N.P. = Non-plastic

* 9.6% of sample retained on Sieve #0 (Gravel).
In graphing, laboratory did not take this 9.6% into consideration.
It is probably due to some extraneous pebbles.

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DATA SUMMARY FORM: Soil Samples - Physical Parameters (Units as given)

:me: Saunders Supply

4724C- Task 5 Sampling Date(s): 7/11/89-7/27/89

Sample No.	41	42	43	201	202	203	204	205
Dilution Factor	1	1	1	1	1	1	1	1
Location	PA-2-B	ST-1.0	CB-6-B	MWD 12 CL	MWD 6 CL	MWD 10 CL	MWD 14 CL	MWD 8 CL
ameter								
'K Density (pcf)	75.2	105.0	79.8	70.4	91.6	93.9	87.8	85.7
eability (cm/sec)	1.64E-06	3.88E-08	2.15E-06	3.07E-06	1.05E-08	1.03E-06	2.14E-06	6.52E-07
id Limit (%)					27			
stic Limit (%)					13			
stic Index				N.P.	14	N.P.	N.P.	N.P.
isture (%)	48.7	17.1	43.7	42.0	29.5	29.4	34.9	33.7

N.P. = Non-plastic

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6. CUMULATIVE FREQUENCY PLOTS

See discussion in Section 5 of Volume of Remedial Investigation Report.

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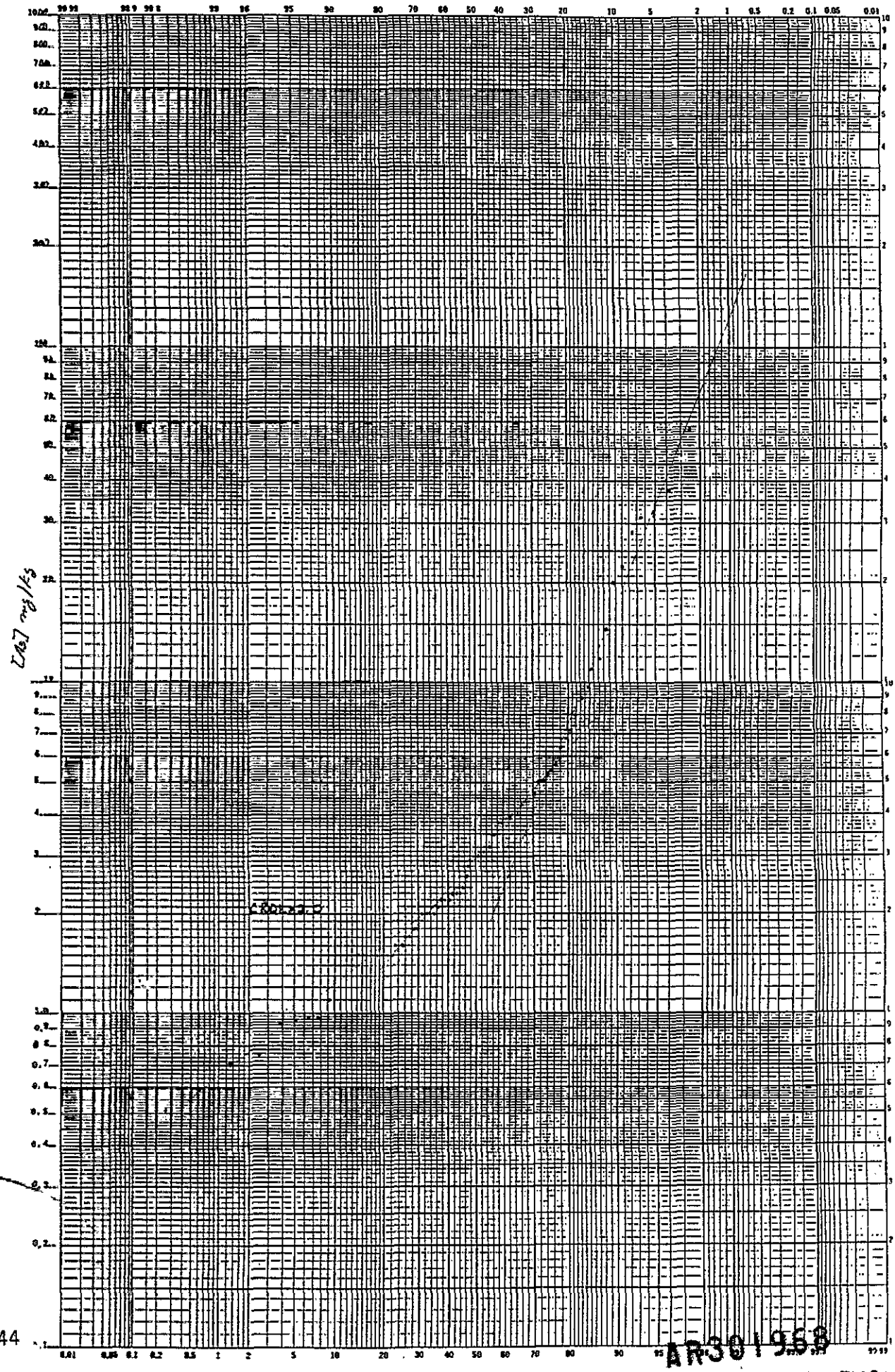
K·E PROBABILITY 46 8040
X 3 LOG CYCLES
KEUFFEL & ESSER CO.

Arsenic



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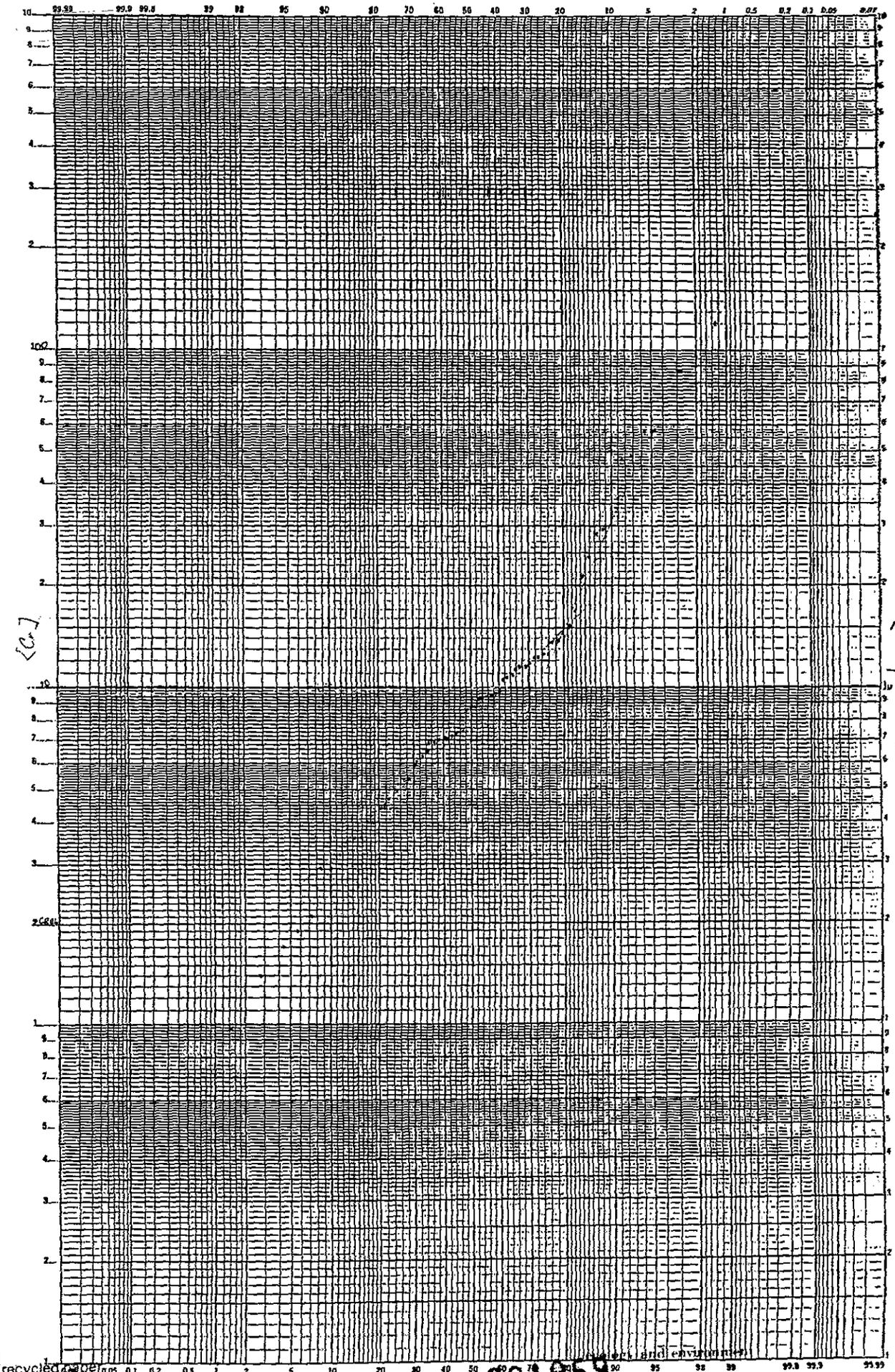
K·E PROBABILITY X Z LOG CYCLES 46 8040 MADE IN U.S.A. KEUFFEL & ESSER CO.

Chromium



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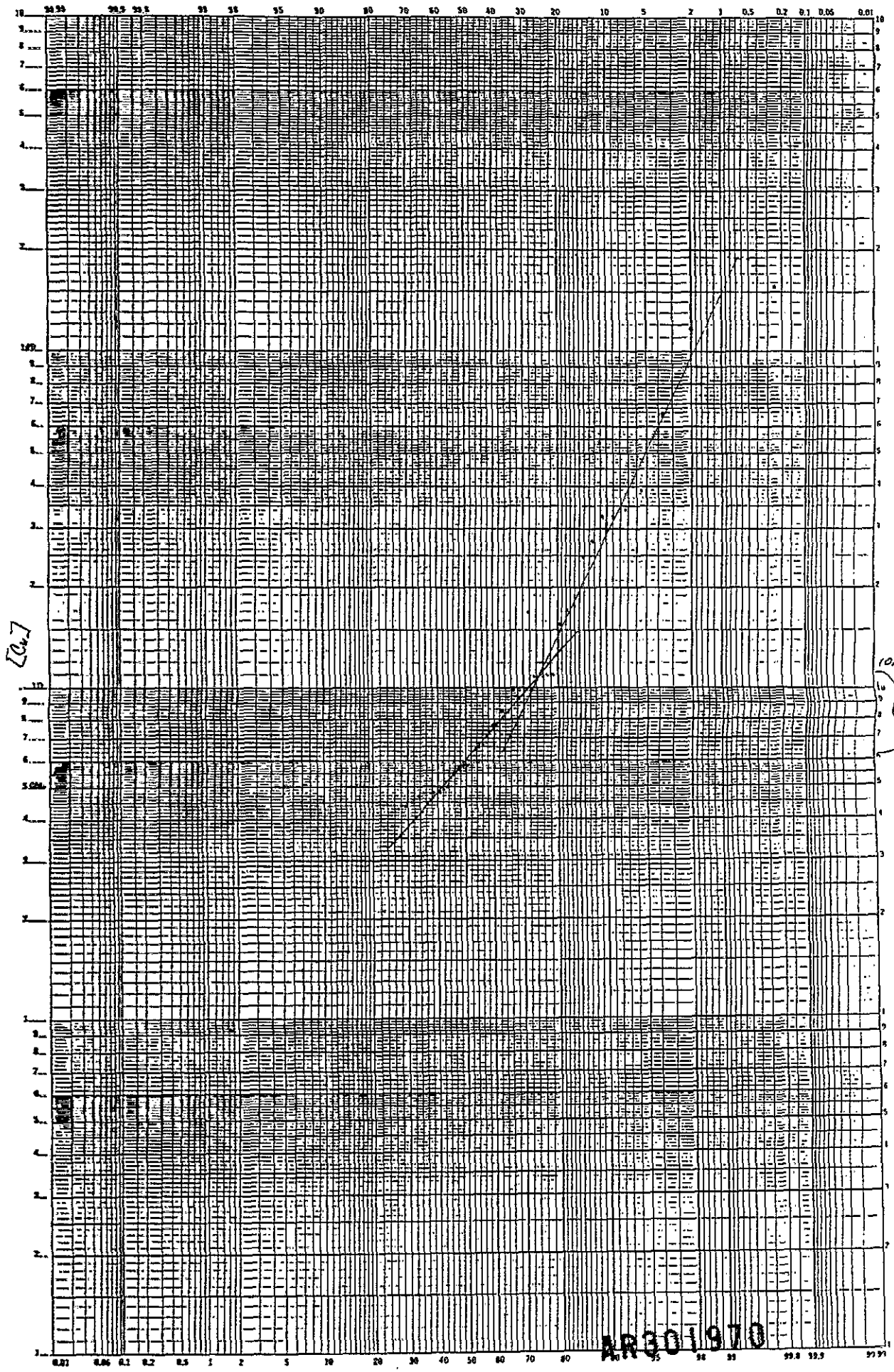
K+E PROBABILITY 46 8040
X 2 LOG CYCLES MADE IN U.S.A.
KEUFFEL & ESSER CO.

Copper



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APPENDIX I

ACTIVATED CARBON ADSORPTION ISOTHERM PROTOCOL

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EPA-600/8-80-023
April 1980

CARBON ADSORPTION ISOTHERMS FOR TOXIC ORGANICS

by

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APPENDIX A

ACTIVATED CARBON ADSORPTION ISOTHERM PROTOCOL

1. General Discussion

1.1 Purpose of Test

Application of activated carbon for removal of solutes from aqueous solution is based on a property known as the adsorption capacity. The adsorption isotherm procedure is a method for the determination of the adsorptive capacity of activated carbons. The test can be used to compare adsorption capacities of different carbons for a given solute or to measure the adsorbability of different solutes on a given carbon.

2. Apparatus

2.1 Jar mill, jar and cylindrical grinding medium

2.2 Standard 200 mesh and 400 mesh sieves with 0.0029 inch (73.6μ) and 0.0015 inch (38.1μ) openings and mechanical sieve shakers.

2.3 Coordinated magnetic stirrers and stirring bars or jar test apparatus.

2.4 Ground-glass stoppered reagent bottles (1000 ml or appropriate volume).

2.5 Volumetric dispensing pipettes.

2.6 Filtration equipment; select from the following: 0:45μ membrane filter, sintered silver filter disc, glass fiber filter paper, syringe equipped with a Swinney filter holder, or pressure filter apparatus.

2.7 Analytical balance

2.8 Drying oven

2.9 Desiccator

2.10 pH meter

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3. Reagents

All reagents must be prepared with "organic-free " distilled water. Treatment of conventional distilled water with large amounts of activated carbon in a column or batch process is suitable for this purpose. If isotherm tests are to be conducted on volatile compounds the carbon-treated distilled water should be boiled for 15 - 20 minutes or purged over night with inert gas in order to remove volatile compounds which may contaminate distilled water during distillation or storage.

3.1 Preparation of adsorbent:

Although granular carbons can be compared or evaluated in their original form by means of a batch test, the general procedure is to pulverize the adsorbent. Use of pulverized carbon assures more rapid attainment of equilibrium. If the adsorbent is in granular form, place in jar with grinding medium. Jar should not be more than half full to insure efficient grinding of the carbon. Place on a jar mill until sample is pulverized. Sieve the pulverized material through a 200-mesh (0.0736 mm) sieve and retain on a 400-mesh (0.038/mm) sieve. Return carbon which did not pass through the 200-mesh sieve to the jar for additional grinding. Repeat procedure until approximately 90% of the sample passes the 200-mesh sieve. Powdered carbons are classified as described above without the grinding operation. Use the 200/400 mesh fraction for isotherm testing. Dry the classified carbon overnight in a drying over ast 105° C. Cool in a desiccator and store until needed for experimental purposes.

3.2 Preparation of activated carbon stock slurry: weigh out 50.00 grams of oven-dried and cooled pulverized carbon and transfer to a one-liter volumetric flask. Dilute to mark with "organic-free" distilled water. One ml of stock suspension contains 50 mg carbon. Prepare other working standard slurries by serial dilution of the stock slurry. Transfer slurries to appropriate flasks containing dispensing pipettes to provide a wide range of carbon concentrations. Table I lists the carbon dosages obtained with various volumes of stock slurry for one-liter sample volumes.

Table 1. Carbon Dosages for Given Pipette Volumes

Volume of Dispensing Pipette, (ml)	Carbon Dosage,* (mg/l)
5	250
10	500
15	750
20	1000
25	1250

* Not corrected for dilution of the one-liter sample volume

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Dilution of the stock slurry by 1:10 and 1:100 would result in carbon doses 1/10 and 1/100 of those shown in Table 1.

3.3 Hydrochloric acid 6N. Dilute concentrated HCl 1:1 with "organic-free" distilled water.

3.4 Sodium hydroxide 6N. Add 240 grams of NaOH pellets to one liter of "organic-free" distilled water.

4. Procedure

4.1 If the test solution contains volatile or semivolatile components, place one-liter samples in a series of ground-glass stoppered reagent bottles. Add increasing carbon dosages to each successive sample. Add no carbon to one sample and use as a control. An initial concentration of 10 mg/l of test compound might require carbon dosages of 5, 10, 25, 50, 100, 250, 500, and 1000 mg/l. A preliminary isotherm may be required to bracket the desired range of dosages. Immediately after addition of the carbon dose, fill the reagent bottle to the bottom of the ground-glass stopper with additional test solution so that no air space remains. This will minimize loss of volatile solutes. Reagent bottle volumes should be recorded on the bottle and closely matched bottles used as a set. One-liter reagent bottles typically have a total volume of 1070-1090 ml. Carbon doses and test solution concentrations can be corrected for dilution associated with completely filling the ground-glass stoppered reagent bottles. In general, this correction is small and can be ignored.

4.2 Place the carbon-dosed samples on a coordinated magnetic stirrer apparatus and stir the control and samples for two hours. At the conclusion of the contact period separate the pulverized carbon from the test solution by an appropriate filtration procedure and analyze for the component of interest. Choice of filtration process will depend upon the characteristics of the test solution and the method of chemical analysis. Analysis of the control or a standard solution before and after filtration will determine whether or not a proper filtration method has been selected. Filtration of the sample should not result in a significant change in concentration of components.

In the case of volatile compounds, a syringe equipped with a Swinney filter holder can be used if the volume of filtrate required for analysis is small (i.e., analytical methods such as purge and trap gas chromatography, total organic carbon, or ultraviolet spectroscopy). Pressure filters can be used if larger volumes are required for analysis. Vacuum filtration with pre-washed membrane filters is suitable for solution containing nonvolatile components, provided adsorption losses are not encountered on the membrane. If adsorption losses are evident, sintered silver membranes or glass fiber paper can be used for separation of the pulverized carbon. Carbon can also be separated by centrifugation.

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4.3 Analysis of the filtrate: The concentration of solute in equilibrium with each carbon dose is measured by an appropriate quantitative method such as spectrophotometry, colorimetry, total organic carbon, gas chromatography, evaporation to residue or other analytical technique.

5. Treatment of Data

5.1 Calculation of adsorption capacity: Activated carbon adsorption isotherm data are usually plotted according to the Freundlich equation. Detailed discussion of the equation and its uses can be found in the literature. Although the equation is empirical, it is nonetheless widely used and has been found to adequately describe the adsorption process in dilute solution. The Freundlich equation has the form:

$$X/M = K\, C_f^{1/n}$$

where $X = C_o - C_f$ which is the amount of solute adsorbed from a given volume of solution

C_o = initial concentration of solute in the untreated solution

C_f = final concentration in the treated solution at equilibrium

M = weight of activated carbon added to the solution

K & 1/n = empirical constants

Data are fitted to the logarithmic form of the above equation which can be written as follows:

$$\log X/M = \log K + 1/n \log C_f \qquad (2)$$

For dilute solutions this equation yields a straight line with a slope of 1/n and an intercept equal to the value of K (when Cf = 1) when X/M is plotted as a function of Cf on logarithmic paper. The intercept is an indicator of adsorption capacity and the slope of adsorption intensity.

A convenient form for tabulation of adsorption isotherm data is shown on the standard data form. Carbon dosages are shown in the left-hand column. The next column for each set of data contains the residual concentrations remaining in solution after carbon treatment. The C_f value for the control sample corresponding to the zero carbon dose is the C_o value. The amount of solute adsorbed (X) is calculated by subtracting each C_f value from C_o and is summarized in the appropriate column. Dividing "X" in mg of solute by the carbon dose in grams gives the adsorption capacity (X/M) per gram of carbon shown in the final column for each set of data. X/M values are plotted as a function of C_f according to equation (2) on logarithmic paper.

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5.2 Least squares regression analysis may be used to locate the best-fit line for the plotted data points. A small programmable calculator is convenient for this purpose.

5.3 Extrapolation of the plotted isotherm to C_o (C_f value with zero carbon dose) gives the adsorption capacity at the initial concentration by noting the corresponding value from the X/M axis. Adsorption capacities at other concentrations can be read in the same manner. As the Freundlich equation states the adsorption capacity of carbon, X/M, is a function of the equilibrium concentration, C_f, of the solute.

5.4 Freundlich parameters: The plotted isotherm can be used to obtain the Freundlich parameters K and 1/n. K can be read from the X/M axis at $C_f = 1$. The slope (1/n) can be measured graphically using a ruler (i.e., mm rise/mm span) or taken from the programmable calculator. These parameters are useful in comparing the adsorbability of solutes and in rating the efficiency of different activated carbons.

6. Alternative Procedures

6.1 The pH of the test solution can affect the equilibrium adsorption capacity. For acidic solutes adsorption is favored at low pH while basic compounds are more strongly adsorbed at higher pH values. Solution pH can be adjusted with hydrochloric acid or sodium hydroxide prior to addition of the carbon if these effects are to be measured. Values of 3.0, 7.0, and 9.0 are recommended as a suitable range to determine pH effects. Use of buffers may be desirable in certain cases where a change in pH during adsorption is to be avoided.

6.2 In cases where nonvolatile solutes are to be measured it is not necessary to fill the reagent bottle to the bottom of the ground-glass stopper. If any doubt exists as to the volatility of the solute(s) completely filled reagent bottles should be used.

6.3 Isotherm testing is usually conducted at room temperature (22 ± 2° C) although conditions can be varied experimentally if desired.

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APPENDIX J

RISK ASSESSMENT TABLES

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Listing of Physical Chemical Properties
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Chemical Name	CAS Number	Mole Weight g/mole	Physcl State	Water Solub (mg/l) Value	Rf	Density (g/ml) Value	Rf	Vapor Presr (mm Hg) Value	Rf	Henrys Cnst atm-m3/mol Value	Rf	Koc (ml/g) Value	Rf	Log Kow Value	Rf	Fish BCF (ml/g) Value	Rf	Date of QC	Date of Last Update
Arsenic and C	7440-38-2	75.0	SOLID	. E-		0.00		0.00E+00						0.00		4.40E+01		/ /	08/01/90
Chromium III	7440-47-3	52.0	SOLID	. E-		0.00		0.00E+00						0.00		1.60E+01		/ /	08/01/90
Chromium VI	7440-47-3	52.0	SOLID			0.00		0.00E+00						0.00		1.60E+01		/ /	08/01/90
Copper and Co	7440-50-8	64.0	SOLID	. E-		0.00		0.00E+00						0.00		2.00E+02		/ /	08/01/90
Pentachloroph	87-68-5	266.3	SOLID	8.00E+01	M	0.00		1.10E-04	K	2.80E-06		6.35E+04		5.12	0	1.36E+05		/ /	08/02/90
2,3,7,8-TCDD	1746-01-6	322.0	SOLID	2.00E-05		0.00		1.40E-09		1.60E-05		2.30E+06		6.20		1.00E+04		11/28/90	11/28/90

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Listing of Absorption Coefficients
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CHEMICAL		WATER		SOIL		AIR	
Code	Name/Synonyms	Dermal	Oral	Dermal	Oral	Partic	Vapor
0039	Arsenic and Compounds	0.00100	1.00	0.010	1.00	1.00	1.00
0115	Chromium III and Compounds	0.00100	1.00	0.010	1.00	1.00	1.00
	Cr(III)						
0116	Chromium VI and Compounds	0.00100	1.00	0.100	1.00	1.00	1.00
	Cr(VI)						
	Hexavalent Chrome						
0119	Copper and Compounds	0.00100	1.00	0.010	1.00	1.00	1.00
0345	Pentachlorophenol	0.00100	1.00	0.100	1.00	1.00	1.00
	PCP						
0375	2,3,7,8-TCDD	0.00100	1.00	0.010	1.00	1.00	1.00
	Dioxin						

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APPENDIX K

TOXICOLOGICAL PROFILES

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ARSENIC

Arsenic is a naturally occurring element usually found combined with one or more other elements such as oxygen, chlorine, and sulfur. Arsenic combined with these elements is referred to as inorganic arsenic, while arsenic combined with carbon and hydrogen is referred to as organic arsenic. The organic forms are usually less toxic than the inorganic forms (ATSDR 1989). Arsenic is widely distributed in the environment from natural sources, but higher concentrations have been found associated with the following situations: waste chemical disposal sites, smelting of copper and other metals, fossil fuel combustion, and pesticide use. Average 24-hour ambient air arsenic levels in the United States (U.S.), based on National Air Sampling Network data, ranged from 2.6 ng/m^3 to 10.9 ng/m^3 (Akland 1983). The natural arsenic content of soils varies between 0.1 and 80 ppm, with an average of 5 to 6 ppm (Walsh and Keeney 1975). Over 90% of all surface water contains 10 µg/L arsenic or less. The average concentration of arsenic in U.S. drinking water supplies is about 2 µg/L (Greathouse and Craun 1978).

Environmental Chemistry and Fate

Arsenic may be released to the atmosphere as a gas or vapor, or adsorbed to particulate matter and transported to other media by dry or wet deposition (ATSDR 1989). Trivalent arsenic may undergo oxidation in the air; therefore, atmospheric arsenic is usually a mixture of the trivalent and pentavalent forms. Most airborne arsenic is usually adsorbed on small-diameter particulate matter. Photolysis is not considered to be an important fate process for arsenic.

Arsenic in surface water can undergo a complex pattern of transformations: oxidation-reduction, ligand exchange, biotransformation, precipitation, and adsorption (EPA 1979). As a consequence of these reactions, arsenic is extremely mobile in aquatic systems, and river-borne arsenic is capable of being transported great distances. Factors most strongly influencing the rates of these reactions include Eh, pH, metal sulfide and sulfide ion concentrations, iron concentration, presence of phosphorus minerals, temperature, salinity, and distribution and composition of biota (EPA 1979).

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Sorption onto clays, iron oxides, manganese compounds, and organic matter is an important fate mechanism in surface water, with sediment serving as a reservoir for most of the arsenic entering surface water. Sediment-bound trivalent and pentavalent arsenic, methylated by aerobic and anaerobic microorganisms, may be released back into the water column.

Soluble forms of arsenic adsorb to soil and travel with the soil matter. Shifts in oxidation state may occur in either direction, depending on the particular characteristics of the soil and groundwater. Volatilization of methylated arsenicals from groundwater is possible.

Arsenic in soil is predominantly found in an insoluble, adsorbed form. Clay with high anion-exchange capacity strongly adsorbs pentavalent arsenic. Other important adsorption processes include complexation and chelation by organic material, iron, or calcium. Leaching of arsenic is usually important in the top 30 centimeters of soil, but may also be important at greater depth in sandy soils. Arsenate predominates in aerobic soils; arsenite is the predominant form in slightly reduced soils; and arsine, methylated arsenicals and elemental arsenic predominate in very reduced conditions (e.g., swamps and bogs)(ATSDR 1989).

As noted above, microorganisms may reduce and methylate arsenicals in water and soil, resulting in volatilization and emission to the air. The volatilization rate is heavily dependent on whether the soil is oxygenated or anaerobic, the pH, and the microbe types and concentrations in soils.

In aquatic systems, bioconcentration of arsenic primarily occurs in algae and lower invertebrates, but biomagnification does not appear to be significant (EPA 1979).

Plants may accumulate arsenic via root uptake, with uptake being dependent on the species, soil arsenic concentration, and soil characteristics.

Toxicokinetics

Exposure to arsenic compounds may occur orally and through inhalation. Little is known about the dermal absorption route. Inorganic arsenic compounds are generally well absorbed, widely distributed, and

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promptly excreted. The rates of these processes depend on the chemical and physical form, particularly the water solubility, of the arsenic compound. Exposure of animal species to either trivalent or pentavalent arsenic leads to the initial accumulation of arsenic in liver, kidney, lung, spleen, aorta, skin, hair, and upper gastrointestinal tract (EPA 1984). These tissues are cleared rapidly except for skin and hair, where the sulfhydryl groups of keratin may promote tight arsenic (III) binding (ATSDR 1989).

Metabolism of arsenic occurs predominantly in the liver by methylation. The major metabolite is dimethylarsinic acid, which is excreted in the urine.

Noncarcinogenic Effects

At high doses, arsenic compounds have been shown to produce acute and chronic toxic effects, including irreversible systemic damage. The trivalent compounds are the most toxic and tend to accumulate in the body. Animal studies have shown that chronic arsenic exposure may cause body weight changes, decreased blood hemoglobin, liver damage, and kidney damage.

There is evidence that arsenic is an essential element enhancing growth and development in certain animal species, and it has been suggested that arsenic may be an essential element for humans (NAS 1980). Whether or not arsenic is an essential element is the subject of continuing research.

Teratogenic effects of arsenic compounds at relatively high exposure levels have been demonstrated in a number of animal species (ATSDR 1989). Generally, these effects have been observed following parenteral (injection) administration; whereas, administration at lower doses by the more relevant oral route has not resulted in any significant reproductive or developmental effects.

Mutagenicity and Carcinogenicity

Arsenic has been shown to be mutagenic in several assay systems and to induce chromosomal aberrations <u>in vivo</u> and <u>in vitro</u>. Animal carcinogenicity studies have reported conflicting results. Several studies have reported an increased incidence of bronchogenic carcinomas in rats

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exposed intratracheally to an arsenic-containing pesticide. Reasons for inconsistent carcinogenicity findings in animals may include inappropriate selection of an animal model, and use of flawed study designs. In humans, epidemiologic studies and case reports have documented that arsenic is associated with tumors of the skin, lungs, genital organs, and visual organs (EPA 1989; ATSDR 1989).

EPA has classified arsenic in Group A, a human carcinogen, based on extensive evidence of human carcinogenicity through inhalation and ingestion exposure (EPA 1990a,b).

Quantitative Indices of Toxicity

Quantitative indices of toxicity for arsenic are presented in Table 1A and 1B.

Using the absolute-risk linear model, EPA derived the upper-bound 95% confidence limit slope factor (SF) based on human exposure data. The upper-bound estimate for the inhalation route is 50.0 $(mg/kg/day)^{-1}$.

Standards and Criteria

Standards and criteria relevant to arsenic are listed in Table 2. The current MCL for arsenic under the National Interim Drinking Water Regulations is 50 ug/L. The National Academy of Sciences (NAS) Drinking Water Committee has analyzed the toxicology of arsenic (NAS 1980). Based upon this evaluation, NAS recommended the retention of the MCL, pending resolution of the question whether arsenic is an essential element in the human diet.

Consistent with the NAS recommendations, EPA has proposed that the MCL remain at the current MCL of 50 ug/L. In its determination, EPA stated that the MCL was below concentrations at which noncarcinogenic toxicity had been demonstrated and was within the concentration range that might be, based on further investigation, essential for humans (EPA 1985, 1989).

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Table 1A

NONCARCINOGENIC INDICES
OF TOXICITY FOR ARSENIC

Oral Route	
Chronic Reference Dose (RfD) mg/kg/day	1×10^{-3}
Subchronic RfD (RfDs) mg/kg/day	1×10^{-3}
Confidence Level	NS
Critical Effect	keratosis; hyperpigmentation; cancer
Test Species for Critical Effect	Human
RfD Basis	Inhalation
RfD Source	HEAST - EPA 1990b
Uncertainty Factor	
- Chronic RfD	1
- Subchronic RfD	1

NS = Not specified.

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Table 1B

CARCINOGENIC TOXICITY INDICES FOR ARSENIC

Oral Route	
Slope Factor (SF) $(mg/kg\text{-}day)^{-1}$	NA
Weight of Evidence Classification	A
Type of Cancer	Skin
Test Species	Human populations
SF Basis	Water
SF Source	IRIS - EPA 1990a
Inhalation Route	
Slope Factor $(mg/kg\text{-}day)^{-1}$	50.0
Weight of Evidence Classification	A
Type of Cancer	Respiratory tract
Test Species	Human populations
SF Basis	Occupational air
SF Source	IRIS - EPA 1990a

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Table 2

STANDARDS AND CRITERIA
FOR ARSENIC

Standard or Criterion	Value	Reference
Drinking Water		
U.S. Primary Drinking Water Standards		
MCL (a)	0.05 mg/L	EPA 1990a
MCLG (b)	0.05 mg/L	EPA 1990a
Surface Water		
U.S. EPA Ambient Water Quality Criteria		
Ingesting Water and Organisms	2.2×10^{-6} mg/L	EPA 1990a
Ingesting Organisms Only	1.75×10^{-5} mg/L	EPA 1990a
Occupational Air Concentrations		
OSHA PEL TWA	10 $\mu g/m^3$	OSHA 1989
ACGIH TWA	0.2 mg/m^3	ACGIH 1990

(a) Maximum contaminant level
(b) Maximum contaminant level goal

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CHROMIUM

Chromium is a naturally occurring element that is used mainly for making steel and other alloys. Chromium compounds are also used in refractory brick for the metallurgical industry and in the chemical industry for metal finishing, manufacture of pigments, leather tanning, wood treatment, and water treatment. Larger amounts of chromium are emitted into the environment from the mining of ores containing chromium and the use of chromium compounds in industrial processes than from natural processes. The atmospheric chromium concentration in the United States is typically less than 0.01 $\mu g/m^3$ in rural areas and 0.01 to 0.03 $\mu g/m^3$ in urban areas (Fishbein 1984). The concentration of chromium in United States river waters usually ranges between 1 and 30 µg/L. Chromium concentrations in soils are reported to range from 5 to 1,500 mg/kg (Carey 1982).

Environmental Chemistry and Fate

The dominant chromium species in water and sediment are hexavalent chromium, or Cr(VI), and trivalent chromium, or Cr(III), both of which will partition between water and sediment. The principal chromium species which will enter into chromium equilibrium in natural water is $Cr(OH)_3$. In soil, Cr(III) is the dominant species. Cr(VI) is soluble in water, existing in solution as a complex anion. Cr(III) may be soluble as an organic complex (Towill et al. 1978), depending on the availability of suitable complexing agents. Cr(VI) is reduced readily by organic matter to Cr(III), while Cr(III) may be oxidized slowly to Cr(VI) in ambient water (EPA 1985a). Cr(III) is likely to be precipitated as insoluble $Cr(OH)_3$ and deposited in sediment. In the pH range of natural water (5.0 to 9.0) and in the presence of chlorides, Cr(III) compounds are likely to precipitate as $Cr(OH)_3$. Higher pH levels are likely to increase $Cr(OH)_3$ formation. Most of the Cr(III) present in surface water is present as particulate matter in sediment.

Most chromium is present in soil in a mineral state, either adsorbed or precipitated (EPA 1985a). Organic matter present in soil is likely to reduce any soluble chromate to insoluble chromium trioxide (Cr_2O_3). The most common form of chromium in soil is Cr(III) as Cr_2O_3-nH_2O (EPA 1985a).

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Chromium may be deposited in surface water and sediment by surface runoff, atmospheric deposition of chromium-containing particulate matter, and emissions from specific chromium sources (EPA 1979). Cr(VI), due to its solubility, is likely to be transported by water. Cr(III) may also be transported by water as suspended particulate matter or as bedload sediment.

Flooding of soils and the resulting anaerobic decomposition of plant matter may increase dissolution of Cr_2O_3-nH_2O in soil (Towill et al. 1978). Chromium is also transported from soil by runoff and may be transported to the atmosphere by aerosol formation (John et al. 1973).

No data were found to indicate that photolysis, volatilization, or sorption are important factors in the environmental fate and transport of chromium (EPA 1985a).

Toxicokinetics

Absorption of chromium and chromium compounds is associated with the inhalation, oral, and dermal routes of exposure. Orally administered chromium in humans resulted in approximately 0.4% of the ^{51}Cr (from $^{51}CrCl_3$) and approximately 10.6% of the ^{51}Cr (from Na_2CrO_4) being absorbed (Donaldson and Barreras 1966). Dermal absorption of chromium is dependent on the chemical species, as well as on physical factors.

Chromium may be distributed throughout the body, with the highest concentrations found in the kidneys, lymph nodes, lungs, spleen, liver, and blood.

Chromium is metabolized by reduction of Cr(VI) to Cr(III) (ATSDR 1989). In vitro studies have shown that Cr(VI) is readily reduced to Cr(III) by gastric juices or glutathione (GSH) (Kitagawa et al. 1982; Levis et al. 1978).

Excretion of chromium occurs in multiple stages: a rapid phase representing clearance from the blood, and at least two slower phases representing clearance from tissues. Urinary excretion is the primary route of elimination (Cavalleri and Minoia 1985; Mertz et al. 1969).

Noncarcinogenic Effects

Following inhalation, Cr(VI) is a respiratory tract irritant. Nasal irritation and slight transient effects on pulmonary function

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occur at the lowest-observed-adverse-effect level (LOAEL). Ulceration and perforation of the nasal passages have been observed at concentrations of 20 to 46 $\mu g/m^3$ (ATSDR 1989). In vitro studies of chromium-induced toxicity following inhalation have indicated that the immune system may be affected. Depression of some indices of the immune system were reported at the higher concentrations, and stimulation was reported at lower concentrations. Hypersensitivity reactions have been reported in humans following inhalation exposure to chromium compounds (Glaser 1985; ATSDR 1989; Moller 1986).

Occupational exposure to chromium compounds by inhalation have resulted in changes in the kidney and liver. Reports of kidney damage, but not liver damage, following oral and dermal exposure to Cr(VI) compounds have been cited (ATSDR 1989).

Carcinogenicity and Mutagenicity

Based on positive animal studies and positive epidemiological studies demonstrating excess cancer mortality in humans among Cr(VI)-exposed workers, and according to its weight-of-evidence carcinogenicity criteria, EPA has placed Cr(VI) in Category A, "human carcinogen" (EPA 1985a). However, since chromium has not been shown to be carcinogenic by the oral route, EPA has concluded that chromium in drinking water should be regulated based upon noncarcinogenic chronic toxicity data (EPA 1985a, b).

Cr(VI) has demonstrated consistently positive mutagenic activity in a number of bacterial systems. Both Cr(III) and Cr(VI) have been shown to interact with DNA in bacterial assays. Cr(VI) has inhibited DNA synthesis and increased unscheduled DNA synthesis in mammalian cells in culture. Both valences have been demonstrated to produce clastogenic effects in mammalian cells. Increased frequencies of chromosomal aberrations have also been observed in occupationally exposed workers.

Quantitative Indices of Toxicity

Table 1 summarizes the quantitative indices of toxicity for chromium (III) and chromium (VI).

There are two chromium valences of principal concern in soil and drinking water: Cr(III) and Cr(VI). Cr(VI) is much more toxic than

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Cr(III) and has been shown to produce liver and kidney damage, internal hemorrhages, and respiratory disorders. EPA has developed an adjusted acceptable daily intake (AADI) for total chromium based upon the effects of Cr(VI) for the following reasons (EPA 1985a):

- The two valences are in dynamic equilibrium in aqueous media;
- An AADI based upon Cr(VI), the more toxic of the two valences, will be more conservative (health-protective); and
- Reduction of Cr(VI) to Cr(III) in the stomach following oral intake is incomplete and, relative to Cr(III), there is greater Cr(VI) absorption and tissue accumulation.

EPA derived the provisional AADI for total chromium based on a no-observed-adverse-effect level (NOAEL) reported in a study in which rats were exposed to Cr(VI) in drinking water for one year. Based on a NOAEL of 2.41 mg/kg/day, an uncertainty factor of 500, and standard intake and physiological assumptions, EPA derived an oral reference dose (RfD) of 5.0×10^{-3} mg/kg/day (EPA 1987, 1990a,b).

Standards and Criteria

Standards and criteria applicable to chromium are summarized in Table 2.

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Table 1A

INDICES OF TOXICITY
FOR CHROMIUM (III)

Oral Route	
Chronic Reference Dose (RfD) mg/kg/day	1.0
Subchronic RfD (RfDs) mg/kg/day	10
Confidence Level	Low
Critical Effect	Hepatotoxicity
Test Species for Critical Effect	Rat
RfD Basis	Diet
RfD Source	IRIS - EPA 1990a
Uncertainty Factor	
- Chronic RfD	100
- Subchronic RfD	100
Modifying Factor	
- Chronic RfD	10
- Subchronic RfD	NS

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Table 1B

INDICES OF TOXICITY
FOR CHROMIUM (VI)

Oral Route	
Chronic Reference Dose (RfD) mg/kg/day	5×10^{-3}
Subchronic RfD (RfDs) mg/kg/day	2×10^{-2}
Confidence Level	Low
Critical Effect	Cancer - not defined
Test Species for Critical Effect	Rat
RfD Basis	Water
RfD Source	IRIS - EPA 1990a
Uncertainty Factor	
- Chronic RfD	500
- Subchronic RfD	100
Modifying Factor	
- Chronic RfD	1
- Subchronic RfD	NS

AR302000

Table 1C

CARCINOGENIC INDICES OF TOXICITY
FOR CHROMIUM (VI)

Inhalation Route	
Slope Factor $(mg/kg\text{-}day)^{-1}$	41.0
Weight of Evidence Classification	A
Type of Cancer	Lung
Test Species	Rat
SF Basis	Occupational Air
SF Source	IRIS

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Table 2

STANDARDS AND CRITERIA
FOR CHROMIUM

Standard or Criterion	Value	Reference
Drinking Water		
National Primary Drinking Water Regulations		
MCL (a) present	0.05 mg/L	EPA 1989a
proposed	0.1 mg/L	EPA 1989a
MCLG (b) proposed	0.1 mg/L	EPA 1989a
Surface Water		
EPA Ambient Water Quality Criteria		
Water and Fish Consumption		
Cr(III)	179 mg/L	ATSDR 1989
Cr(VI)	50 µg/L	ATSDR 1989
Occupational Air Concentrations		
OSHA PEL TWA		
Chromates (as Cr)	0.052 mg/m^3 (ceiling)	OSHA 1989
Cr (II) and Cr (III) Compounds (as Cr)	0.5 mg/m^3	OSHA 1989
Chromium Metal (as Cr)	1.0 mg/m^3	OSHA 1989
ACGIH TLV TWA		
Chromium Metal	0.5 mg/m^3	ACGIH 1990
Cr(II) and Cr(III)	0.5 mg/m^3	ACGIH 1990
Water-Soluble Cr(VI) Compounds	0.05 mg/m^3	ACGIH 1990
Certain Water-Insoluble Cr(VI) Compounds	0.05 mg/m^3	ACGIH 1990
Chromite Ore Processing	0.05 mg/m^3	ACGIH 1990

a MCL = Maximum contaminant level.

AR302002

COPPER

Copper (Cu) is a naturally occurring metal that is used in the production of its brass and bronze alloys and of electrical wires and other electrical apparatus. Copper is also used extensively in the production of high-temperature containers such as boilers, steam pipes, automobile radiators, and cooking utensils.

Environmental monitoring of copper concentrations in various media has been used to determine background concentrations or concentrations that are considered normal. Total copper averages 25 mg/kg (ppm) (range of 4-700 mg/kg) in surface soils of the continental United States.

Environmental Chemistry and Fate

Copper occurs in three oxidation states: 0, +1, and +2. Of these, only the +2 oxidation state is found in aquatic systems. The factors that influence copper speciation are Eh, pH, inorganic complexing agents, and organic and inorganic ligands (Jenne 1968).

Adsorption, precipitation, and the formation of organic complexes render copper one of the least mobile metals in soils (Kabata-Pendias and Pendias 1984). The solubility of copper is lowest between pH 7 and 8. Below pH 7, copper hydroxide cations are formed, and above pH 8, anionic complexes are formed. Copper mobility is enhanced by complex formation with dissolved organic compounds such as fulvic and humic acids.

Copper is more strongly bound to organic ligands than any other metal, and the presence of natural or man-made organics in water will markedly affect the distribution of copper-containing species. Organo-copper interactions result in increased solubility of some copper-containing minerals and subsequent transport of the organo-cupric complex (Ong et al. 1970; Rashid and Leonard 1973).

Copper forms soluble complexes with carbonate, to the extent that most dissolved copper is present as a cupric carbonate complex rather than as the free Cu(II) ion. Copper can also complex with cyanide, ammonia, amino acids, and humic substances. In the absence of complexing agents, hydrolysis and precipitation dominate the aqueous chemistry of copper. In unpolluted waters, $Cu_2(OH)_2CO_3$ (malachite) can form, removing copper from solution. Formation of this species is very slow,

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however, and can be affected by the presence of competing ligands (EPA 1979).

Copper forms stable complexes with metal oxides, clays, carbonate materials, and organic matter (EPA 1979). Other metals can compete with copper for sorptive sites, leading to release of adsorbed copper. An additional release mechanism may occur if the metal oxide is reduced and releases the adsorbed copper. Adsorption of copper by clays was found to be pH-dependent and could be enhanced by the presence of humic materials (Huang et al. 1977). Copper forms stable anionic complexes with humic and fulvic acids (Shuman and Cromer 1979). The resulting organo-copper anion can be sorbed to positively charged clay or oxide surfaces. The effectiveness of this sorption process increases with pH. Ramamoorthy and Rust (1978) found that sediments provide a sink for organo-copper complexes.

TOXICOKINETICS

Gastrointestinal absorption of copper is normally regulated by a homeostatic mechanism in order to maintain optimal body stores. Metallothionein, a metal-binding protein, is thought to aid in copper homeostatis by providing benching sites in the intestinal mucosa for ionic copper, and by acting as a mucosal block to prevent toxic amounts of copper from being absorbed (Goyer 1986; Evans 1973). In this manner, short-term copper deficiencies or increases in exposure may be tolerated (EPA 1987).

Limited research on the homeostatic mechanism that protects against copper toxicity suggests that infants could be especially susceptible to higher levels of copper intake occurring before these mechanisms are fully developed (EPA 1987; Henkin et al. 1973; Schorr et al. 1958).

Limited data are available regarding the absorption of inhaled copper or copper compounds (EPA 1987). Copper-containing granules have been observed in the lungs, livers, and kidneys of workers occupationally exposed to copper-containing fumes. This provided indirect evidence that copper can be absorbed through the lungs (Villar 1974). Pulmonary absorption of copper has been demonstrated in laboratory experiments with rats (Batsura 1969).

AR302004

Copper is transported in the blood as a complex with plasma albumin and amino acids. Removal of copper from the serum occurs primarily in the liver, where it is either excreted into the bile, stored, or used in synthesizing ceruloplasmin, a copper-containing protein. Copper is also required in hemoglobin formation, pigment formation, carbohydrate metabolism, tissue respiration, catecholamine biosynthesis, cross-linking of collagen and elastin, and cross-linking of hair keratin (EPA 1987).

Copper is eliminated from the body by excretion in the feces, urine, perspiration, saliva, hair, nails and menstrual fluid (Sorel et al. 1984).

The half-life of copper in the body was estimated by Davies and Bennett (1983) to be about four weeks. The relatively short biological half-life, together with the well-established homeostatic mechanism for controlling body stores of copper, indicates that most individuals enjoy significant protection against excessive accumulation of copper from the diet. There are, however, several subpopulations that are less well protected (EPA 1987). These include very young children in which the homeostatic mechanisms are not fully developed; individuals with Wilson's disease, an inborn error in copper metabolism that leads to copper accumulation in the liver, brain, kidneys, and cornea, with pathological results; and individuals with existing glucose-6-phosphate dehydrogenase (an enzyme) deficiency (EPA 1988).

Noncarcinogenic Effects

Copper is an essential element at low dose levels, but has toxic effects at high dose levels. Toxic effects resulting from acute exposure to copper in laboratory animals and humans include gastrointestinal disturbances, hemolytic anemia, liver damage, and glucose-6-phosphate dehydrogenase inhibition (EPA 1987).

Limited data are available on the chronic toxicity of copper. Efficient homeostatic mechanisms generally protect mammals from dietary copper excess. Humans with Wilson's disease have an inborn error of copper metabolism, resulting in accumulation of copper in the liver, kidneys, and brain. Consequently, hemolytical anemia, neurological abnormalities, and corneal opacities have been reported in diseased individuals exposed to copper.

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EPA has recently proposed a Maximum Contaminant Level Goal (MCLG) for drinking water regulations of 1.3 mg/L for adults and children. This MCLG is based on a Lowest Observed Adverse Effect Level (LOAEL) of 5.3 mg/day from human clinical case studies in which 5.3 mg was the lowest acute oral dose at which gastrointestinal effects were seen. An uncertainty factor of 2 was applied and daily consumption of 2 liters of water per day by an adult was assumed (EPA 1988).

Reproduction and Development

Copper deficiency has been observed to produce teratogenic responses in a variety of animals (Hurly and Keen 1979). However, high doses of copper sulfate have been observed to elicit a teratogenic response following oral administration to mice of 103.5 mg/kg/day for 30 days (Lecyk 1980).

Mutagenicity and Carcinogenicity

Copper compounds have generally elicited negative results in in vitro mutagenesis assays. At high concentrations, copper sulfate was observed to increase the frequency of recessive lethal mutations in D. Melanogaster.

Equivocal results have been obtained in oral chronic animal carcinogenicity bioassays. Based upon its carcinogenic risk assessment guidelines, EPA has placed copper in category D--not classified.

Quantitative Indices of Toxicity

Table 1 summarizes the quantitative indices of toxicity for copper.

EPA has calculated a reference dose of 3.7×10^{-2} mg/kg/day by applying an uncertainty factor of 2 to a human lowest-observed-adverse-effect level (LOAEL) of 7.4×10^{-2} mg/kg/day, based on gastrointestinal symptoms (EPA 1990a,b).

The inhalation reference dose of 1.0×10^{-2} mg/kg/day was developed by applying a safety factor of 10 to the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value (TLV) of 1.0 mg/m^3 for copper dust or mist (EPA 1985b). The safety factor of 10 was used to translate the dose from a relatively healthy population of workers to members of the general population with varying degrees of sensitivity to inhaled copper.

AR302006

Standards and Criteria

Standards and criteria relevant to copper are outlined in Table 1.

EPA has recently proposed a Maximum Contaminant Level Goal (MCLG) for drinking water regulations of 1.3 mg/L for adults and children (EPA 1988). This MCLG is based on a Lowest Observed Adverse Effect Level (LOAEL) of 5.3 mg/day from human clinical case studies in which 5.3 mg was the lowest acute oral dose at which gastrointestinal effects were seen. An uncertainty factor of 2 was applied and daily consumption of 2 liters of water per day by an adult was assumed (EPA 1988).

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Table 1

STANDARDS AND CRITERIA
For Copper

Standard or Criterion	Value	Reference
Reference Dose:		
Oral	3.7×10^{-2} mg/kg/day	EPA 1989a
Inhalation	1.0×10^{-2} mg/kg/day	EPA 1989
Drinking Water		
National Primary Drinking Water Regulations		
MCL (proposed) (a)	1.3 mg/L	EPA 1988
MCLG (proposed) (b)	1.3 mg/L	EPA 1988
Surface Water		
EPA Ambient Water Quality Criteria	1 mg/L	EPA 1986
Occupation Exposure Limits (Air)		
OSHA PEL TWA:		
Dusts and mists (as Cu)	1 mg/m^3	OSHA 1989
Fumes	0.1 mg/m^3	OSHA 1989
ACGIH TWA:		
Dusts and mists	1.0 mg/m^3	ACGIH 1990
Fumes	0.2 mg/m^3	ACGIH 1990

a MCL = Maximum contaminant level.
b MCLG = Maximum contaminant level goal.

AR302010

PENTACHLOROPHENOL (PCP)

Introduction

Pentachlorophenol (PCP) is one of the most widely used biocides in the United States. The principal use of PCP is in wood preservation, with 80% of domestic use accounted for in the treatment of utility poles. PCP is also registered for use as a termicide, fungicide, herbicide, algicide, disinfectant, and as an antifouling paint ingredient (ATSDR 1989). Wood uses account for at least 98% of domestic consumption. This wide range of uses can be partially attributable to the solubility of the nonpolar compound, PCP, in organic solvents and its polar sodium salt in water (ATSDR 1989).

Typically, commercial PCP is 88.4% pure and may be contaminated with several other chemicals including other polychlorinated phenols, polychlorinated dibenzodioxins (iPCDDs) and polychlorinated dibenzofurans (PCDFs). This profile addresses the toxicity of PCP.

Environmental Chemistry and Fate

The relevant physical and chemical properties for PCP (CAS No. 87-86-5) are summarized below (EPA 1986a,b).

Molecular Formula	C_6Cl_5OH
Molecular Weight (g/mole)	266.3
Water Solubility (mg/L at 25°C)	14
Vapor Pressure (mmHg at 25°C)	1.1×10^{-4}
Henry's Law Constant ($atm\text{-}m^3$/mole)	3.4×10^{-6}
Log K_{ow}	5.12
Organic-Carbon Partition Coefficient (K_{oc})	32,900 (Schellenberg, et al. 1984)
BCF	1,000 (goldfish)

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PCP has a very low vapor pressure and the vapor pressure of its salt or ionic form is expected to be significantly less. Based upon its low vapor pressure and Henry's Law Constant, volatilization from aqueous systems is not considered to be a significant transport mechanism. Based upon its K_{oc} and low vapor pressure, PCP will strongly bind to and only slowly volatilize from surface soil.

Schellenberg et al. (1984) demonstrated that the sorption of PCP is highly dependent on the organic content of the sorbent and reported an average K_{oc} value of 32,900 for the compound with lake and river sediments and aquifer materials. Besides organic carbon content, pH is the most important variable controlling sorption of PCP to soil. PCP is sorbed to soils or sediments under acidic conditions, but is mobile under neutral or alkaline conditions (Kuwatsuka and Igarashi 1975).

PCP's high log K_{ow} value indicates that the chemical is likely to bioaccumulate in organisms and food chains. However, the extent of bioaccumulation is highly dependent on the pH of the medium, since PCP dissociates to its more water soluble anionic form at higher ambient pH levels. Bioconcentration factors (BCFs) up to 1,000 have been reported in algae and aquatic invertebrates (USEPA 1986a).

Atmospheric PCP is photolyzed in the atmosphere; however, oxidation is not expected to be an important mechanism in this medium. Photolysis and biodegradation are believed to be the dominant transformation processes for PCP in aqueous systems. For example, Pignatello et al. (1985) demonstrated that the photolytic half-life of PCP at the water surface is 0.70 hour. However, the same author reported that photolysis was greatly attenuated with increasing depth in the water column. PCP is biotransformed in aqueous systems by acclimated microorganisms. Biodegradation is considered to be the major transformation mechanism for PCP in soil. As in the case for water, PCP in soil is rapidly metabolized by microorganisms.

Toxicokinetics

PCP is readily absorbed from the gastrointestinal tract in animals and humans. Braun et al. (1979) reported that oral absorption of PCP in humans was first-order with peak blood values occurring within 4 hours of ingestion. The corresponding calculated absorption half-life is 1.3 hours.

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Limited data are available concerning absorption in humans and animals following inhalation of PCP. Occupational case reports indicate PCP is absorbed based upon elevated levels of PCP in urine and plasma of exposed workers compared to unexposed workers (Jones et al. 1988). Casarett et al. (1969) estimated absorption of 88% and 76% in two human volunteers following inhalation of 230 and 432 $\mu g/m^3$, respectively.

Based upon occupational case reports describing severe toxicity and/or death due to PCP, as well as findings of PCP in urine and plasma following primarily dermal exposure to PCP (ATSDR 1989), USEPA (1984) has assumed a dermal absorption rate in humans of 50% for PCP in organic solvents and 10% for aqueous solution of sodium pentachlorophenate.

Following oral and inhalation exposure in animals, PCP is cleared rapidly and only a small amount is accumulated in any specific tissues. PCP is extensively bound to plasma proteins (Braun et al. 1979). This can result in lower levels of PCP being distributed to tissues, for metabolism and excretion and increased retention in the body, PCP may have a greater potential for eliciting toxicity in humans than indicated in animal studies.

No studies were found concerning the distribution of PCP in humans or animals following dermal exposure.

Animal and human studies indicate that PCP is not readily metabolized. This is evidenced by a large fraction of administered dose being excreted in the urine unchanged in all species studied (ATSDR 1989). Metabolism of PCP does occur, however, in the liver with major pathways consisting of conjugation to form the glucoronide and oxidative dechlorination to form tetrachlorohydroquinone (TCH).

Noncarcinogenic Effects

PCP exerts its toxic effects by uncoupling mitochondrial oxidative phosphorylation, causing alterations in aerobic metabolism. The cell membrane is apparently the site of action, thus disrupting membrane function. This mechanism can occur in many organ systems and could explain the wide range of toxic effects associated with PCP.

Hepatic toxicity in humans and animals is manifested by elevated liver enzymes, enlarged livers, fatty infiltration of the liver, and centrilobular congestion and degeneration (Gray et al. 1985; Klemmer

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et al. 1980; NTP 1989). While purified PCP does possess some degree of hepatic toxicity, the hepatotoxic response to technical grade PCP appears to be more severe.

Kidney toxicity in humans has been manifest by disruption of acid-base equilibrium and metabolic balance, impaired glomerular filtration, tubular function, and mild tubular generation (Begley et al. 1977; Bergner et al. 1965). Begley et al. (1977) observed that these symptoms were reversible following cessation of exposure. Similar effects have been observed in animal studies. Little if any consistent difference in renal toxicity was observed between technical and purified grades of PCP. Thus, given the reversible and transient nature of renal effects, currently it can be concluded that PCP does not elicit strong toxicity on the kidney.

Central and peripheral nervous system toxicity in humans is evidenced by clinical and histopathological findings. Clinical findings may include lethargy, tachycardia, convulsions, and respiratory distress; whereas histopathological findings include cerebral edema with facial swelling of the myelin sheath (Chapman and Robson 1965). It is likely that these effects are secondary to the uncoupling of oxidative phosphorylation in neuronal tissue.

No evidence of PCP-induced immunotoxicity was found in the reviewed literature. The available animal data indicate that PCP affects a wide range of immune functions, such as humoral and cellular immunity, susceptibility to tumor induction, and complement activity (ATSDR 1989). Many of the effects may be attributed to technical grade impurities. This is supported by animal studies, which compared effects of technical grade and purified PCP on immune function.

Developmental and Reproductive Effects

Pentachlorophenol has not been shown to be teratogenic in any of the four animal studies designed to assess the toxicological endpoint (Hinkle 1973; Larsen et al. 1975; Schwetz et al. 1974; Welch et al. 1987).

Embryotoxicity and fetotoxicity have been elicited by both purified and commercial PCP, with the effects probably secondary to maternal toxicity. Fetotoxic effects noted in rat studies include increases in

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resorptions, alterations in the sex ratio, and a number of skeletal anomalies regarded by the investigators as indicative of embryotoxicity and fetotoxicity rather than teratogenicity (ATSDR 1989). Since purified PCP elicited more severe effects than technical grade PCP, it appears that the animal responses are attributable to PCP itself (Schwetz et al. 1974; Welch et al. 1987). EPA has identified a NOVEL of 3 mg/kg/day (USEPA 1987a) from a two-year oral study. The Agency has developed an oral reference dose of 0.03 mg/kg/day by applying a 100-fold safety factor to this NOAEL.

Carcinogenicity and Mutagenicity

Up until 1988 pure pentachlorophenol has not been reported to be carcinogenic in a number of animal studies (USEPA 1989). There is no convincing epidemiological data indicating PCP induces cancer in humans (ATSDR 1989; USEPA 1990a,b). Case reports suggest a possible association between three cancer types--Hodgkin's disease, soft tissue sarcoma, and acute leukemia--and occupational exposure to technical grade PCP (Fingerhut et al. 1984; Greene et al. 1978; Roberts 1983). However, case reports are generally regarded as extremely weak evidentiary sources, given the likely existence of many other risk factors including concurrent exposure to other toxic substances, which cannot be adequately controlled in the study design.

The National Toxicology Program (NTP) has recently completed a carcinogenicity bioassay on both technical and commercial grades of PCP in mice (NTP 1989). The report showed dose-related increases in three tumor types and carcinomas and adenomas of the liver and adrenal tumors in $B_6C_3F_1$ male and female mice with both grades of the compound. The USEPA has reclassified PCP into Group B_2 (sufficient evidence in animals) based on the findings of multiple tumor types at different dose levels in both sexes of mice (EPA 1990b).

The available genotoxicity data indicate that PCP has some genotoxic potential; however, the evidence cannot be characterized as conclusive (ATSDR 1989). PCP was not shown to be mutagenic in either bacteria or Drosophila, but has been shown to be mutagenic in yeast. PCP was also shown to be weakly mutagenic in vivo (Fahrig et al. 1978). A small increase in chromosome aberration frequency was reported in one study (Bauchinger et al. 1982), but not in another study of occupa-

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tionally exposed workers (Wyllie *et al*. 1975). PCP exposure produced a weakly positive response in human lymphocytes in an *in vitro* assay.

Standards and Criteria

Standards and criteria are presented in Table 1.

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Table 1

STANDARDS AND CRITERIA FOR PENTACHLOROPHENOL

Standard or Criteria	Value	Reference
Reference Dose (Oral) Chronic/ Subchronic	0.03 mg/kg-day	EPA 1990a,b
Reference Dose (Inhalation) Chronic/Subchronic	--	EPA 1990a,b
Cancer Slope Factor (Oral)	0.12 $(mg/kg/day)^{-1}$	EPA 1990b
Drinking Water		
Safe Drinking Water Act MCLG (Proposed)	0.2 mg/L	EPA 1989
MCL (Proposed)	0.2 mg/L	EPA 1989
Surface Water		
U.S. EPA Ambient Water Quality Criteria		
Human Health		
Ingesting Water and Aquatic Organisms	1.01 mg/L	EPA 1990a
Adjusted for Drinking Water Only	1.01 mg/L	EPA 1990a
Organoleptic Effects (Taste)	30 µg/L	EPA 1990a
Aquatic Life		
Freshwater		
Acute	22 µg/L (1-hour average)	
Chronic	13 µg/L (4-day average)	
Marine		
Acute	13 µg/L (1-hour average)	
Chronic	79 µg/L (4-day average)	
Occupational Air Concentrations		
OSHA PEL TWA	0.5 mg/m^3	OSHA 1989
ACGIH TWA - Skin	0.5 mg/m^3	ACGIH 1990

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Vertical distribution of 2,3,7,8-TCDD through the uppermost soil layers and horizontal distribution beyond the boundaries of the initial contamination have also been documented for soils in the vicinity of the Seveso, Italy, industrial accident. Increased vertical movement in soil may occur as a result of saturation of sorption sites, migration with organic solvents, and human activities. Soil concentrations of 2,3,7,8-TCDD have been reported to drop sharply in the top 8 cm of soil and remain relatively constant from 8-cm to 24-cm depth (DiDomenico et al. 1980; 1982). Concentrations measured at depths below 8 cm were approximately one order of magnitude less than the levels down to 8 cm, and the highest levels were generally found at depths from 0.5 cm to 1.5 cm. Other authors (Belli et al. 1982) report penetration to 20 cm in soils near Seveso.

Due to its low vapor pressure, extensive volatilization of 2,3,7,8-TCDD is not expected. However, several authors (Podoll et al. 1986; Freeman and Schroy 1986; Palausky et al. 1986) have demonstrated the volatility of TCDD from soil in both laboratory and field experiments. Although volatilization losses are expected to be slow, they will be environmentally significant in the absence of other transport/transformation processes. Freeman and Schroy (1984) predicted that 90% of the TCDD at Times Beach had been lost through volatilization over the course of 10 years (with subsequent photolysis); 57% loss was estimated to have occurred in the first summer.

The depth of the initial disposal will also affect the apparent half-life of the compound in soil, since volatilization is largely a surface phenomenon. Podoll et al. (1986) reported rapid volatilization of 2,3,7,8-TCDD at the soil/air interface, with a significant amount of tightly sorbed residue. In the same study, very low TCDD volatilization was reported when the contamination was buried to a depth of a few millimeters in dry soil.

The low vapor pressure indicates that volatilization from soils would occur at extremely low rates. Finally, low rates of physical or biological degradation indicate that PCDDs and PCDFs would be highly persistent in soils and groundwater.

The low water solubilities, high K_{oc}s, and moderate Henry's law constant indicate that both partitioning from surface water to air and

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sediments and sorption to sediments are important fate processes. Due to low rates of biodegradation and high K_{oc}s, PCDDs and PCDFs should be highly persistent in sediments.

BACKGROUND CONCENTRATIONS OF PCDDs AND PCDFs IN ENVIRONMENTAL MEDIA

Consistent with the reduction in the analytical quantification limits, PCDDs and PCDFs have been increasingly detected in many environmental media. Identified sources include municipal solid waste (MSW) incinerators, hazardous waste incinerators, copper smelters, steel mills, pulp and paper mills, and automobile exhaust. The purpose of this section is to identify and discuss sources and concentrations of ambient environmental PCDDs and PCDFs. Background concentrations are presented where identified (background is defined as concentrations in environmental media where no point sources could be identified).

Automobile Exhaust

Marklund et al. (1987) reported the results of a study designed to measure PCDDs and PCDFs in car exhausts. The test cars were divided into two groups:

- Cars equipped with a catalytic converter using unleaded gasoline and no halogenated scavengers; and
- Cars with no catalytic converter using leaded gasoline (0.15 g/L) and a dichloroethane scavenger (0.1 g/L).

Before the test runs, the motor oil was changed in all of the cars. No PCDDs or PCDFs were identified in cars using unleaded gasoline, whereas the emission average from cars using leaded gasoline ranged from 50 to 860 pg/mile (30 to 540 x 10^{-12} g/km) of TCDD equivalents. The authors estimated that the total amount of PCDDs and PCDFs from cars in Sweden using leaded gasoline with halogenated scavengers ranged from 10 to 100 g TCDD equivalents per year (Marklund et al. 1987).

USEPA (as cited by Environment Canada 1985) reported in one set of samples of automobile exhaust that the emission rate of total dioxins was 380 pg/mile (640 x 10^{-12} g/km), and the emission rate of TCDD was 14.4 pg/mile (24 x 10^{-12} g/km) for cars equipped with catalytic converters using unleaded gasoline. For cars using leaded gasoline,

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USEPA reported a total dioxin concentration and a TCDD concentration of 1,340 pg/mile (2,240 x 10^{-12} g/km,) and 77 pg/km (128 x 10^{-12} g/km), respectively.

Soil and Sediments

A large number of analyses have been performed on soil and sediment samples, particularly in areas of known contamination (e.g., Seveso, Italy; Times Beach, Missouri; Love Canal; etc.). In a few of these studies, background (off-site) levels, of PCDDs and/or PCDFs were reported. In most of these studies, non-validated and non-isomer-specific analytical methods were used. These studies typically indicate background levels in the low ng/kg range without reporting isomer-specific concentrations (Rappe et al. 1987). Nestrick et al. (1986) reported results of a large-scale environmental survey for chlorinated dioxins. Concentrations identified in soil from urban environments are summarized in Table 4.

Air Concentrations

Due to sampling and analytical problems, very few data are available on typical levels in urban air. Crummett et al. (1985) and Czuczwa and Hites (1986) have reported air particulate concentrations from Washington, D.C., and St. Louis, Missouri, respectively. In both studies, PCDD was found to be a major constituent, with concentrations ranging from 150 to 200 ppb. Only one of the two studies reported isomer-specific results (Crummett et al. 1985), with 2,3,7,8-TCDD ranging from 5 to 50 ppt (45-450 ng/m^3) and 2,3,7,8-TCDF from 100 to 380 ppt (900-3,420 ng/m^3).

Oehme et al. (1986) detected a large number of PCDD and PCDF isomers in urban air. The highest levels ranged from 5 to 10 pg/m^3; concentrations in suburban areas were lower by a factor of 5 to 10 (Oehme et al. 1986). Air samples containing the higher concentrations were collected near municipal incinerators (near Akron and Columbus). Concentrations in these samples were approximately twice those found at the background sites.

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Aquatic Organisms

Fish and other aquatic animals from the Great Lakes have been analyzed, with data indicating background levels (1 to 300 ppt) of a series of PCDD and PCDF isomers. With a detection limit of 2 ng/kg, Stalling et al. (1983) reported no detectable concentrations of PCDDs but did detect PCDFs (15 to 40 ng/kg in Lake Superior fish samples, and 2,3,7,8-TCDD and 2,3,7,8-TCDF in all fish samples collected from Lake Huron, Lake Ontario, and the Tittabawasee River. Total levels of PCDFs ranged from 12 to 290 ng/kg (Stalling et al. 1983). The residue pattern suggested a strong influence from point source discharges (not identified) (Stalling et al. 1981).

The Baltic Sea is considered a system of interest because no known PCDD or PCDF point sources have been identified. Table 5 summarizes the findings by Rappe et al. (1987) of PCDDs and PCDFs in fish samples from the Baltic Sea. Of note are the ranges for tetra-, penta-, and hexachlorinated PCDD and PCDF isomers detected in salmon.

USEPA INTERIM PROCEDURES FOR ESTIMATING TOXICITY EQUIVALENT FACTORS OF PCDD AND PCDF MIXTURES

There is neither a validated bioassay for evaluating the toxicity of complex mixtures of PCDDs and PCDFs nor complete sets of toxicological data for each constituent PCDD or PCDF congener (USEPA 1989a). Consequently, as an interim science policy measure, USEPA has developed a procedure for estimating the toxic risks of these mixtures using the distributions and concentrations of individual isomers and/or of isomers with the same number of chlorine substituents, as well as the estimated relative toxicity of these compounds. These procedures generate 2,3,7,8-TCDD toxicity equivalence factors (TEFs) of complex mixtures based on isomer-specific data. Table 6 presents the USEPA-recommended TEFs. 2,3,7,8-TCDD equivalents are defined as the concentration of 2,3,7,8-TCDD which by itself would be believed to exhibit the same biological potency as the mixture of structurally related compounds, PCDDs/PCDFs, actually present in a sample. The structurally related PCDDs and PCDFs which could be observed include the tetra- through octachlorinated homologs and 2,3,7,8-substituted isomers.

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Toxicokinetics

Absorption of 50 to 80% of 2,3,7,8-TCDD administered in a lipophilic vehicle by gavage has been reported in rats, guinea pigs, and hamsters (USEPA 1985). Fifty to 60% absorption of the chemical administered in the diet has been reported (Fries and Marrow 1975). The vehicle in which 2,3,7,8-TCDD is administered strongly influences gastrointestinal absorption. Poiger and Schlatter (1980) reported that the percentage of 2,3,7,8-TCDD was reduced when administered orally in a soil suspension versus a 50% solution of ethanol; whereas, no absorption occurred when the compound was administered in a suspension of activated carbon. As indicated by biological effects and the amount of 2,3,7,8-TCDD in the liver, McConnell et al. (1984) and Lucier et al. (1986) reported that absorption was approximately 50% less from soil than corn oil. Other factors which strongly influence absorption from contaminated soil include soil type and duration of contact.

As with oral absorption, the vehicle strongly influences absorption of 2,3,7,8-TCDD through the skin. Poiger and Schlatter (1980) estimated that 40% of the applied dose was absorbed when the compound was applied in ethanol; 1.4% was absorbed when applied in Vaseline; and 9.3% was absorbed when applied in polyethylene glycol. Smaller amounts were absorbed when applied in a paste in soil (less than 2%) or in activated charcoal (nondetectable).

Following oral administration in a human volunteer, Poiger and Schlatter (1986) estimated that approximately 90% of the body burden was sequestered in the fat. In this study, which lasted 135 days, elevated radioactively labeled TCDD remained in the blood only during the initial two days following treatment. These data are consistent with the high bioconcentration potential calculated by Geyer et al. (1986) for TCDD in humans.

USEPA (1985) reviewed the literature concerning the distribution following oral administration of 2,3,7,8-TCDD in rats, mice, and guinea pigs. In rats and mice, the liver had the highest amount of 2,3,7,8-TCDD, followed by the feet. In guinea pigs this was reversed. 2,3,7,8-TCDD has been shown to cross the placenta and accumulate in the fetus following gavage administration in mice (Weber and Birnbaum 1985). These authors reported that approximately 0.5% of the dose was detected

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in the fetus. Similar findings were reported by Krowke (1986) following subcutaneous injections in mice. Nau et al. (1986) reported postnatal exposure to the young occurred via milk after a single administration prenatally to pregnant mice.

2,3,7,8-TCDD metabolism is slow; however, subsequent to formation metabolites are rapidly excreted through the urine and bile as glucoronide and sulfate conjugates (Olson 1986; Olson and Wroblewski 1985). Various animal studies indicate that differential rates of metabolism and quantitative and qualitative differences in metabolites formed may account for the large difference in species- and strain-specific toxicity (ATSDR 1988).

2,3,7,8-TCDD and its metabolites are eliminated predominantly in the feces and the urine in an apparent first-order process (ATSDR 1988). According to USEPA (1985), between 91 and 99% of the excreted 2,3,7,8-TCDD radioactivity was found in the feces in rats and guinea pigs; 54 and 72% was detected in the feces in mice; and 59% was observed in the feces of hamsters. Elimination half lives were 22 to 30 days for guinea pigs, 17 to 31 days for rats, 11 to 24 days for mice (11 days in response mice and 24 days in nonresponsive mice).

Lethality and Decreased Longevity

No reported deaths in humans were identified in the available literature following acute exposure to 2,3,7,8-TCDD (ATSDR 1988). Extensive acute lethality studies indicate that the chemical is toxic at very low levels in all animal species tested. Species difference in lethality range over four orders of magnitude in dose level. For example, median lethal doses (LD50s) after gavage administration in lipophilic solvents were 0.6 to 2.1 µg/kg in Hartley guinea pigs (Schwetz et al. 1973); 20 to 60 µg/kg in rats; 100 to 600 µg/kg in mice; and 1,000 to 5,000 µg/kg in hamsters (USEPA 1985, McConnell et al. 1984). Other factors which influence lethality are strain differences and bioavailability of the compound vis-á-vis vehicle lipophilicity. Subchronic LD50 values for cumulative exposure during a 90-day oral study in guinea pigs were similar to those for acute exposure.

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Systemic Toxicity

Four major toxic effects characteristic of 2,3,7,8-TCDD exposure in animal and/or men are chloracne, the wasting syndrome, hepatoxicity, and immunotoxicity.

Chloracne is the only lesion definitively identified in humans exposed to 2,3,7,8-TCDD. Human data are insufficient to evaluate the dose-response relationship in humans directly. Unfortunately, chloracne can only be detected in a few species, and experimental studies have been limited and were not designed to evaluate dose-response relationships. A single dose of 70 µg/kg or a dose of approximately 0.01 µg/kg/day in a 7-month feeding study in monkeys produced chloracne (McConnell et al. 1978; Allen et al. 1977).

The wasting syndrome, which has been observed in animal studies only, is characterized by extreme loss of body weight. This syndrome is observed in both acute and longer-term studies and is most commonly associated with lethal doses. Whether the severe body weight loss is the direct cause of death or can be segregated from lethality is unknown at this time.

2,3,7,8-TCDD is hepatotoxic in all species tested, with the severity of the lesions being highly species-dependent. For example, the guinea pig is the most sensitive species tested for lethality. Liver changes have been reported at low doses (Turner and Collins 1983). In the study, a single dose of 0.1 µg/kg/day could be identified as a lowest-observed-adverse-effect level. Kociba (1978a,b) and NTP (1982a) reported in chronic studies of rats "toxic hepatitis" and degenerative liver changes at lowest dietary doses of 1 ng/kg/day in 2-year feeding studies.

Immunotoxicity, based upon numerous animal studies, is one of the most sensitive toxicological endpoints for 2,3,7,8-TCDD. Immunotoxicity data in humans are extremely limited. The guinea pig is the most sensitive species. Vos et al. (1973) observed decreased thymus weight, total lymphocyte number and total leukocyte number in groups of 10 guinea pigs receiving 2,3,7,8-TCDD weekly at doses of 0, 0.008, 0.04, or 0.2 µg/kg. From this study, a LOAEL of 0.04 µg/kg and a NOAEL of 0.008 µg/kg were identified.

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Reproductive and Developmental Effects

There have been no reports of reproductive or developmental toxicity in humans.

The fetus, in all animal species tested, is highly sensitive to the toxic effects of 2,3,7,8-TCDD. In rats, evidence of fetotoxicity included hemorrhage, edema, and kidney abnormalities. In mice, cleft palate and hydronephrotic kidneys were reported. Sparschu et al. (1971 a,b) reported a frank effect level (FEL) and NOAEL of 0.125 and 0.03 µg/kg/day, respectively, in pregnant rats receiving 2,3,7,8-TCDD on days 6 through 15 of gestation. Mice appear less sensitive than rats with a FEL and LOAEL of approximately 1 and 0.3 µg/kg/day, respectively (Neubert and Dillman 1972). USEPA (1985) has reported a LOAEL of 0.001 µg/kg/day based on a three-generation reproductive toxicity study in groups of rats receiving 2,3,7,8-TCDD in the diet at doses of 0.001, 0.01, and 0.1 µg/kg/day (Murray et al. 1979). Murray et al. (1979) concluded that, based on reduced litter size and fetal and neonatal survival, 0.01 µg/kg/day was a LOAEL. They also concluded that 0.001 µg/kg/day was a NOAEL. However, Nisbet and Paxton (1982) statistically reevaluated the data and concluded that the lowest dose of 0.001 µg/kg produced dilated renal pelvises, decreased fetal weight, and changes in gestational index. USEPA (1985), using this analysis, concluded that 0.001 µg/kg was a LOAEL, representing the lowest dose in animals resulting in important adverse fetal effects.

In a study of monkeys receiving 2,3,7,8-TCDD in the diet for seven months, spontaneous abortions occurred in two-thirds of monkeys receiving doses of 0.0015 and 0.01 µg/kg/day (Allen et al. 1979). No data were available in the study to establish a NOAEL.

Carcinogenicity and Mutagenicity

2,3,7,8-TCDD has been shown to be a carcinogen in rats and mice in an NTP (1982) bioassay and in rats in a 2-year bioassay by Kociba et al. (1978a,b). Based upon a histologic reevaluation of the tumor incidences in the study by Kociba et al. (1978a,b), USEPA estimated a carcinogenic slope factor (SF) of 1.56×10^5 $(mg/kg/day)^{-1}$ (USEPA 1985).

USEPA has reviewed TCDD-related epidemiological studies and judged them to be insufficient on methodological and statistical grounds, for

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directly evaluating carcinogenicity of the chemical in humans. Based upon the positive bioassay data, USEPA has categorized the chemical in group B2 (sufficient data in animals, insufficient data in humans), as a "probable human carcinogen" (USEPA 1985).

There have been no reports of genotoxicity in humans exposed to 2,3,7,8-TCDD. The chemical has produced mostly negative responses in genotoxicity tests; however, there are some positive responses. ATSDR (1988) concludes that the inconsistent findings may be related to difficulties in testing a highly toxic compound with extremely low solubility, rather than non-genotoxicity, per se.

STANDARDS AND CRITERIA

Standards and criteria applicable to PCDDs and PCDFs are summarized in Tables 7 through 9.

Acceptable daily intakes of TCDD have been proposed by various regulatory and advisory boards. These are presented in Table 10. The broad range of values derived reflects a lack of consensus concerning the genotoxic carcinogens and the most appropriate method for quantitatively estimating the risk for such chemicals at fairly low doses.

The concentration of 2,3,7,8-TCDD in fish muscle (fresh weight) considered acceptable for human consumption is set by New York State at 10 ppt, by the USFDA at 25 ppt, and the Canadian government at 20 ppt. Food items containing more than 50 ppt are considered unsafe for human consumption, but fish fillets containing between 25 and 50 ppt of 2,3,7,8-TCDD may be eaten once weekly by occasional consumers of fish and twice monthly for those who eat fish year round (Stolzenburg and Sullivan 1983).

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Table 1

NUMBER OF PCDD AND PCDF ISOMERS
ACCORDING TO TOTAL CHLORINE SUBSTITUENTS

	Chlorine Substituents								
	1	2	3	4	5	6	7	8	Total
PCDDs	2	10	14	22	14	10	2	1	75
PCDFs	4	16	28	38	28	16	4	1	135

[AD]TOXIC/PROFILES/4065/27

Source: USEPA 1985.

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Table 2

ABBREVIATIONS USED FOR INDIVIDUAL PCDD AND PCDF ISOMERS*

	PCDD Isomer	PCDF Isomer
Tetrachloro	TCDD	TCDF
Pentachloro	PeCDD	PeCDF
Hexachloro	HxCDD	HxCDF
Heptachloro	HpCDD	HpCDF
Octachloro	OCDD	OCDF

[AD]TOXIC/PROFILES/4067/36

*When describing individual isomers, the chlorine substitution pattern will precede the isomer designation. For example, 2,3,7,8-tetrachloro-dibenzodioxin is abbreviated as 2,3,7,8-TCDD.

Source: Ecology and Environment, Inc. 1990.

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Table 3

PHYSICO-CHEMICAL DATA FOR TCDD

Parameter	Value	Source
Water Solubility	0.019 $\mu g/l$ at 20°C	Murphy, et al. (1986)
Vapor Pressure	1.4×10^{-9} mm Hg at 25°C	Palausky, et al. (1986)
Saturation Concentration in Air at 20°C	30 $\mu g/m^3$	IRP (1989)
Henry's Law Constant	1.6×10^{-5} atm-m^3/mol at 25°C	Podoll, et al. (1986)
K_{oc}*	2.3×10^6	Karickhoff, et al. (1979)
log K_{ow}**	6.15 to 7.28	Kenaga (1986); Marple, et al. (1986); Burkhard, et al. (1986)
BCF***	10,000	EPA (1988a)

[AD]TOXIC/PROFILES/4066/19

*Soil organic carbon-water partition coefficient.
**Logarithm of octanol-water partition coefficient.
***Aquatic bioconcentration factor.

Source: Ecology and Environment, Inc. 1990.

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Table 4

LEVELS OF 2,3,7,8-TCDD IN SOIL FROM DIFFERENT URBAN LOCATIONS

Location	TCDD Concentration (μg/kg)
Lansing, MI	ND(0.0007) - 0.003
Gaylord, MS	ND(0.0002)
Detroit, MI	0.0021 - 0.0036
Chicago, IL	0.0042 - 0.0094
Akron, OH	0.0063
Nashville, TN	0.0008
Pittsburgh, PA	0.0026
Philadelphia, PA	0.0009
Brooklyn, NY	0.0026
Arlington, VA	ND(0.0003)

02[AD]TOXIC/PROFILES/4062/37

ND = Not detected.

Values within parentheses are detection limits.

Source: Adapted from Nestrick et al. 1986.

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Table 5

LEVELS OF PCDDs AND PCDFs IN FISH SAMPLES FROM THE BALTIC SEA
(ng/kg)

PCDD/PCDF	Salmon Ume River 1985	Salmon Ume River 1985	Herring Karlskrona 1983	Herring Lulea 1983
2,3,7,8-TCDF	29	12	5.5	3.0
2,3,7,8-TCDD	1.9	1.3	<0.3	<0.6
1,2,3,7,8-/1,2,3,4,8 PeCDF	6.9	3.3	1.4	0.9
2,3,4,7,8-PeCDF	49.0	23.0	6.8	8.8
1,2,3,7,8-PeCDD	8.8	4.3	1.1	4.7
1,2,3,4,7,8-/1,2,3,4,7,9-HxCDF	1.1	0.7	0.4	0.3
1,2,3,6,7,8-HxCDF	1.3	0.8	0.4	0.3
1,2,3,7,8,9-HxCDF	ND	ND	0.4	0.2
2,3,4,6,7,8-HxCDF	1.1	0.6	0.4	0.2
1,2,3,4,7,8-HxCDD	ND	0.4	0.2	ND
1,2,3,6,7,8-HxCDD	4.6	2.3	1.3	8.1
1,2,3,7,8,9-HxCDD	ND	ND	ND	ND
Total HpCDFs	ND	2.7	0.8	ND
Total HpCDDs	ND	ND	ND	ND
OCDF	ND	1.0	ND	ND
OCDD	ND	ND	ND	ND

02[AD]TOXIC/PROFILES/4063/20

ND = <0.1 ng/kg (<0.1 x 10^{-13} g/g).

Source: Rappe *et al*. 1987.

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Table 6

TOXICITY EQUIVALENCE FACTORS
(TEFs)
FOR PCDDs AND PCDFs

Compound	TEF
PCDDs	
Mono- through tri-CCDs	0
2,3,7,8-TCDD	1
Other TCDDs	0.01
2,3,7,8-PeCDDs	0.5
Other PeCDDs	0.005
2,3,7,8-HxCDDs	0.04
Other HxCDDs	0.0004
2,3,7,8-HpCDDs	0.001
Other HpCDDs	0.00001
OCDD	0
PCDFs	
Mono- through tri-PCDFs	0
2,3,7,8-TCDFs	0.1
SOther TCDFs	0.001
2,3,7,8-PeCDFs	0.1
Other PeCDFs	0.001
2,3,7,8-HxCDFs	0.01
Other HxCDFs	0.0001
2,3,7,8-HpCDFs	0.001
Other HpCDFs	0.000001
OCDF	0

[AD]TOXIC/PROFILES/4068/42

Source: USEPA 1989a.

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Table 7

STANDARDS AND CRITERIA RELEVANT TO PCDDs AND PCDFs

Standard or Criteria	Value	Reference
Carcinogenic Potency Factors (CPFs)		
2,3,7,8-TCDD	1.6×10^{5} $(mg/kg/day)^{-1}$	USEPA 1990a
Two HexCDD isomers	6.2×10^{3} $(mg/kg/day)^{-1}$	USEPA 1990a
Safe Drinking Water Act (MCLs or MCLGs)	5.0×10^{-6} mg/L[P]	USEPA 1990d
Drinking Water Health Advisories		USEPA 1987b
One Day	0.001 µg/L	
Ten Days	0.0001 µg/L	
Longer Term Child (10 Kg)	0.00001 µg/L	
Adult (70 Kg)	0.000035 µg/L	
Lifetime 10^{-6} Cancer Risk Concentration	2.2×10^{-7} µg/L	
Soil Contamination "Action Levels"		
Residential Area Soil Concentration Above Which Remedial Measures Should Be Considered	1 µg/kg	Centers for Disease Control (CDC) in Kimbrough, et al. 1984

02[AD]TOXIC/PROFILES/4215/24

[P] = proposed

Source: Ecology and Environment (1990).

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Table 8

SURFACE WATER AND FISH ADVISORIES
(2,3,7,8-TCDD EQUIVALENTS)

	Fish Concentration Guideline (10^{-12} ng/kg)	Guideline Water Concentration (10^{-12} g/L)
USEPA AWQC for fish consumption*	--	1.4×10^{-2}
USEPA AWQC for water and fish ingestion*	--	1.3×10^{-2}
New York State Fish Advisory**	10	--
Ontario Fish Advisory**	20	--
Canadian Fish Advisory**	20	--
FDA Fish Advisory**	25	--
Great Lakes Water Quality Agreement**	--	1

[AD]TOXIC/PROFILES/4070/27

*USEPA 1984.
**USEPA and USDOJ 1985.

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Table 9

REGULATORY GUIDELINES FOR TCDF

Guideline	Dose (mg/kg/day)
CDC Guideline*	6.4×10^{-10}
New York State DOH**	2×10^{-9}
Canadian National Research Council Guideline***	1×10^{-8}

[AD]TOXIC/PROFILES/4069/38

*Kimbrough, et al. 1984.
**Kim, et al. 1982.
***USEPA 1985 and USDOJ 1985.

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Table 10

ACCEPTABLE DAILY INTAKES FOR TCDD
PROPOSED OR ADOPTED BY VARIOUS REGULATORY AGENCIES[a]

Agency	Dose-Response Extrapolation Method	Allowable Intake fg/Kg·d	Allowable Intake pg/d
USEPA[b]	Linearized multistage	6.4	0.5
USEPA[c]	Weight of evidence	100	7
CDC[d]	Linearized multistage	28 - 1,428	2 - 100
OME[e]	Safety Factor (100)	10,000	700
SINH[f]	Safety Factor (250)	4,000	280
FEA[g]	Safety Factor (100 - 1,000)	1,000 - 10,000	70 - 700
FDA[h]	Safety Factor (77)	13,000	910
FDA[i]	Linearized multistage	57	4
NYSDH[j]	Safety Factor (500)	2,000	140

02[AD]TOXIC/PROFILES/4064/24

[a]Modified from Fries and Paustenbach (1986)
[b]U.S. Environmental Protection Agency (1985)
[c]U.S. Environmental Protection Agency (1988a)
[d]Centers for Disease Control (Kimbrough, et al. 1984)
[e]Ontario Ministry of Environment (1985)
[f]State Institute of National Health, Netherlands (1982)
[g]Federal Environmental Agency, West Germany (1984)
[h]U.S. Food and Drug Administration (Cordle 1981)
[i]U.S. Food and Drug Administration (USFDA 1983)
[j]New York State Department of Health (NYSDH 1983)

Source: Modified from Fries and Paustenbach (1990).

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